The 2025 NorthEast Pacific Deep-sea Exploration Project (NEPDEP) Expedition Report (PAC2025-M14)

Heidi Gartner, Daniel M. Labbé, and Marilyn Brière-Deschênes

Fisheries and Oceans Canada
Science Branch, Pacific Region
Institute of Ocean Sciences
Sidney, British Columbia
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THE 2025 NORTHEAST PACIFIC DEEP-SEA EXPLORATION PROJECT (NEPDEP) EXPEDITION REPORT (PAC2025-M14)

By

H. Gartner[1], D.M. Labbé[1], and M. Brière-Deschênes[2]

[1]Fisheries and Oceans Canada
Science Branch, Pacific Region
Institute of Ocean Sciences
9860 West Saanich Road
Sidney, BC, V8L 4B2

[2]Council of the Haida Nation
Marine Planning Program
#1 Reservoir Road
Skidegate, Haida Gwaii, BC, V0T 1S0

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The 2025 NorthEast Pacific Deep-sea Exploration Project expedition (PAC2025-M14) occurred from September 4 – 18th, 2025, aboard the *Motor Vessel (M/V) CanPac Valour*. This expedition mapped and surveyed deep-sea features within the Canadian Pacific Exclusive Economic Zone (EEZ), including Ts'íidaa Seamount within the Tuzo Wilson Seamount Complex, regions off the west coast of Haida Gwaii, and Endeavour Seamount. High-resolution bathymetric mapping of Ts'íidaa Seamount and Zone 504 was completed using a Kongsberg EM®304 MKII multibeam echosounder, which mapped a total of 2307 km of seafloor bathymetry throughout the expedition. Using this echosounder, a previously unknown gas plume and associated cold seep field was discovered along the border of zone 504 of the proposed Offshore Haida Gwaii Marine Protected Area. Seven scientific dives were conducted using CanPac's ROV *Mantis*: four on Ts'íidaa Seamount, one in Tasu Sound, one on the newly discovered cold seep near Zone 504, and one on Endeavour Seamount. These dives re-visited 4 long-term monitoring sites on Ts'íidaa Seamount, established a new long-term monitoring site on Endeavour Seamount, continued to explore and document previously unexplored benthic regions, and collected 80 samples which supported multiple on-going and collaborative research projects. We also discovered a Pacific White Skate and Boreal Skate egg nursery on Endeavour Seamount, the second skate nursery within Canada's Oceans (the first being on Ts'íidaa Seamount). We deployed two oceanographic moorings to document annual changes in water properties. We recorded 11 sea-surface observations of marine mammals and large fish species. Finally, we shared these discoveries with global audiences through live dive streams, communicated our activities as newsletters to stakeholders, and presented at 4 sea-2-shore events during the expedition. This highly collaborative expedition successfully achieved its major scientific objectives.

Résumé

Gartner, H., Labbé, D.M., and Brière-Deschênes, M. 2026. The 2025 NorthEast Pacific Deep-sea Exploration Project (NEPDEP) Expedition Report (PAC2025-M14). Can. Tech. Rep. Fish. Aquat. Sci. 3770: viii + 67 p. https://doi.org/10.60825/a7qp-hh04

L'expédition 2025 NorthEast Pacific Deep-sea Exploration Project (NEPDEP; PAC2025-M14) s'est déroulée du 4 au 18 septembre 2025, à bord du *navire à moteur CanPac Valour*. Cette expédition a permis de cartographier et d'étudier des structures des grands fonds marins situées dans la zone économique exclusive (ZEE) du Canada dans le Pacifique, notamment le mont sous-marin Ts'íidaa, au sein du complexe des monts sous-marins Tuzo Wilson; ainsi que des secteurs au large de la côte ouest de Haida Gwaii, et le mont sous-marin Endeavour. La cartographie bathymétrique à haute résolution du mont sous-marin Ts'íidaa et de la zone 504 a été réalisée à l'aide d'un échosondeur multifaisceaux Kongsberg EM®304 MKII, permettant de cartographier un total de 2 307 km de bathymétrie des fonds marins au cours de l'expédition. Grâce à cet échosondeur, un panache de gaz sous-marin, jusque-là inconnu, et le champ de suintements froids qui y est associé, ont été découverts le long de la limite de la zone 504 de la zone de protection marine extracôtière proposée de Haida Gwaii. Sept plongées scientifiques ont été réalisées à l'aide du ROV *Mantis* de CanPac: quatre sur le mont sous-marin Ts'íidaa, une dans Tasu Sound, une sur la source froide nouvellement découverte près de la zone 504, et une sur le mont sous-marin Endeavour. Ces plongées ont permis de revisiter quatre sites de suivi à long terme sur le mont sous-marin Ts'íidaa, d'établir un nouveau site de suivi à long terme sur le mont sous-marin Endeavour, de poursuivre l'exploration et la documentation de zones benthiques auparavant inexplorées, et de recueillir 80 échantillons appuyant plusieurs projets de recherche en cours et de projets collaboratifs. Nous avons également découvert une nurserie d'œufs de raie blanche du Pacifique et de raie boréale sur le mont sous-marin Endeavour, la deuxième zone de reproduction de raies identifiée dans les océans du Canada (la première ayant été découverte sur le mont sous-marin Ts'íidaa). Deux amarrages océanographiques ont été déployés afin de documenter les variations annuelles des propriétés de l'eau. Nous avons consigné 11 observations de mammifères marins et de grandes espèces de poissons à la surface. Enfin, nous avons partagé ces découvertes avec un public mondial grâce à des diffusions en direct des plongées. En plus, nous avons communiqué nos activités aux parties prenantes par l'entremise de bulletins d'information, et nous avons présenté nos travaux lors de quatre événements "de la mer à la terre" pendant l'expédition. Cette expédition très collaborative a permis d'atteindre avec succès ses principaux objectifs scientifiques.

1. Objectives

The 2025 NorthEast Pacific Deep-sea Exploration Project (NEPDEP) expedition aimed to discover, explore, and monitor deep-sea ecosystems while also communicating and documenting the remarkable life and features hidden far beneath the waves. Owing to the region's uniquely small, active, and nearshore tectonic plates, there is an incredible concentration of seamounts, hydrothermal vents, and cold seeps that are globally rare biodiversity hotspots. We collected scientific data to inform the conservation and monitoring of deep Ecologically and Biologically Significant Areas (EBSAs) of existing, planned, and potential Marine Protected Areas (MPAs). The expedition was planned and co-created by Fisheries and Oceans Canada (DFO), the Council of the Haida Nation (CHN), Nuu-chah-nulth Tribal Council (NTC), and Ocean Networks Canada (ONC). While the main goal is supporting conservation decision-making, the expedition partners recognize the importance of the research in ensuring healthy oceans for all.

The primary tools of the expedition were a Kongsberg EM®304 MKII multibeam echosounder for mapping and a remotely operated vehicle (ROV) Mantis for collecting data and incredible imagery of the deep sea. The expedition goals and primary study sites were (Figure 1):

1. To collect detailed, high-resolution multibeam data at the Tuzo Wilson Seamount Complex (TWSC), the proposed Offshore Haida Gwaii (HG) MPA network zones (MPA Network BC Northern Shelf Initiative 2023), and Union Seamount - with additional multibeam data collected while underway between all sites.
2. To capture imagery, collect samples, and log data using the ROV Mantis at targeted study sites:
    a. TWSC
        i. Expanding and mapping the extent of the skate nursery ground, Bamboo Coral garden, and Precious Coral garden
        ii. Documenting any evidence of heat
        iii. Observing any animal behaviours related to the nursery ground
        iv. Returning to long-term monitoring sites to document ecological change
        v. Collecting skate eggs for an energy density and proximate analysis study
    b. Proposed Offshore HG MPA network zones
        i. Collecting the first deep-sea imagery in the dive area to support management and conservation decisions
    c. NEPDEP 54 Seamount (in Dellwood Seamounts)
        i. Returning to long-term monitoring sites to document ecological change
    d. Union Seamount
        i. Documenting the change in community structure from depths to summit on the seamount as pass through the various oxygen zones of the seamount
    e. Endeavour Seamount
        i. Confirming and mapping the extent of skate nursery ground
        ii. Documenting any evidence of heat
        iii. Observing any animal behaviours related to the nursery ground
    f. Baby Bare Seamount
        i. Documenting the community associated with hydrothermal venting
        ii. Documenting any evidence of heat
3. To deploy moorings on the summits of the Ts'ïidaa Seamount (in the TWSC) and NEPDEP 54 Seamount (in the Dellwood Seamounts) to compare oxygen levels in the water column with ecological changes observed at long-term monitoring sites.

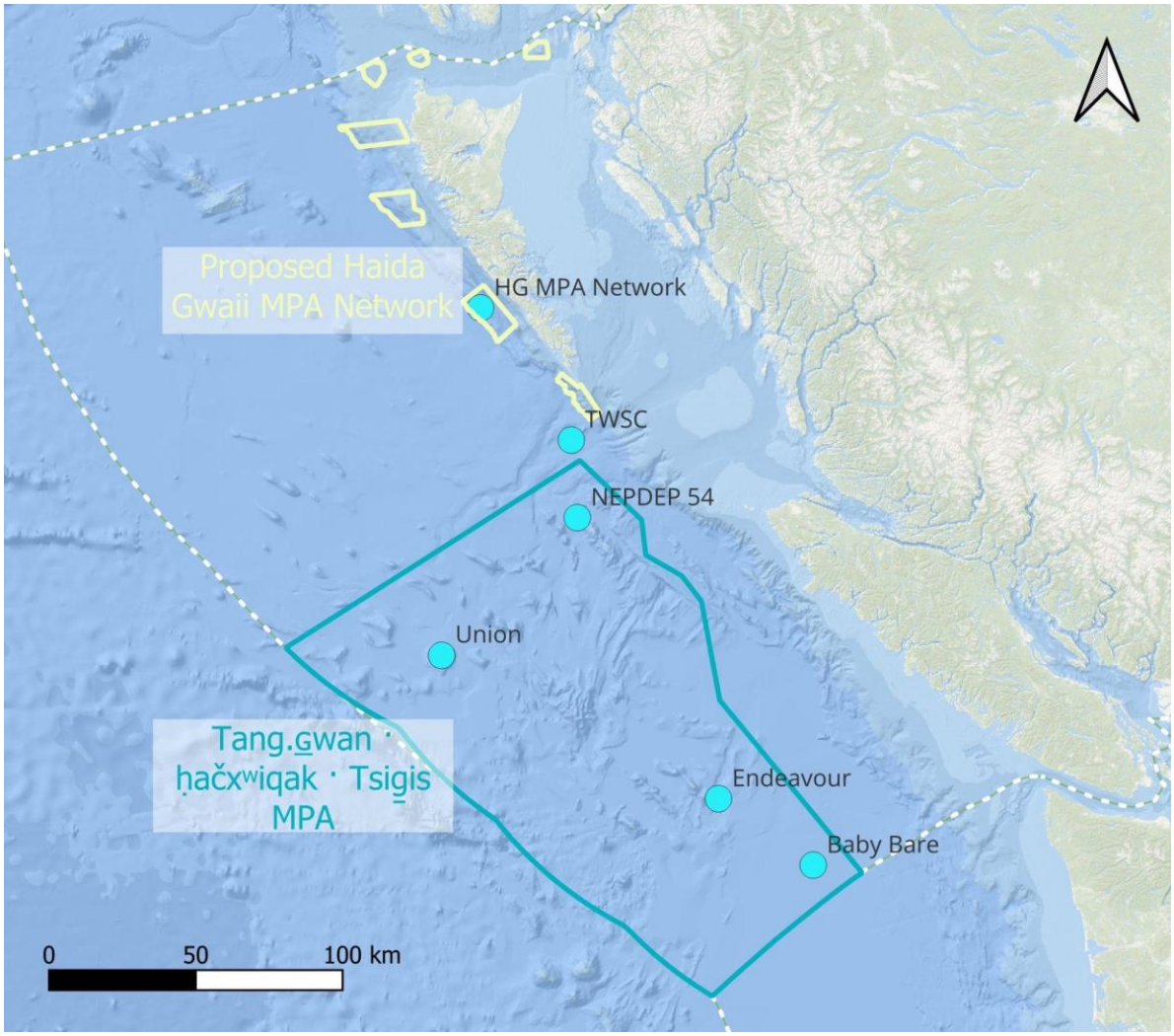

Figure 1. The planned, pre-expedition study sites for scientific activities: HG MPA Network = sites in the proposed Offshore Haida Gwaii Marine Protected Area Zones, TWSC = Tuzo Wilson Seamount Complex (includes two seamounts K̲uug̲a and Ts'íidaa), NEPDEP 54 Seamount (a seamount in the Dellwood Seamounts Chain), Union & Endeavour Seamounts, and the Baby Bare Seamount and Hydrothermal Vents.

IMPORTANT NOTE - Since the time of expedition planning and execution, the placeholder names "NEPDEP 57" and "NEPDEP 58" Seamounts in Tuzo Wilson Seamount Complex have been replaced with the official X̲aayda kil and X̲aad kíl names. "NEPDEP 57" is now **K̲uug̲a**, meaning *rock shelves* in X̲aayda kil. "NEPDEP 58" is **Ts'íidaa,** meaning *skate* in X̲aad kíl[1]. Most of the document has been updated to reflect the naming, however somec planning documents may still refer to these seamounts with the placeholder names of "NEPDEP 57" and "NEPDEP 58".

2. Methods

2.1. Crew and Partners

[1] *X̲aayda kil and X̲aad kíl are dialects of Haida language.The lack of other translations in this document do not mean that a X̲aayda kil or X̲aad kil equivalent does not exist. This document should not be used as a language reference. All inquiries should be directed to the appropriate language authorities.*

The expedition was conducted from, and supported by the crew of the CanPac Valour. The vessel was equipped with a Kongsberg EM®304 MKII multibeam echosounder that was run by Terra Remote Sensing. Our deep-sea dives were conducted using the ROV Mantis by the CanPac Marine Services.

This expedition was co-created by the following NorthEast Pacific Deep-Sea Exploration Project (NEPDEP) partners: Fisheries and Oceans Canada (DFO); Council of the Haida Nation (CHN); Nuu-chah-nulth Tribal Council (NTC); and Ocean Networks Canada (ONC). Additional footage was collected for on-going projects with the British Broadcasting Corporation (BBC). The at-sea crew consisted of 21 members (Table 1 and Figure 2).

Table 1. At-sea crew during the expedition.

Crew	Affiliation	Role
James Barnett	Canpac Marine Services	ROV pilot
Marilyn Brière-Deschênes	CHN	Mapping lead
Peter Bunton	ONC	Video and mooring engineer
Mike Burns	Canpac Marine Services	Bosun
Heidi Gartner	DFO	Science lead
Travis Houston	Terra Remote Sensing	Hydrographic surveyor
Robbie Jadresko	Canpac Marine Services	Deck hand
Zenon Joniec	Canpac Marine Services	Engineer
Taylor Kemp	Canpac Marine Services	Engineer
Daniel Labbé	DFO	Sampling and data coordinator
Heather Lacasse	Canpac Marine Services	ROV pilot
Ben Lott	Canpac Marine Services	Captain
James Materi	Canpac Marine Services	Cook
Tammy Norgard	DFO	Science lead
Justin Poon	Terra Remote Sensing	Hydrographic surveyor
Damian Prlic	Canpac Marine Services	Deck hand
Erin Ranney	BBC	BBC
Julian Smith	DFO	Sampling team and photographer
Scott Spurr	Canpac Marine Services	ROV pilot
Josh Tetarenko	Canpac Marine Services	ROV lead
Eric Vail	Canpac Marine Services	First officer

Figure 2. The at-sea expedition team in front of the remotely operated vehicle Mantis. From left to right: (Bottom row) Julian Smith, Scott Spurr, Marilyn Brière-Deschênes, Josh Tetarenko, Heather Lacasse, Travis Houston, Heidi Gartner; (Middle row) Mike Burns, Daniel Labbé, Justin Poon, Ben Lott, Taylor Kemp, James Barnett, James Materi; (Top row) Peter Bunton, Tammy Norgard, and Erin Ranney. *Image credits: Julian Smith, DFO*

Additional collaborators supporting the science from shore include: Merlin Best (shore-based annotations), Cherisse Du Preez (dive and planning support), Venessa Hodes (transport and equipment support), Shannon Schmunk (transport and equipment support), Ashley Nielsen (transport and equipment support), Alison Wale (outreach), Irine Polyzogopoulos (outreach), Nick Hammar (outreach), Lauren Hudson (outreach).

2.2. Research Vessel

The expedition was conducted aboard the *Motor Vessel (M/V) CanPac Valour* (Figure 3). It is a 50 meters long by 11 meters wide multipurpose offshore supply vessel. The vessel has an open deck of 30 meters by 9 meters, and can carry 500 tons on deck. It was fitted with a 15-metric ton pedestal crane and a LARS crane specially suited for ROV operations. The vessel has 22 berths.

Figure 3. The motor vessel *CanPac Valour* at anchor. Labelled are 1 - The multibeam pole and 2 - the LARS crane as seen on the starboard side mid-ship. *Image credits: Julian Smith, DFO*

2.3. Event Summary

The expedition ran from September 4 - 18th, 2025 and included the loading, unloading, testing equipment, conducting outreach, and science activities. Daily science activities primarily focused on ROV dives during the day and either multibeam mapping and/or transits during the evening and night (Table 2). Not all planned, pre-expedition sites were visited due to travel times and weather conditions (Figure 4).

Table 2. Summary of major events of the 2025 NEPDEP expedition.

Date (YYYY-MM-DD)	Time (UTC)	Location	Activity
2025-09-04	19:30	Port Alberni	Science crew arrival for 2025 NEPDEP Expedition - Seamounts and Mapping. Began loading science equipment.
2025-09-05	07:00	Port Alberni	CanPac Valour departure from Alberni Inlet. Enroute to TWSC. Total trip time estimated at 40 hours.
	All Day	Transit	Science equipment set up.
2025-09-07	01:00	TWSC	Start of multibeam transects in TWSC.
	16:14	TWSC	Pause of multibeam transects of Ts'íidaa Seamount.
	17:36	TWSC	Start dive MANTIS030.

Date (YYYY-MM-DD)	Time (UTC)	Location	Activity
2025-09-08	4:09	TWSC	End dive MANTIS030.
	5:20	TWSC	Resume multibeam transects of Ts'íidaa Seamount.
	13:05	TWSC	Pause of multibeam transects of Ts'íidaa Seamount.
	16:53	TWSC	On route to the dive site following some ROV troubleshooting and fixes.
	18:31	TWSC	Start dive MANTIS031.
2025-09-09	5:43	TWSC	End dive MANTIS031.
	7:37	TWSC	Resume multibeam transects.
	12:40	TWSC	Final end of multibeam. Completed mapping of Ts'íidaa Seamount.
	19:07	TWSC	Mooring preparation.
	21:53	TWSC	Mooring launch.
	22:34	TWSC	Start dive MANTIS032.
2025-09-10	10:35	TWSC	End dive MANTIS032.
	11:17	TWSC	Depart TWSC and en route to Tasu Sound to shelter from incoming swell and bad weather.
	19:00	Zone 504	Route to Tasu Sound adjusted to complete a transect of multibeam mapping in Zone 504.
	19:18	Zone 504	Ship-2-shore event with Royal BC Museum (RBCM).
	20:00	Zone 504	Ship-2-shore event with Haida classroom.
2025-09-11	4:08	Tasu Sound	End of multibeaming. Heading into Tasu Sound to anchor.
	18:00	Tasu Sound	Pulling anchor and transit to mouth of Tasu Sound.
	20:00	Tasu Sound	Ship-2-shore event with the Shaw Centre for the Salish Sea.
	22:36	Tasu Sound	Start dive MANTIS033
2025-09-12	2:00	Tasu Sound	End dive MANTIS033
	20:00	Tasu Sound	Drone flight for outreach footage. Pilot = Justin; Observer = Julian and Erin.
2025-09-13	2:05	Tasu Sound	Departure from Tasu Sound. Transit to Zone 504 for ROV dive.

Date (YYYY-MM-DD)	Time (UTC)	Location	Activity
	14:31	Zone 504	Start dive MANTIS034.
2025-09-14	00:09	Zone 504	End dive MANTIS034
	01:19	Zone 504	Departure of Zone 504. Transit to TWSC for ROV dive.
	15:15	TWSC	Start dive MANTIS035
	17:00	TWSC	Ship-2-shore event with Broad Reach Canada.
	21:13	TWSC	End dive MANTIS035
	22:37	TWSC	Departure of TWSC. On route to NEPDEP 54 in Dellwood Seamounts for mooring deployment.
2025-09-15	03:10	NEPDEP 54	Mooring prep.
	03:25	NEPDEP 54	Mooring launch.
	03:28	NEPDEP 54	Drone flight for outreach of ship at sea and mooring deployment. Pilot: Justin; Observer: Marilyn
	06:00	NEPDEP 54	Departure from NEPDEP 54. On route to Endeavour Seamount with a minor detour to map NEPDEP 7.
	23:52	NEPDEP 7	Slow down for multibeam mapping of NEPDEP 7 while in transit.
2025-09-16	07:01	Endeavour Seamount	Prep and start of dive MANTIS036.
	18:47	Endeavour Seamount	End of dive MANTIS036.
	20:00	Endeavour Seamount	Presentation for the Upwelling Series: Climate Change and Marine Protected Areas Knowledge Sharing Event.
2025-09-17	00:38	Endeavour Seamount	Departure of Endeavour Seamount. On route to IOS for science demobilization.
2025-09-18	07:00	IOS	Arrival and unloading of science equipment and science personnel. End of expedition.

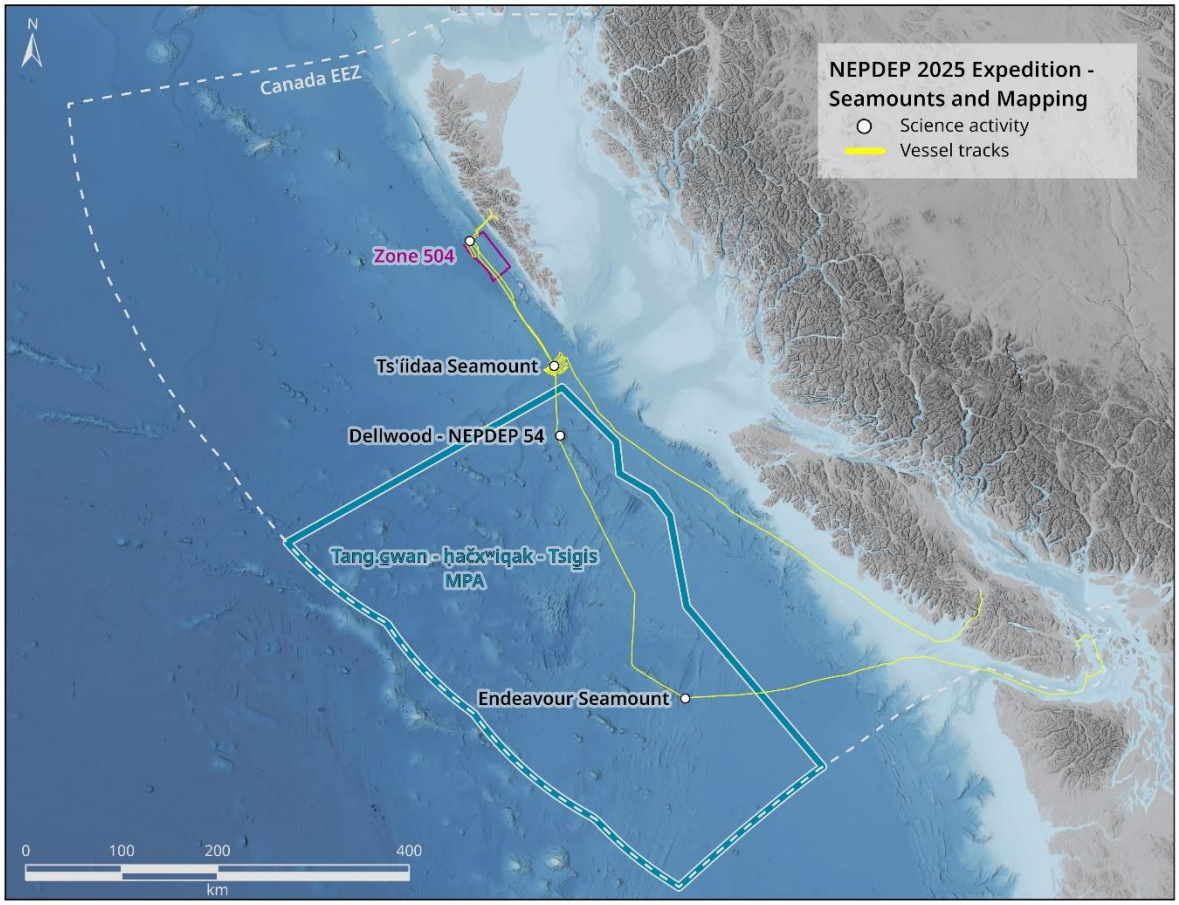

Figure 4. Vessel track during expedition including transit and science activity locations. *Map credit: Marilyn Brière-Deschênes, CHN*

2.4. Mapping

The ship was equipped with a Kongsberg EM®304 MKII multibeam echosounder (MBES) able to provide hydrographic data at full ocean depth, up to 11,000 meters (for details see Appendix 1. Kongsberg EM®304 MKII multibeam echosounder Specification Sheet). It was used to map designated targets and while transiting between sites. Targeted sites were ensonified at slower vessel speed, around 5 knots, to give the best possible sounding density and therefore, the best possible data resolution. Transits, on the other hand, were travelled at a higher vessel speed at around 8 knots. Data collection was primarily bathymetry data, but water column data was also logged alongside.

2.4.1. Targeted areas

The target areas MBES mapping for this expedition were: 1) Ts'íidaa Seamount in the TWSC, 2) zone 504 of the proposed Offshore Haida Gwaii Marine Protected Area, 3) a potential peak near a mud volcano off of the west coast of Haida Gwaii (Figure 1; Figure 4). Ts'íidaa had been mapped in the past at an 80-meter resolution and had offsets of about one kilometer (roughly to the east). Zone 504 had out-dated, 80-meter resolution bathymetry. The potential peak near a mud volcano was flagged from previous very poor quality bathymetry.

2.5. Deep-Sea Ecology

Dives were conducted by ROV Mantis to document the incredible deep-sea ecosystems (Figure 5). This ROV is rated up to depths up to 6000 m and is equipped with two manipulators, multiple bioboxes, a suction sampler and corresponding carousel for samples,

and multiple sensors (Figure 5B; for more details on ROV MANTIS vehicle details please visit the MANTIS specification sheet). One of the main deviations to the specification sheet, for our expedition, was the main forward-facing camera and downward-facing cameras were both Manta cameras (Appendix 2. Manta Camera Specification Sheet). The forward-facing camera was the feed used to collect primary biological data during transects and was live streamed to a global audience from the control room (Figure 5C; on the 2025 NEPDEP Expedition - Seamounts and Mapping expedition page, located on the NEPDEP website, and on ONC's SeaTube platform under 'DFO Expedition 2025-09 (Sep 2025)'). The downward-facing camera was used to collect detailed downward images of sediment type and biological organisms. The camera was offset of midline (measurements taken from top view of the ROV: 2.54m Forward (Y), 0.2m Starboard (X), -1.12m (Z)). Additional cameras were added to the porch for BBC filming (Figure 5C). Full navigation components and report available.

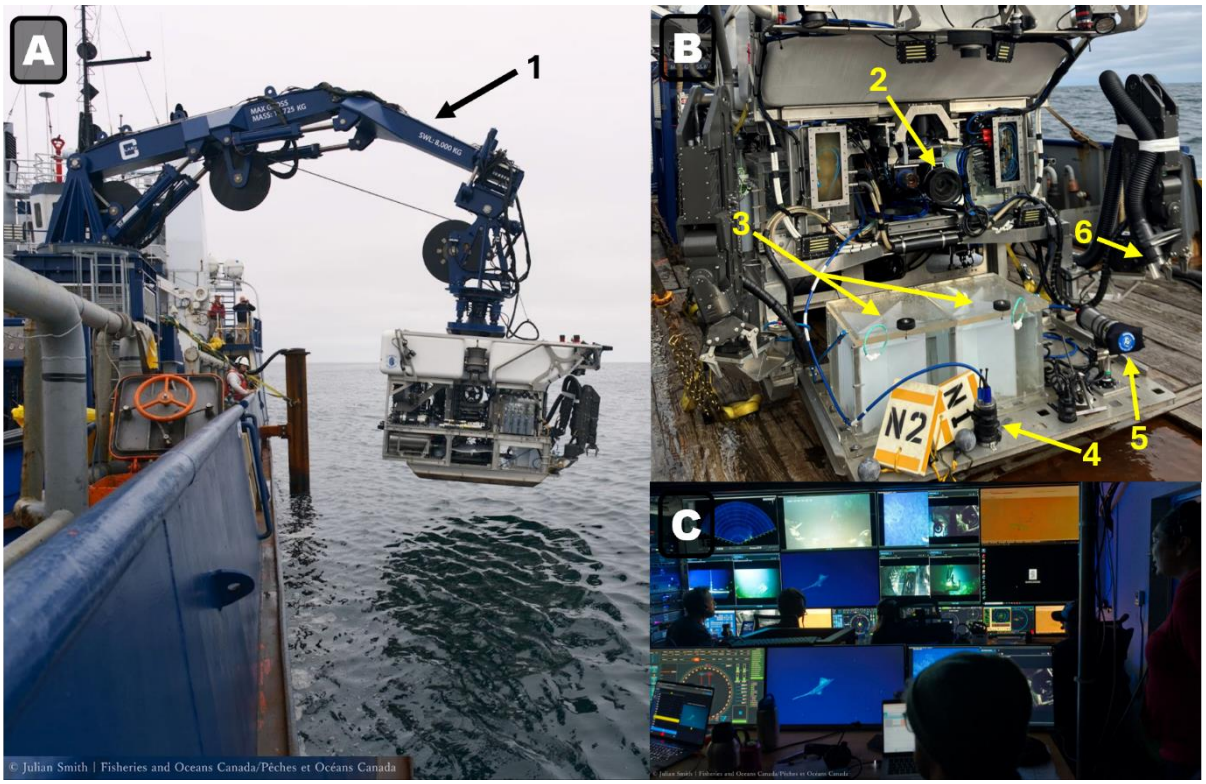

Figure 5. Remotely operated vehicle Mantis (A) being deployed off the starboard side of the motor vessel *CanPac Valour* using the LARS crane, (B) the anterior view. Labels: 1 - LARS crane; 2 - forward facing camera; 3 - bioboxes used for specimen collection; 4 - downwards facing camera; 5 - BBC camera; 6 - Manipulator with attached suction sampler, and (C) the control room with the front row for pilots and the back row for the science team. *Image credits: Julian Smith, DFO*

2.5.1. Long-term Monitoring Sites

During the dives we employed a photomosaic protocol to collect images and video for 2D and 3D photogrammetric reconstructions of established and new long-term study sites (Table 3). The protocol was based on techniques from the pilot long-term monitoring site study established in 2018 (Gartner et al. 2022). Establishing these long-term monitoring sites will allow detailed comparison of community change over time. As not all planned, pre-expedition sites were visited (due to travel times and weather conditions) only four long-term monitoring sites were revisited and a new one was established on Endeavour Seamount (Table 3).

Table 3. Existing long-term monitoring sites targeted for resurveying during this expedition. Bolded sites were re-surveyed during PAC2025-M14.

Site	Marker	Region/ Seamount	Depth (m)	Latitude	Longitude	Notes
N58-01	**L1**	**Ts'ídaa**	**1605**	**51.40315**	**-131.01228**	**Area of visible staining**
N58-02	**K5**	**Ts'ídaa**	**1599**	**51.40149**	**-131.01329**	**High density of skate eggs**
N58-03	**L2**	**Ts'ídaa**	**1600**	**51.40188**	**-131.01332**	**Deployed on large boulder**
N58-04*	**Whalefall**	**Ts'ídaa**	**1603**	**51.4012**	**-131.01385**	**Baleen whale skeleton**
N54-01	A1	NEPDEP 54	833	50.7214954	-130.920496	Mooring deployed in vicinity
N54-02	B1	NEPDEP 54	625	50.7568615	-130.888173	
N54-03	B2	NEPDEP 54	640	50.757104	-130.886122	
N54-04	B3	NEPDEP 54	633	50.7568945	-130.886717	
N54-05	B4	NEPDEP 54	630	50.756914	-130.887399	
N54-06	B5	NEPDEP 54	607	50.7566603	-130.889155	
N54-07	B6	NEPDEP 54	616	50.756671	-130.88896	
	N1	**Endeavour**	**1614**	**48.302479**	**-129.044287**	**Newly established during PAC2025-M14**

2.5.1.1. Configuration

Benthic imagery was collected using the downward facing Manta camera and is intended to be the primary data source for the reconstructions. The forward facing oblique video, using the forward facing Manta camera, was adjusted to a downward oblique angle to best capture the study site, minimize vignetting caused by darker waters, and maintain navigation functionality for the pilots and is intended as a backup data source for stills to be extracted if there are any data limitations from the downward facing camera. This forward facing video also provides visual and audio context for the collections to aid in data processing.

2.5.1.2. Site Selection

Sites were selected by one of two methods. Previously established sites were located using the precise location data from the previous survey (latitude, longitude, depth, altitude, and heading; Table 3. Existing long-term monitoring sites targeted for resurveying during this expedition. Bolded sites were re-surveyed during PAC2025-M14.Table 3), the previously collected imagery and reconstructions, and the visual cue of the physical site markers. When new sites were established, the desired location was determined by the lead scientist and a single site marker was placed in the bottom right corner of the new study site using the ROV manipulator (Figure 6).

2.5.1.3. Photomosaic Protocol

The ROV flight protocol for these collections was based on techniques from the pilot long-term monitoring site study established in 2018 (Gartner et al. 2022) and has also been employed on subsequent surveys in 2022, 2023, and 2024. The ROV was positioned over the site marker or feature corner location in preparation for the photomosaic protocol. For sites with two site markers, the starting corner was determined by which marker would allow the ROV optimal lighting and orientation as it moved across the study area during the photomosaic protocol. Moving upslope and away from dropping off areas was preferred to minimize vignetting on imagery. The ROV was then oriented to the correct heading using previously collected survey data or the desired heading for a new site determined by the lead scientist to best capture the intended area of interest. Note - it was important to capture several images with the starting marker in view of the forward and downward facing cameras so the marker can be seen in the reconstructions.

The ROV flew roughly 10 meter long transects across the study area (from “bottom to top”) at the desired heading with the ROV stepping over approximately 1m between transect lines (Figure 6). Lasers were cycled on and off at the beginning and end of each transect line, and during, so the images could be used for scaling the reconstructions. Attempts were initially made to follow the 2018 protocol and have the ROV step over approximately 1 meter (to the left or right, depending on which marker the mosaic collection started at) and then fly backwards to complete the next transect line. However, in working with ROV pilots and navigation team we determined that the 1 meter intervals would be piloted in the same direction/heading for each line and between the ROV would move higher in the water column, fly backward and reposition for the start of the next line (Figure 6). The exception was site N58-04 (which followed the old protocol). Additionally, we did not complete any ‘line c’ perpendicular flight lines across the monitoring sites.

Photogrammetric reconstructions always have poorer results at the edges of the data collection area due to decreased image overlap, therefore transect lines were often pushed to 12 meters long and or an extra line or two were added across the site to ensure that the 10 x 10 area can be reliably reconstructed (and/or matched to previous monitoring site collection data). The ROV attempted to maintain a consistent altitude of ~ 1 meter from the seafloor during the flight lines when possible, to reduce light absorption and achieve consistent spatial resolution in imagery. Note - this expedition the ROV was flown at a higher altitude on average and should therefore have increased overlap in the downward facing camera stills. It should be noted that variation exists at some sites depending on the animals (e.g. tall corals vs. low lying skeletal bones) and bathymetry of the site.

Geolocation information (latitude, longitude, altitude, heading) from the ROV navigation data will be utilized to match images prior to the reconstructions. Geolocation information is fundamental for photogrammetric reconstructions, especially if any volumetric changes are to be measured from the results.

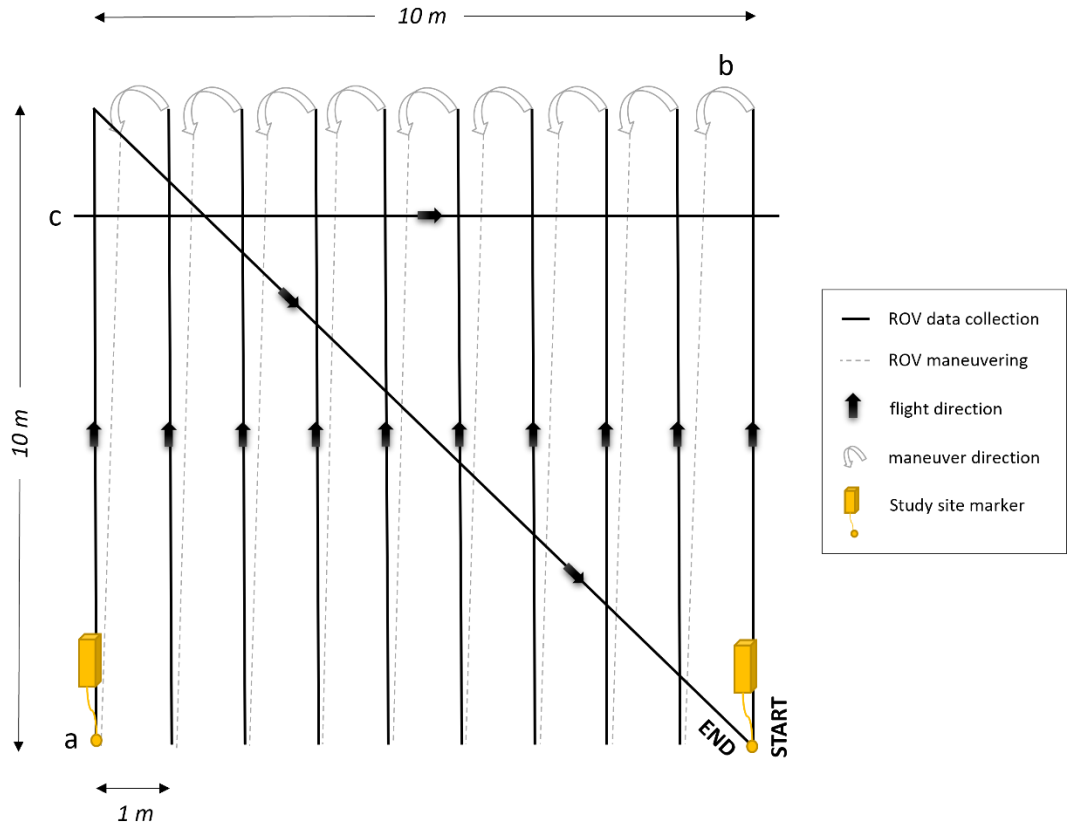

Figure 6. Remotely operated vehicle path for photomosaic protocol with 10 transect lines, 10 meters long, across study sites at 1 meter intervals to yield coverage of a 10 m x 10 m study site. A perpendicular and a diagonal line are also displayed here. Arrows denote direction of ROV flight. Labelled are a) the deployment of second site markers at established monitoring sites., b) deviation from 2018 protocol with the ROV manoeuvring up and back to the 'bottom edge' starting position to run the next flight line, c) an example of a perpendicular flight line that can be flown across the site to improve the reconstructions of highly variable sites.

2.5.2. Sampling - Specimens and tissues

During the dives, specimens were collected to resolve taxonomic identity (e.g., species), better understand the deep-sea biodiversity of our region, inform annotation of imagery, and/or fill data gaps of specific study (e.g. Pacific White Skate egg energy density and proximate analysis study; Figure 7).

Once an animal had been selected for collection, we followed these steps:

- Obtained an in-situ image of the whole animal
- Pointed the lasers at the specimen for accurate size measurements
- Zoomed in for good quality imagery of any identifying features, associated fauna, attachment points, etc.
- Collected the specimen. The dive lead and/or sampling coordinator advised on which location to place the sample (biobox, suction chamber #, etc.) and annotators noted the collection information.

Annotators worked in Seatube to log the sampling event number and associated data (latitude, longitude, depth, and a brief description).

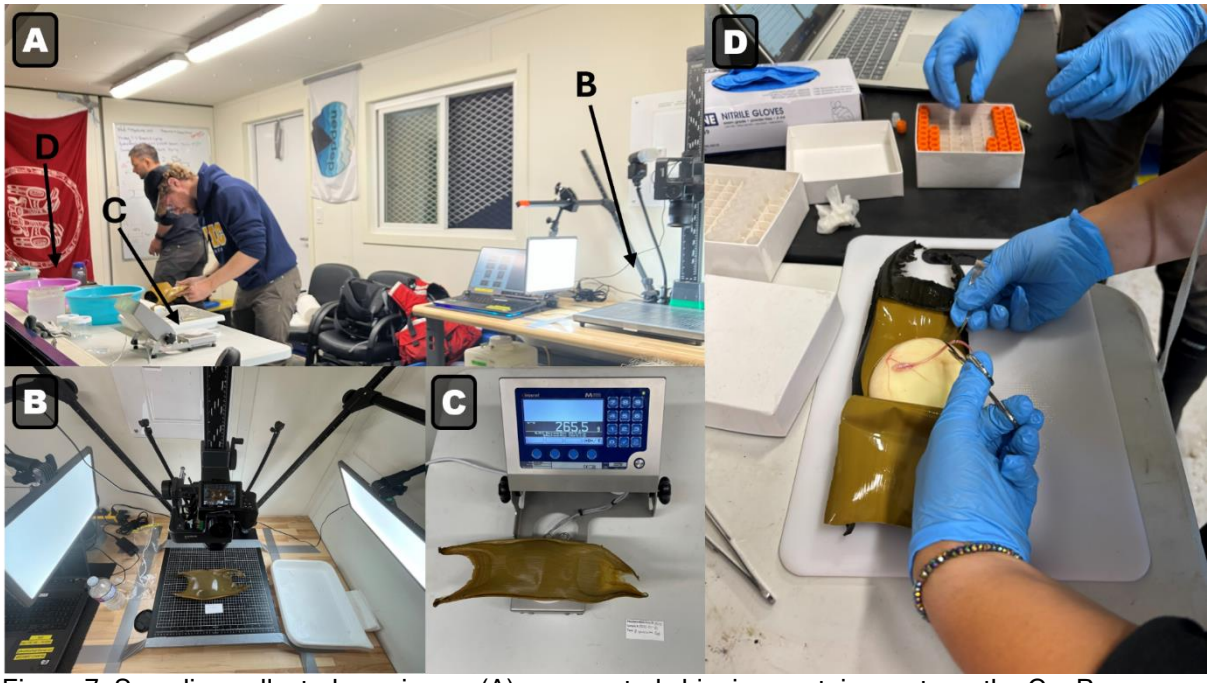

Figure 7. Sampling collected specimens (A) a converted shipping container acts as the CanPac Valour lab space, where benthic samples (i.e. skate eggs) are processed, the lab is split into three stations: (B) the macro imaging station, (C) the dissection and weighing table, and (D) the identification and tissue sampling table. *Image credits: Julian Smith, DFO*

When the ROV surfaced, we utilized separate containers for each sample with their corresponding sampling event number. We assigned a sample number to each specimen with the sampling event number as a prefix (e.g.: for sampling event M030-05, specimens will be M030-05-01, M030-05-02, etc.). We ensured when sorting and subsampling that specimens always had an accompanying label. Specimens were photographed, assigned a preliminary taxonomic identification, subsampled for genetics (1-2 subsamples depending on the sample), relaxed (when appropriate), and preserved (Appendix 3. Specimen Preservation).

Benthic collections on Ts'ïidaa Seamount focused on the Pacific White Skate (*Bathyraja spinosissima*) skate egg energetics and proximate analysis study. Once eggs were recovered from the ROV they were processed in the CanPac Valour lab space (Figure 7A) as follows:

1. Eggs were patted dry using a paper towel.
2. Both sides of the egg were photographed while fresh (Figure 7B).
3. Measurements were made of egg cases (total length from horn to horn, length between aprons, length including aprons, and width).
4. Eggs were weighed using a Marel M Series 2200 analytical balance (M200-M02), using the maritime setting for measurements at sea (Figure 7C).
5. Eggs were placed in a -20°C freezer overnight to ensure complete freezing of the egg.
6. While frozen, the egg contents were dissected from the egg cases by cutting a window-shaped cut on the anterior end of the egg case . Egg contents removed from egg casings. The horns were then cut open and any remaining contents attached to the interior of the egg casings were scrapped into the jar.
7. The egg case and egg contents were then weighed.
8. Both egg case and yolk were then preserved in the -20°C freezer.

Benthic collections on Endeavour Seamount were focused on an ongoing Pacific White Skate population genetics study. Once eggs were recovered from the ROV they were processed as follows:

1. Eggs were patted dry using a paper towel.
2. Both sides of the egg were photographed while fresh.
3. Measurements were made of egg cases (total length from horn to horn, length between aprons, length including aprons, and width).
4. Eggs were weighed using a Marel M Series 2200 analytical balance (M200-M02), using the maritime setting for measurements at sea (Figure 7C).
5. The egg contents were dissected from the egg cases by cutting a window-shaped cut on the anterior end of the egg case (Figure 7D). If present (not an empty case), egg contents were photographed within the case.
6. The embryo and/or yolk were measured.
7. Tissue samples, 2 per embryo, were collected and placed in 95% ethanol and stored at -20°C. (see *Tissue Sampling* section for additional details).
8. The embryo and yolks were then carefully transferred to an appropriately sized jar with 75% ethanol and stored at room temperature.
9. The cases were checked for parasites. If present, the parasites were preserved in 70% ethanol and tissue samples were collected.
10. Empty cases were reweighed then preserved in the -20°C freezer.

2.5.2.1. Lab Imaging

We obtained at least one high-quality image for each taxon (Figure 7B). Many identifying features can become distorted and/or colours can be lost during the preservation process, so we attempted to take pictures of the specimen prior to preservation and genetic sampling. We named the image files with their associated specimen number. Each specimen had at least one image with a scale bar and label.

2.5.2.2. Tissue Sampling

After sample photography, tissue samples were taken for genetic analysis (Figure 7D). If there was sufficient material, two samples were taken – one for reference at the RBCM, and one for mitogenome sequencing, with remaining tissue retained for further sequencing.

While wearing gloves, these steps were followed:

- Cleaned work surface with ethanol
- Cleaned instruments with ethanol (forceps, scalpel)
- Allowed the ethanol to evaporate, then flamed the ends of the instruments
- Once the ends were cool, took a tissue sample from a non-identifying feature (see table for taxon-specific details, minimum size a grain of rice)
- Placed the tissue in a cryovial with its sample number, and filled with 95% ethanol
- Noted the sample numbers and number of genetics samples for every specimen sampled in the spreadsheet
- Placed the boxes of samples in the -20°C freezer when done

2.6. Mooring Deployment

Two Ocean Networks Canada (ONC) moorings were deployed during the expedition, one on Ts'íidaa Seamount (TWSC) and the other on NEPDEP 54 Seamount (Dellwood Seamounts). During ROV dive MANTIS032 the Ts'íidaa mooring was inspected to determine their positioning on the sea floor. Due to time limitation we were not able to inspect the NEPDEP 54 mooring using the ROV. On Ts'íidaa the mooring was deployed near the long-term monitoring site K5 and the NEPDEP 54 mooring was placed near long-term monitoring site A1.

Both moorings are being used to monitor intra-annual variations in the oxygen minimum zone (OMZ) of the regions. To do this, each mooring has been equipped with three CTD sensors that are set to monitor the water column for a year (Figure 8). CTDs were placed near the bottom (4 m off bottom), 50 m off bottom, and in the estimated low/anoxic zone of

the OMZ (600 m off bottom for Ts'ïidaa and 353 m off bottom for NEPDEP 54). The moorings will be deployed for 1 year, with plans to recover and deploy replacements next year. The moorings are planned to be recovered in collaboration with the Ocean Moorings Group at DFO. The replacement moorings are currently with ONC.

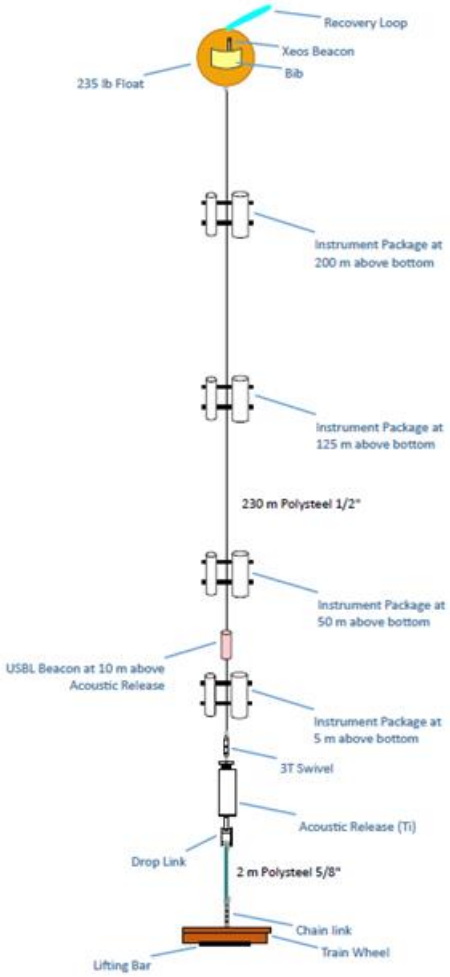

Figure 8. Schematic of mooring design. *Schematic credit: Ocean Networks Canada*

2.7. Marine Mammal, Seabird, and Other Transient Species Observations

Observations of the surface community were collected opportunistically and were confirmed with photography when possible. Observations were made using a Nikon Z 2 camera with a Nikkor 200-500 mm telephoto lens. Data was recorded on species identification, date and time of observation, location (latitude and longitude), count of individuals, recorder's name, image file information. This information is available for any programs that will benefit from this data.

2.8. Outreach, Communication, and Community Engagement

All dives were live streamed, annotated, and stored using Ocean Networks Canada's SeaTube. The live feed was also hosted on the NEPDEP Facebook page and website.

Outreach events were coordinated through the expedition partners - CHN, DFO, NTC, and ONC. These ship-2-shore connections allowed audience members to hear about the expedition activities, get a tour of the vessel, and ask live questions to the at-sea team.

The presentations were performed in the ROV control room (primarily between dives), using the monitors to display pre-screened highlights of past dives, maps, and navigational displays (Figure 9). A portable Bluetooth speaker and microphone was used to communicate to the presenters and a ring light was used for lighting. In addition, a pre-recorded video tour of the back deck and lab space was shown to the audience by the shore based ONC hosts. Live tours were not possible due to Wi-Fi and Bluetooth limitations on the aft deck of the ship.

Figure 9. NorthEast Pacific Deep-sea Exploration Project expedition members present at an online sea-2-shore event in the ROV control room between dives. Image from left to right: Marilyn Brière-Deschênes, Heidi Gartner, Justin Poon, and Peter Bunton. *Image credits: Julian Smith, DFO*

3. Preliminary Results

3.1. Summary

Key preliminary results are summarized below. Detailed preliminary results are reported for each activity type in the following sections.

- Collected 2307 km of bathymetry data using the Kongsberg EM®304 MKII multibeam echosounder
- High-resolution mapped three regions (Ts'ïidaa Seamount, anomalous gas flare and cold seep region, and south western half of the proposed MPA Zone 504)
- Completed 7 scientific dives using ROV Mantis
- Collected footage of a Pacific White Skate (*Bathyraja spinosissima*) in the process of laying an egg, the second time this process has been observed on Ts'ïidaa Seamount
- Identified active bubble streams (gas flares) using multibeam, water column data which led to a dive and visual confirmation of a previously unknown cold seep field
- Visually confirmed a dense deep-sea skate nursery on Endeavour Seamount, the second discovered in Pacific Canada
- Deployed two ONC moorings to monitor intra-annual physicochemical variability in the water column
- Collected 77 biological specimens and 3 rock samples
- Documented 11 wildlife sightings via surface observations

- Connected with audiences through 4 ship-2-shore events, a presentation to an online knowledge sharing event, and live streamed dives to global audiences

3.2. Mapping

A total of 2,307 kilometers were travelled during this expedition, including the distance covered to map the targeted areas (Figure 4). The multibeam was active and recording during transits. Transits generally resulted in lower data resolution due to the cruising speed of the vessel. However, some shallow areas mapped during transits resulted in higher resolution (0.5 m).

The settings on the multibeam and the overlap of the survey lines dictated what the final mapping resolution could be. A vessel speed of maximum 5 knots was adopted for targeted areas and a 100% overlap was the goal. A sound velocity cast of the water column was done at each targeted site to calibrate the multibeam system; either at full depth or partial depth. The frequency of the multibeam echo sounder was adjusted with depth.

Bathymetry data was the primary data type (.kmall) collected and the team generated high-resolution surfaces for part of Tuzo Wilson Seamount Complex (Ts'ïidaa Seamount), for part of proposed MPA Zone 504, and for a poorly mapped peak to the south of Zone 504. Preliminary data could be up to 6-meter resolution, but once the data was cleaned off artefacts the final results were closer to 10-meter resolution (Figure 10).

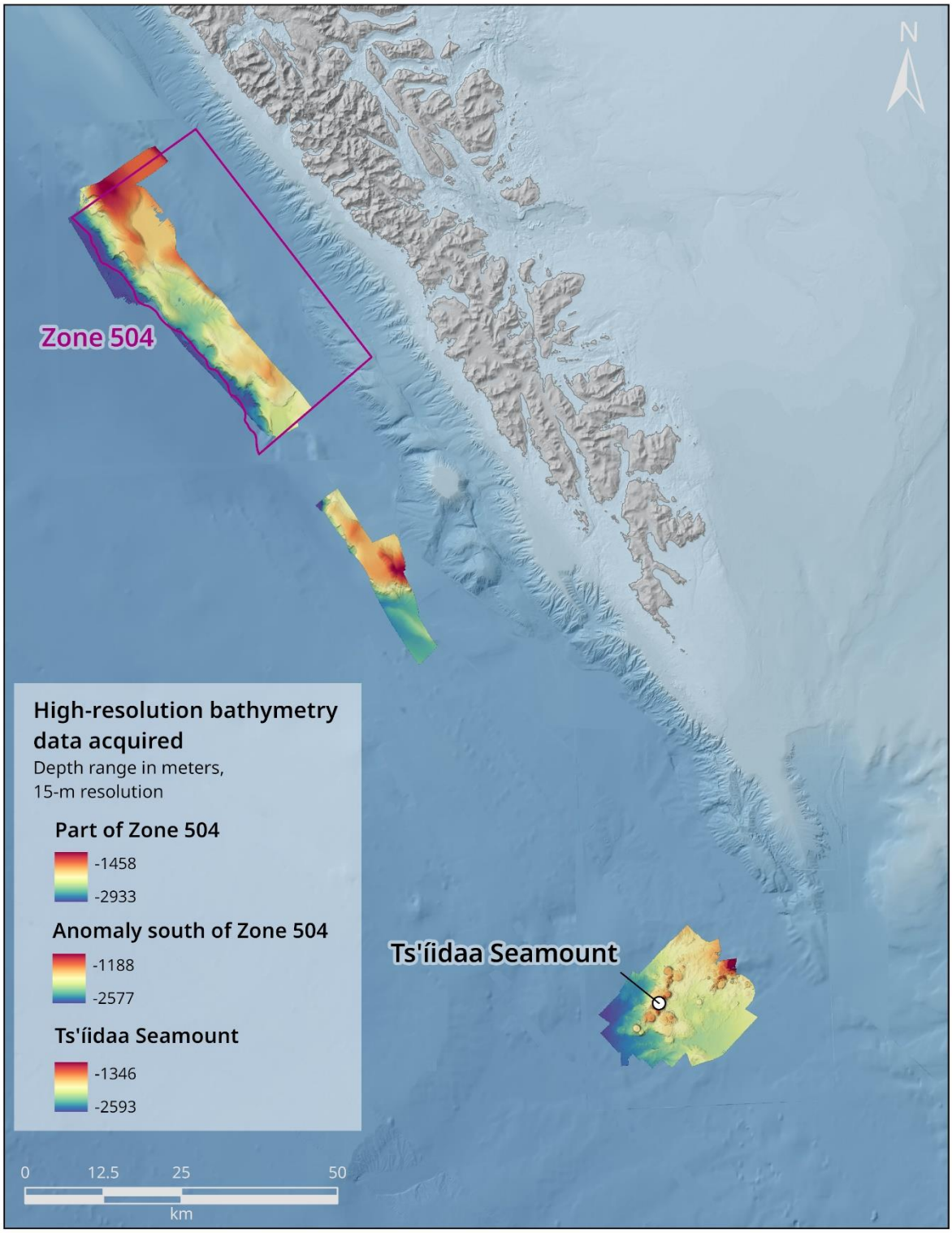

Figure 10. High resolution bathymetry data acquired during the expedition in the target areas of the Tuzo Wilson Seamont Complex (TWSC), anomaly south of proposed Marine Protected Area network Zone 504 and Zone 504. *Map credit: Marilyn Brière-Deschênes, CHN*

Water column data (.kmwcd) provided valuable information that was logged and displayed in real-time and lead to gas flares detected in the water column (Figure 11Figure 11). The most northerly flare, along the edge of Zone 504, was detected 1500 m below sea surface and the cold seep field was subsequently confirmed during dive MANTIS034 (Figure 12).

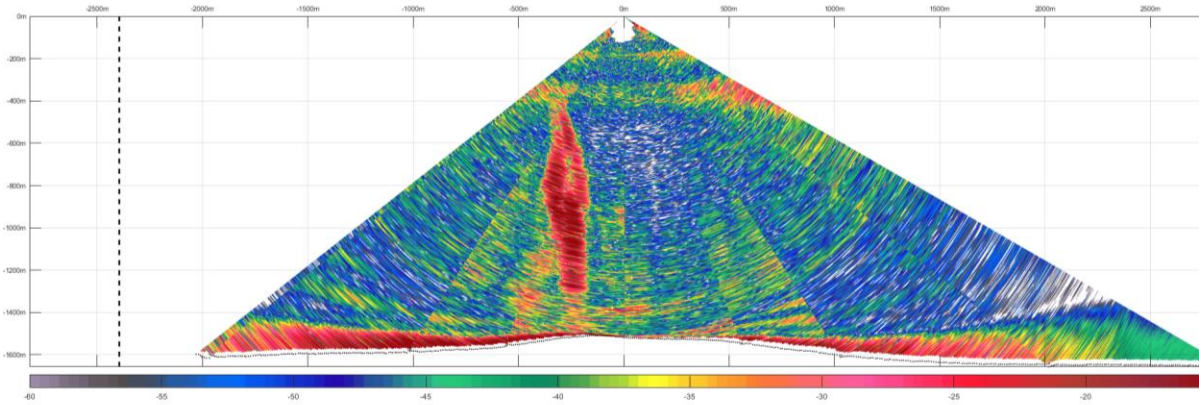

Figure 11. Water column data of the most northerly flare seen along the edge of Zone 504, as seen in real-time.

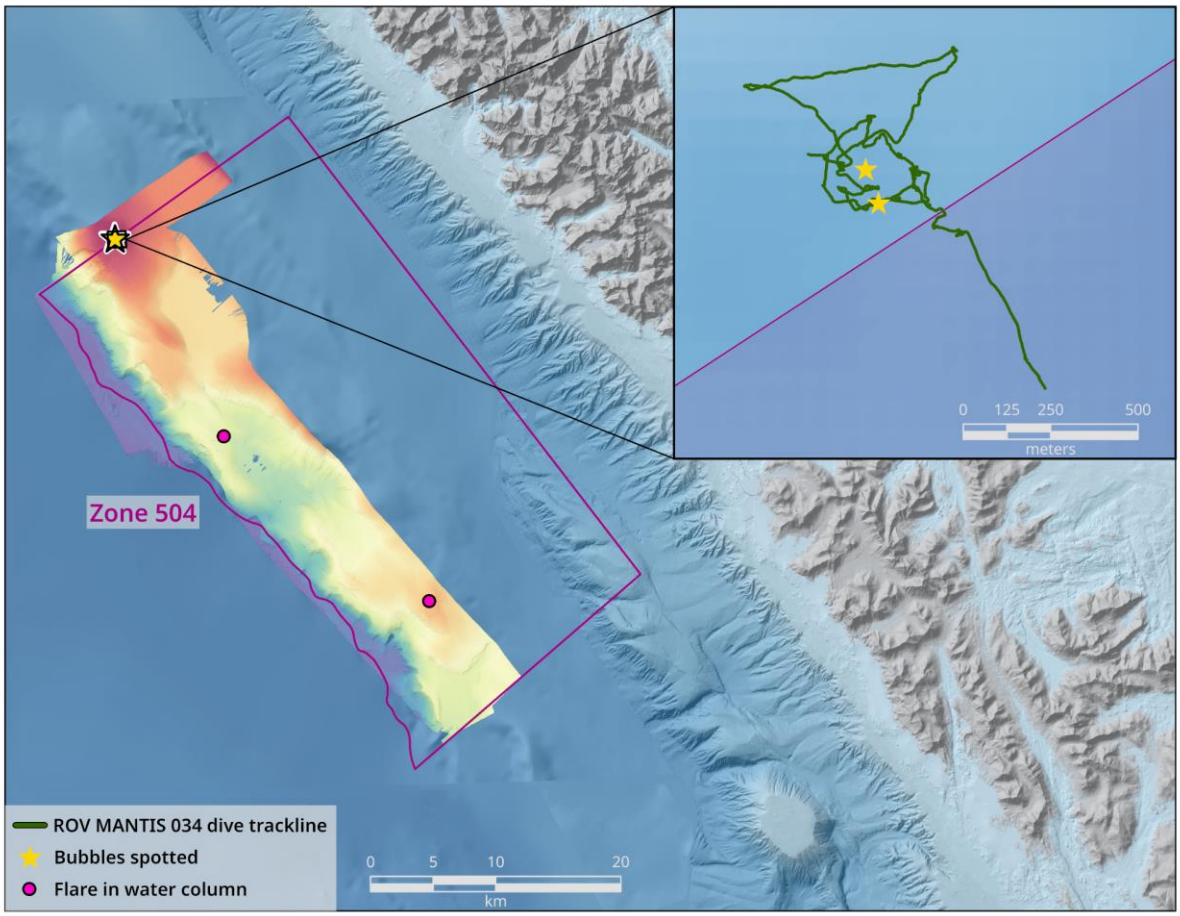

Figure 12. Locations of gas flares detected with multibeam echosounder. The most northern flare (star) was subsequently confirmed as a cold seep vent field during dive MANTIS034 (inset). *Map credit: Marilyn Brière-Deschênes, CHN*

3.3. Deep-Sea Ecology

There were 7 scientific dives conducted with ROV Mantis during the expedition (Table 4; Figure 13; detailed dive descriptions in subsequent sections below). Full dive plans for each dive can be found in Appendix 4. Dive Plans. The dives were live-streamed, annotated, and stored using Ocean Networks Canada's SeaTube platform, under 'DFO Expedition 2025-09 (Sep 2025)'.

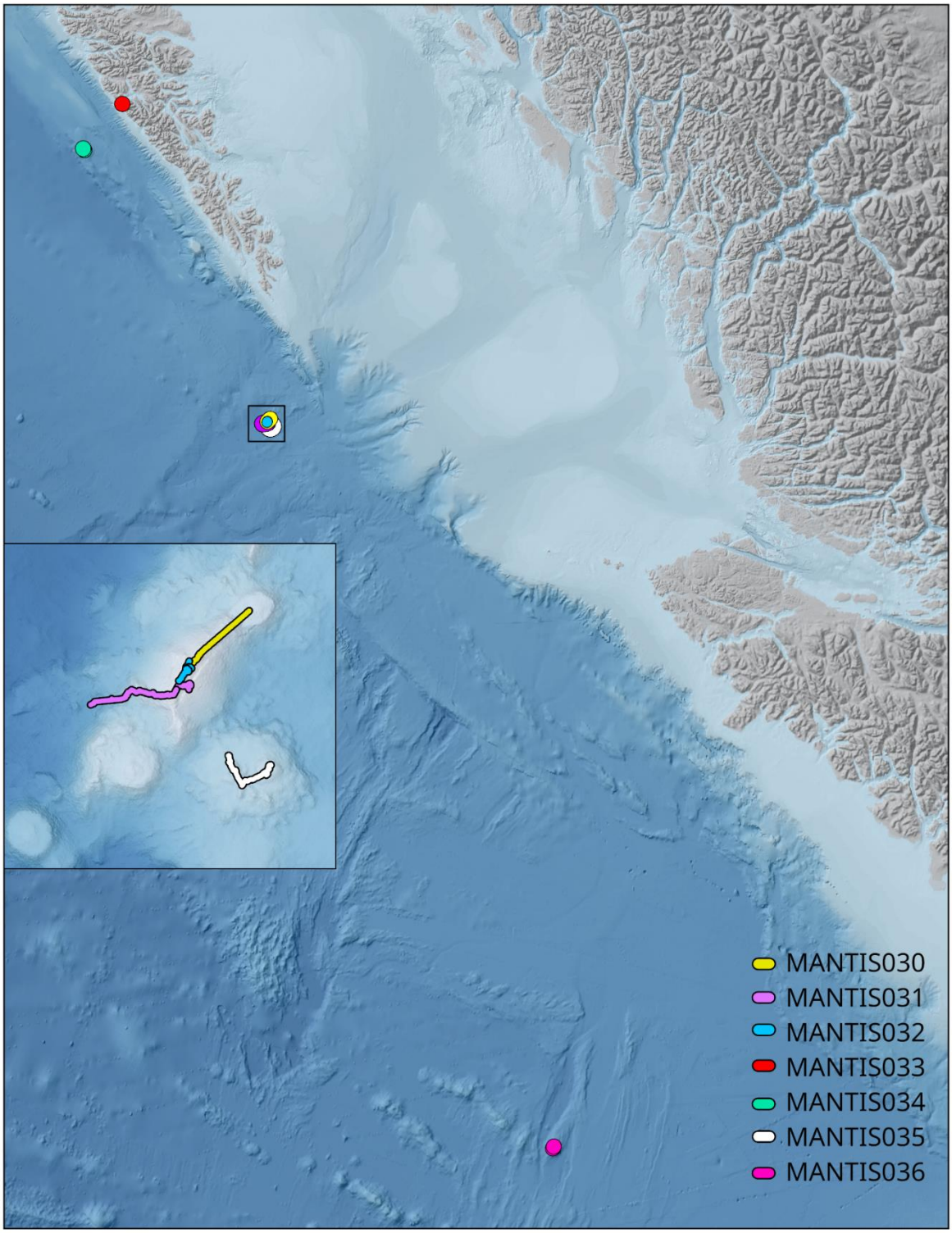

Figure 13. Tracklines of all scientific dives performed by ROV Mantis during the PAC2025-M14 expedition. Four dives were performed within the Tuzo Wilson Seamount Complex, with three of those being on Ts'ïidaa Seamount (inset). *Map credit: Marilyn Brière-Deschênes, CHN*

Table 4. Dives executed during the Northeast Pacific Deep-Sea Expedition (PAC2025-M14).

Site Name	Dive #	Date (UTC)	Start D (m)	End D (m)	Max Depth (m)	Min Depth (m)	Dive Length (m)	Dive Time (HH:MM:SS)	Start Time (UTC HH:MM:SS)	End Time (UTC HH:MM:SS)
Ts'íidaa Seamount (Northeastern Ridge)	MANTIS030	2025-Sep-07	1894	1604	1907	1591	2552	08:54:04	19:12:07	04:06:11
Ts'íidaa Seamount (western region)	MANTIS031	2025-Sep-08	2236	1728	2233	1623	4178	10:31:28	19:09:20	05:40:48
Ts'íidaa Seamount (pinnacle/monitoring sites)	MANTIS032	2025-Sep-09	1631	1617	1643	1587	3267	11:04:45	22:33:07	09:37:52
Tasu Sound (Cliff near entrance)	MANTIS033	2025-Sep-11	164	12	165	11	1542	03:01:59	22:38:03	1:40:02
Zone 504 (Tasu seeps)	MANTIS034	2025-Sep-13	1543	1470	1545	1459	5164	09:46:11	14:18:49	00:05:00
Ts'íidaa Seamount (heat anomaly)	MANTIS035	2025-Sep-14	1989	1910	1996	1909	3192	5:13:50	15:46:32	21:00:22
Endeavour Seamount	MANTIS036	2025-Sep-16	1650	1646	1650	1562	3766	10:56:06	07:46:49	18:42:55

3.3.1. Tuzo Wilson Seamount Complex (Ts'ídaa Seamount)

There were four dives conducted on Ts'ídaa Seamount in the Tuzo Wilson Seamount complex (Figure 13; Figure 14). The dives were designed to explore new areas of the seamount, sample for a Pacific White Skate egg energy density study, revisit long-term monitoring sites, and seek out potential heat anomaly sites.

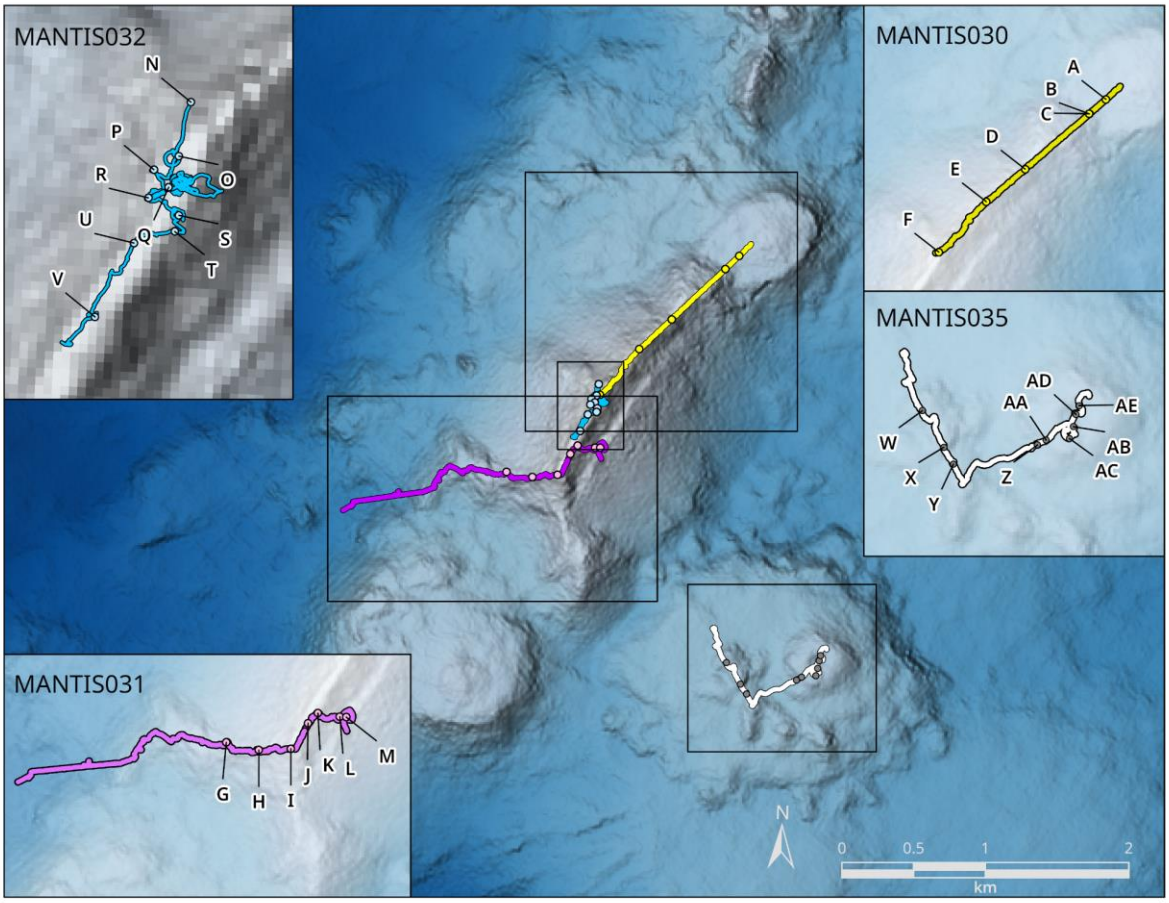

Figure 14. Dive tracks on Ts'ídaa Seamount in the Tuzo Wilson Seamount Complex using ROV Mantis. Dive highlights images have been labelled alphabetically and correspond to the images in the subsequent dive highlight figures. *Map credit: Marilyn Brière-Deschênes, CHN*

MANTIS030

Dive MANTIS030 traversed over 2.5 km of a previously unexplored area of Ts'ídaa Seamount, performing a transect from the northeast slope, along the seamount ridge, to the seamount summit (Figure 14; Figure 15). This transect covered substrate of pillow lava, cobbles, and boulders, with little sedimentation. A Precious Coral (*Hemicorallium* sp.*)* garden was documented along this northeastern ridge of the seamount, beginning at the start of the transect and continuing up towards the summit amongst the Bamboo Coral (Keratoisididae) garden, staining, and skate egg nursery. This is the second Precious Coral bed sighted on this seamount with the previous sighting occurring during PAC2024-041 on the southeastern ridge of the summit (it was Canada's first known Precious Coral bed; unpublished data but available on Seatube). There was a unique sighting of a new, unidentified sponge but no collections were made. There were a couple close sections during the transect where there were lots of broken

and toppled corals (e.g. Seatube). Boreal Skate (*Amblyraja hyperborea)* and Pacific White Skate (*Bathyraja spinosissima*) eggs, the large Bamboo Coral gardens, and yellow staining on rocks became more prevalent later in the transect as we approached the summit. The first skate egg observation was recorded at 51.406406 °N, 131.007967 °W at a depth of 1681.31 m. No adult skates were documented during the transect in the main camera. During the dive, collections were made of sponges, Precious Coral, volcanic rock, and Pacific White Skate eggs. Upon later examination, the rock collected had traces of volcanic glass - which does not persist in the deep-sea for long geological timescales (Cooper Stacey, NRCan, Sidney, BC, pers. comm.), possibly indicating more recent volcanic activity within the TWSC than current estimates indicate (Gartner et al. 2025). This discovery has prompted ongoing analysis of the rock.

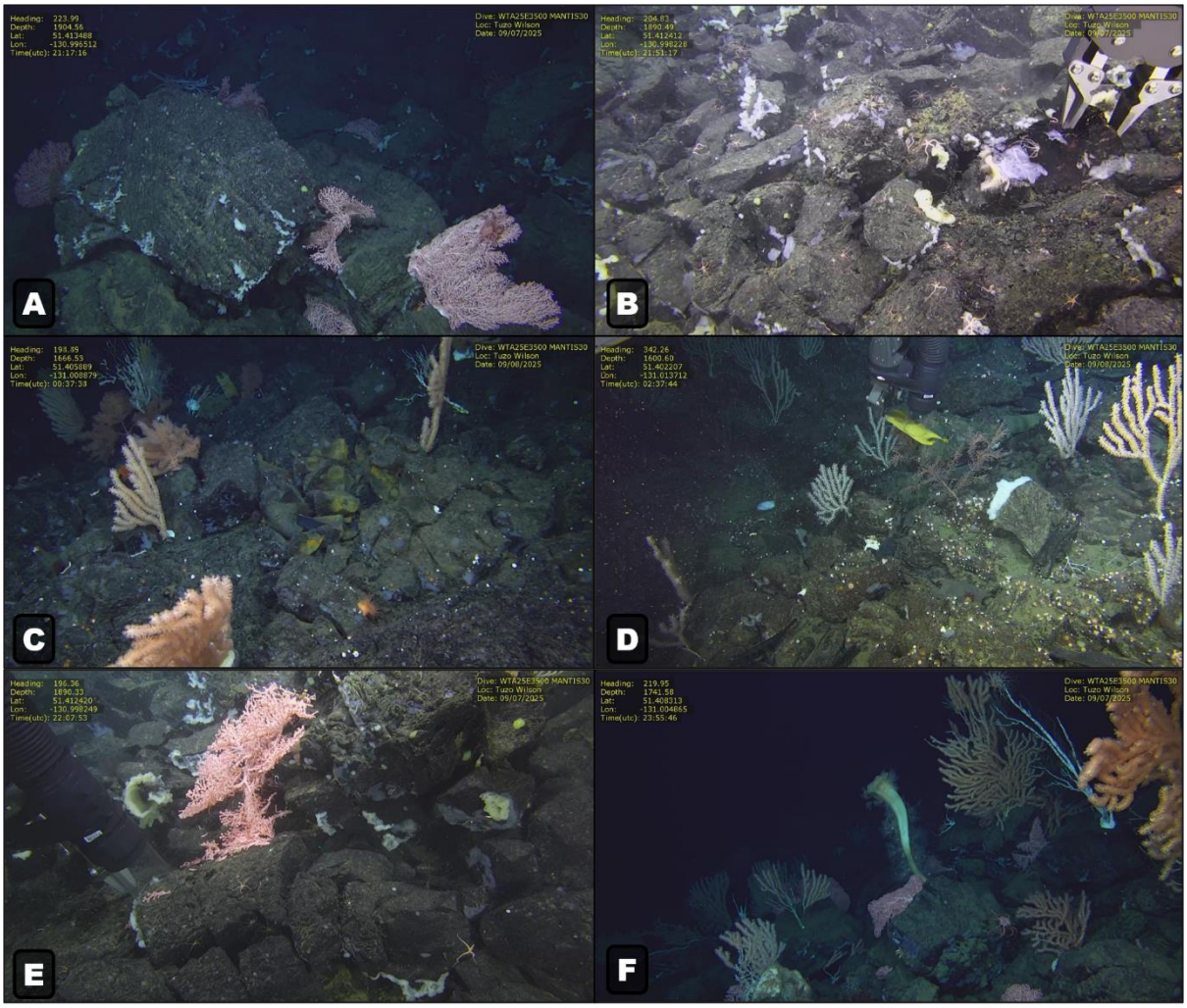

Figure 15. Highlights of dive MANTIS030 at Ts'ïidaa Seamount (A) Precious Corals grow on boulders, (B) sample collection (M030-01) of basalt with a sponge and bryozoan attached, (C) a pile of skate eggs sitting among rocks with yellow staining (possible geothermal activity), (D) sample collection (M030-06) of a Pacific White Skate egg from an area with corals, (E) sample collection (M030-02) of a piece of Precious Coral, and (F) a new sponge sighting among corals. Image lettering corresponds to labels of dive transect in Figure 14.

MANTIS031

Dive MANTIS031 transected another area not previously explored on Ts'ïidaa Seamount and traversed roughly 2.5 km, following along the western slope and ridge up towards the summit where egg collections and skate observations were performed (Figure 14; Figure 16). Along this transect we encountered soft sediment (including a soft-sediment landslide and deep sedimented pillow basalt) near the base of the seamount and transitioned to rocky regions with boulders and cobble. During the transect we observed five Boreal Skate adults (three males and two females). Skate egg observations started at 1723 m and continued through the remainder of the dive, discovering previously unknown dense regions of eggs. Precious Coral was again documented along the transect. During the dive areas of staining were noted and two temperature measurements were collected, noting an increase of 0.1° C and 0.5° C above ambient temperatures in water near yellow stained rock crevices.

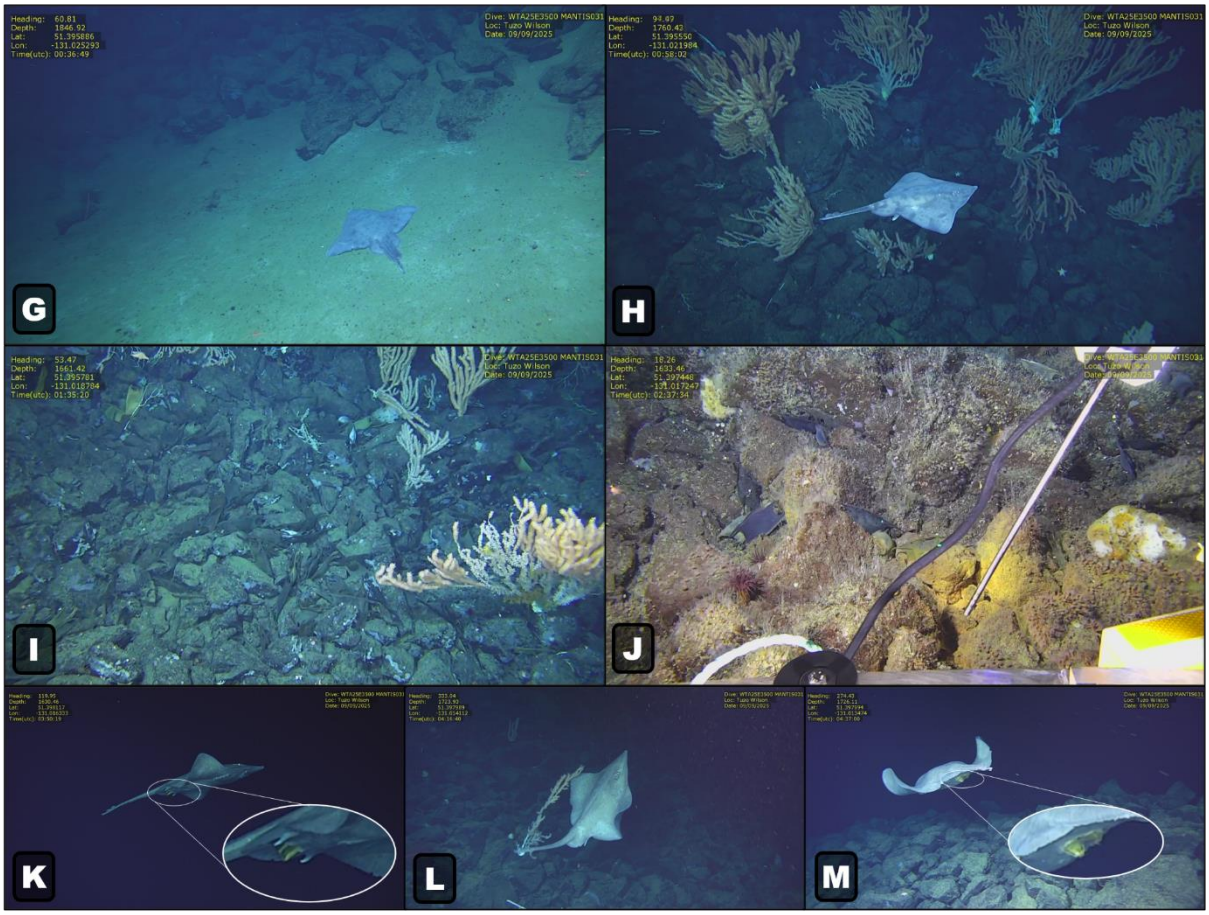

Figure 16. Highlights of dive MANTIS031 at Ts'ïidaa Seamount. (G) An adult male Boreal Skate in a sedimented area, (H) an adult female Boreal Skate swimming near corals on rocky substrate, (I) a dense grouping of skate eggs near corals, (J) a temperature probe measurement for hydrothermal venting near yellow-stained rocks, (K) an adult female Pacific White Skate swimming with an egg protruding, (L) the adult female adult female Pacific White Skate with the egg flexing near the seafloor, and (M) a posterior view of adult female Pacific White Skate with egg protruding. Image lettering corresponds to labels of dive transect in Figure 14.

Near the end of the dive, we documented a Pacific White Skate female with an egg case protruding from its cloaca. Only once before on PAC2023-030 dive R2310 has a female Pacific White Skate been observed in the process of laying an egg (Gartner et al. 2025; Seatube). We

observed the female swim down towards the rocks and corals, flex its back as it neared the seafloor then return to swim above the seafloor. While swimming near the seafloor, the skate would occasionally collide with corals and rocks, possibly from disorientation due to the presence of the ROV, which is loud and bright relative to its typical environment. We followed the female Pacific White Skate for some time while she swam back down towards the base of the seamount.

MANTIS032

Dive MANTIS032 surveyed ~800 m and completed multiple science objectives on the seamount summit (Figure 14; Figure 17). The Ts'íidaa Seamount long-term monitoring sites were revisited, completing ROV flights over the areas for 3D mosaic reconstruction following the ROV photomosaic protocol (Figure 6). Sites resurveyed include L1, L2 (the boulder), K5, and Whalefall (Table 3). The L1 site had to be re-run as it was difficult to line up initially but the issue was resolved (heading very helpful on complex cliff face). In past surveys the whalefall mosaic was performed in a series of lines starting at the jaw, but this year the mosaic was completed in a mow pattern (see protocol outlined in Gartner et al. 2022). During the mosaic procedure, it was noted that the whale bones may have been displaced since the last survey. The mooring deployed the previous night was inspected and the first sensor was recorded to sit at 1623 m depth (missed target depth). The dive concluded with the collection of 17 recently laid (bright yellow) Pacific White Skate eggs. During the first skate egg collection (ID M032-01) there was a hydraulic malfunction on the starboard manipulator, causing the arm to lose function mid-collection. The egg within the arm remained firmly held and survived the rest of the dive and surfacing, demonstrating the durability of these egg cases. Across the whole dive, there were 8 adult skates documented in the main camera. Most skate observations were of Boreal and Pacific White Skates, but there was also an observation of an Abyssal Skate (*Bathyraja abyssicola*).

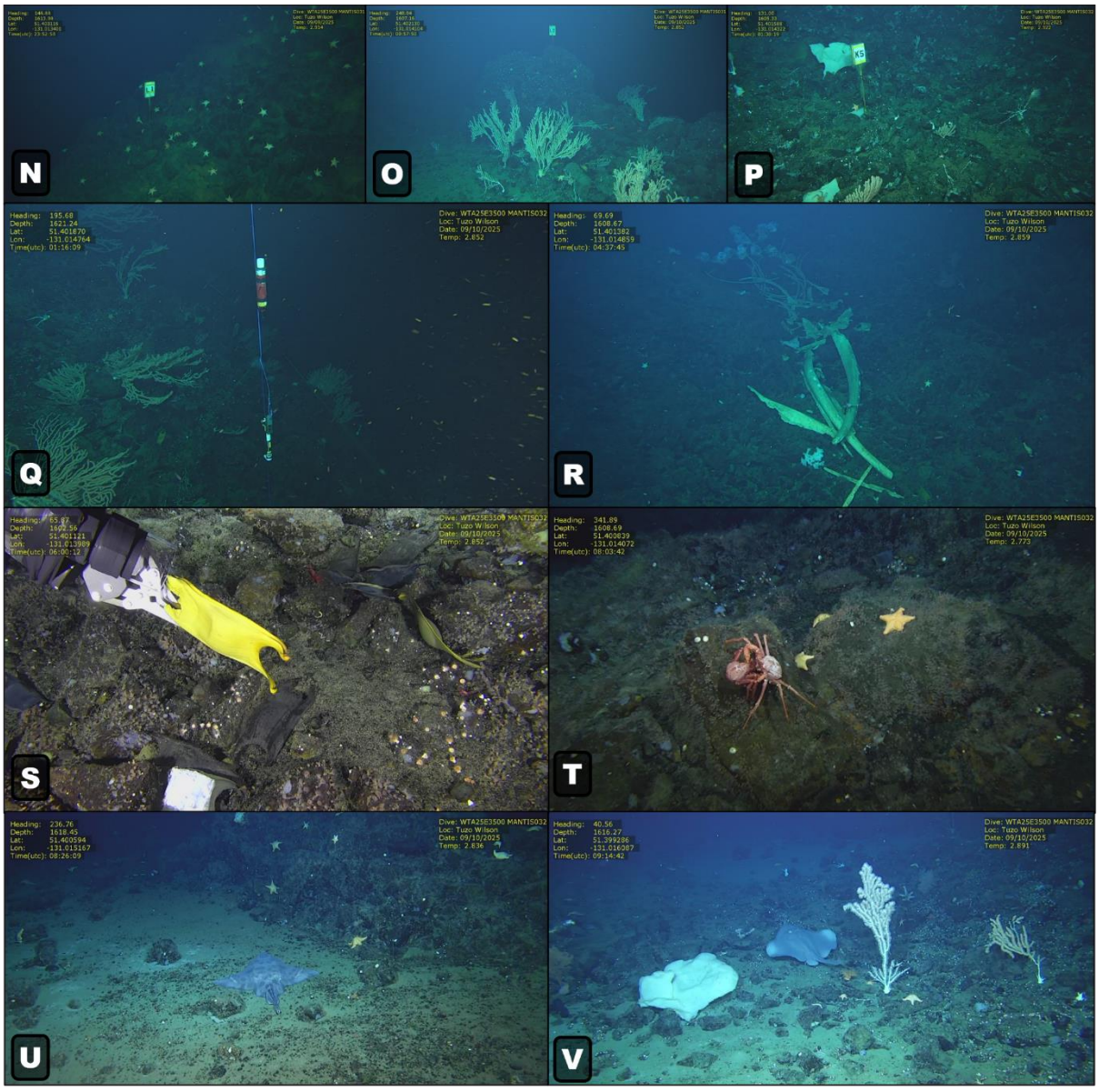

Figure 17. Highlights of Dive MANTIS032 on Ts'ïidaa Seamount. (N) Long-term monitoring site L1, (O) long-term monitoring site L2 (the boulder), (P) long-term monitoring site K5 which is being used to investigate the development timeline of skate eggs, (Q) ONC mooring deployed on the summit of Ts'ïidaa to monitor the physicochemical properties of the water column near the skate nursery, (R) the whalefall long-term monitoring site, (S) sample collection of a Pacific White Skate egg (ID M032-13), one of 22 eggs collected for the skate egg energy density and proximate analysis project, (T) two crabs displaying mate guarding behaviour, (U) an adult male Boreal Skate on a sedimented area between rocky patches, and (V) an Abyssal Skate among sponges and corals. Image lettering corresponds to labels of dive transect in Figure 14.

MANTIS035

For dive MANTIS035 we returned to Ts'ïidaa Seamount to investigate a CTD heat anomaly detected in Denton (1986), located near an outcrop 2-3 km from the seamount summit (Figure 14. Dive tracks on Ts'ïidaa Seamount in the Tuzo Wilson Seamount Complex using ROV Mantis. Dive highlights images have been labelled alphabetically and correspond to the images in the subsequent dive

highlight figures.Figure 14; Figure 18). Along the outcrop, areas of werfor potential hydrothermal venting. In one of these areas we detected a temperature reading of 3.2° C (ambient 2.7°C), while one area had no detectable increase in temperature and the other three found max temperature of 2.9°C, 3.1°C, and 3.1°C. Otherwise no significant venting was discovered on the feature. Near the end of the transect it appeared we were exploring a caldera, with a notable lack of corals and growth in the area. During the dive, we captured imagery including footage of crabs, a Deep-Sea Octopus (*Graneledone pacifica)* brooding eggs, a Boreal Skate, and five adult Pacific White Skates (three males and two females). This dive was time limited due to inclement weather.

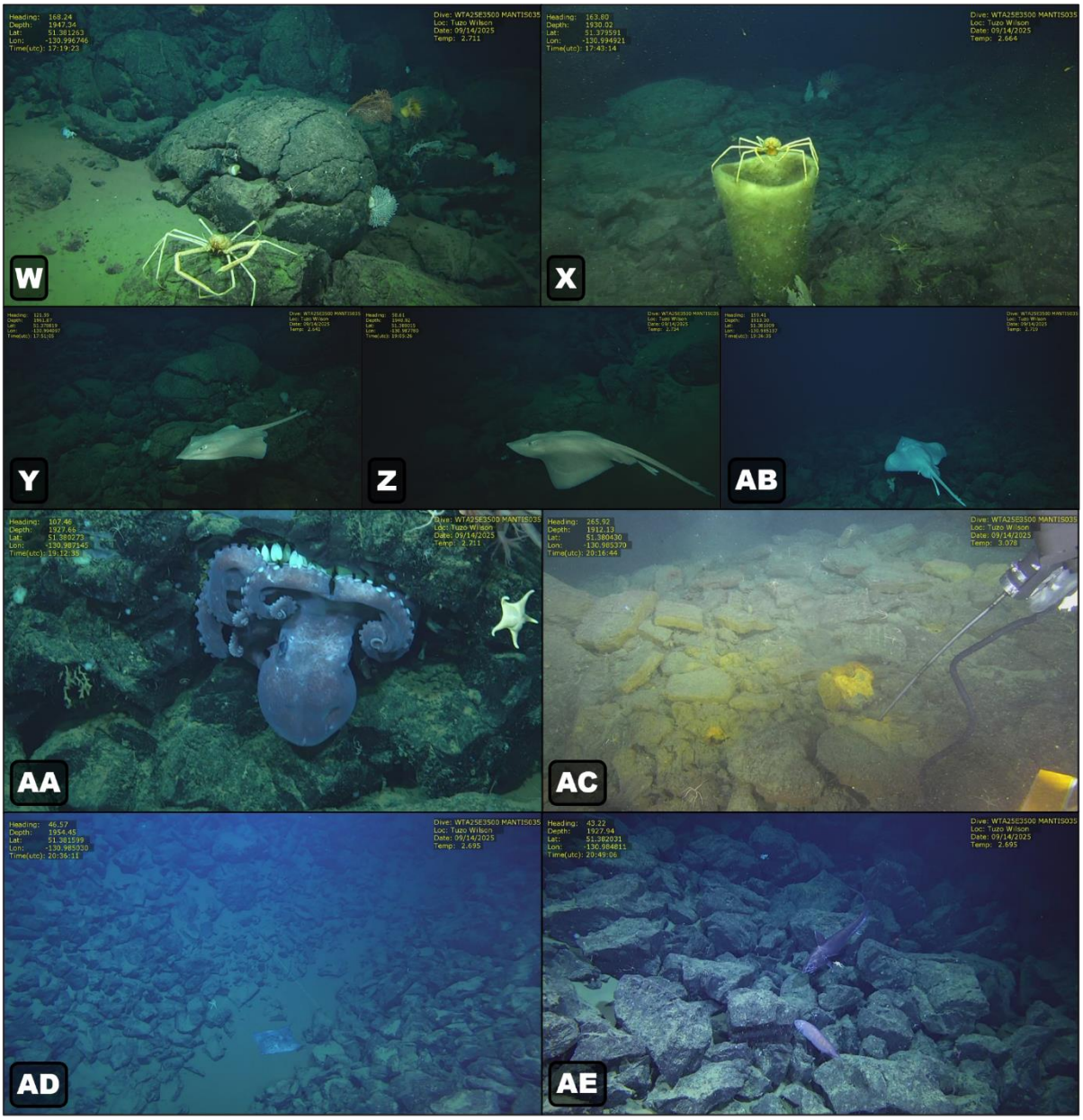

Figure 18. Highlights of dive MANTIS035 in the Tuzo Wilson Seamount Complex on Ts'íidaa Seamount to investigate a heat anomaly detected in Denton (1986). (W) Biota living on and around pillow basalt, (X) Long-clawed Spider Crab with eggs sitting on top of a sponge, (Y) an adult female Pacific White Skate, (Z & AB) adult male Pacific White Skates, (AA) Deep-sea Octopus brooding eggs on the underside of a boulder, (AC) temperature probe being inserted among rocks with yellow staining, measuring for heat

anomalies caused by possible hydrothermal venting, (AD) an adult female Boreal Skate sitting at the bottom of a caldera on soft sediment, and (AE) A snail fish and grenadier swimming over basalt in the caldera. Image lettering corresponds to labels of dive transect in Figure 14.

3.3.2. Haida Gwaii and Zone 504

Dives were planned to document life within the proposed Offshore Haida Gwaii Marine Protected Area (OHG MPA), part of the Great Bear Sea MPA Network in the Northern Shelf Bioregion (MPA Network BC Northern Shelf Initiative 2023). Due to weather conditions the expedition sheltered in Tasu Sound. We multibeam mapped en route which informed the subsequent dive in OHG MPA Zone 504, and did an opportunistic dive in Tasu Sound (Figure 19).

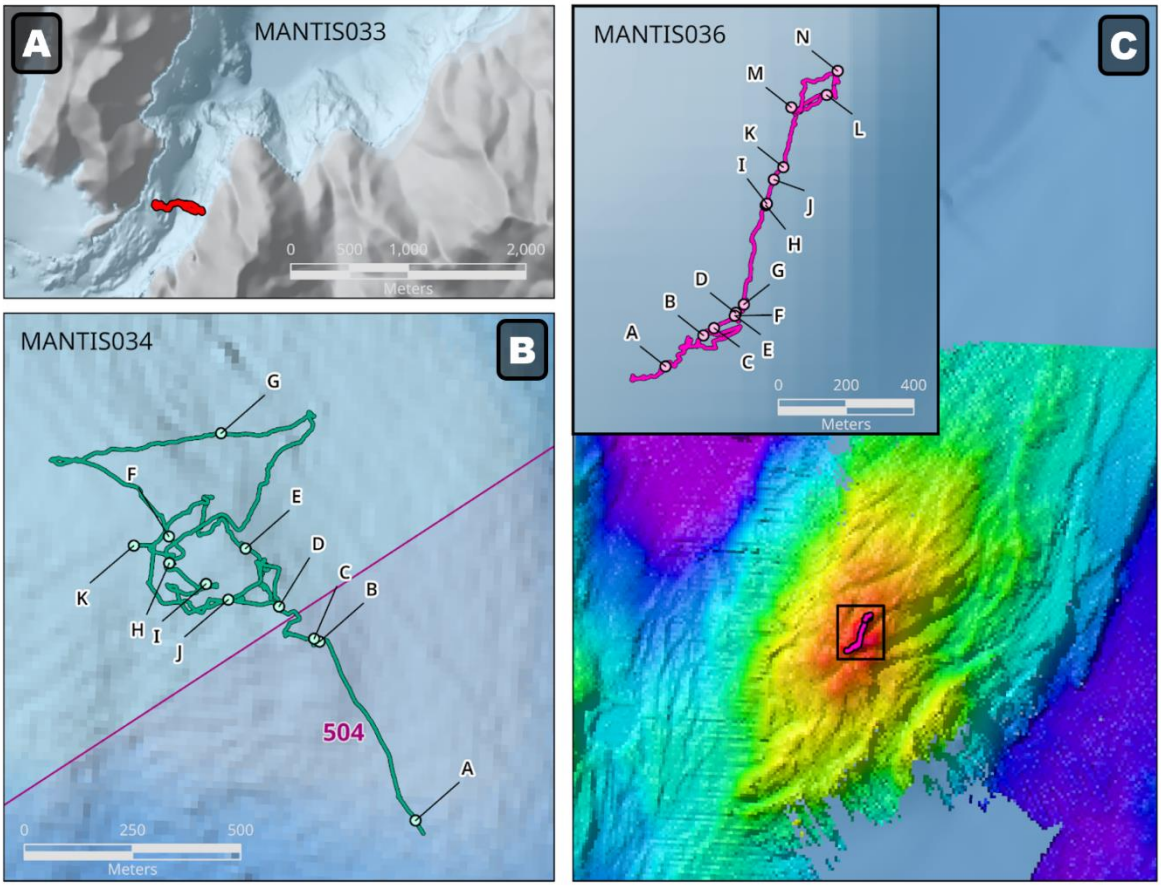

Figure 19. Dives performed using ROV Mantis along (A) the entrance to Tasu Sound, (B) the cold seep identified near the edge of proposed Offshore Haida Gwaii Marine Protected Area Zone 504, and (C) Endeavour Seamount. Dive highlights have been labelled alphabetically which correspond to the images in the following figures. *Map credit: Marilyn Brière-Deschênes, CHN*

MANTIS033

MANTIS033 was an opportunistic dive performed while sheltering from weather along the cliffs bordering the entrance to Tasu sounds (Figure 19; Lat 52.744, Lon -132.102). Parallel transects were performed between ~164 m and the surface along the cliff until the currents became unmanageable and the ROV was recovered.

MANTIS034

MANTIS034 dove HG MPA Zone 504 to confirm a suspected cold seep field identified from a flare in the multibeam water column data mapped on route to Tasu Sound (Figure 11; Figure 12; Figure 19; Figure 20). This cold seep field was previously unknown and the flare was mapped just outside the proposed OHG MPA Zone. The dive followed benthic features identified in the multibeam and the site of the water column flare. The dive commenced in sediment habitat but proceeded to document an extensive cold seep field. Areas of extensive carbonate structures, chemosynthetic organisms, mounded fields with suspected underlying methane hydrate, and methane bubble streams were observed both inside and outside of the current bounds of OHG MPA Zone 504. During this dive, collections included a stalked tunicate (ID M034-01), carnivorous sponge (ID M034-02), a black coral (ID M034-03), and two rock samples. The rock samples were shared with colleagues at Natural Resources Canada for further identification and analysis.

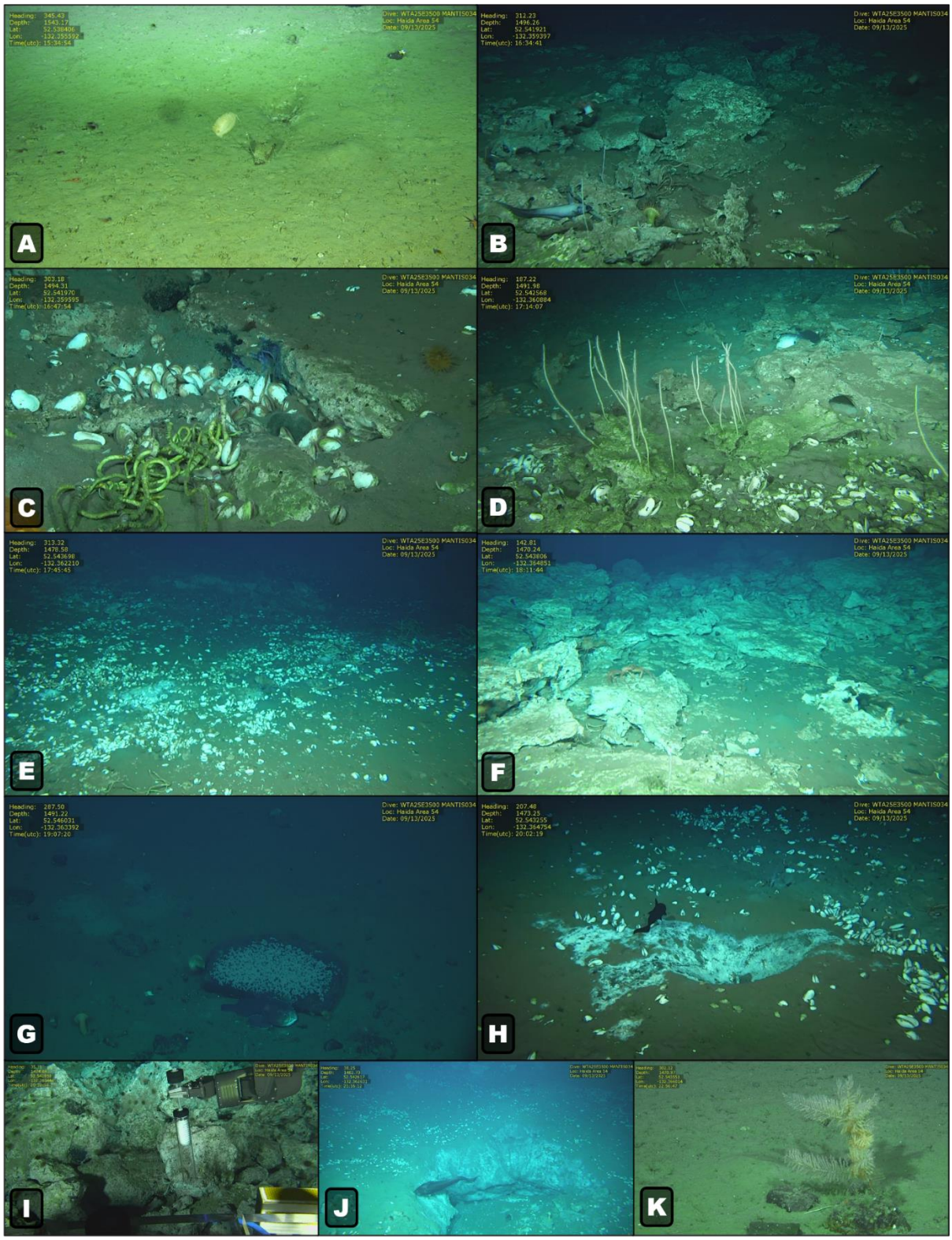

Figure 20. Highlights of dive MANTIS034 along the proposed Haida Gwaii Marine Protected Area network Zone 504. (A) Stalked tunicate on a non-carbonate rock (M034-01), (B) carbonate rock with heterotrophic fauna, (C) carbonate rocks with chemosynthetic microbes (purple sulphur oxidising bacteria) and macrofauna (bivalves and tube worms), (D) carnivorous sponges (M034-02) attached to carbonate rocks, (E) chemosynthetic clam bed, (F) extensive carbonate rock with heterotrophic fauna, (G) Blob Sculpin

adult guarding eggs, (H) chemosynthetic bacterial mat near clam beds, (I) methane hydrate forming from bubbles, during an attempt at quantifying gas emission at a bubble stream, (J) partially buried methane hydrates, (K) Black Coral attached to a non-carbonate rock (M034-03). Image lettering corresponds to labels of dive transect in Figure 19b.

3.3.3. Endeavour Seamount

MANTIS036

The final dive of the expedition, MANTIS036 was performed on Endeavour Seamount in the Tang.ɢwan – ḥačxwiqak – Tsigis MPA, travelling a 1.2 km transect (Figure 19; Figure 21). Upon reaching the seafloor, there were large densities of Boreal and Pacific White Skate eggs, indicating a second skate nursery found on Canadian seamounts. The region was a mixture of loose sediment areas, and rocky areas with cobble and some boulders. There were collections of 8 Pacific White Skate eggs for the population genetics study, and 1 Boreal Skate egg was collected. Several crevices were inspected for yellow staining and venting but there were no indications of heat detected in the area. Notably absent from Endeavour Seamount were dense and large coral and sponge communities (especially when comparing to the skate nursery ground on Ts'íidaa Seamount), though a more significant presence of brittle stars. Where corals did increase, a long-term monitoring site was established (N1; Table 3). Throughout the dive, 12 adult skates (seven female Pacific White Skates, four male Boreal Skates, and one sex-unknown Boreal Skate) were documented. In addition, there were multiple sightings of the Deep-Sea Octopus, Blob Sculpins (*Psychrolutes phrictus)* with eggs, and fascinating sighting of Low-Clawed Crabs (*Macroregonia macrochira*) eating a recently caught (still moving) squid. While observing the crab eating the squid, multiple amphipods were observed near the crab's face and the squid in its claws, presumably feeding on pieces of the squid as the crab tears off pieces. Another Low-Clawed Crab was recorded picking and presumably eating undefended Blob Sculpin eggs.

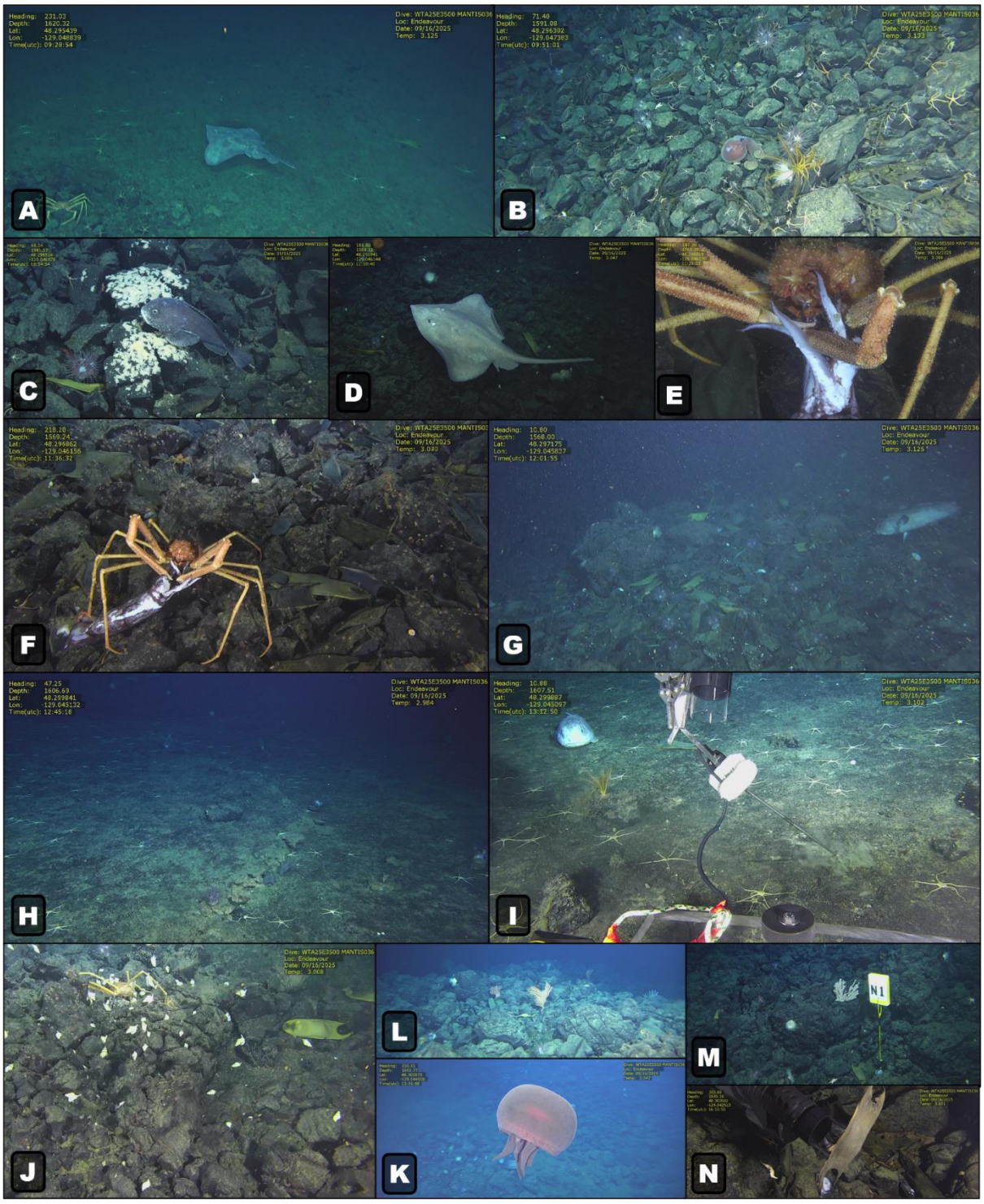

Figure 21. Highlights from dive MANTIS036 on Endeavour Seamount. (A) An adult male Boreal Skate, (B) Deep-sea Octopus among cobble, brittle stars, and skate eggs, (C) Blob Sculpin guarding eggs, (D) an adult female Pacific White Skate swimming along the seafloor strewn with skate eggs, (E) amphipods crawling along a Long-Clawed Crab's face, presumably feeding on squid detritus as the crab eats a squid, (F) Long-Clawed Crab consuming a dying squid beside a pile of skate eggs, (G) an area with abundant skate eggs and marine snow, (H) a crevice with possible yellow colouring in soft sediment, (I) temperature probe was deployed in soft sediment to check for heat anomalies, with biota in the background, (J) patch of gastropods on cobbles near a crab molt and a Pacific White Skate egg, (K) Big Red Jelly, (L) Scattered

corals and other biota on the rocky seafloor, (M) the establishment of a long-term monitoring site (N1), and (N) using the suction sampler to collect a Pacific White Skate egg collection.

3.4. Sampling

Across five dives (Figure 14), a total of 77 samples were collected, three of which were rock samples from Ts'íidaa and a cold seep near Zone 504, 30 were Pacific White Skate eggs, and one Boreal Skate egg. Tissue samples from biological samples were collected when possible, resulting in 27 duplicate samples for genetic analysis and reference storage. All specimens were either preserved in 70% ethanol or frozen at -20° C.

Pacific White Skate eggs were collected for two ongoing studies. The first utilized 22 eggs collected from the Ts'íidaa nursery for energy density and proximate analysis measurements, while the five viable embryos (four Pacific White Skate and one Boreal Skate) from the Endeavour Seamount nursery were tissue sampled and preserved for an ongoing research into a Pacific White Skate population genetics. All benthic samples are summarized in Appendix 5. Benthic Collections with preliminary (at the time of sampling) taxonomic identification and all records are stored online in the Marine Spatial Ecology and Analysis Azure database. Samples not used for the skate egg studies will be used to resolve taxonomy and will be deposited to the Royal BC Museum.

3.5. Mooring Deployment

During the expedition, two ONC moorings were deployed, one on the summit of Ts'íidaa and the other on NEPDEP 54 (Figure 22). Both moorings are being used to monitor the oxygen minimum zone near the seamounts. The moorings have a planned 1 year deployment and data will not be accessible until the moorings are recovered.

During a subsequent dive at Ts'íidaa (MANTIS032), the mooring landing site was investigated (Figure 17Q). The mooring deployment target was adjacent to monitoring site K5 (Table 3), but upon inspection the mooring had landed slightly off target, resting on a nearby cliff. The mooring bottom weight (Lifting Bar and Train Wheel) were sitting at a depth of 1622 m, which is 27 m deeper than the targeted 1595 m, and should be taken into account upon data collection and water column analysis on Ts'íidaa.

Due to incoming weather, we were not able to inspect the mooring deployed at NEPDEP54 with the ROV. The deployment went according to plan and appeared to land in the correct region.

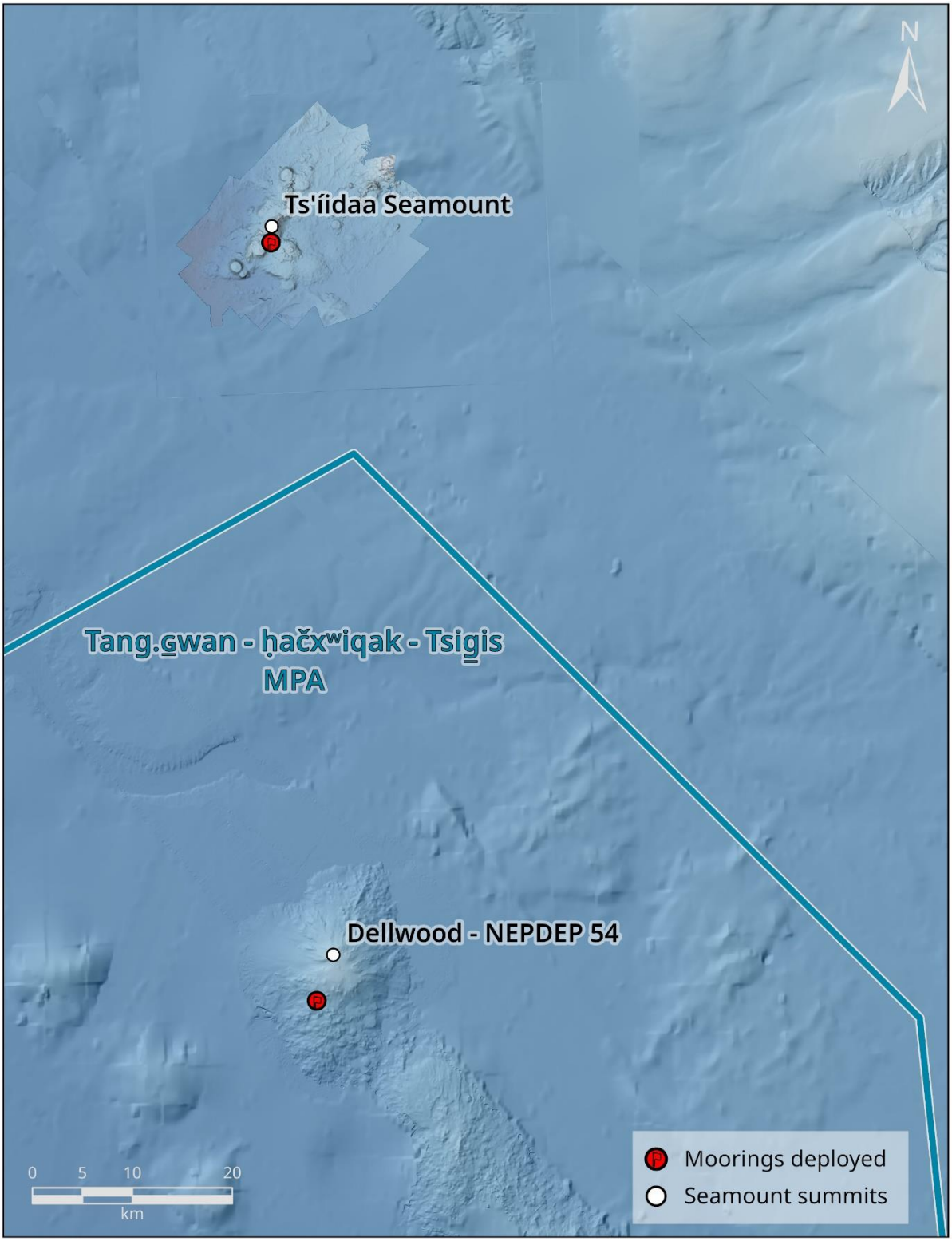

Figure 22. Mooring deployment sites at Ts'íidaa and NEPDEP 54. *Map credit: Marilyn Brière-Deschênes, CHN*

3.6. Marine Mammals, Seabird, and other Transient Species Observations

During the expedition, 11 sea surface wildlife observations were made and reported in Seatube. This included 9 marine mammals observations and two large fish observations (Table 5). Species sighted include Humpback Whales (*Megaptera novaeangliae*), Dall's Porpoise (*Phocoenoides dalli*), Unidentified Dolphins (*Delphinidae sp.*), Ocean Sunfish (*Mola mola*), Blue Shark (*Prionace glauca*), a Fin Whale (*Balaenoptera physalus*), and Orcas (*Orcinus orca*). Most identifications occurred with high confidence, the only exception being the Blue Shark and Dolphin identifications. When possible the wildlife was photographed to aid in its identification (Figure 23).

Table 5. Opportunistic sea surface wildlife observations.

Species	Count	ID Confidence	Date and Time (UTC)	Latitude	Longitude
Humpback Whales (*M. novaeangliae*)	1-2	Certain	2025-09-06 01:36:04	49.68188167	-127.4475617
Humpback Whales (*M. novaeangliae*)	3	Certain	2025-09-06 01:45:42	49.69355333	-127.4725517
Humpback Whales (*M. novaeangliae*)	2	Certain	2025-09-06 02:01:01	49.70958	-127.50959
Humpback Whales (*M. novaeangliae*)	3	Certain	2025-09-06 02:09:36	49.71872833	-127.531715
Dall's Porpoise (*P. dalli*)	Many	Certain	2025-09-09 21:00:13	51.40180833	-131.0149167
Ocean Sunfish (*M. mola*)	1	Certain	2025-09-13 22:00:48	52.543045	-132.3616083
Blue Shark (*P. glauca*)	1	Fair	2025-09-14 01:08:05	52.53718667	-132.3147467
Dolphins (*Delphinidae* sp.)	~20	Certain	2025-09-15 01:00:00	51.01449	-130.9651883
Fin Whale (*B. physalus*)	1	Good	2025-09-15 01:00:00	51.01449	-130.9651883
Humpback Whales (*M. novaeangliae*)	6-10	Certain	2025-09-17 17:08:12	48.49702167	-124.879985
Orcas (*O. orca*)	4	Certain	2025-09-17 17:08:12	48.49702167	-124.879985

Figure 23. Surface observations of seabirds, large fish, and marine mammals were collected opportunistically throughout the expedition. Imaged above are (A) an Ocean Sunfish (*M. mola*; red arrow) being followed by a flock of gulls and (B) two Humpback Whales (*M. novaeangliae*). *Image credits: Julian Smith, DFO*

3.7. Outreach, Communication, and Community Engagement

Dives were livestreamed to the public on the NEPDEP website and on the NEPDEP Facebook page. Traffic to the pages reached over 8,000 during the expedition. The at-sea team was able to engage with audiences through the chat function under the dives. Collaborating researchers were able to watch in real-time and contribute to the dives and research by communicating with the at-sea team.

Email newsletters “News from the 2025 NEPDEP expedition” were sent to all collaborators and interested parties to keep them informed of changes to schedules or the major events of the expedition (Appendix 6. Newsletters). A total of 4 newsletter were distributed across the expedition.

Four ship-2-shore events were held while at sea. These events were well received and the at-sea team was able to talk with audiences at the Royal BC Museum, classrooms on Haida Gwaii, visitors at the Shaw Centre for the Salish Sea, and learners at Broad Reach Canada. Additionally, Heidi and Marilyn were able to present at the Upwelling series: Climate Change and Marine Protected Areas Knowledge Sharing Event on CHN and DFO shared research.

4. Conclusions

The 2025 NEPDEP expedition – Seamounts and Mapping (PAC2025-M14) completed multiple science objectives and contributed to many ongoing research projects which support the monitoring, management, and conservation of the deep sea. NEPDEP is a United Nations Ocean Decade-endorsed project that contributes to our global understanding of the deep through the Challenger 150 program.

This was an expedition that used incredible technology to map the seafloor and document the remarkable life in the deep. We began by visiting one of the most geologically dynamic regions of the ocean — an ancient underwater volcano located at the intersection of three tectonic plates - home to a globally unique deep-sea skate nursery, nestled on the geothermally heated summit. We mapped and expanded the new nursery area, found signs of more heat emanating from the seamount, found a second Precious Coral bed, and tracked the journey of adult skates including a female in the midst of laying an egg.

Our trip continued to gather data on a newly proposed Offshore Haida Gwaii marine protected area in the Great Bear Sea MPA Network in the Northern Shelf Bioregion. Multibeam technology provided evidence of bubbles emerging over 800 m up into the water column from the seafloor. Upon diving the area, we were able to discover a new cold seep habitat including chemosynthetic animals, young-looking carbonate concretions, blow-out craters (pockmark-like) and features of mounds with gas hydrate underneath.

The final discovery of the expedition challenged our understanding of deep-sea skate nurseries as imagery collected from the summit of Endeavour Seamount revealed the region's second, and possibly larger, skate nursery ground.

While many of the scientific objectives were achieved, there were multiple which were not able to be completed. Regions that were not able to be surveyed included Union Seamount and Baby Bare. These regions were not visited due to travel speeds (8 knots, instead of the expected 10 knots) and inclement weather limiting ROV working days. Ship transit speed could be increased by one or two knots without the MBES pole attached to the CanPac Valour, but that would remove the mapping capabilities of the ship. Alternatively, changes to the MBES mount, such as adding a swivel to lift the pole out of the water when not mapping, could allow the ship to travel at full speed.

Much of the data collected on this expedition is undergoing continued analysis and processing. New findings and conclusions from this data will be discussed and shared with survey collaborators to determine next steps and future work.

5. Literature Cited

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Gartner, H., Best, M., Boyko, R., Labbé, D.M., Lauer, R., MacIntosh, H., Skil Jáada (Zahner, V.), Stacey, C.D., Stanley, C., and Du Preez, C. 2025. Biophysical and Ecological Overview of the Tuzo Wilson Seamount Complex. Can. Tech. Rep. Fish. Aquat. Sci. 3689: x + 109 p. https://doi.org/10.60825/wcjj-h160

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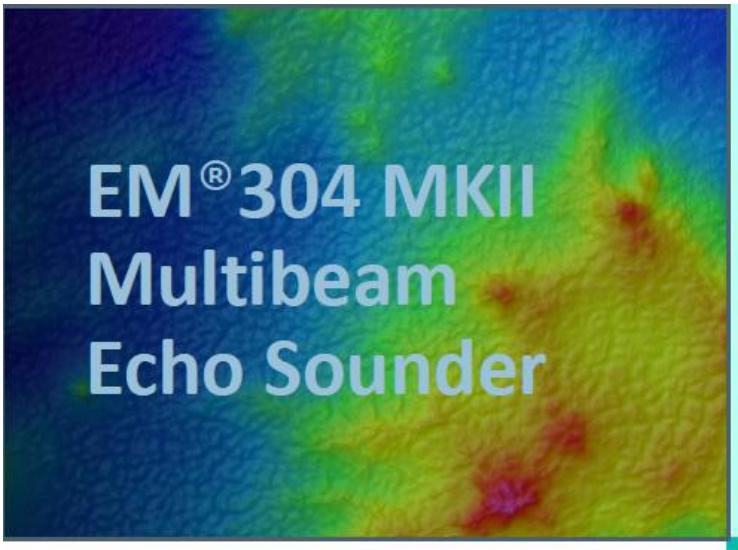
Appendix 1. Kongsberg EM®304 MKII multibeam echosounder Specification Sheet



KONGSBERG

Contact Sales

kd.sales@kd.kongsberg.com
+47 33 03 41 00

Full ocean depth
26 kHz

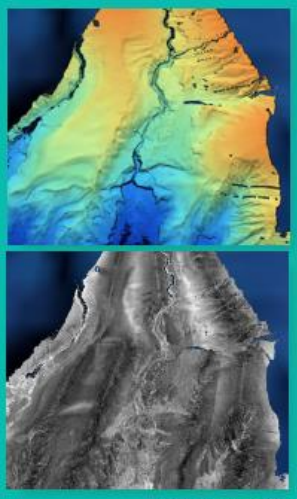
The EM304 MKII consists of new, state-of-the-art electronics and separate transmit and receive transducers in a Mills Cross configuration. It utilizes the same field-proven receive transducer as its predecessor, EM302, and a **new redesigned wide band transmit transducer** increasing the depth and coverage. The system can be tailored to **almost any required size.**

The largest standard size, 0.3 x 0.5 degrees, gives the ultimate system performance in terms of resolution and range, while a smaller 4 x 4 degrees solution can be installed on any vessel of opportunity. The EM304 MKII performs accurate, high resolution seabed mapping in shallow waters to full ocean depth. A low noise echo sounder, EM304 MKII delivers superior data requiring minimal post-processing.

Full seabed coverage
Compared to the EM302, the EM304 MKII has an **increase of 75% swath performance at 6000m.** The transmit fan is divided into up to 16 individual sectors in dual swath mode. This allows for unique control of the transmit fan, enabling active stabilization in real time to correct for any yaw and pitch movement of the vessel, while roll stabilization is applied on the receiving beams. The result is a stabilized system for full ensonification of the seabed with equally distributed footprints, even in bad weather conditions, leaving no gaps or holes in the mapped area. All beams are maintained and automatically adjusted according to achievable coverage or operator defined limits. Up to 1600 individual beams are available in dual swath mode where two individual transmitting fans are generated with a small difference in tilt giving a constant sounding separation alongtrack, resulting in a dense sounding pattern on the seafloor.

Key Features

- Frequency range 20-32 kHz
- Clean and high resolution data
- Modular and flexible design
- Roll, pitch and yaw stabilization in real time
- Transmit and receive nearfield focusing
- Marine mammal protection
- Ice windows available
- Sub Bottom Profiler integration available
- Backscatter calibration service available



kongsberg.com/discovery

463787/B January 2025

Technical Specifications						
Common Options*	0.3° x 0.5°	0.5° x 1°	0.6° x 1°	1° x 2°	2° x 4°	4° x 4°
TX Length	10.1 m	6.8 m	4.9 m	3.4 m	1.8 m	0.9 m
RX Length	6.6 m	3.3 m	3.3 m	1.7 m	0.9 m	0.9 m
No. of TX modules	24	16	12	8	4	2
No. of RX modules	16	8	8	4	2	2
Max no. of beams per ping	1600	1600	1600	1024	512	512
TX beamwidth	0.3°	0.45°	0.6°	0.9°	1.8°	3.6°
Rx Beamwidth	0.46°	0.9°	0.9°	1.9°	3.7°	3.7°

Beamwidth is calculated for nadir sectors in medium depth mode and 1500 m/s sound velocity.
* 0.3 x 0.5 degree system is the largest possible system available with two transmitter and receiver units.
** 0.6 x 1 degree system is the largest possible system with one transmitter and receiver unit.

Frequency range	20 to 32 kHz	Roll stabilized beams	±15°	Transmitter Unit dimensions (W x H x D) and weight	606 x 898 x 612 mm	70-96 kg
Max ping rate	>5 Hz	Pitch stabilized beams	±10°	Receiver Unit dimensions (W x H x D) and weight	488 x 285 x 240 mm	21 kg
Swath coverage sector	Up to 150°	Yaw stabilized beams	±10°	Beam patterns	High density equidistant and equiangular	

Clean, high resolution data

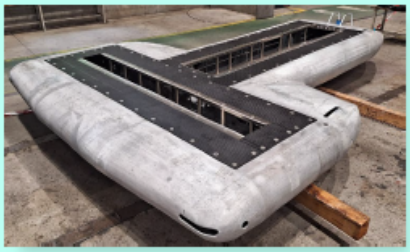
Due to the sector transmission technique, the system produces a strong dampening of multi-bounce interference from false echo, resulting in significantly cleaner data. Near-field beam focus is applied in real time, both during transmission and reception. Due to sector transmission the focal point will be individual for each sector, resulting in a much sharper transmit beam over the entire swath. On reception, the focus is applied dynamically for each beam. The result is a much higher resolution representation of the seabed.

Ice windows

Acoustic ice protection windows can be offered for vessels going to the ice edge and for ice breakers. TX and RX ice windows are made of polyether urethane, reinforced with titanium rods, available in 70 mm thickness.

Upgrade path

EM302 users can upgrade to the EM304 MKII in two stages. First, the topside electronics can be replaced. Second, the transducer arrays are replaced. This allows operators the flexibility to upgrade the system within both budget and scheduling constraints.



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Front top image from NOAA Ocean Exploration. Data images from Ifremer. Left, Kongsberg Discovery custom designed portable gondola in galvanized steel.

463787/B January 2025

Appendix 2. Manta Camera Specification Sheet

Manta

CAMERA SERIES

The FHD IP camera with 360x zoom

Features

- 1080p-FHD-IP or HD-SDI camera
- 30x optical zoom and 12x digital zoom
- Local recording to SD card
- ONVIF profile S compliant
- Extern pan/tilt/light connection
- 1,000m rated
- Durable, anodized aluminum housing

Technical specifications on reverse.

Arctic Rays specializes in deep-sea lighting and imaging systems and other custom solutions specifically for use on AUVs, ROVs, manned submersibles and other offshore and underwater structures.

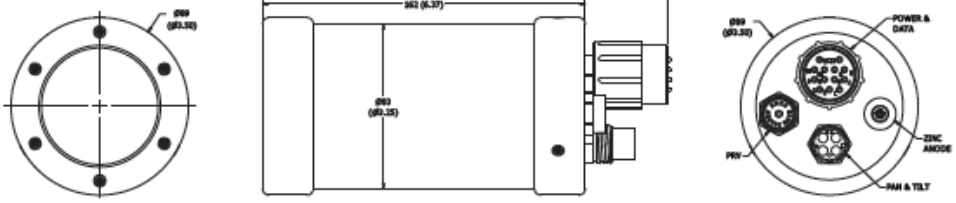
Think deep.
arcticrays.com • 1.321.610.4635

ARCTIC RAYS
SUBSEA TECHNOLOGIES

Manta

Technical Specifications

PARAMETER	SPECIFICATION
Model Number	AR 205
OPTICAL	
Camera Sensor	Sony FCB-EV7520A, 1/2.8" Exmor R, back-illuminated CMOS
Camera Lens	4.3 mm (wide) to 129.0mm (tele); f/1.6 to f/4.7
Focus	Auto, manual, one-push AF, interval AF, zoom trigger AF
Exposure	Auto, manual, shutter priority, iris priority, bright, EV compensation, slow AE
Zoom	30x optical, 12x digital (360x combined)
SNR	>50 dB
Supported Resolutions	1,920x1,080 (FHD); 1,280x720 (HD)
Max Frame Rates	30 fps (NTSC), 25 fps (PAL), progressive scan
Angle of View in Water	Flat port: 53°D, 47°H, 28°V; Dome port: 73°D, 64°H, 40°V
Minimum Illumination	0.0015 lux
INTERFACE	
Connector	Subconn DBH13M (Ethernet IP) or Subconn CX75BH6M (HD-SDI)
Video Outputs	Ethernet IP streaming or HD-SDI (coax)
IP Network	10/100 Base-T ethernet
IP Video Latency	<200 ms (glass to glass)
Supported Protocols	TCP/IP, UDP/IP, IPv4/6, RTSP, RTP, RTCP, HTTP, HTTPS, FTP, DHCP, ARP, ONVIF Profile S, Bonjour, Zeroconf, UpnP, built-in configuration webpage
Onboard Recording	Optional: MPEG4 (H.264), MJPEG
Onboard Storage	Optional: 128GB microSD card; remote file download via FTP
Remote Control	Sony VISCA via ethernet TCP/IP or RS232
PTL Control	Optional: external pan/tilt/lighting control via passthru serial port over TCP/IP
PTL Connector	Subconn MCBH4F standard
PTL Standard Pinout	1:GND; 2: +V out; 3: RS232 RX; 4: RS232 TX
ELECTRICAL	
Voltage	10–36 VDC standard; other ranges optional
Power	8 W @ 24 VDC
MECHANICAL	
Weight	1.2 kg (2.7 lbs) in air; 340 g (0.75 lbs) in seawater
Materials	6061-T6 aluminum housing (AHC black) with Delrin bezel; acrylic (flat) or BK7 glass (dome) viewport; other materials optional
ENVIRONMENTAL	
Depth Rating	1,000 m (3,300 ft) standard; other depths optional
Temperatures	-5°C to 50°C operating; -10°C to 60°C storage



Appendix 3. Specimen Preservation

Phylum	Taxon	Default fixative (taxonomy)	Additional sampling / other consideration (if practical)	Tissue notes
Porifera	Porifera (small)	Ethanol	No relaxation needed	Look for less fouled areas
	Porifera (large)	Ethanol or freezer	No relaxation needed	Look for less fouled areas
Cnidaria	Hydroids	Ethanol	Relax - menthol crystals or magnesium chloride	
	Jellyfish	Formalin	Relax - try menthol crystals or see resources	Try a chunk of the bell; avoid manubrium and digestive system
	Black coral (Antipatharia)	Ethanol or freeze	ASAP	
	Octocorals (Alcyonacea)	Ethanol or freeze	ASAP	
	Anemones (Actinaria)	Formalin	Relax - menthol crystals or freeze (deep sea only)	Tough because of mucus, feeding strategies, etc. Go for tentacles if enough tissue and not obviously fouled OR body wall (more damage to specimen usually)
	Corals (Scleractinia)	Ethanol		
Ctenophora	Comb jellies	Formalin or dilute ethanol	Difficult! - try ethanol ladder (weak to strong) or see resources	
Platyhelminthes	Flatworms	Formalin	Relax - menthol crystals or freeze	Usually mid body, one side
Echiura	Echiura	Ethanol	Relax - e.g. menthol crystals or freeze	
Sipuncula	Sipuncula	Ethanol or Formalin	Relax - e.g. freeze or mag chloride	
Phoronida	Phoronids	Ethanol		
Kamptozoa	Kamptozoa	Ethanol		

Phylum	Taxon	Default fixative (taxonomy)	Additional sampling / other consideration (if practical)	Tissue notes
Bryozoa	Bryozoa	Ethanol		
Annelida	Polychaetes	Formalin or ethanol	Preferably formalin; relax with magnesium chloride or menthol crystals	Usually mid body, one side (non-diagnostic features)
Mollusca	Chitons	Ethanol	Try to flatten	Chunk of foot, near middle
	Bivalves and gastropods	Ethanol	Relax - freeze	Chunk of foot, near middle
	Sea slugs / nudibranchs	Ethanol	Relax - freeze or magnesium chloride	Chunk of foot, near middle
	Cephalopods	Formalin	Don't collect. Anaesthetize! E.g. p. 698 in Light and Smith	
Echinodermata	Sea stars and sand dollars	Ethanol		Cut off the tip of one arm
	Sea cucumbers and urchins	Ethanol	Relax - menthol crystals or mag chloride	Tough - see resource notes
	Brittle stars	Ethanol	Relax - freeze	Cut off the tip of one arm
Crustacea	All	Ethanol	Relax - freeze (if dropping legs too easily then don't freeze)	Non-diagnostic leg(s)
Pycnogonids	Seaspiders	Ethanol		Non-diagnostic leg(s)
Tunicata	Ascidia	Formalin	Relax - menthol crystals or magnesium chloride	Non-colonial – avoid branchial basket
	Salps / Pyrosomes	Formalin	Relax - magnesium chloride	
Sediment samples	Macrofauna	Formalin or ethanol	Preferably in formalin; ensure large volume of preservative relative to sediment volume	

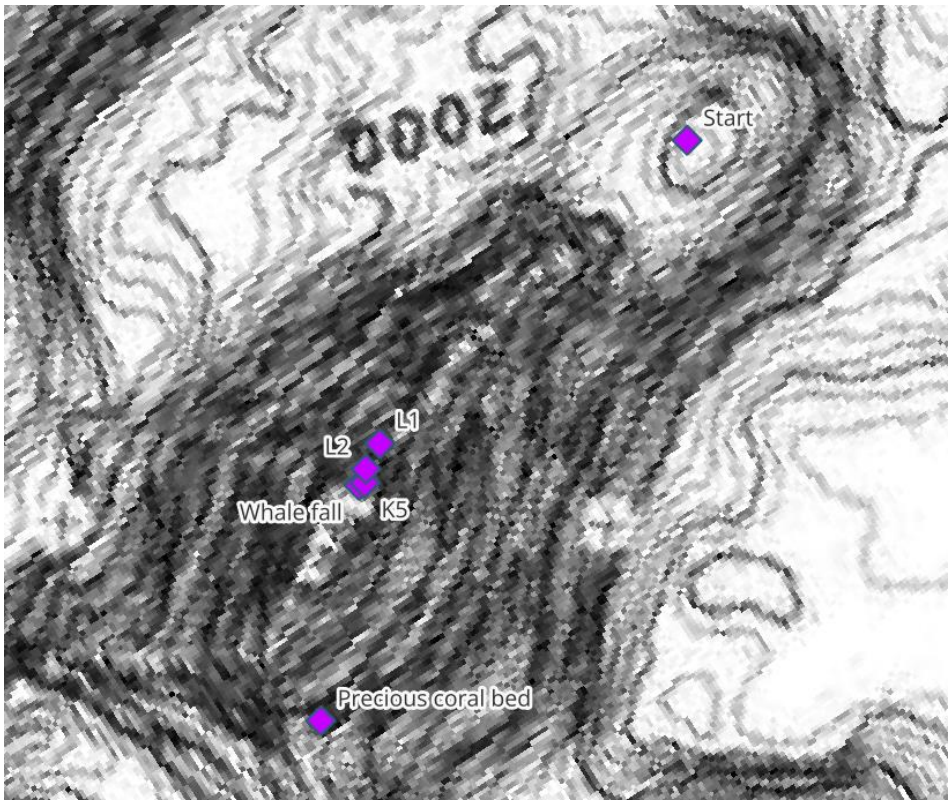
Appendix 4. Dive Plans

MANTIS030 Dive Plan

NEPDEP - Seamounts & Mapping; PAC2025-M14

Tuzo Wilson Seamount Complex - Long-term monitoring sites

September 7, 2025



Vehicle Configuration

Manta HD camera as pilot camera, downward facing stills camera just off centre on porch. BBC - Big Dave (up near main camera on same pan and tilt) and Opti (on porch). Porch has two bioboxes (divided into 4 each), 2 outside bioboxes, 6 suction sample containers, 4 cores.

Summary info

Mapping and sampling of the skate nursery on the summit of NEPDEP58 Seamount in the Tuzo Wilson Seamount Complex. Collect information for advice re: potential protection (skates, corals, extent, thermal, etc.). Resurvey long-term monitoring sites and collect golden eggs from the summit for energy study.

Dive time	7:00-19:00	**Distance**	1.2 nmi (2.2 km)
Depth Range	1900-1597 m	**Lead/Annotation**	Heidi, Tammy, Daniel

Dive Plan

Transit from **Start** up toward long-term monitoring sites where we will run photomosaics. Moving from **L1, L2, K5**, to **Whalefall**. Stopping along the way between long-term monitoring sites to collect golden skate eggs.

Waypoints

Name	Lat	Long	Depth	Source	Info
Start	51.41464	-130.995	~1800	Cones	Volcanic cone from Allen 1993
L1	51.40306	-131.013	1603.207	2024 waypoints	Transect on venting ridge, est. 2023
L2	51.40209	-131.014	1600.859	2024 waypoints	Pan around boulder, est. 2023
K5	51.40156	-131.014	1596.984	2024 waypoints	10x10 m, est. 2023 (more like a 15 by 30)
Whale fall	51.40146	-131.015	1597.988	2024 waypoints	Intact skeleton, est. 2023 (no marker), run parallel lines
Precious coral bed	51.39247	-131.017	1810.691	2024 waypoints	Where 3 skates were observed together

Science notes

- Collecting eggs for energy study (collaborating with Erika Eliason)
- Mapping, proposed MPA (DFO & CHN)
- Long-term monitoring sites (DFO)

Activity notes

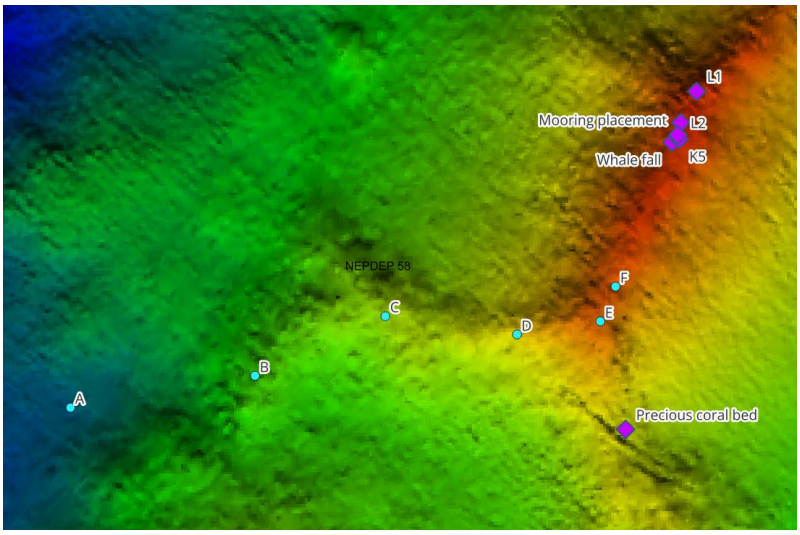
Before dive	Transit from Alberni and night of multibeam
After dive	Multibeam area

Dive Execution

Came down a little northwest of start but transected over. Huge pillow lavas at start. Worked our way up through to almost reaching L2 but bypassed L1 while following the ridge/feature. Collected eggs, sponges, and precious coral. Huge shadow in downward facing so did not attempt mosaics. Asked for it to be recorded once started noticing it hadn't been on and lots to document in the downward facing camera. CTD and temperature probe did not work. Opti pan and tilt broke early on (BBC camera). Right manipulator had hydraulic issues.

MANTIS031 Dive Plan

NEPDEP - Seamounts & Mapping;
PAC2025-M14



Tuzo Wilson Seamount Complex - West Side

September 8, 2025

Vehicle Configuration

Manta HD camera as pilot camera, downward facing stills camera just off centre on porch. BBC - Big Dave (up near main camera) and Opti (on porch with new pan and tilt). Porch has two bioboxes (divided into 4 each), 2 outside bioboxes, 6 suction sample containers, 4 cores.

Summary info

Mapping and sampling of the skate nursery on the summit of NEPDEP58 Seamount in the Tuzo Wilson Seamount Complex. Collect information for advice re: potential protection (skates, corals, extent, thermal, etc.). Look for juvenile nursery ground deep and to the west. Potentially, resurvey long-term monitoring sites and collect golden eggs from the summit for energy study.

Dive time	11:00-20:00	**Distance**	2500 m or 1.1 nmi
Depth Range	2200-1700 m	**Lead/Annotation**	Heidi, Tammy, Daniel

Dive Plan

Start deep at **A** looking for juveniles, then move up slope and ridge to **F.** If time allows, move toward long-term monitoring sites to run photomosaics (unlikely but aim for **K5**). Stopping along the way to collect golden skate eggs and document any behaviours.

Waypoints

Name	x	y
A	-131.045	51.39315
B	-131.036	51.39414

C	-131.029	51.39602
D	-131.022	51.39544
E	-131.018	51.39585
F	-131.017	51.39694

Science notes

- Collecting eggs for energy study (collaborating with Erika Eliason)
- Mapping, proposed MPA (DFO & CHN)
- Long-term monitoring sites (DFO)

Activity notes

Before dive	Mantis030 Dive, Multibeam overnight
After dive	Multibeam area

Dive Execution

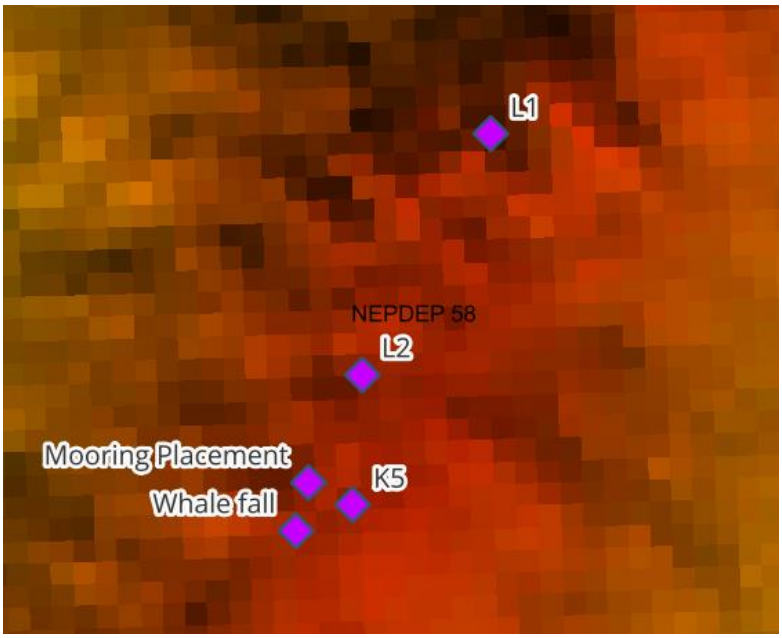
Delayed start again but everything was working today (ctd, temperature probe, pan and tilts). Had position issues near start of dive - when ins wasn't working switched to usbl and then again later from ins. Started just off of A in deep sedimented pillow basalt. No juveniles sighted. Worked our way through points though there were some challenges following the curved ridge between B and C. Saw the first female Boreal around 2150 m. We saw 5 total Boreal Skate (3 males, 2 females). Started seeing eggs at 1723, and hit some very dense areas over the dive (new area for nursery!). Finished our A-E explore and began working our way to the monitoring sites stopping to take two temperature measurements (0.1 degree difference and 0.5) and collect eggs. We were collecting eggs near the summit when we spotted a female Pacific White Skate and abandoned the egg collection. We followed the female for about an hour and documented an egg case protruding from her cloaca.

MANTIS032 Dive Plan

NEPDEP - Seamounts & Mapping; PAC2025-M14

Tuzo Wilson Seamount Complex - Long-term monitoring sites

September 9, 2025

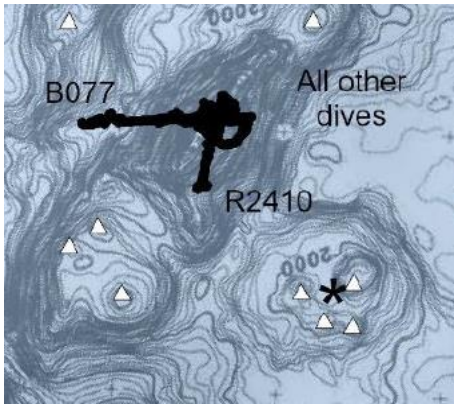


Vehicle Configuration

Manta HD camera as pilot camera, downward facing stills camera just off centre on porch. BBC - Big Dave (up near main camera on same pan and tilt) and Opti (on porch). Porch has two bioboxes (not divided today), 2 outside bioboxes, 6 suction sample containers, 4 cores.

Summary info

Mapping and sampling of the skate nursery on the summit of NEPDEP58 Seamount in the Tuzo Wilson Seamount Complex. Collect information for advice re: potential protection (skates, corals, extent, thermal, etc.). Resurvey long-term monitoring sites and collect golden eggs from the summit for energy study.



UPDATE - Mooring deployment took a very long time. Starting dive late… going to do a super long dive today and then running from weather. If time permits will head to the temperature anomaly site (asterisk).

Dive time	15:00-02:00	**Distance**	0.19 nmi (230 m)
Depth Range	~1600 m	**Lead/Annotation**	Heidi, Tammy, Daniel

Dive Plan

Check mooring position. Transit between long-term monitoring sites where we will run photomosaics. Stopping along the way between long-term monitoring sites to collect golden skate eggs and document any behaviours.

Waypoints

Name	Lat	Long	Depth	Source	Info
L1	51.40306	-131.013	1603.207	2024 waypoints	Transect on venting ridge, est. 2023
L2	51.40209	-131.014	1600.859	2024 waypoints	Pan around boulder, est. 2023
K5	51.40156	-131.014	1596.984	2024 waypoints	10x10 m, est. 2023 (more like a 15 by 30)
Whale fall	51.40146	-131.015	1597.988	2024 waypoints	Intact skeleton, est. 2023 (no marker), run parallel lines
Precious coral bed	51.39247	-131.017	1810.691	2024 waypoints	Where 3 skates were observed together

Science notes

- Collecting eggs for energy study (collaborating with Erika Eliason)
- Mapping, proposed MPA (DFO & CHN)
- Long-term monitoring sites (DFO)
- Film BBC

Activity notes

Before dive	Mooring deployment
After dive	Multibeam new area

Dive Execution

Drifted and came down to the west between L1 and L2 so adjusted plan and worked from L1 south. I messed up first pass at L1 but adjusted according to heading and depth and mosaic was successfully completed (may have overshot, unfortunately lasers may have been on). L2 seemed good - difficult to estimate distance from rock (gain lasers may have not been properly cycled). Mooring check… went down a little cliff so not where we wanted (may explain the weird pings of beacon). Depth at 1622 which puts it off from K5 at approx 1595 m. K5 mosaic completed successfully. Note - run at higher altitude than previous years and means a lot of overlap in imagery, iris not always consistent for forward-facing, lasers cycled properly, Travis (nav) ran it by mapping and eventually just passed reigns to him, took a lot of passes (likely because of height), did interrupt several times to follow nearby skates. Whalefall monitoring site notes - first line around 3 m, next 3 at 4 m. We travelled mow pattern instead of all lines starting at jaws. Noticed disturbance in the bone configuration. Collected 17 skate eggs. Tried to finish dive with a few temperature measurements and adult skate sightings. Ran the dive into early morning because picking up to move on due to weather and transit times needed.

Skates observed:

Female Boreal - review for egg?

Female Boreal

Female Abyssal - Heidi missed but thinks this

Female Pacific White - shot no egg

Possible Abyssal - review footage

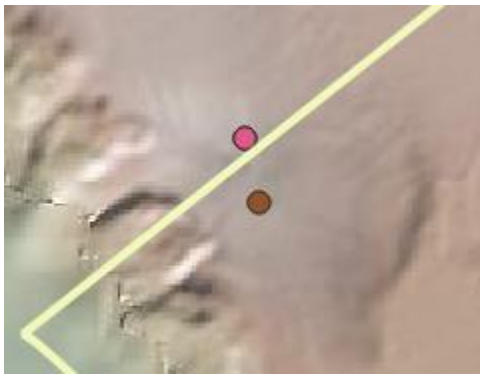
Male Boreal

Pacific White - review downward for ID and sex, the skate got away during ROV maneuver

Female Abyssal - mis ID’d at first

Haida Gwaii 504 - Possible cold seep

September 13, 2025



Vehicle Configuration

Manta HD camera as pilot camera, downward facing stills camera just off centre on porch. BBC - Big Dave (up near main camera on same pan and tilt) and Opti (on porch). Porch has two bioboxes (divided in 4), 2 outside bioboxes, 6 suction sample containers, 3 cores.1 core modified to potentially measure bubbles with graduated core.

Summary info

Document potential cold seep site just on the edge of proposed Haida Gwaii Zone 504. Multibeam data suggested a very tall bubble plume (close to 1 km). *Note - map and dive path to be updated in morning based off of multibeam data.*

Dive time	07:00-20:00	**Distance**	More like 800
Depth Range	~1520-1480m	**Lead/Annotation**	Heidi, Tammy, Daniel

Dive Plan

Descend and do exploratory transect looking for evidence of cold seeps (bubbles, chemosynthetic animals, carbonate). Map extent if found. If bubbles are discovered measure bubble flow rate with modified core. Collect any specimens.

Waypoints

TBD - morning

Science notes

- Mapping, proposed MPA (DFO & CHN)034

Activity notes

Before dive	Multibeam area

After dive	Multibeam and transit south

Dive Execution

Slight adjustments to dive based on multibeam and the proceeded.

Coming down close to ‘summit’ within 504 boundary. Collection early on. Colour balance seems quite green today. Lighting off center for downward facing - side lighting from port. Extensive carbonate starting 400 m from bubble target. Some patchiness but continued to the bubble point. No bubbles sighted at location, actually not much carbonate there either - however still extensive carbonate nearby. Decided to work toward other point of bubble detection (the big first one). Transit between the areas showed no carbonate and no bubbles at that waypoint either. Worked toward summit with little to no evidence of cold seep (though still very mud volcano-like with little rocks and boulders, occasional shells. After ‘summit’ worked way back down trying to map the western extent of the carbonate/cold seep area. Did eventually find bubbles. Bacteria, chemosynthetic animals, carbonate, and bubbles all sighted. Did not get other side of structure so not sure if cold seep community on other side either

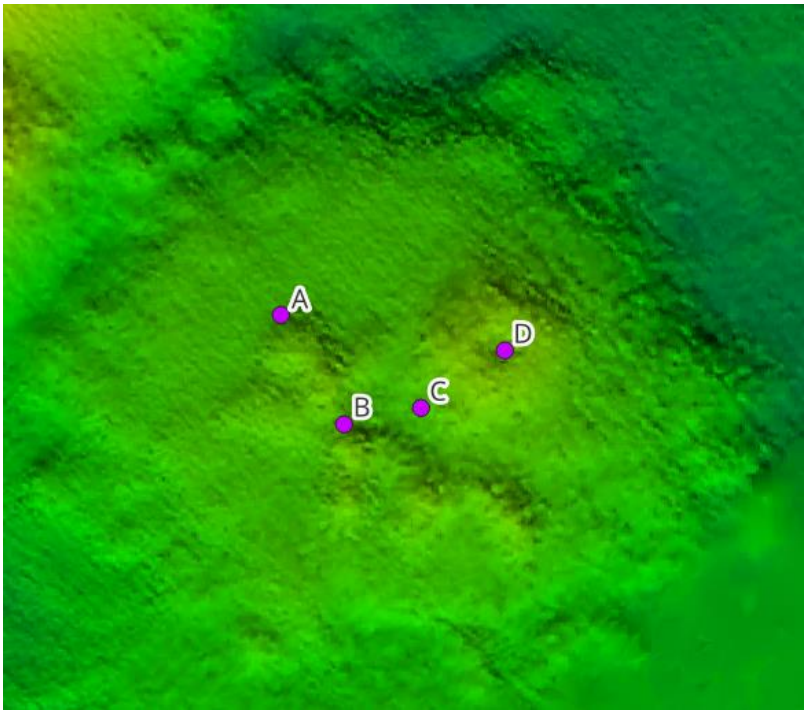
Get waypoints from nav.

MANTIS035 Dive Plan

NEPDEP - Seamounts & Mapping; PAC2025-M14

Tuzo Wilson Seamount Complex - Heat anomaly south

September 14, 2025



Vehicle Configuration

Manta HD camera as pilot camera, downward facing stills camera just off centre on porch. BBC - Big Dave (up near main camera) and Opti (on porch with new pan and tilt). Porch has two bioboxes, 2 outside bioboxes, 6 suction sample containers, 3 cores. Temperature probe on porch.

Summary info

Mapping further extent of habitat and nursery grounds of NEPDEP58 Seamount in the Tuzo Wilson Seamount Complex. Collect information for advice re: potential protection (skates, corals, extent, thermal, etc.). Look for juvenile nursery ground. Look for sign of extreme temperature difference according to heat anomaly in Denton 1986.

Dive time	09:00 - 16:00	**Distance**	0.7 nmi
Depth Range	~2000 m	**Lead/Annotation**	Heidi, Tammy, Daniel

Dive Plan

Start at **A** working through to **D** looking for signs of extreme heat (staining, shimmering water, etc.) with likelihood of using the temperature probe to measure heat. Document any behaviours, habitats, and high density of skate eggs.

Waypoints

Name	x	y
A	-130.998	51.38264
B	-130.994	51.37869
C	-130.99	51.37927

D	-130.985	51.38135

Science notes

- Mapping, proposed MPA (DFO & CHN)

Activity notes

Before dive	Multibeam overnight in transit from 504
After dive	Transit to Dellwood

Dive Execution

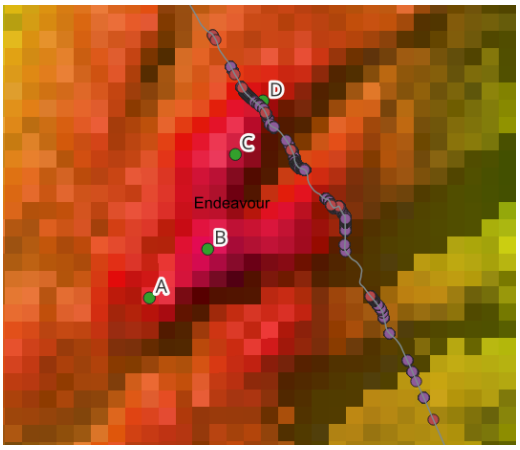
Came down before A and worked way along past B to high point on pinnacle. Then back down to C and up aim for D. Near D deviated from plan to reach both high and low points of the caldera. Stopped on transects for images of crabs for Erin and documenting adult skates. Found different areas of staining with the highest reading being 3.2 deg C (ambient 2.7). Had to have a short dive day due to incoming weather and need to deploy mooring at Dellwood.

MANTIS036 Dive Plan

NEPDEP - Seamounts & Mapping; PAC2025-M14

Endeavour Seamount - Summit with skate eggs

September 15/16, 2025



Vehicle Configuration

Manta HD camera as pilot camera, downward facing stills camera just off centre on porch. BBC - Big Dave (up near main camera) and Opti (on porch with new pan and tilt). Porch has two bioboxes (4 dividers), 2 outside bioboxes, 6 suction sample containers, 4 cores. Temperature probe on porch.

Summary info

Mapping further extent of habitat and skate eggs on the summit of Endeavour Seamount. Collect information for advice re: monitoring (skates, eggs, etc.). Collect eggs for population genetic study.

Dive time	23:00 - 10:30	**Distance**	0.57 nmi or 1.1 km
Depth Range	~1570-?	**Lead/Annotation**	Heidi, Tammy, Daniel

Dive Plan

Work up from A to two separate summits at B and C then work our way toward D where we've previously documented a density of skate eggs. Documenting along the way egg densities, adult skates, and any notable habitat. Stopping to collect skate eggs and possibly establishing a long-term monitoring site.

Waypoints

A	-129.0497406446	48.2951147746
B	-129.0462428509	48.2970444962
C	-129.0446361407	48.3007902182
D	-129.0429583373	48.3028899725

Science notes

- Mapping extent to inform monitoring and management (DFO & co-managing First Nations - CHN, NTC, Pachedaht and Quatsino First Nations)
- Collect eggs for Pacific White Skate population genetic study (Ingrid Spies, NOAA)

Activity notes

Before dive	Multibeam overnight in transit from Dellwood
After dive	Transit to IOS

Dive Execution

Came down immediately on eggs. Eggs present through to close to B where they were extensive! Deployed Charlie and collected eggs close to B. Worked over C to D. C to D had slightly less eggs than expected based on abundance near B. Temperature measurements near weird crevices. Set up a longterm site 100 m SW of D - only place that had a decent amount of corals. Then sampling until dive called just a touch early for weather. During dive looked for sources/sign of heat with no luck.

Skates seen:

Male Boreal

Female Pacific White

Female Pacific White

Female Pacific White

Male Boreal

Female Pacific White

Female Pacific White

Female Pacific White

Male Boreal

Male Boreal

Porch/other cams:

Boreal

Female Pacific Whie

Appendix 5. Benthic Collections

Benthic samples collected across the PAC2025-M14 expedition. Samples latitude and longitude are listed as 'Unknown' when multiple samples were carried in one biobox, causing the specific collection location to be unclear (common with egg samples). Specimen identification status as of March 9th, 2026.

Sample ID	Taxon/Current ID	Higher taxon	Collection Notes	Latitude	Longitude	Depth (m)
M030-01-01	Porifera	Porifera	Yellowish sponge from rock, broke into pieces when collecting and pieces were suctioned	51.412408	-130.998230	1890.43
M030-01-02	Ophiuroidea	Echinodermata	In bio box with rock			
M030-01-03	Ophiuroidea	Echinodermata	Brittle star arm? Collected (suction) after falling off rock sample			
M030-01-04	Porifera	Porifera	Encrusting scraped off rock			
M030-01-05	Unidentified		Collected off rock			
M030-01-06	Hydrozoa	Cnidaria	Hydroids collected off rock, many pieces			
M030-01-07	Rock		Igneous			
M030-02-01	Hemicorallium sp.	Octocorallia	3 pieces of broken branch	51.412	-130.998	1890
M030-02-02	Asteroidea cf. Velatida	Echinodermata	Larval echinoderm (asteroidea or ophiuroidea)			
M030-A1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed	Unknown	Unknown	1630 - 1600.6
M030-A2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M030-A1			
M030-B1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			
M030-B2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M030-B1			
M030-C1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			

M030-C2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M030-C1			
M030-D1	Bathyraja spinosissima	Elasmobranchii	Frozen before dissection			
M030-D2	Bathyraja spinosissima	Elasmobranchii	Egg contents; frozen before dissection			
M030-08-01	Keratoisididae	Octocorallia	Bamboo coral skeleton stuck on treads of mantis	Unknown	Unknown	Unknown
M030-08-02	Unidentified		Took off of bamboo coral			
M031-01-01-01	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed	51.397967	-131.016621	1620
M031-01-01-02	Bathyraja spinosissima	Elasmobranchii	Egg contents removed from M031-01-01-01			
M032-A1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed	Unknown	Unknown	1602-1611
M032-A2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-A1			
M032-B1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			
M032-B2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-B1			
M032-C1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			
M032-C2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-C1			
M032-D1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			
M032-D2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-D1			
M032-E1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			
M032-E2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-E1			
M032-F1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			

M032-F2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-F1			
M032-G1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			
M032-G2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-G1			
M032-H1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			
M032-H2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-H1			
M032-I1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			
M032-I2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-I1			
M032-J1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			
M032-J2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-J1			
M032-K1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			
M032-K2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-K1			
M032-L1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			
M032-L2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-L1			
M032-M1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			
M032-M2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-M1			
M032-N1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			
M032-N2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-N1			
M032-O1	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed			

M032-O2	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-O1			
M032-01-01-01	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed	51.40174	-131.014	1609.71
M032-01-01-02	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-01-01-01			
M032-02-01-01	Bathyraja spinosissima	Elasmobranchii	Skate case with contents removed	51.40158	-131.014	1611
M032-02-01-02	Bathyraja spinosissima	Elasmobranchii	Egg contents dissected from M032-02-01-01			
M032-00-01	Gastropod	Gastropoda	Loose in Port side box with eggs	Unknown	Unknown	Unknown
M032-00-02	Scleractinia	Octocorallia	Possibly a piece of coral, found loose in port side box with loose eggs			
M034-01-01	Culeolus sp.	Tunicata	Stocked tunicate on rock	52.538	-132.356	1543
M034-01-02	Scalpellidae	Crustacea	Removed from stock of tunicate			
M034-01-03	Hydrozoa	Hydrozoa	Picked off rock			
M034-01-04	Rock	N/A				
M034-02-01	Cladorhizidae	Porifera	First sponge collected (has a little branch)	52.542568	-132.360880	1492
M034-02-02	Cladorhizidae	Porifera	Second sponge collected (split in half)			
M034-03-01	Antipatharia cf. Lillipathes sp.	Octocorallia	On rock	52.543558	-132.366038	1470
M034-03-02	Polychaete	Polychaeta	Picked off Antipatharia cf. Lillipathes sp.			
M034-03-03	Hydrozoa	Hydrozoa	Hydroids picked off rock			
M034-03-04	Gastropoda	Gastropoda	Picked off rock and hydrozoa			
M034-03-05	Polychaete	Polychaeta	Picked off rock			
M034-03-06	Unidentified		Picked off rock			
M034-03-07	Tunicata	Tunicata	Picked off rock			

M034-03-08	Porifera	Porifera	Picked off rock			
M034-03-09	Barnacle	Crustacea	Picked off rock			
M034-03-10	Gastropoda	Gastropoda	Picked off rock			
M034-03-11	Gastropoda	Gastropoda	Loose in bucket with rock and Antipatharia cf. Lillipathes sp.			
M034-03-12	Rock		Basalt			
M034-00-01	Amphipod	Crustacea	Ethanol 95%, going to Plankton Group, in bio box with sponges and tunicate	Unknown	Unknown	Unknown
M036-01-01	Bathyraja spinosissima	Elasmobranchii	Empty egg case	48.296824	-129.046087	1568
M036-01-02	Idas ep.	Mollusca	On skate egg case			
M036-01-03	Ampharetidae	Polychaeta	Found in egg case horns			
M036-02-01	Bathyraja spinosissima	Elasmobranchii	Empty egg case	48.296824	-129.046086	
M036-02-02	Choristella hickmanae	Gastropoda	Found in empty egg case			
M036-03-01-01	Amblyraja hyperborea	Elasmobranchii	Skate egg case with embryo and yolk removed	48.296843	-129.046088	
M036-03-01-02	Aamblyraja hyperborea	Elasmobranchii	Embryo Dissected from M036-03-01-01			
M036-04-01-01	Bathyraja spinosissima	Elasmobranchii	Skate egg case with embryo and yolk removed	48.296842	-129.046089	
M036-04-01-02	Bathyraja spinosissima	Elasmobranchii	Embryo Dissected from M036-04-01-01			
M036-04-02	Polycheata	Polychaeta	Loose in biobox			
M036-05-01-01	Bathyraja spinosissima	Elasmobranchii	Skate egg case with embryo and yolk removed	48.296878	-129.046101	1569
M036-05-01-02	Bathyraja spinosissima	Elasmobranchii	Embryo Dissected from M036-05-01-01			

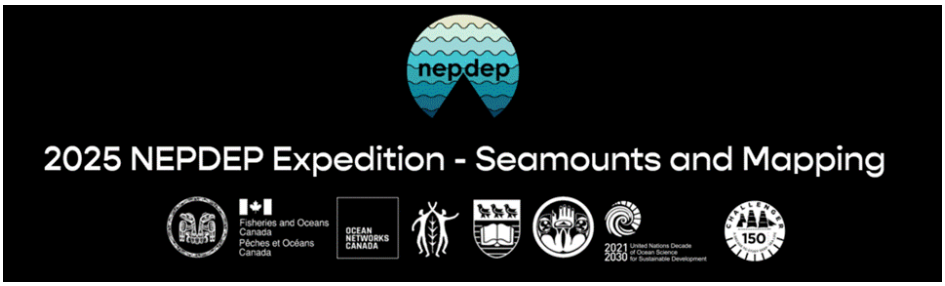
M036-06-A1	Bathyraja spinosissima	Elasmobranchii	Empty egg case	48.303504	-129.042514	1645 - 1646
M036-06-A2	Choristella hickmanae	Gastropoda	Found in empty egg case			
M036-06-A3	Polychaeta	Polychaeta	Found in egg case horns			
M036-06-B1	Bathyraja spinosissima	Elasmobranchii	Skate egg case with embryo and yolk removed	48.303509	-129.042524	
M036-06-B2	Bathyraja spinosissima	Elasmobranchii	Embryo Dissected from M036-06-B1			
M036-06-C1	Bathyraja spinosissima	Elasmobranchii	Skate egg case with embryo and yolk removed	48.303572	-129.042411	
M036-06-C2	Bathyraja spinosissima	Elasmobranchii	Embryo Dissected from M036-06-C1			
M036-06-D1	Bathyraja spinosissima	Elasmobranchii	Empty egg case	48.303558	-129.042412	1646
M036-06-D2	Choristella hickmanae	Gastropoda	Found in empty egg case			
M036-06-D3	Gastropoda	Mollusca	Found in empty egg case			
M036-09-01	Heteropora cf. alaskensis	Octocorallia	In pieces; collected by accident with suction	Unknown	Unknown	1568-1646
M036-09-02	Choristella hickmanae	Gastropoda	Loose in suction container			
M036-09-03	Pectinidae	Mollusca	Loose in suction container			
M036-09-04	Amphipoda	Crustacea	Loose in suction container; ethanol 90%, going to plankton group			
M036-09-05	Polychaete	Polychaeta	Loose in suction container			
M036-09-06	Gastropoda	Mollusca	Loose in suction container			

Appendix 6. Newsletters

From: Gartner, Heidi (she, her / elle, la) (DFO/MPO)

Sent: Saturday, September 6, 2025 6:01 PM

Subject: News from the 2025 NEPDEP expedition - Seamounts and Mapping



Hello deep-sea explorers,

Tomorrow is the first DIVE day of the 2025 NEPDEP expedition – Seamounts & Mapping. We're currently steaming towards the Tuzo Wilson Seamount Complex (TWSC) capturing multibeam along the way. The MANTIS030 dive plan is here, but the gist is we are going start deep in an area not previously surveyed, summit to revisit our long-term monitoring sites, and collect golden skate eggs of the Pacific White Skate for an energy study on this special nursery ground. Dive time roughly 07:00 to 19:00.

Remember, you can watch live on our website and Facebook live, and chat with us in real-time on chat with us in real-time on Facebook, Slack, or send us a message.

To stay up-to-date you can check social (Instagram) and the recorded dives on Facebook, as well as the daily Google Drive photo/video uploads. For help with species IDs, check out our iNaturalist project page for our image-based guide.

Note:

Tentative schedule: We are aboard the Canpac Valour working with the ROV Mantis! Weather permitting the next week with be working within the TWSC and along the southern coast of Haida Gwaii.

Thanks for your interest and/or fantastic collaboration,

Your intrepid ship-based expedition members

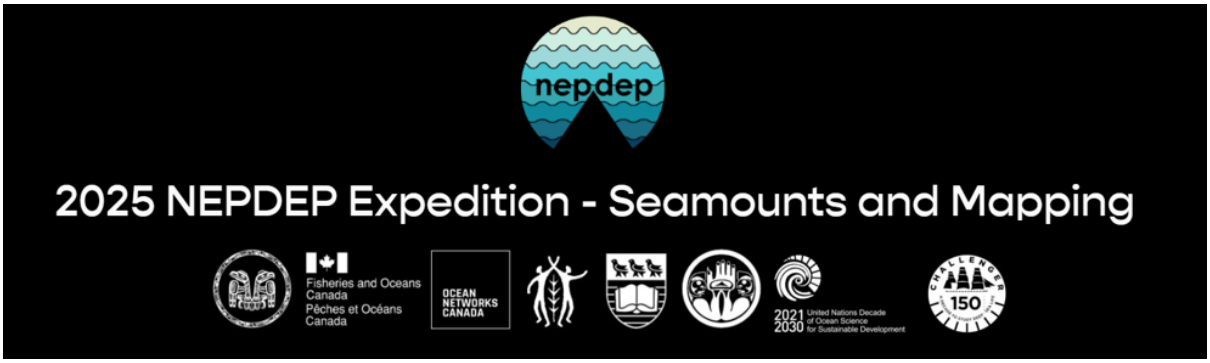
(please let me know if I should add/remove someone to the email list, thank you)

We respectfully acknowledge we will explore the ocean within the territories of multiple coastal First Nations, including the Haida, Nuu-chah-nulth, Pacheedaht, and Quatsino First Nations. The focus will be on areas for proposed conservation. This expedition was co-created by Fisheries and Oceans Canada, the Council of the Haida Nation, Nuu-chah-nulth Tribal Council, and Ocean Networks Canada to contribute to a better understanding of these remarkable and fragile ecosystems, working together to ensure a healthy ocean for all.

From: Gartner, Heidi (she, her / elle, la) (DFO/MPO)

Sent: Monday, September 8, 2025 12:47 PM

Subject: RE: News from the 2025 NEPDEP expedition - Seamounts and Mapping



Hello deep-sea explorers,

We had a great first dive day of the 2025 NEPDEP expedition – Seamounts & Mapping. We're currently steaming streaming our second dive on the Tuzo Wilson Seamount Complex (TWSC) exploring deep on the western side. The MANTIS031 dive plan is here, but the gist is we are going start deep in an area not previously surveyed looking for juveniles of the Pacific White Skate.

Remember, you can watch live on our website and Facebook live, and chat with us in real-time on chat with us in real-time on Facebook, Slack, or send us a message.

To stay up-to-date you can check social (Instagram) and the recorded dives on Facebook, as well as the daily Google Drive photo/video uploads. For help with species IDs, check out our iNaturalist project page for our image-based guide.

Note:

Tentative schedule: We are aboard the Canpac Valour working with the ROV Mantis! Weather permitting the next week with be working within the TWSC and along the southern coast of Haida Gwaii.

Thanks for your interest and/or fantastic collaboration,

Your intrepid ship-based expedition members

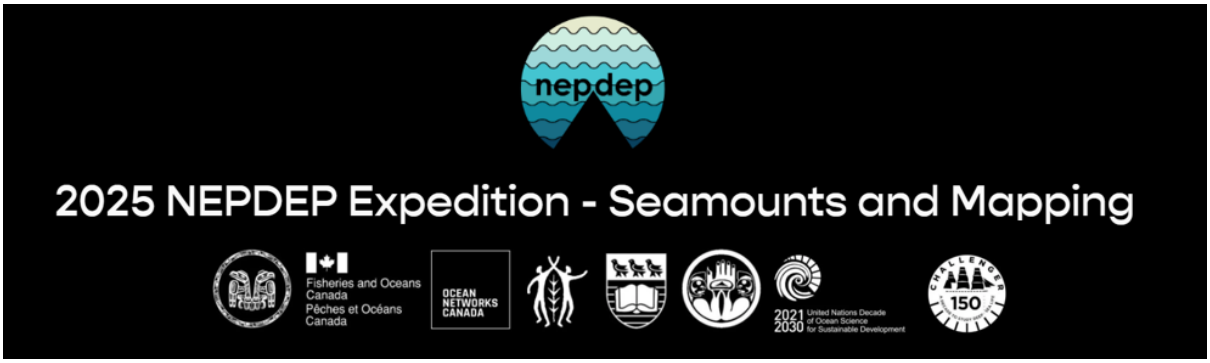
(please let me know if I should add/remove someone to the email list, thank you)

We respectfully acknowledge we will explore the ocean within the territories of multiple coastal First Nations, including the Haida, Nuu-chah-nulth, Pacheedaht, and Quatsino First Nations. The focus will be on areas for proposed conservation. This expedition was co-created by Fisheries and Oceans Canada, the Council of the Haida Nation, Nuu-chah-nulth Tribal Council, and Ocean Networks Canada to contribute to a better understanding of these remarkable and fragile ecosystems, working together to ensure a healthy ocean for all.

From: Gartner, Heidi (she, her / elle, la) (DFO/MPO)

Sent: Wednesday, September 10, 2025 2:19 PM

Subject: RE: News from the 2025 NEPDEP expedition - Seamounts and Mapping



Hello deep-sea explorers,

We've had some wonderful dives in the TWSC complex – we documented another female Pacific White Skate about to lay an egg, collected skate eggs for a nursery energy study, and deployed a mooring to monitor this nursery ground as it right at the edge of the expanding oxygen minimum zone. If you want to watch our past dives you can watch them on Seatube or our Facebook page.

We are currently mapping proposed marine protected areas (part of the Northern Shelf Marine Protected Area Network) along the coast of Haida Gwaii as we head north to tuck away from some incoming weather. We are also keeping busy with outreach as we conducted our first outreach events today from the CanPac Valour (RBCM Live at Lunch and connection with Haida classroom). We have another hybrid outreach even tomorrow. Can you please share widely the event below to connect with our at-sea team.

To stay up-to-date you can check social (Instagram) as well as the daily Google Drive photo/video uploads. For help with species IDs, check out our iNaturalist project page for our image-based guide.

Note:

Tentative schedule: The weather is not looking great for Thursday and Friday – standby for possible surprise dive….

Thanks for your interest and/or fantastic collaboration,

Your intrepid ship-based expedition members

(please let me know if I should add/remove someone to the email list, thank you)

We respectfully acknowledge we will explore the ocean within the territories of multiple coastal First Nations, including the Haida, Nuu-chah-nulth, Pacheedaht, and Quatsino First Nations. The focus will be on areas for proposed conservation. This expedition was co-created by Fisheries and Oceans Canada, the Council of the Haida Nation, Nuu-chah-nulth Tribal Council, and Ocean Networks Canada to contribute to a better understanding of these remarkable and fragile ecosystems, working together to ensure a healthy ocean for all.

From: Gartner, Heidi (she, her / elle, la) (DFO/MPO)

Sent: Monday, September 15, 2025 5:04 PM

Subject: RE: News from the 2025 NEPDEP expedition - Seamounts and Mapping

Hello deep-sea explorers,

Exploring in the deep sea is never boring and we've had the added bonus of scheduling around weather for a good part of this trip. However, still had some major accomplishments such as multi-beaming the majority of the proposed 504 marine protected areas (part of the Northern Shelf Marine Protected Area Network) along the coast of Haida Gwaii. The water column imagery revealed a new cold seep bubble signature that we dove – revealing an extensive area of cold seep carbonate habitat. Additionally, we were able to deploy a second mooring on the summit of Dellwood Seamount to document changes in the water column near our long-term monitoring sites. If you want to watch our past dives you can watch them on Seatube or our Facebook page.

We are currently on our way to Endeavour Seamount to do an overnight dive (11pm to 11 am). If you get this Tuesday morning it is likely we are still up and diving – so please tune in! The summit of this seamount also has a suspected skate nursery ground that we hope to document.

To stay up-to-date you can check social (Instagram) as well as the daily Google Drive photo/video uploads. For help with species IDs, check out our iNaturalist project page for our image-based guide.

Note:

The weather kicks up again after this dive so we'll be transiting home!

Thanks for your interest and/or fantastic collaboration,

Your intrepid ship-based expedition members

(please let me know if I should add/remove someone to the email list, thank you)

We respectfully acknowledge we will explore the ocean within the territories of multiple coastal First Nations, including the Haida, Nuu-chah-nulth, Pacheedaht, and Quatsino First Nations. The focus will be on areas for proposed conservation. This expedition was co-created by Fisheries and Oceans Canada, the Council of the Haida Nation, Nuu-chah-nulth Tribal Council, and Ocean Networks Canada to contribute to a better understanding of these remarkable and fragile ecosystems, working together to ensure a healthy ocean for all.