DFO Sea Mount Exploration Cruise - Navigation Log – September 2025

ROV: **Mantis**
Vessel: **CanPac Valour**
Navigation Software: **Hypack 2021**
USBL System: **Sonardyne Ranger 2 + GyroUSBL**
Positioning and Heading System: **Hemisphere R330 One Antenna GPS System, NovaTel PWP PAK70 Dual Antenna**
Navigator: ***Travis Houston, Justin Poon, Terra Remote Sensing***

Offsets:
Primary GPS is attached adjacent to the Sonardyne USBL pole and measured with reference to the USBL head:
X: 1.92m, Y: -0.62m, Z: 7.73m

Valour's Dual-GPS heading was used as primary heading. A dockside heading calibration was performed prior to leaving the dock using the Valour's Gyro heading as reference.

SPRINT Nav IMU and Sonardyne beacon offsets are input in the SPRINT Nav software with reference to the vehicle center:
IMU Offsets - Starboard: -0.440, forward: -1.140, Z: 0.640
Beacon Offset: Starboard: -0.910m, forward: 1.610m, Z: -0.960m

Horizontal Datum: NAD83
Projection: UTM9N

All times are UTC unless otherwise noted.

Device Definitions:
DEV 0/MSG 0 = GPS messages from the Ship's PWP PAK70 dual antenna located atop the bridge. These are ZDA (Timing), VTG (Velocity), HDT (Ship heading), RMC (Redundant position, velocity, time)

DEV 1/MSG 1 = GGA from R330 GPS antenna located adjacent to the USBL pole. This string provides ship positioning for the cruise. These are GGA (position) only.

DEV 2/MSG 2 = GGA from primary USBL beacon mounted on the ROV. This was the beacon used most of the time for navigation.

DEV 3/MSG 3 = GGA from secondary USBL beacon mounted on the ROV. This was used as a backup in the case that the primary beacon stops functioning correctly. It was not used as a primary responder for this cruise.

DEV 4/MSG 4 = GGA from beacon placed on Valour Wire.

DEV 5/MSG 5 = GGA from beacon deployed on the sea floor. In notes as “Deployable BCN 1”
UNUSED

DEV 6 = PSONNAV string from the Sprint IMU outputting Lat/Long (POS), Heading (GYR), Pitch/Roll (HCP). Data from SprintINS **“PSONNAV”** protocol. For specific message formats refer to document “ONC May 2025 PSONNAV Standard Message Format” document provided.
“POS 6 5255.921 464096.513 5388808.604”
For above message: 464096.513 = **Easting of ROV from SPRINT**
5388808.604= **Northing of ROV from SPRINT**
“GYR 6 5274.220 27.799”
For above message: 27.2799 = **Heading of ROV from SPRINT**
“HCP 6 5274.220 0.000 0.500 -0.121”
For above message: 0.500 = **Pitch of ROV from SPRINT**
-0.121 = **Roll of ROV from SPRINT**
DEV 7/MSG 7 = Custom string sent from the ROV telemetry that contains INS Lat/Long (POS), Depth (EC1), Heading (GYR), Altitude/Pitch/Roll (HCP) in one string.
“POS 7 69066.613 475187.284 5436447.853”
For above message: 475187.284 = **Easting of ROV from SPRINT**
5436447.853= **Northing of ROV from SPRINT**
“GYR 7 69066.613 334.494”
For above message: 334.494 = **Heading of ROV from SPRINT**
“EC1 7 69066.829 145.860”
For above message: 145.860= **Depth of ROV from SPRINT**
“HCP 7 69066.829 0.240 -1.030 0.280”
For above message: 0.240 = **Altitude of ROV from SPRINT**
-1.030 = **Pitch of ROV from SPRINT**
0.280 = **Roll of ROV from SPRINT**

DEV 8/MSG 8 = GGA from beacon deployed on the seafloor. In notes as “Deployable BCN 2”
UNUSED

September 7, 2025 – JD250
Dive 1 – TWSC – North Ridge

Files: 0001_1853, 0002_2052, 0003_0520, 0005_1048, 0005_1050, 0010_0529, 0011_0739

Beacons:

ROV1 = 2108
ROV2 = 2107

Dive Notes: Minor INS outage at the surface, restarting the system fixed the issue. USBL and INS systems performed well for the dive.

19:07 ROV off deck
19:10 ROV in water, INS restarted before diving
20:31 ROV on bottom, 1895m
20:41 Navigating to start location, looking for coral and skates
20:46 Start transect to L1, lots of precious coral
21:21 Glass sponge identified
21:30 Ascending up the ridge
21:45 Collecting sponge sample here
21:58 Sample collected in bio box
22:02 Using suction sampler to collect Precious Coral
22:15 Sample collected
22:58 Blob Sculpin identified
23:25 Waiting for ship to catch up
00:28 Skate eggs located here
00:31 More Skate eggs
00:37 Yellow stained rock and skate eggs
00:44 Many Skate eggs
01:00 TH on shift, JP to bed
01:16 Collecting egg samples here
01:33 First sample floated away, collecting second sample
01:36 Sample collected, #1
01:54 Sample collected, #2
02:01 Skate fly by, following
02:21 Many eggs and yellow stained rock
02:31 Collecting more egg samples
02:46 Sample collected, #3, practicing transect flying before recovery
03:02 Sample collected, #4, recovering
04:06 ROV at surface
04:08 ROV on deck,

September 8, 2025 – JD251
Dive 2 – TWSC Southwestern Ridge

Files: 0000_2235, 0001_0207, 0001_1808, 0001_1827_0002, 0001_1926

Beacons:

ROV1 = 2108
ROV2 = 2107

Dive Notes: INS system failed to start, USBL positioning was used for the start of the dive which was very stable. INS was fixed (software issue) shortly after arriving at bottom, and was stable for the remainder of the dive.

19:06 ROV off deck, INS not outputting positions or overlay to stream
19:07 ROV in water
21:00 Overlay being provided by USBL now, still working on INS fix
21:02 ROV on bottom, at 2222m
21:42 INS fixed and operational. Continuing dive
22:25 Skate spotted, following
22:32 Goodbye Skate, resuming transect towards waypoint B
22:57 At waypoint B, continuing to C
23:21 Following ridge up
23:58 Octopus spotted
00:08 At waypoint C, continuing to D
00:20 Skate spotted
00:45 TH on shift, JP to bed
00:52 Arriving at waypoint D
01:01 Skate spotted
01:44 Arriving at waypoint E, continuing to F
02:07 Arriving at waypoint F, looking for eggs to collect
02:11 Stopping to take temperature probe at some yellow stained rocks
02:28 Temp reading taken, continuing
02:36 Stopping for another temperature reading
02:40 Temp reading taken, continuing
02:55 Stopping to collect egg samples
03:38 Egg collected, looking for more
03:45 Pacific Skate spotted, abort and follow with ROV
04:01 Egg sample floated out of sample box, continuing to follow
04:47 Goodbye Skate, recovering ROV from bottom
05:42 ROV on deck, return to Multibeam survey and prep for mooring deployment at TWSC

17:50-21:51 Mooring deployment at TWSC – ONC beacon attached and left on mooring line

September 9, 2025 – JD252
Dive 3 – TWSC Mooring and Long Term Monitoring Sites

Files: 0001_0043, 0001_0311, 0001_0435

Beacons:

ROV1 = 2108
ROV2 = 2107

Dive Notes: USBL and INS performed very well for the duration of the dive. Multiple mosaic lines were run using the INS position to collect still-photos for mosaicking.

22:29 ROV off deck
22:30 ROV in water, diving
22:35 Hypack logging start, 80m
23:34 ROV on bottom, 1639m
23:52 At L1, approaching yellow stained rock
23:56 Line 1 start, running transect down slope
00:01 Line 2 start, going up slope
00:07 Line 3 start
00:14 End of line 3, wrong heading, restarting with new heading
00:20 Start line 1 going upslope
00:25 End of line 1
00:26 Start line 2
00:32 End line 2, start line 3
00:36 End line 3
00:50 At L2 marker, flying 360 around to do mosaic
00:59 TH on shift, JP to bed, complete 360
01:06 Collecting egg sample, 1x egg
01:16 Abort to go to mooring, placed on slope at 1623m
01:32 Egg collected, moving to K5 marker for mosaic
01:40 Start mosaic lines, 20m by 1m lines
01:46 Line 2 start
01:51 Line 3 start
01:57 Line 4 start
02:03 Line 5 start
02:10 Line 6 start
02:17 Line 7 start
02:23 Line 8 start
02:30 Line 9 start
02:36 Line 10 start
02:42 Line 11 start
02:50 Line 12 start
02:54 Pause, following skate
03:06 Returning to K5
03:11 Line 13 start, Hypack logging restart
03:17 Line 14 start
03:25 Line 15 start
03:30 Line 16 start
03:39 Break to follow skate
03:43 Line 17 start
04:07 Line 18 start
04:14 Line 19 start

04:21 One more line for mosaic, Line 20 start
04:24 End of mosaic lines, arriving at Whale Fall for another mosaic
04:58 Whall fall mosaic, 3 lines done
05:00 Looking for golden eggs to collect
05:18 Deploying Charlie (GoPro)
05:39 Deployed, collecting eggs in view
08:45 Charlie retrieved, exploring ridge to the south west
08:50 Temp probe taken
09:38 Recovering
10:31 ROV on deck

September 11, 2025 – JD254
Dive 4 – Tasu Sound Entrance

Files: 0001_2236

Beacons:

ROV1 = 2108
ROV2 = 2107

Dive Notes: USBL and INS were very stable. Dive took place in heavy weather at the mouth of the sound, with large waves, tight quarters, and heavy current. Cliff survey was performed on each side of the sound. Dive went well.

22:36 ROV off deck
22:37 In water, diving
22:46 ROV on bottom, 160m. Moving to Southern cliffs first
23:09 At base of cliff, survey start
23:53 Beacons not responding, out of range from vessel
23:56 Beacons back, ROV closer to ship
00:07 At bottom of cliffs. Moving to the north side. TH on shift, JP to bed
00:27 Ascending north cliffs
00:34 Getting ship closer to ROV
00:54 Rising up cliff, adjusting ship heading
01:15 Sampling yellow sponge on cliff
01:38 Recovering
01:46 ROV on deck

September 13, 2025 – JD256
Dive 5 – Cold Seep at AOI504

Files: 0001_1418, 0001_1803

Beacons:

ROV1 = 2108
ROV2 = 2107

Dive Notes: USBL and INS performed fine. Dive goals were to identify plume feature noted in multibeam data which turned out to be a cold seep just north of AOI504. New feature discovered!

14:15 ROV off deck
14:18 ROV in water, diving
15:13 On bottom, 1540m
15:28 Collecting sediment sample
15:45 Complete, moving to cold seep target
15:53 Blob Sculpin eggs located, investigating
16:02 On the move again
16:34 Exploring depression with carbonate formations
17:08 Stop for sample of Carnivorous Sponge
17:35 Cavern depressions with ice?!
18:00 At plume target, no bubbles ☹
18:28 Moving to another target from multibeam, no bubbles ☹
18:57 Transit to summit,
19:30 At summit, no bubbles, descending back to ice formations
20:09 Bubbles! 😊 Collecting sample
20:33 Solid methane identified during sampling
20:39 Looking for more bubbles
20:46 More bubbles found. Velocity test
21:07 Transit to ice field
21:38 Poking carbonates
22:57 Coral Sample collected
23:12 Recovering
00:09 ROV on deck

September 14, 2025 – JD257
Dive 6 – TWSC Heat Anomaly

Files: 0001_1526

Beacons:

ROV1 = 2108
ROV2 = 2107

Dive Notes: USBL and INS performed well throughout dive.

15:23 ROV off deck
15:25 ROV in water
15:31 Temp probe fell off, recovering to fix
15:41 ROV off deck
15:43 ROV in water, diving
17:04 On bottom at 2000m
18:04 At plateau near B, temperature probe here

18:15 Transit B to C
18:43 At C, Temp probe here
18:50 Transit C to D
19:20 Yellow stained rock, temp probe here
20:41 Down in canyon passed D
21:00 End of dive, 1900m, recovering
22:10 ROV on deck

September 15, 2025 – JD258
Dive 7 – Endeavor

Files: 0001_0731, 0001_1428, 0001_1435, 0001_1527

Beacons:

ROV1 = 2108
ROV2 = 2107

Dive Notes: INS failed at 600m depth. After cycling power for 20 minutes, communication came back. INS remained active for the duration of dive but was jumpy with the USBL for the first quarter. Eventually, the INS settled out and remained stable for the rest of the dive.

07:31 Hypack logging
07:41 ROV off deck
07:49 ROV diving, 50m
08:20 INS lost, pause decent and power cycle INS
08:38 INS regained, resume dive
09:12 ROV on bottom
09:15 Moving to waypoint A
09:19 At waypoint A, octopus
10:01 Deploying Charlie (GoPro) to collect eggs
10:09 Charlie deployed, moving to find eggs
10:18 Collecting eggs x3
11:13 Total of 5 eggs collected so far. Abort to follow skate
11:22 Goodbye skate, retrieving Charlie
11:30 Close up of crab eating squid
11:48 Charlie recovered, moving toward summit
12:46 Probing fault in seabed
13:10 Probe again nearby
13:55 At waypoint C, moving on to D
14:36 Nothing at D, moving along to “Tammy Spot”
15:27 Establish monitoring spot, mosaic time N1
16:21 Mosaic complete
16:29 Collecting eggs
16:51 New spot to collect eggs
17:54 Recovering
18:40 ROV on deck