FINAL FIELD REPORT
CCGS VECTOR / CGSL OTTER BAY
North Coast Surveys

26 June – 31 July, 2006

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CSL Otter Bay

Introduction

This field report covers the first five weeks of the Vector`s and Otter Bay's field season. The two vessels were to work separately for three weeks, then rendezvous in the Queen Charlotte Islands, and work as a team for the remaining two weeks. The Vector would start at the north end of Vancouver Island with Cook Bank, finding time to do a small job over a sponge bed, and get some coverage for rockfish habitat southwest of the Scott Islands. Then heading north sounding a single swath to the Charlottes, eventually meeting the Otter Bay. The Otter Bay was to head north with two hydrographers, doing a combination of hazard investigations, GPS control work and small multibeam sounding jobs, ultimately arriving in Prince Rupert. Then they would steam southwest, crossing Hecate Strait to meet the Vector. In the following two weeks, the Vector was to be used partially as a floating hotel for Otter Bay hydrographers, while it worked on Laskeek Bank. This turned out to be impractical, so the vessels simply worked in close proximity to each other, and hydrographers were swapped in and out on a three to four day basis. The two vessels worked on various projects in the Charlottes, Hecate Strait and Caamaño and Estevan Sounds, until time for a personnel change in Prince Rupert.

The driving forces behind this season were NRCan's continued interest in geological and habitat mapping, and CHS' need to sound critical sections of two proposed supertanker routes. This proposal is known as the "Gateway Project", and it includes both VLCCs (Very Large Crude Carriers) and LNG (Liquid Natural Gas) transportation in and out of the port of Kitimat.

Personnel

Peter Milner	H-I-C	Vector	June 26 – July 31
Sarah McDonald	Hydrographer	Vector	June 26 – July 31
Gordon Worthing	Electronics Tech.	Vector	June 26 – July 17
Danielle Jmieff	GIS Specialist (NRCan)	Vector	June 26 – July 17
Dennis Stewart	DND	Vector	July 3 – July 17
David Gartley	Electronics Tech.	Vector	July 17 – July 31
Kim Picard	GIS Specialist (NRCan)	Vector	July 17 – July 31
Oliver Meyer	DND	Vector	July 17 – July 31
Ronald Woolley	Hydrographer	Otter Bay	June 28 – July 19
		Vector/OtterBay	July 20 – July 31
Brent Seymour	Hydrographer	Otter Bay	June 28 – July 17
David Thornhill	Hydrographer	Vector	July 17 – July 19
		Vector/OtterBay	July 20 – July 31

Life is good on the Vector.

LIST OF EQUIPMENT

Equipment	*CCGS Vector*	*CGSL Otter Bay*
Multibeam	Kongsberg EM1002	Kongsberg EM3002
	Frequency: 95 kHz	Frequency: 300 kHz
	Swath angle: 120° (111 beams)	Swath angle: 120° (160 beams)
	Fore / aft beam width: 2.4°	Fore / aft beam width: 1.5°
MBES Processing software	HIPS/SIPS CARIS (Ver.6.0/6.1)	HIPS/SIPS CARIS (Ver.6.0/6.1)
Surface Sound Speed Sensor	AML Smart SV&T	AML Smart SV&T
Velocity Profiler	1 AML SVP Plus	1 AML SVP Plus
	1 Brooke Ocean MVP 30	
Motion Sensor / MBES GPS	Applanix POSMV (Ver.4)	Applanix POSMV (Ver.4)
	Trimble GPS	Trimble GPS
Auxiliary GPS	NovAtel RT-20	NovAtel RT-20
Differential GPS Corrections	Primary: CCG radio beacons	Primary: CCG radio beacons
	Secondary: CDGPS service	Secondary: CDGPS service
Magnetometer	Marine Magnetics (SeaSPY)	
Sub-bottom profiler	ORE 140	
	Frequency: 3.5 kHz	
Tide Gauge	None deployed. All surveys used Pseudo Tides (Predicted tides with a predicted-observed difference from a reference port applied) or Observed Tides from a PWLN gauge.	

Description of Projects

Cook Bank. June 29 – July 13.
NRCan Vector survey of a 10 mile by 10 mile area on the north side of the Scott Islands. The purpose was geological and habitat mapping. A difficult area to work, as sea states are often too high for multibeam sounding.

Malcolm Island. June 30.
NRCan Vector survey of a small sponge bed in Queen Charlotte Strait, off the north side of Malcolm Island. This data was gathered to bolster some previously obtained NRCan data over the sponge area. The survey was conducted during a bad weather window while doing Cook Bank.

Goletas Channel. July 14-16.
CHS Vector survey of opportunity, conducted after Cook Bank was finished, and before a crew change in Port Hardy on July 17. Goletas Channel is a major access route leading to Johnstone Strait, part of the "Inside Passage". Depths ranged from 20m near Nahwitti Bar to 500m, with half of the depths being over 300m.

Hardy Bay. July 7-8.
CHS Vector survey of opportunity, conducted during a bad weather window while doing Cook Bank. Hardy Bay is the waterway leading to Port Hardy, Vancouver Island's most northerly port. It is home to a large fishing fleet and an active Coast Guard base.

StAD Sites. July 13-14.
A Vector survey done for Stock Assessment Division, DFO, now called MEAD (Marine Environment and Aquaculture Division), for the purposes of habitat mapping, mainly rockfish. It included two sites, one at the top end of Pisces Canyon, 14 miles south of Cox Island, and the other 12 miles WSW of Triangle Island. Rough seas made this survey a challenge.

Shelf Break. July 18-19.
CHS Vector survey on a line from the northern StAD Site to a point 15 miles southeast of Cape St. James. This line was a single swath only, and is intended to be added to in future years to eventually cover the shelf break from Cape Scott to Cape St. James. Depth ranged from 200m to 900m.

Seep Sites. July 19.
NRCan Vector survey of two small areas in southern Hecate Strait, 3.4 sq. km and 2.9 sq. km., of average depth 137m and 128m respectively. Both of these sites have existing geological data to suggest that they may be areas where hydrocarbon (methane) surface seepage could occur.

Laskeek Bank. July 18-22.

NRCan Vector and Otter Bay survey of a portion of Hecate Strait, at the edge of Laskeek Bank. This area is part of NRCan's ongoing hydrocarbon studies. The survey has an odd shape because one of NRCan's coverage criteria is the completion of NTS maps. One (103B10) needed a triangular section in the northwest corner to be complete, and the other (103B11) needed a much larger area, but there was only time to run a few lines on the north side of existing MB coverage. The Otter Bay was to work in this area, but after two days it was clear that it was not feasible to have it steam out from its anchorage site for 2.5 hours and then possibly have the sea state curtail their work. They were subsequently tasked for surveys of opportunity in sheltered water. They did however manage to survey an old Shell Oil well site (Sockeye E66), and the EM3002 picked up the well head standing proud of the bottom by 1.0m.

Dana Inlet. July 20.
CHS Vector survey of opportunity while waiting for a gale to abate in Hecate Strait. This survey had to be abandoned prior to completion, in order to work on higher priority areas, so there is a large hole in the deeper part of the inlet which will have to await a favourable opportunity to finish.

103B09. July 22-25.
NRCan Vector survey of the southern third of NTS map sheet 103B09, needed to complete the sheet. This was a large area, 346 sq. km., but went fairly quickly due to the depth, mostly 200-300m.

Caamaño Tanker Route. July 24-29.
CHS Vector and Otter Bay survey of the southern proposed supertanker route into Kitimat. Major work was done this year by CHS in response to announcements regarding the "Gateway Project", which includes the building of an oil pipeline into Kitimat, and the transportation of oil by VLCCs by 2010-2012. The southern route goes across Hecate Strait and into Caamaño Sound, and must pass within 1.25 miles of significant shoals. Most of the work was done by the Vector, but important shoal areas were sounded by the Otter Bay to make the project more complete.

Otter Channel. July 29-30.
CHS Vector survey of another portion of the "Gateway Project". Otter Channel is a short, wide and quite deep waterway between Campania and Pitt Islands, and connects Nepean Sound and Squally Channel. This area was chosen to fill the remaining survey time until the ship headed to Prince Rupert for a personnel change.

Squitty Bay. June 28.
CHS Otter Bay hazard investigation to prove or disprove the existence of a reported rock near Squitty Bay, at the east end of Lasqueti Island in Strait of Georgia. The survey showed that the reported rock was already charted, and not a new hazard.

Copeland Island. June 29.
CHS Otter Bay hazard investigation to obtain the position and depth of two wrecks in the Copeland Island Marine Park. The wrecks are old tug boats, and are located between the

southernmost two of the Copeland Islands. One is in about 15m of water and rises 5m above the bottom. The other is very close to shore, and all that's left is part of the stack.

Fish Egg Inlet. July 2.
CHS Otter Bay hazard investigation of a reported rock in the eastern part of Fish Egg Inlet. The rock was found at the reported position and sounded with the EM3002.

Taylor Bay. July 2.
CHS Otter Bay hazard investigation of a reported rock in the northern end of Taylor Bay, Rivers Inlet. The rock was found and sounded over. Position and depth were consistent with original report.

Nanakwa Shoals. July 9.
CHS Otter Bay survey of two shoals in Douglas Channel, Nanakwa Shoal and Coste Rocks. They lie at the south end of Kitimat Arm, leading to the port of Kitimat, and in light of the "Gateway Project", present a significant hazard to VLCCs. Both have their peaks well charted, but the sounding was to check the channel side of their slopes for any missed peaks.

Prince Rupert. July 13-14.
CHS Otter Bay survey of four sites in and around Prince Rupert Harbour. The various purposes were to add to existing multibeam coverage, check into discrepancies between previously obtained soundings, shoal coverage and the sounding of a cruise ship facility.

Cecil Patch. July 12.
CHS Otter Bay survey of a shoal in Arthur Passage, south of Prince Rupert. This shoal used to be marked by a buoy, which has now been replaced by a fixed light on piles. The Otter Bay was tasked to obtain the position of the light, and the multibeam sounding was performed as part of the general investigation.

Atli Inlet. July 20-21.
CHS Otter Bay survey of opportunity. The Otter Bay was tasked to work in Atli Inlet, north end of Lyell Island in the Queen Charlottes, when it was deemed no longer suitable for them to work on Laskeek Bank. The sounding they did was adjacent to multibeam sounding by the Vector in 2004. They spent the night tied to a mooring buoy in Powrivco Bay.

Thurston Harbour. July 21.
CHS Otter Bay survey of a small anchorage site on the north side of Talunkwan Island, on the east side of the Queen Charlottes. The original hydrography is very old and is on an unknown datum. Two Notice-to-Mariners were promulgated regarding rocks which were found, one of whose existence was suspected after a white blotch was seen on an aerial photo.

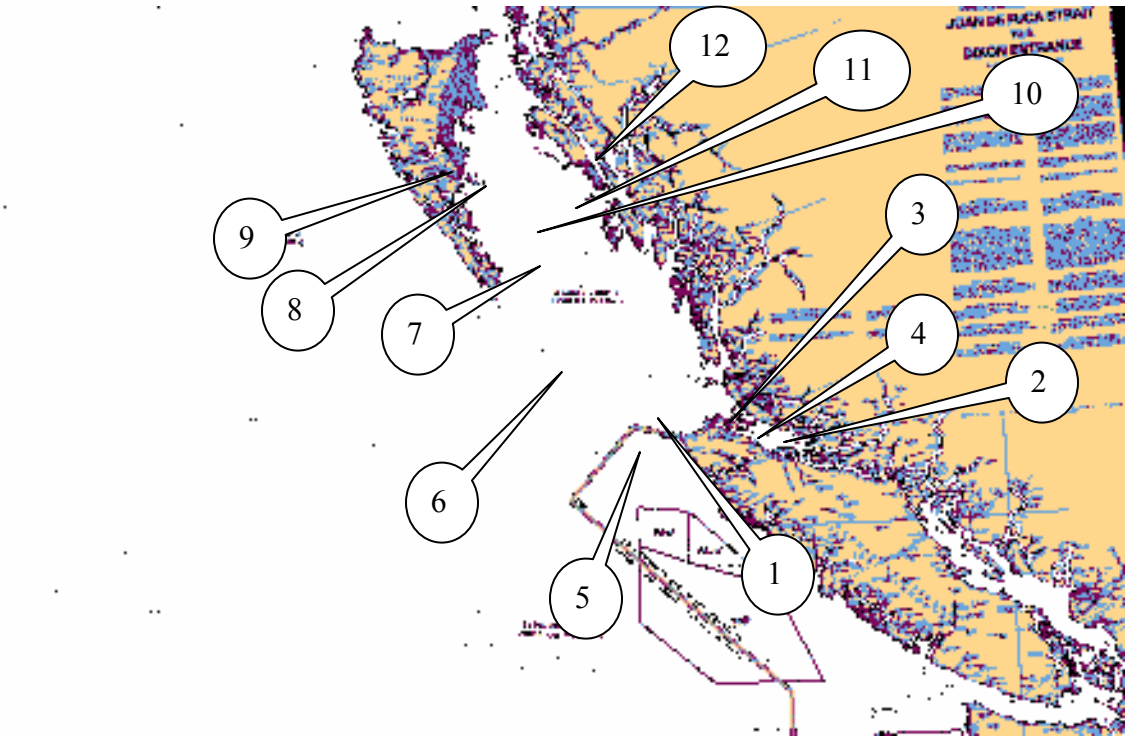
Estevan South. July 25 – August 4.

CHS Otter Bay survey of the shoaler portion of Estevan Sound. This area lies between Campania Island and Estevan Group, and opens to the south into Caamaño Sound. Although it is not expected that VLCCs will transit through Estevan Sound, it is still part of the "Gateway Project", and the shoaler south portion was once considered as an anchorage site for supertankers.

Estevan Sound Rock. July 25.
CHS Otter Bay hazard investigation of a reported rock in the shoals that make up Estevan Reef. A 4m shoal was found approximately 100m from the reported position.

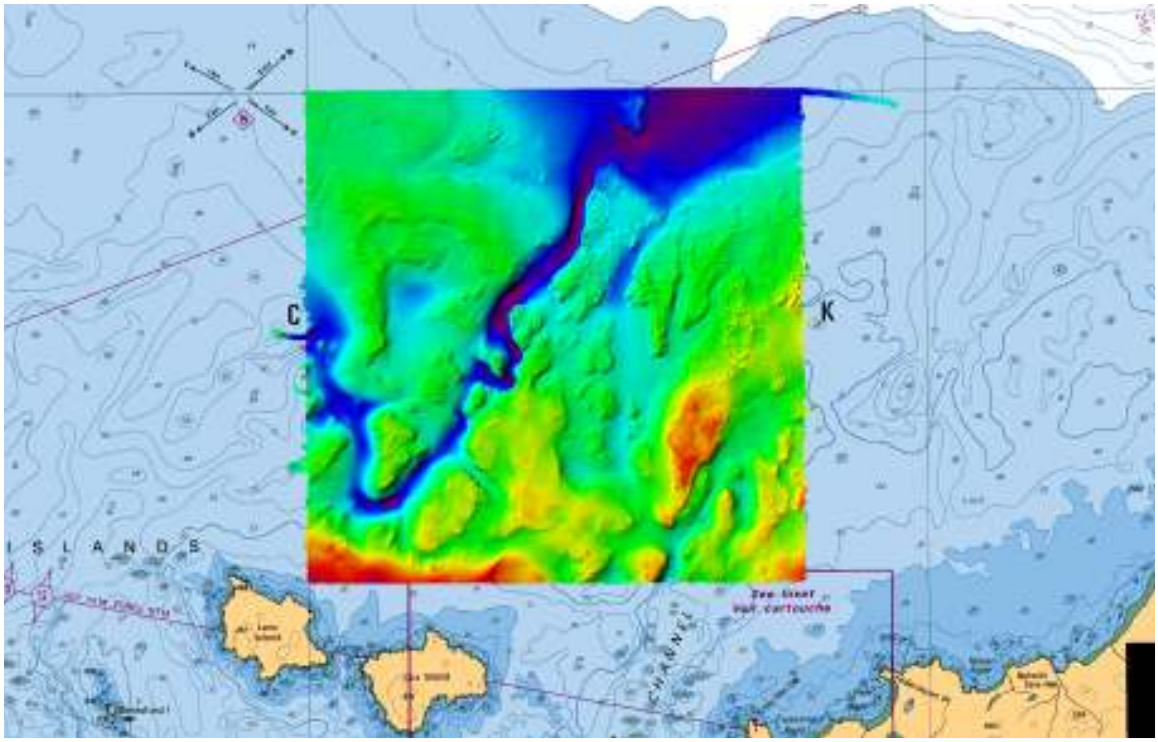
Tuwartz Narrows. July 31.
CHS Otter Bay survey of opportunity during the time that the Vector was in Prince Rupert for a personnel change. Tuwartz Narrows lies at the north end of Tuwartz Inlet, on the south end of Pitt Island, and separates the main body of the inlet from a small basin.

Cherry Islets. July 31.
CHS Otter Bay survey of opportunity during the time that the Vector was in Prince Rupert for a personnel change. The Cherry Islets lie off the south end of Pitt Island, in Squally Channel.

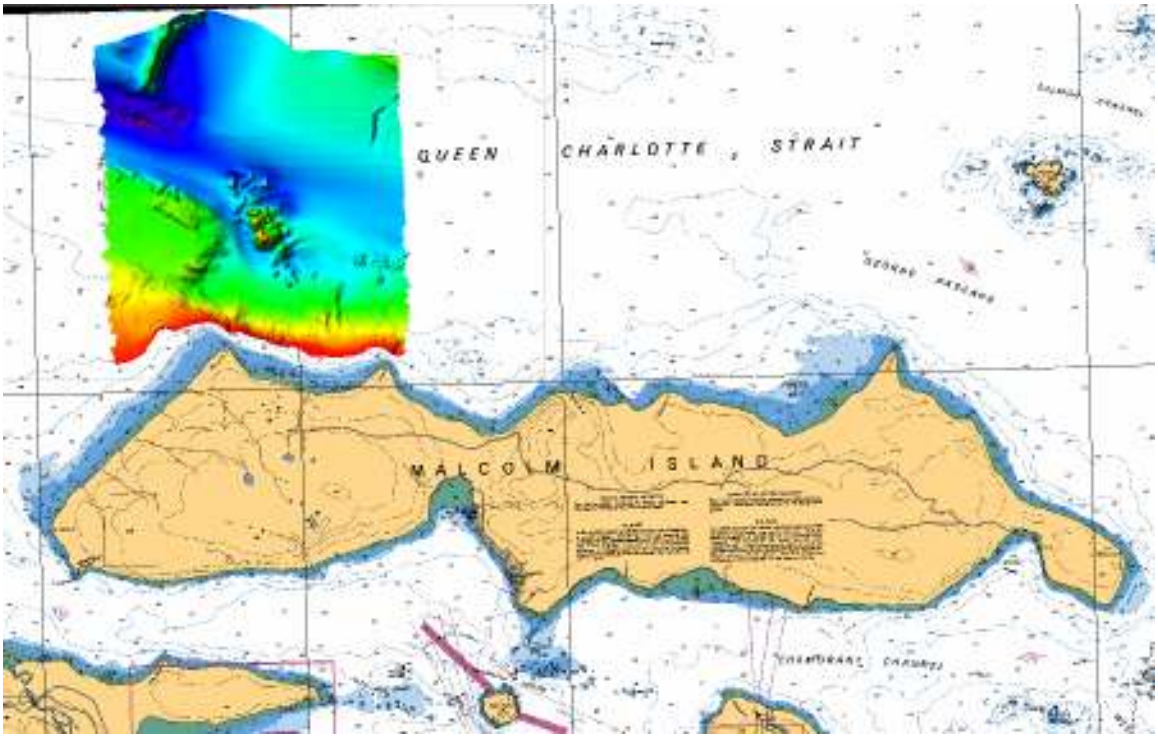


VECTOR Survey Project Location Diagram

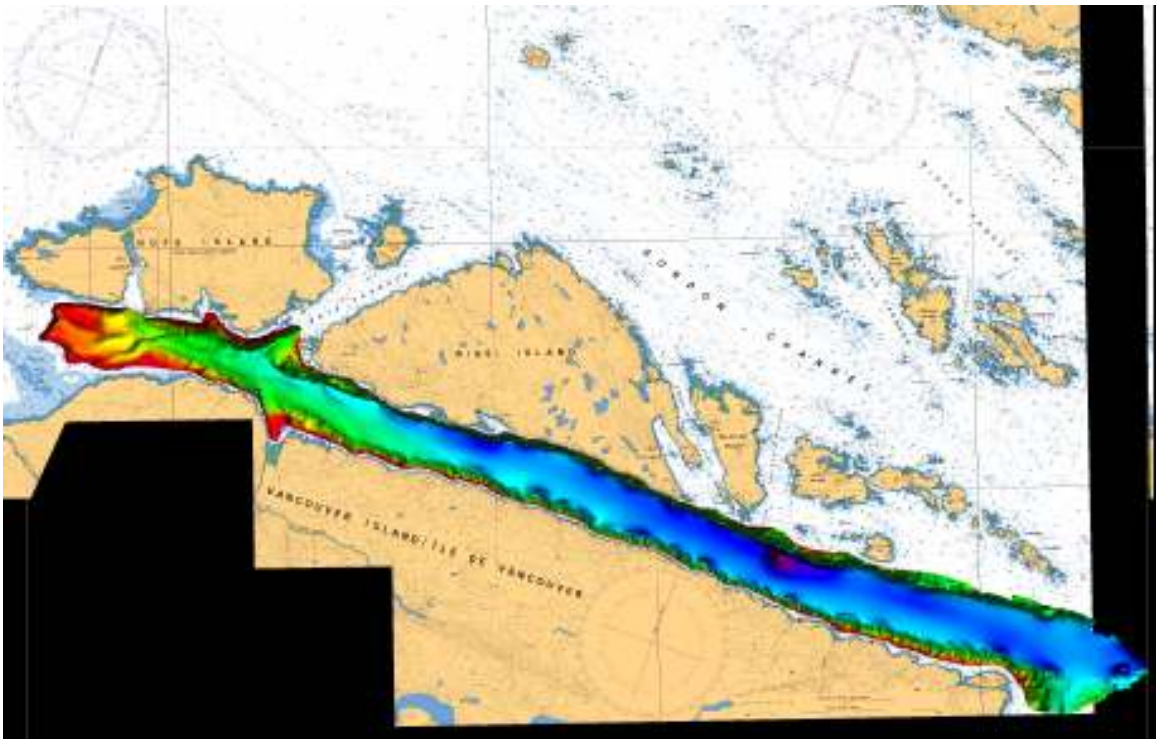
	Project Name	CHSDir #	Client
1	Cook Bank	5026017	NRCan
2	Malcolm Island	5026045	NRCan
3	Goletas Channel	5026290	CHS
4	Hardy Bay	5026289	CHS
5	StAD Sites (Stock Assessment Division)	5026036	MEAD
6	Shelf Break	5026018	CHS
7	Seep Sites	5026019	NRCan
8	Laskeek Bank	5026027	NRCan
9	Dana Inlet	5026329	CHS
10	103B09 (NTS #)	5026028	NRCan
11	Caamaño Tanker Route	5026029	CHS
12	Otter Channel	5026369	CHS



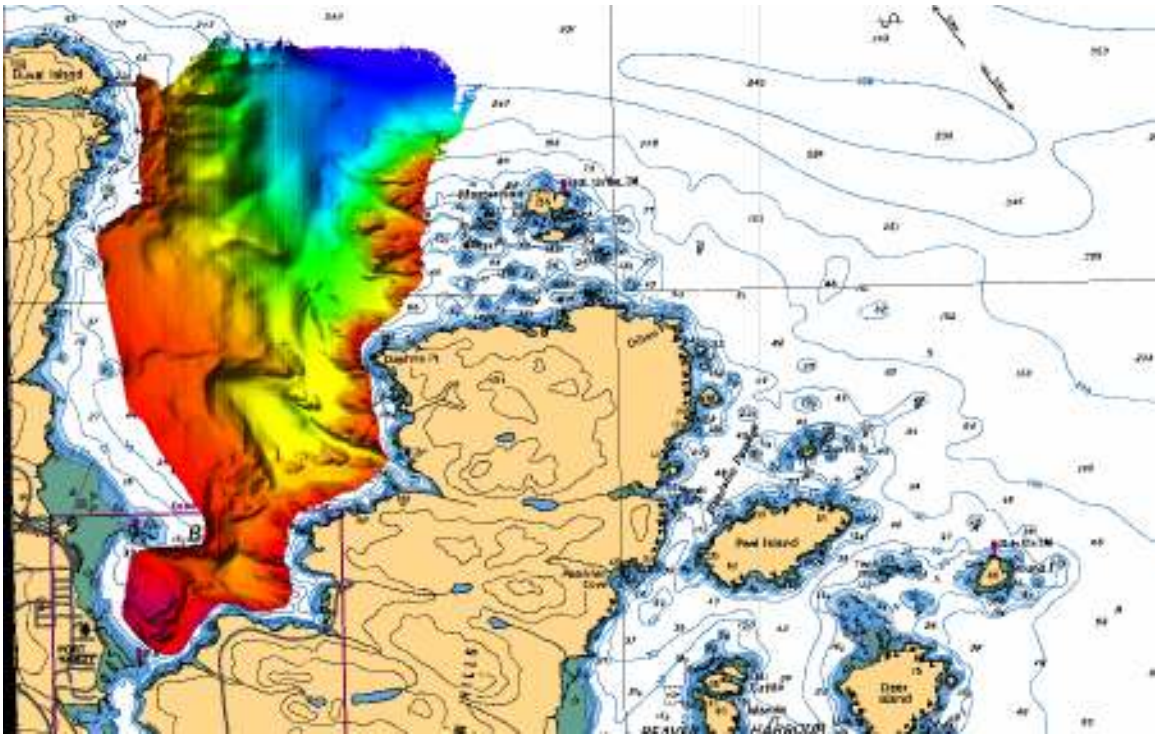
(1) 2006CookBank, June 29-July 13, 356.0 Sq. km. (chart 3605).



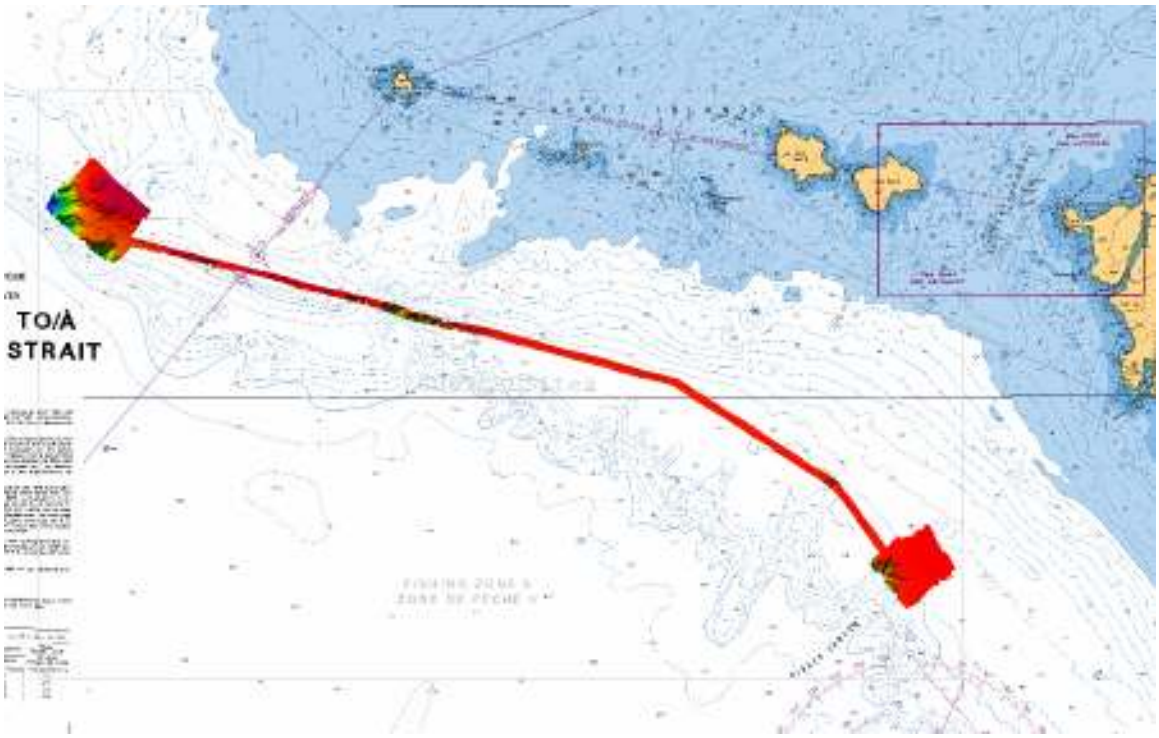
(2) 2006MalcolmIsland, June 30, 46.6 Sq. km. (chart 3546).



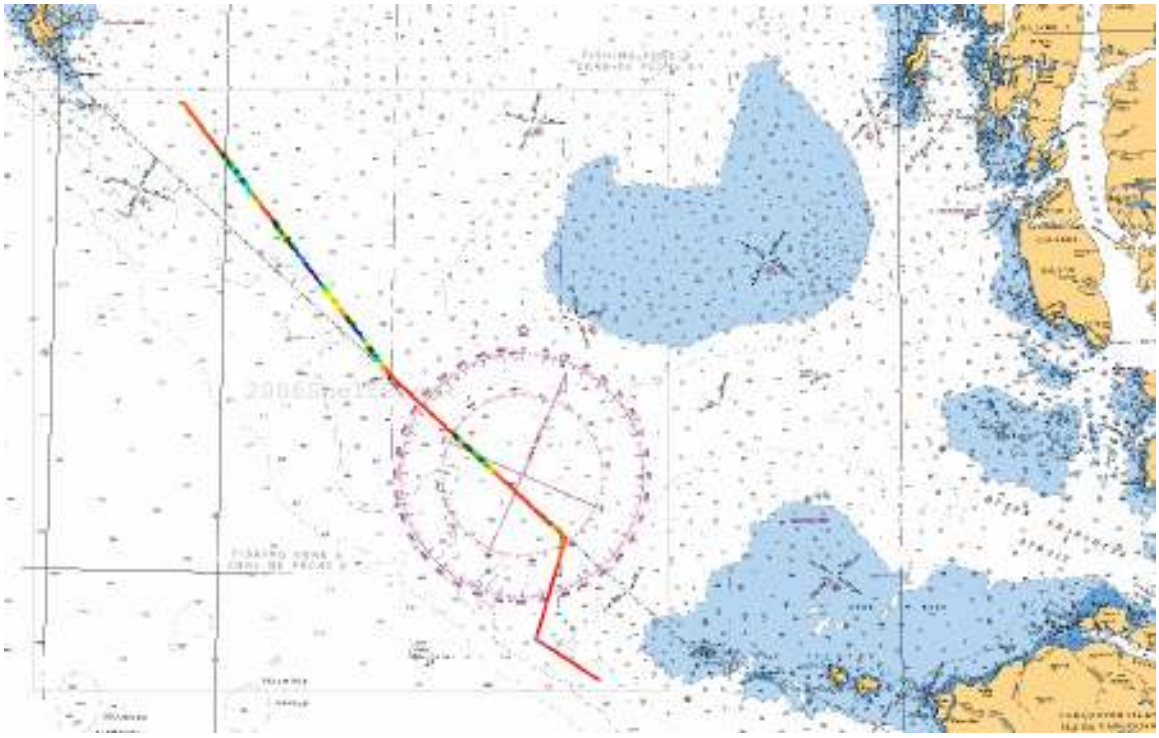
(3) 2006GoletasChannel, July 14-16, 100.4 Sq. km. (chart 3549).



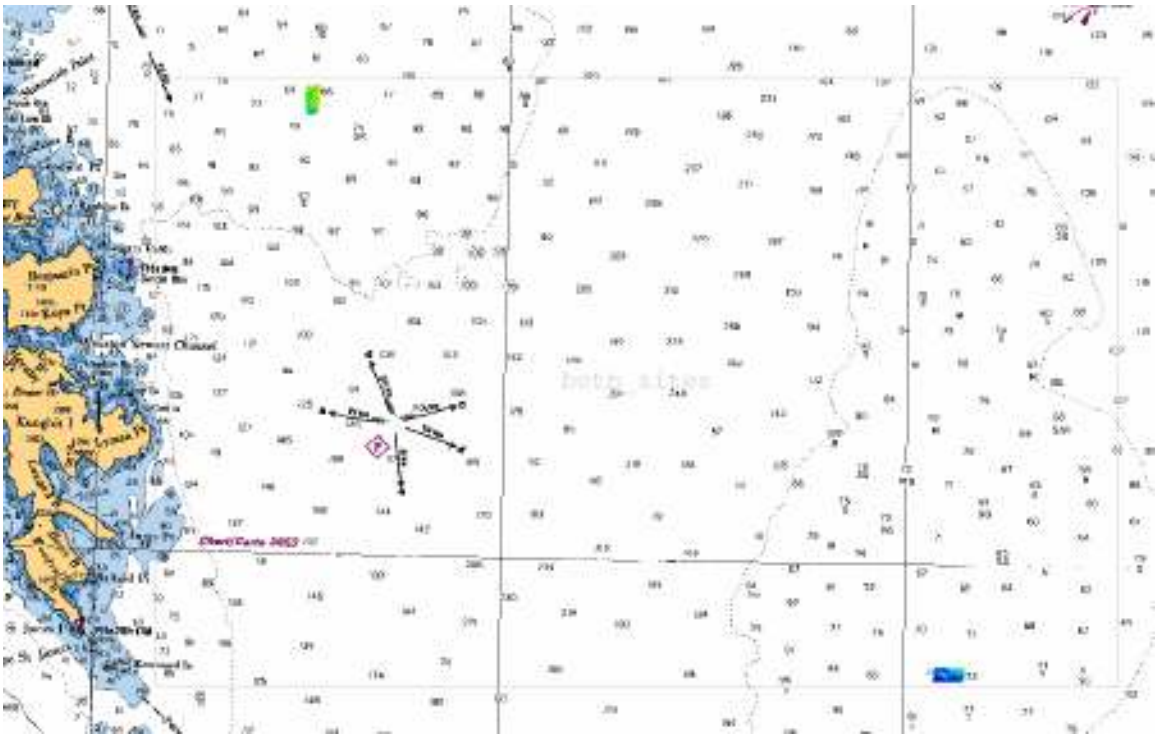
(4) 2006HardyBay, July 7-8, 13.3 Sq. km. (chart 3548)



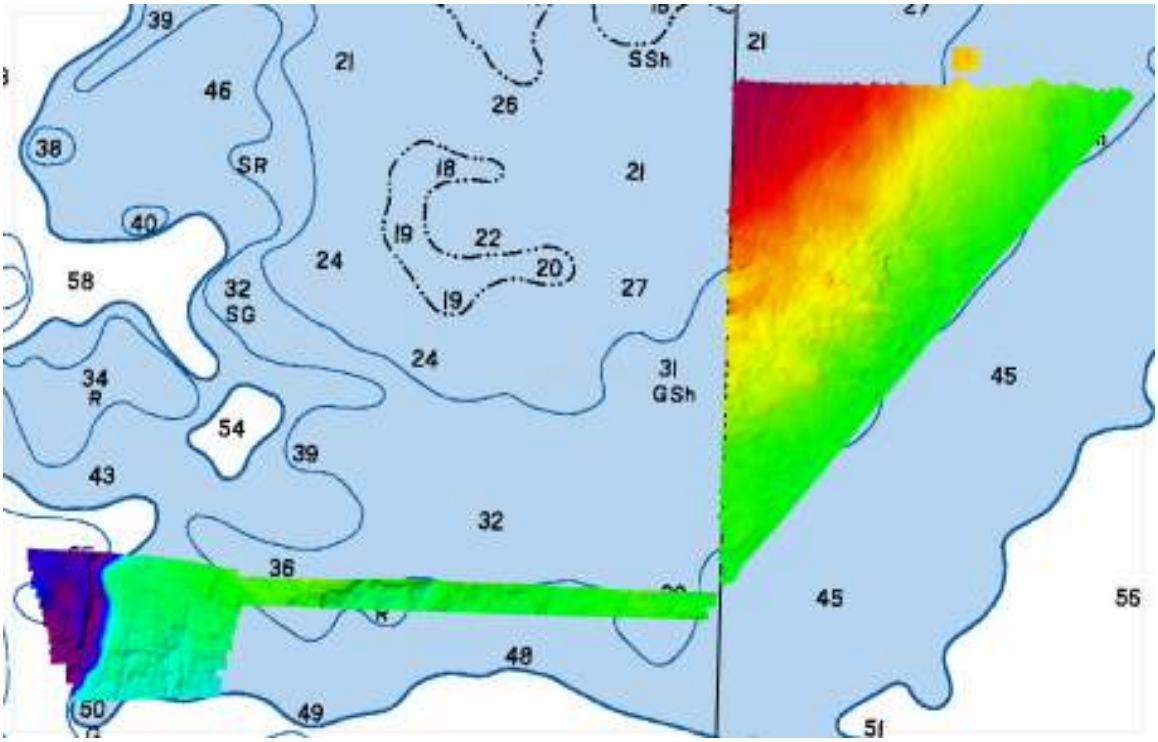
(5) 2006StADSites (MEAD), July 13-14, 83.1 Sq. km. (chart 3605)



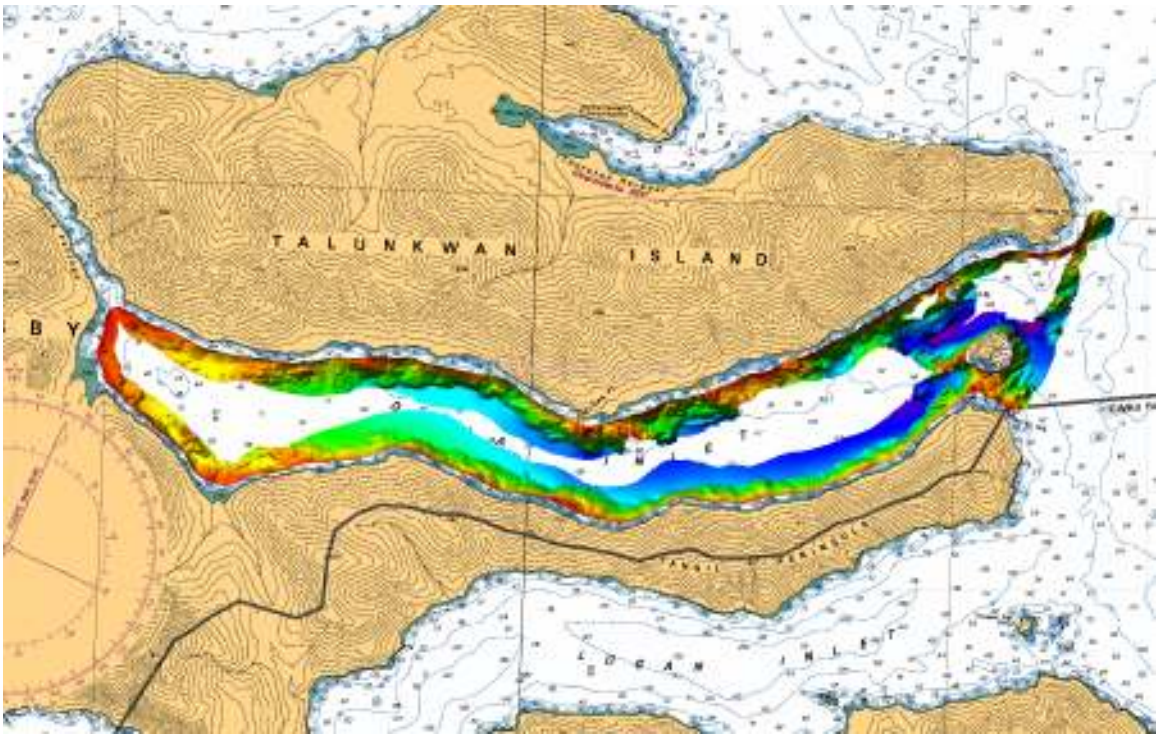
(6) 2006ShelfBreak, July 18-19, 155.0 Sq. km. (chart 3744)



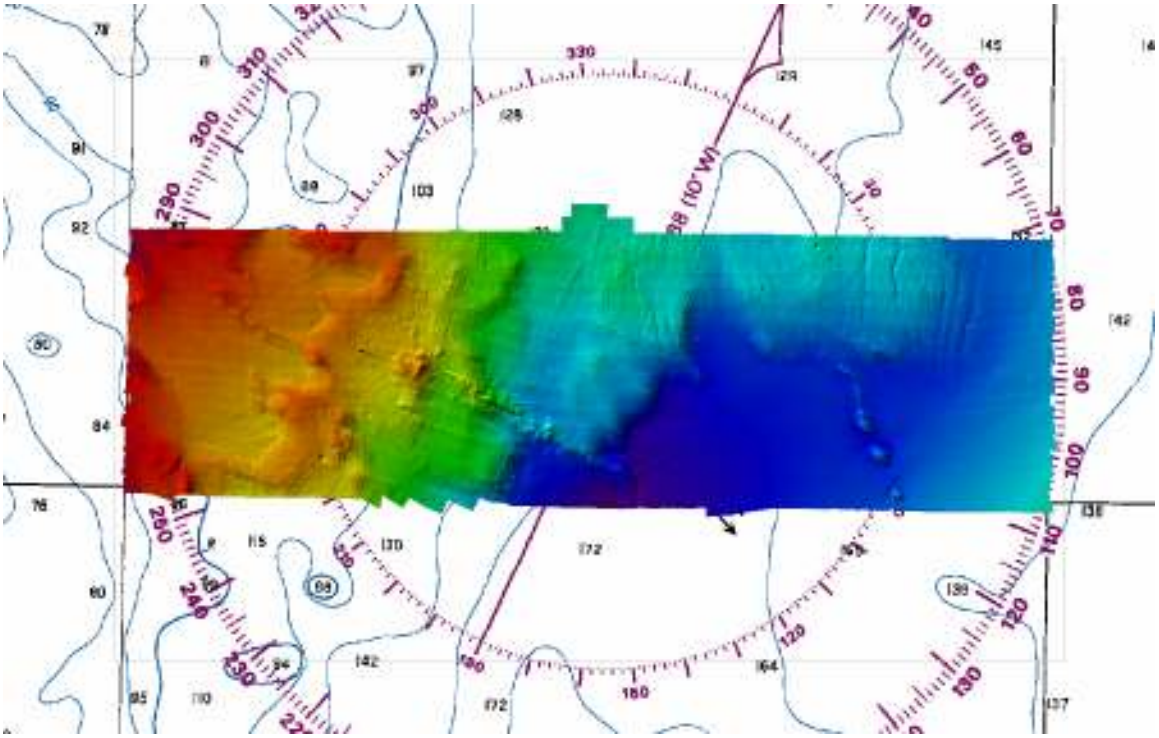
(7) 2006SeepSites, July 19, 6.3 Sq. km. (chart 3744)



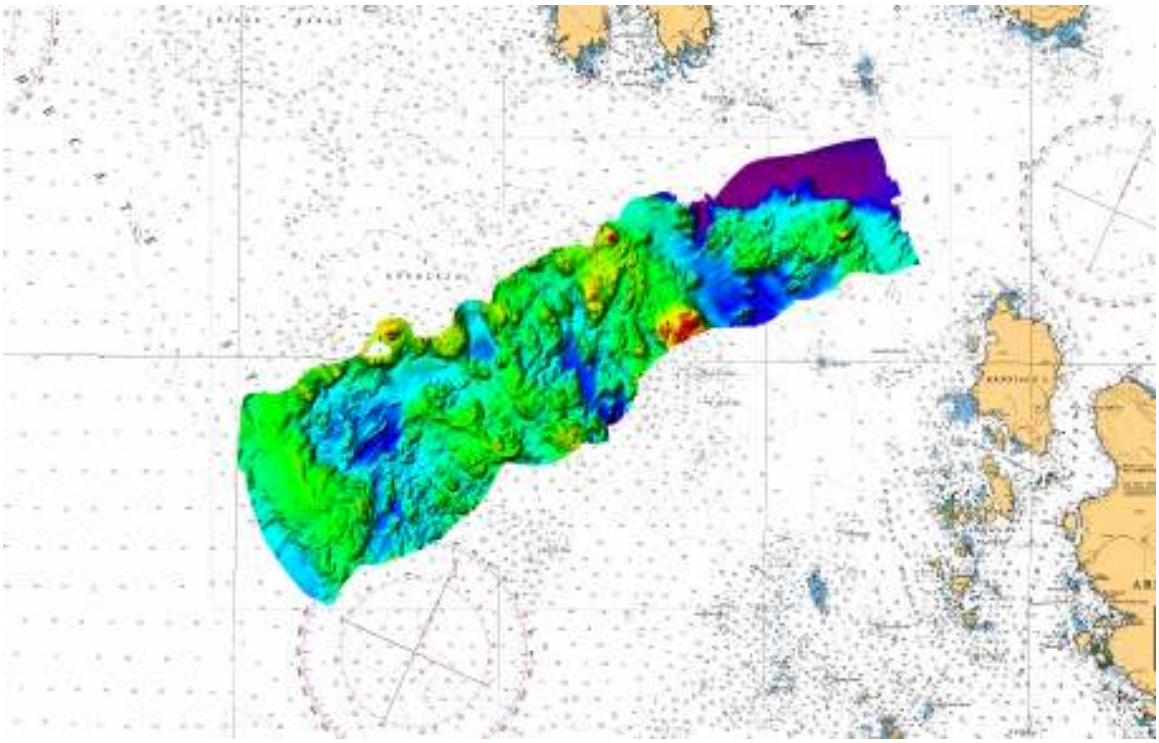
(8) 2006LaskeekBank, July 18-22, 78.3 Sq. km. (chart 3902)



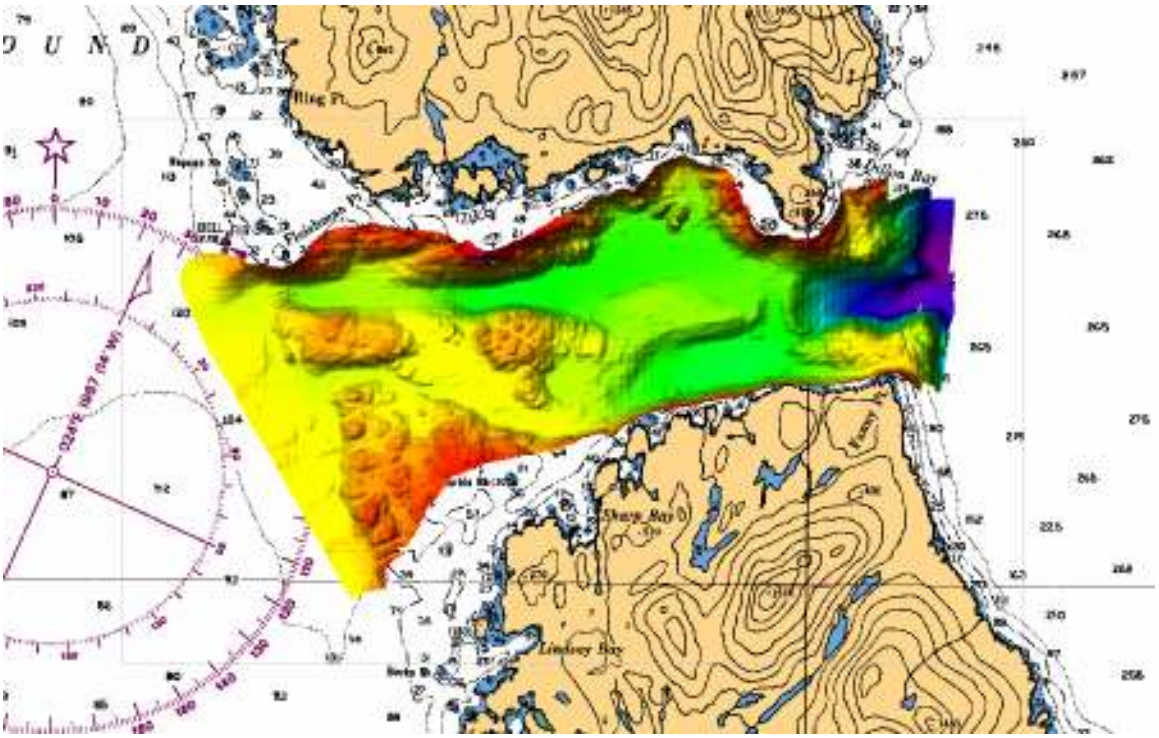
(9) 2006DanaInlet, July 20, 13.0 Sq. km. (chart 3807)



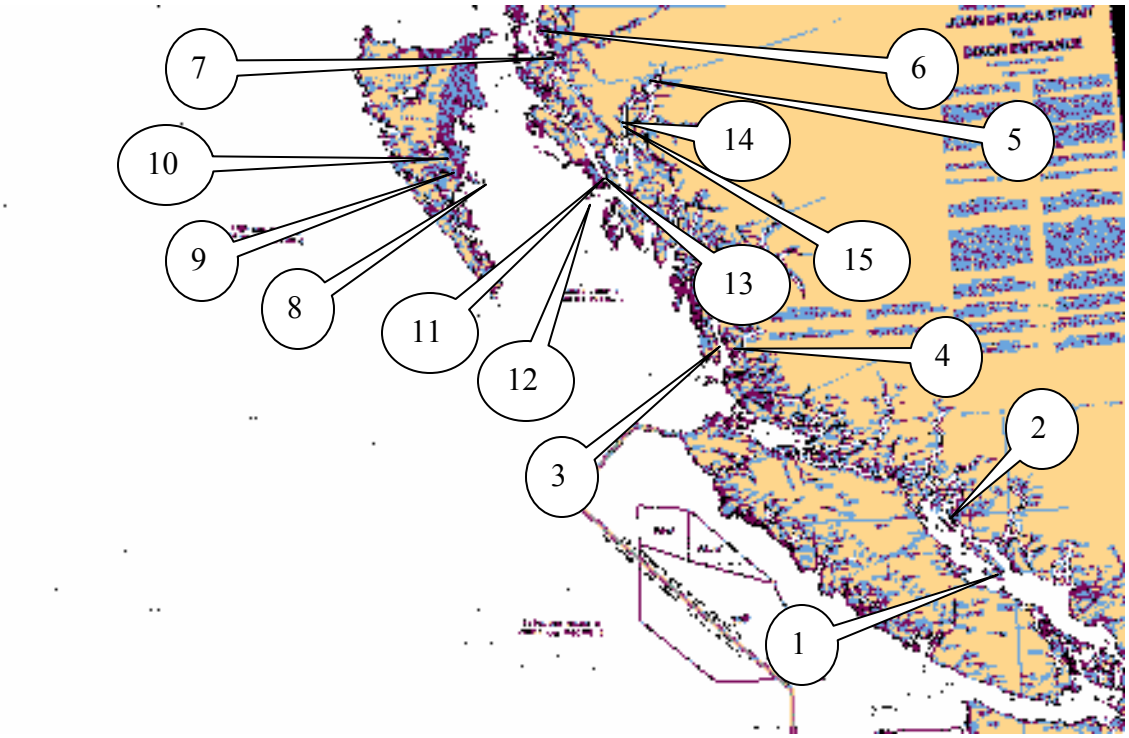
(10) 2006103B09, July 22-25, 346.0 Sq. km. (chart 3902)



(11) 2006CaamanoTankerRoute, July 24-29, 215.9 Sq. km. (chart 3724)

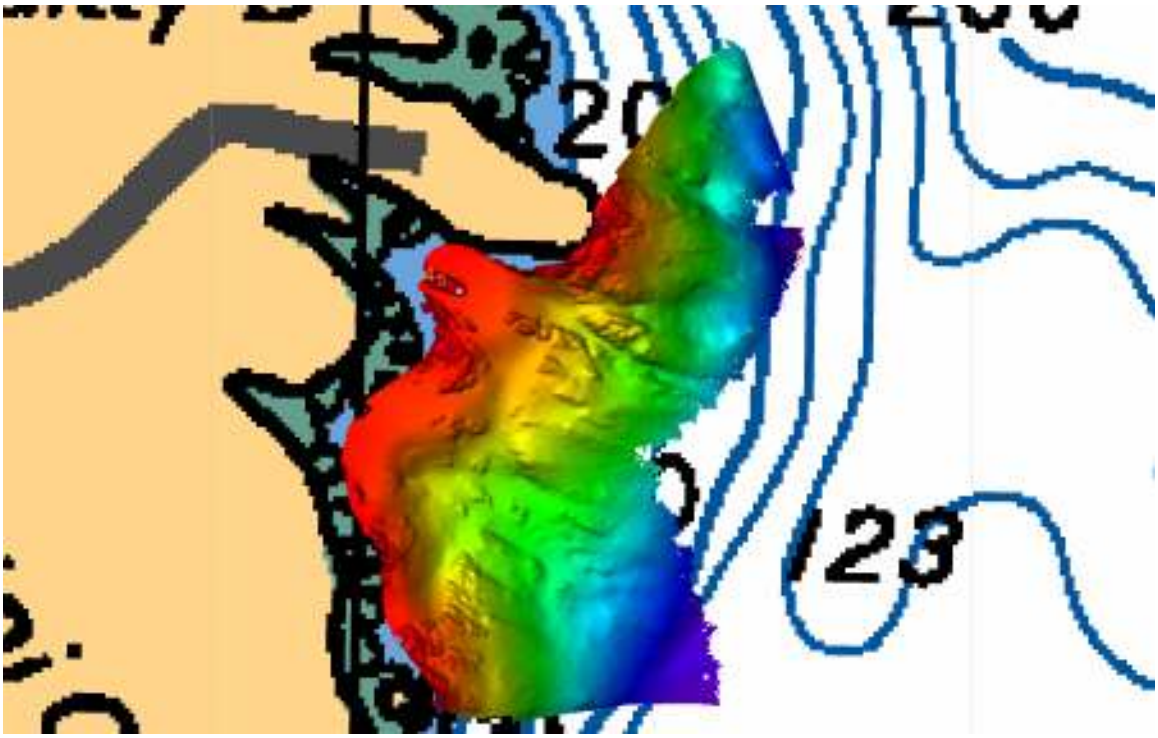


(12) 2006OtterChannel, July 29-30, 29.0 Sq. km. (chart 3724)

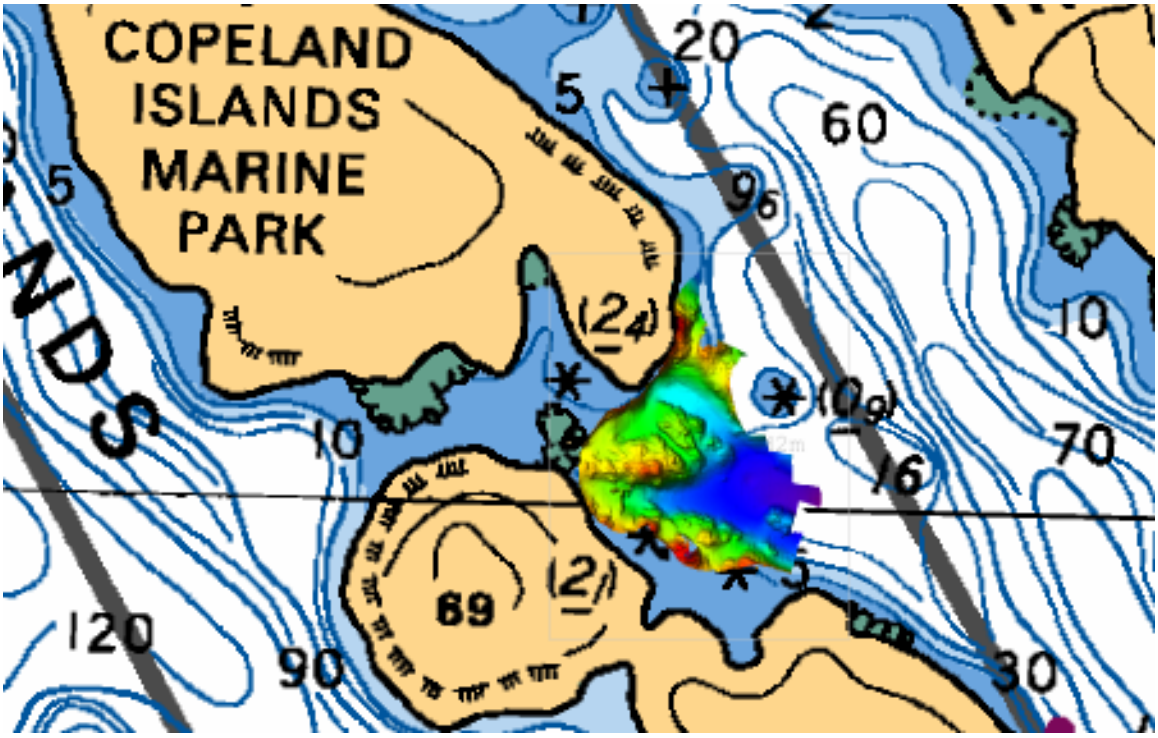


OTTER BAY Survey Project Location Diagram

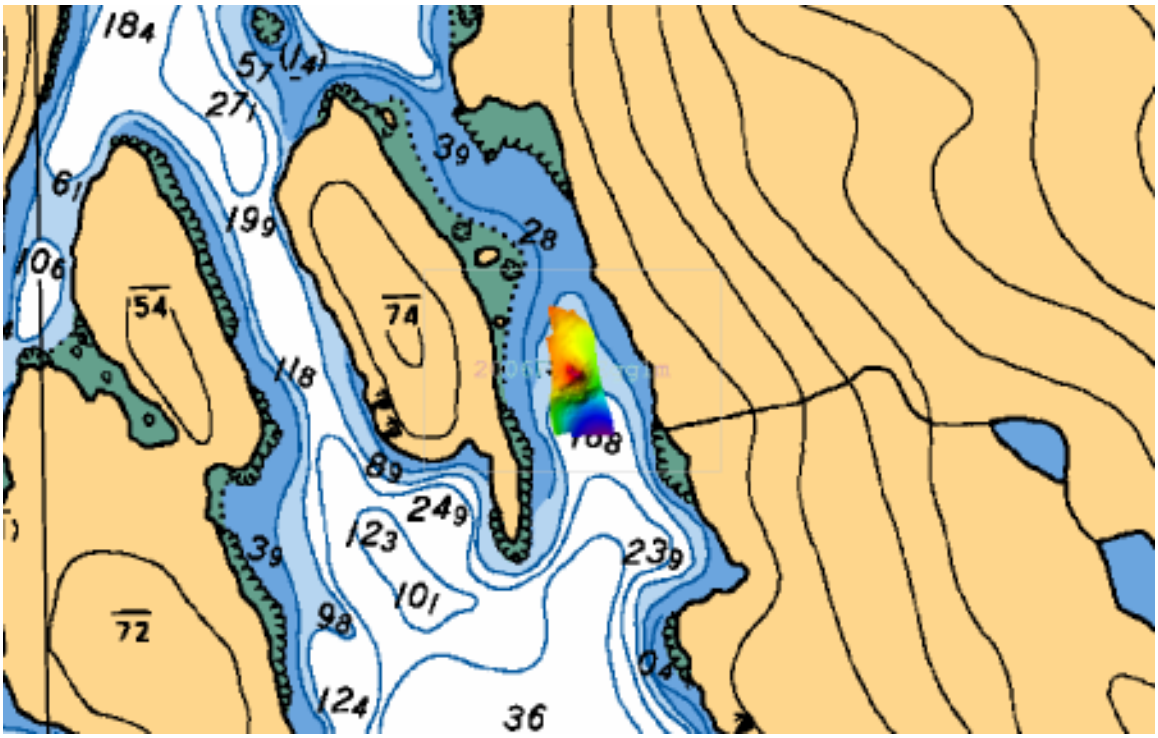
	Project Name	CHSDir #	Client
1	Squitty Bay	5026227	CHS
2	Copeland Islands	5026429	CHS
3	Fish Egg Inlet	5026425	CHS
4	Taylor Bay	5026374	CHS
5	Nanakwa Shoals	5026331	CHS
6	Prince Rupert	5026294	CHS
7	Cecil Patch	5026373	CHS
8	Laskeek Bank	5026027	NRCan
9	Atli Inlet	5026328	CHS
10	Thurston Harbour	5025330	CHS
11	Estevan South	5026355	CHS
12	Caamaño Tanker Route	5026029	CHS
13	Estevan Sound Rock	5026375	CHS
14	Tuwartz Narrows	5026304	CHS
15	Cherry Islets	5026302	CHS



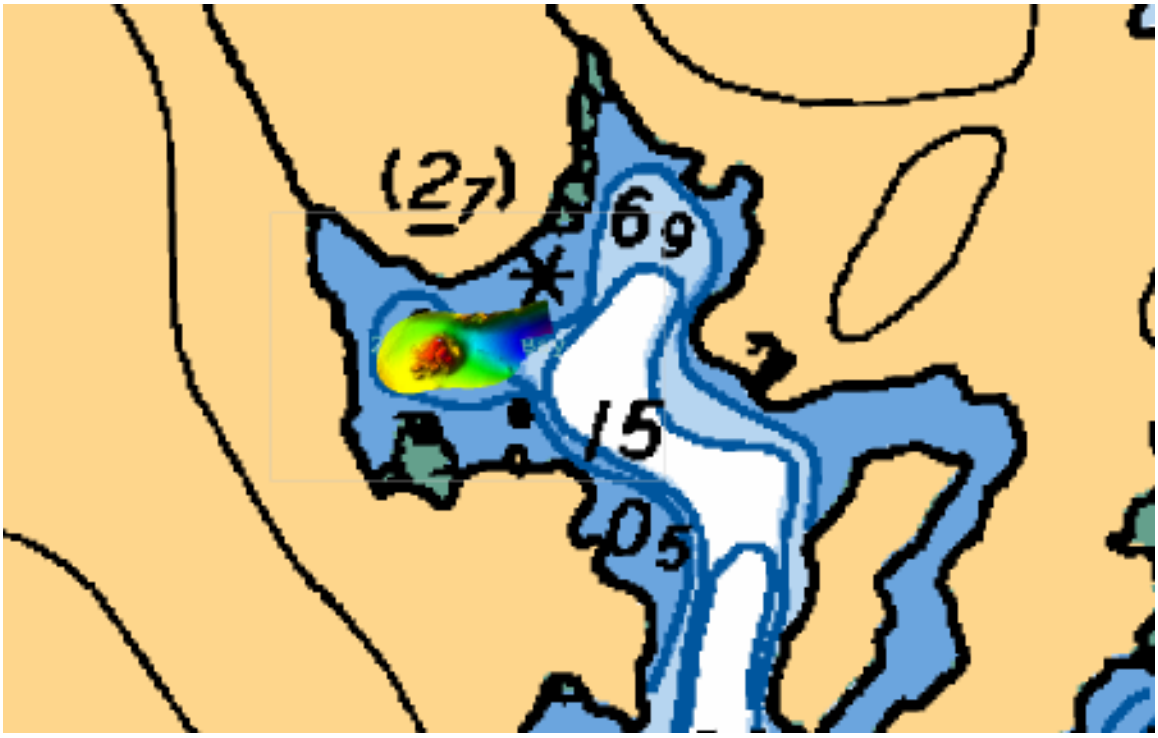
(1) 2006SquittyBay, June 28, 0.5 Sq. km. (chart 3512)



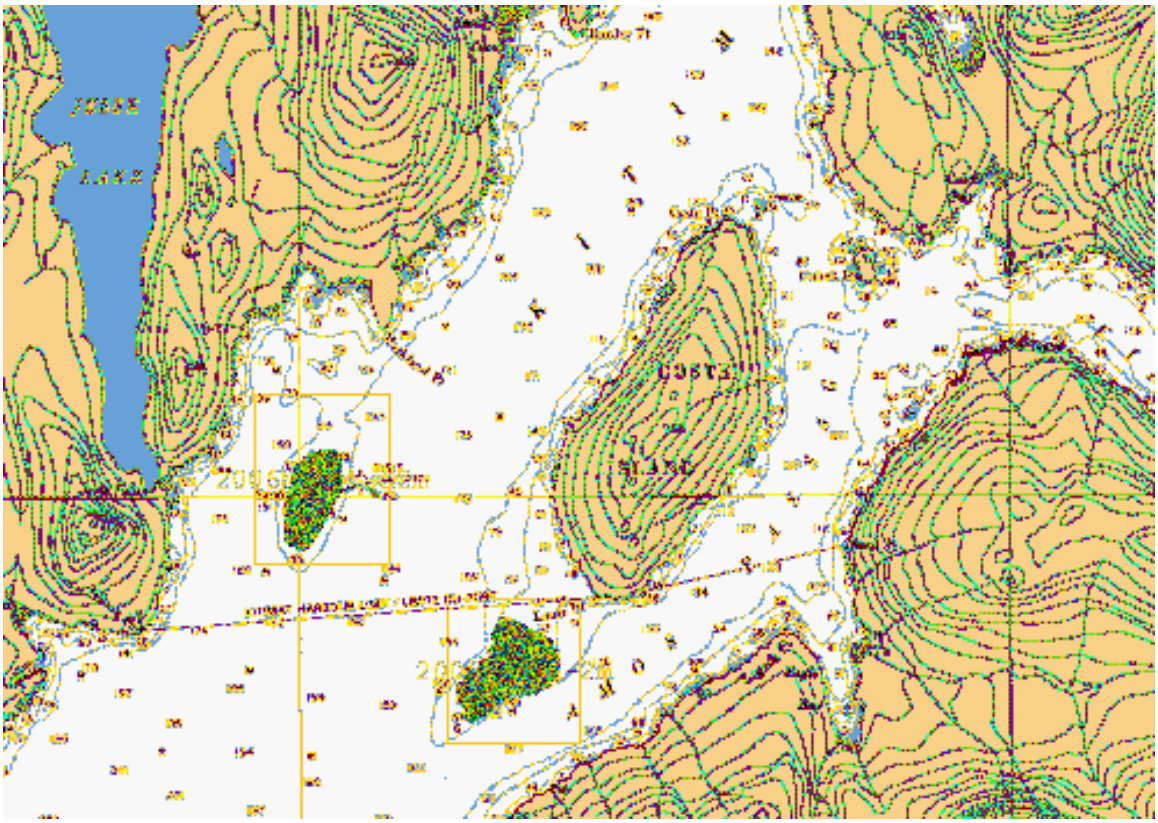
(2) 2006Copeland, June 29, 0.1 Sq. km. (chart 3538)



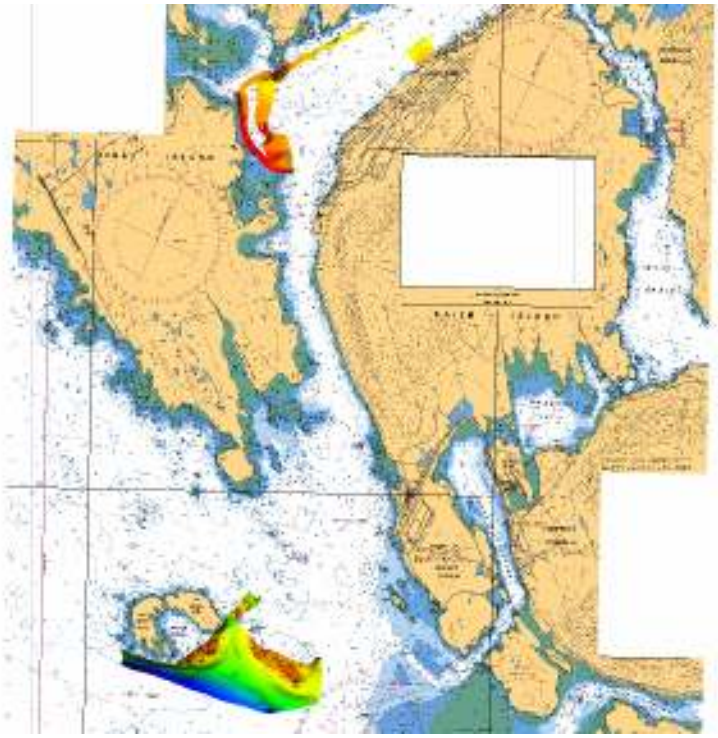
(3) 2006FishEggInlet, July 2, 0.01 Sq. km. (chart 3921)



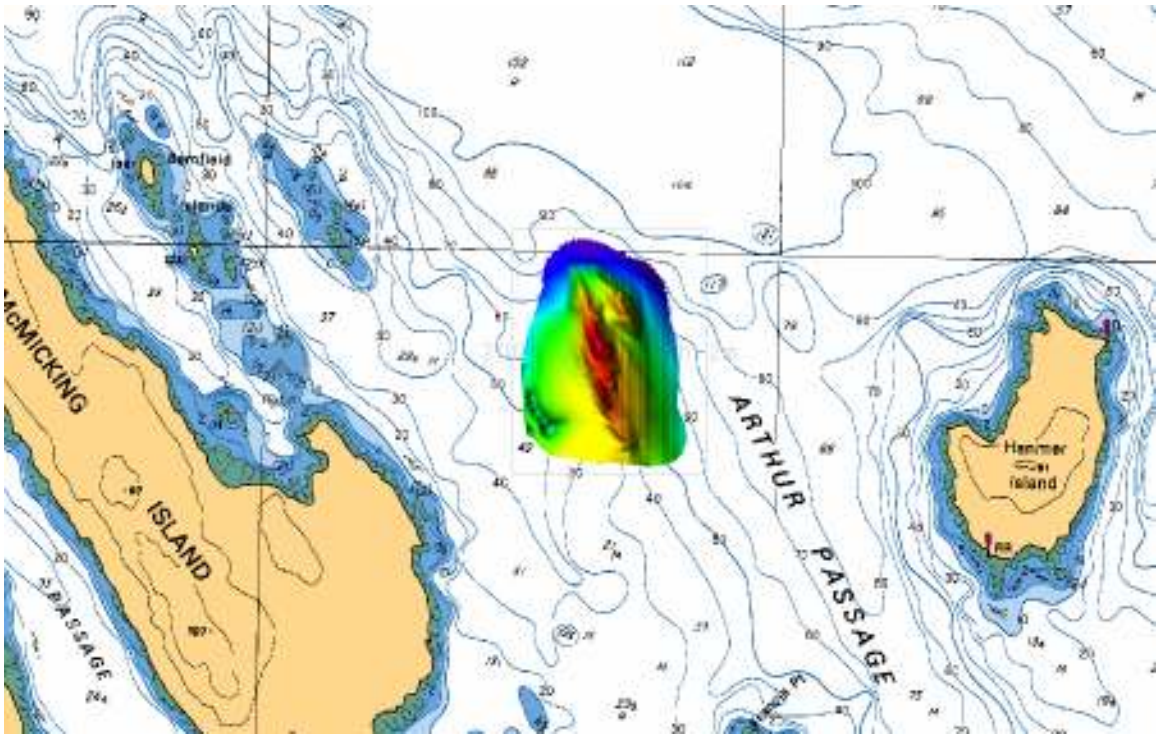
(4) 2006TaylorBay, July 2, 0.01 Sq. km. (chart 3932)



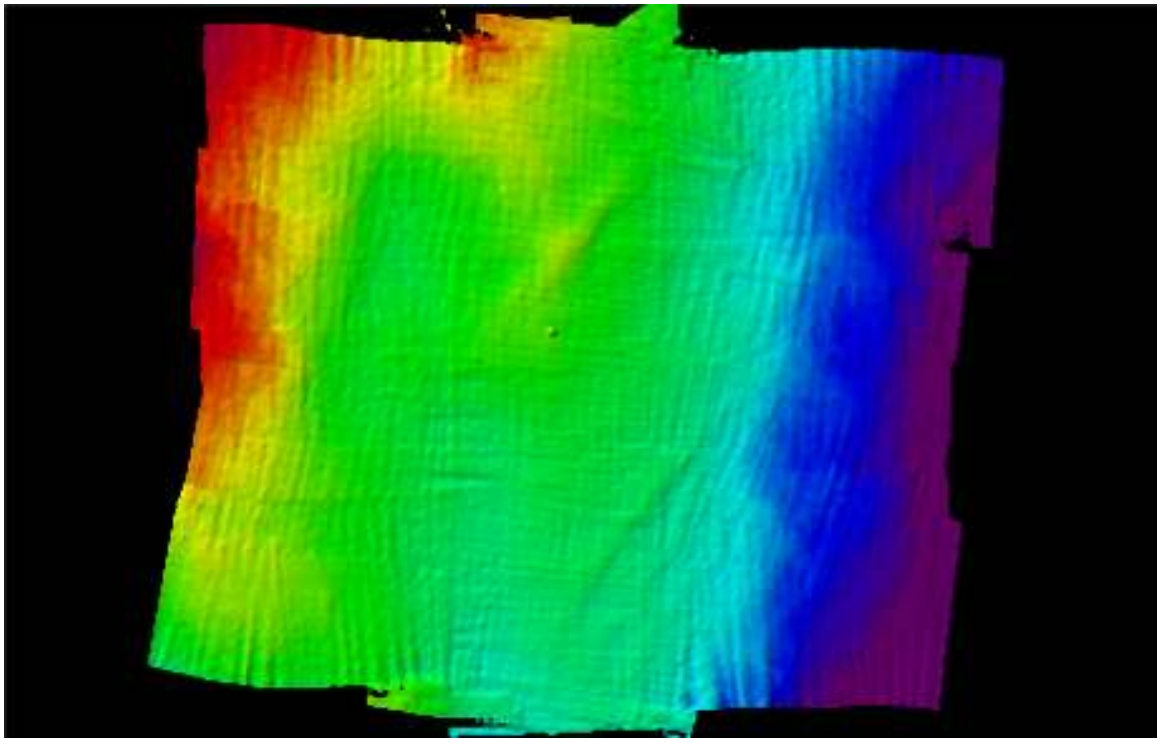
(5) 2006NanakwaShoals, July 9, 2.2 Sq. km. (chart 3743)



(6) 2006PrinceRupert, July 13-14, 6.5 Sq. km. (chart 3958)

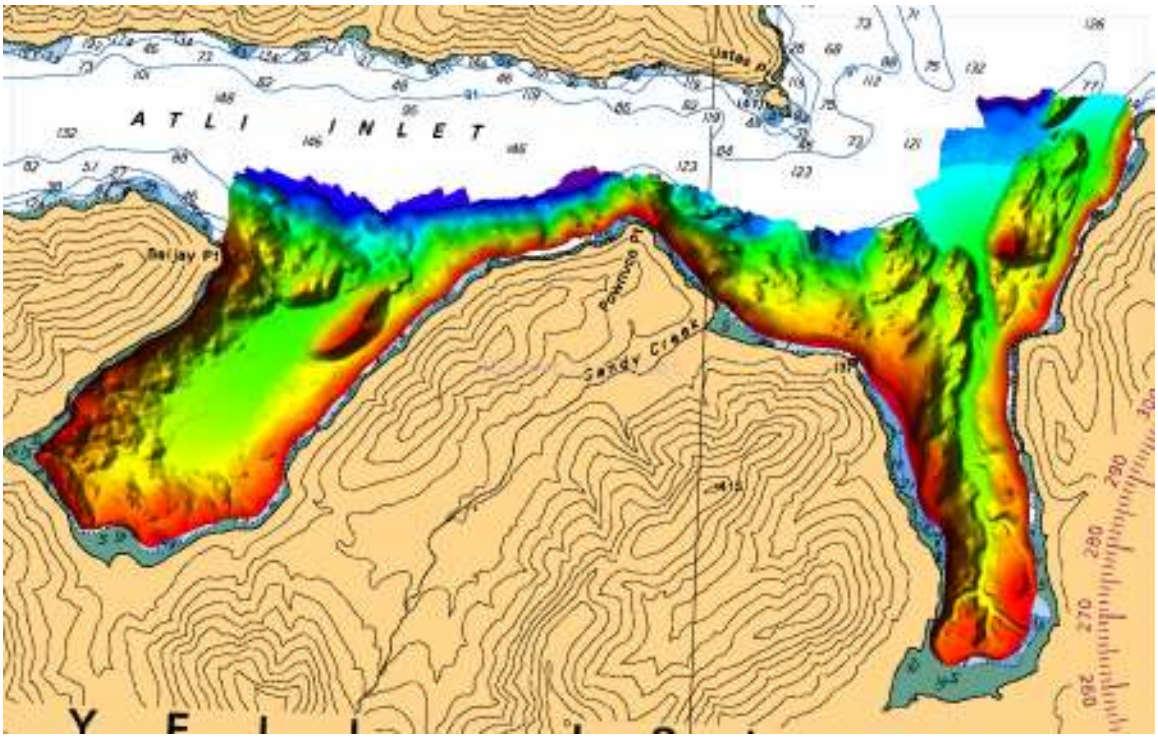


(7) 2006CecilPatch, July 12, 0.5 Sq. km. (chart 3717)

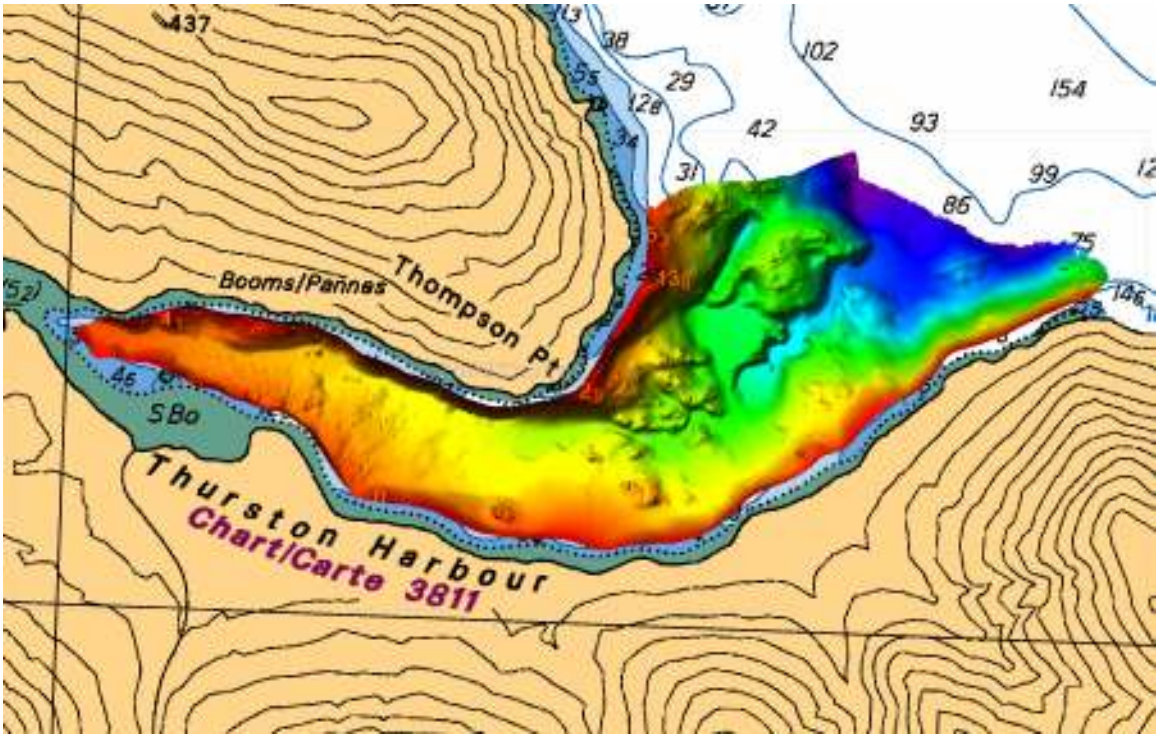


(8) 2006LaskeekBank (Well Head), July 18-19, 5.9 Sq. km. (no chart)

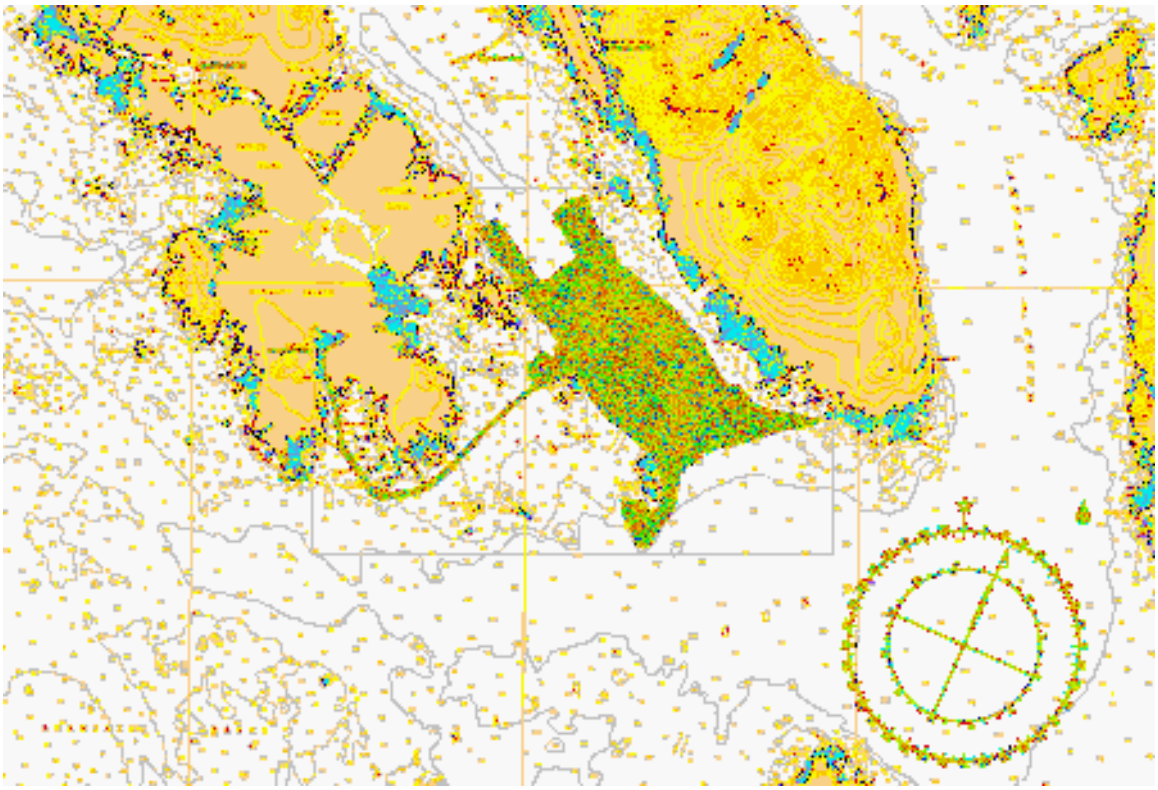
The Laskeek Bank project was a joint Vector-Otter Bay survey. The small dot near the centre is a well head, in 57 metres of water, sitting proud of the bottom by 1.0m.



(9) 2006AtliInlet, July 20-21, 7.4 Sq. km. (chart 3807)



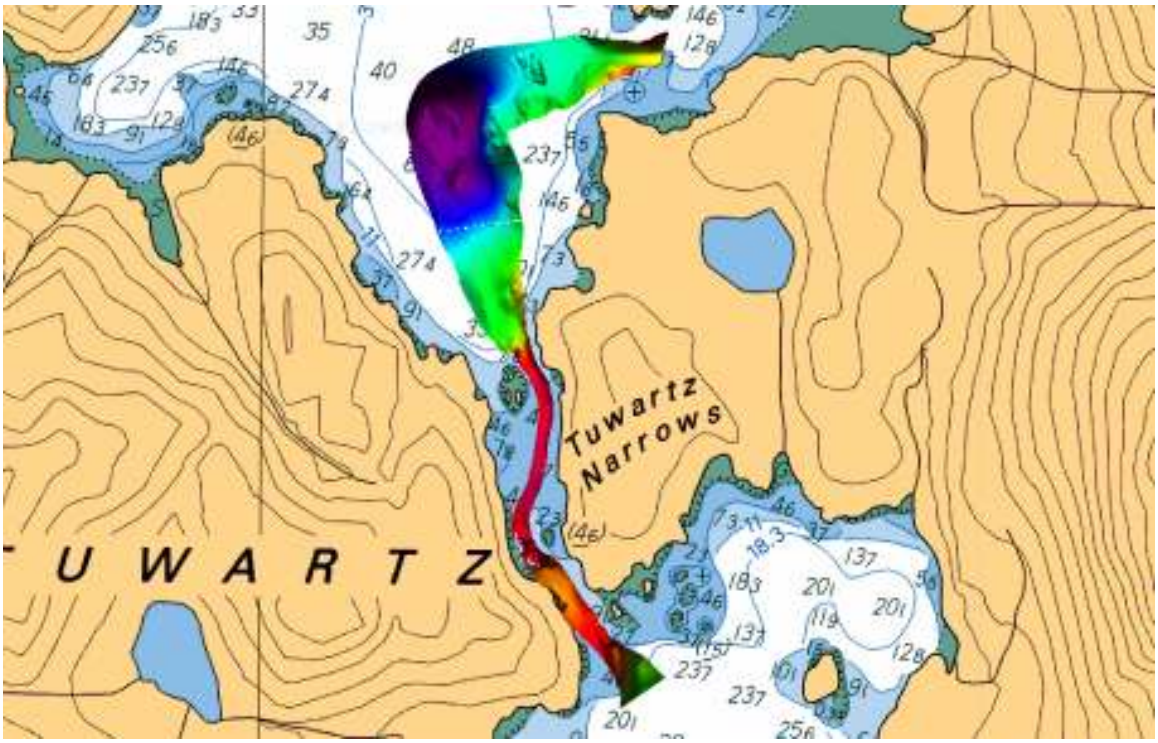
(10) 2006ThurstonHarbour, July 21, 2.0 Sq. km. (chart 3807)



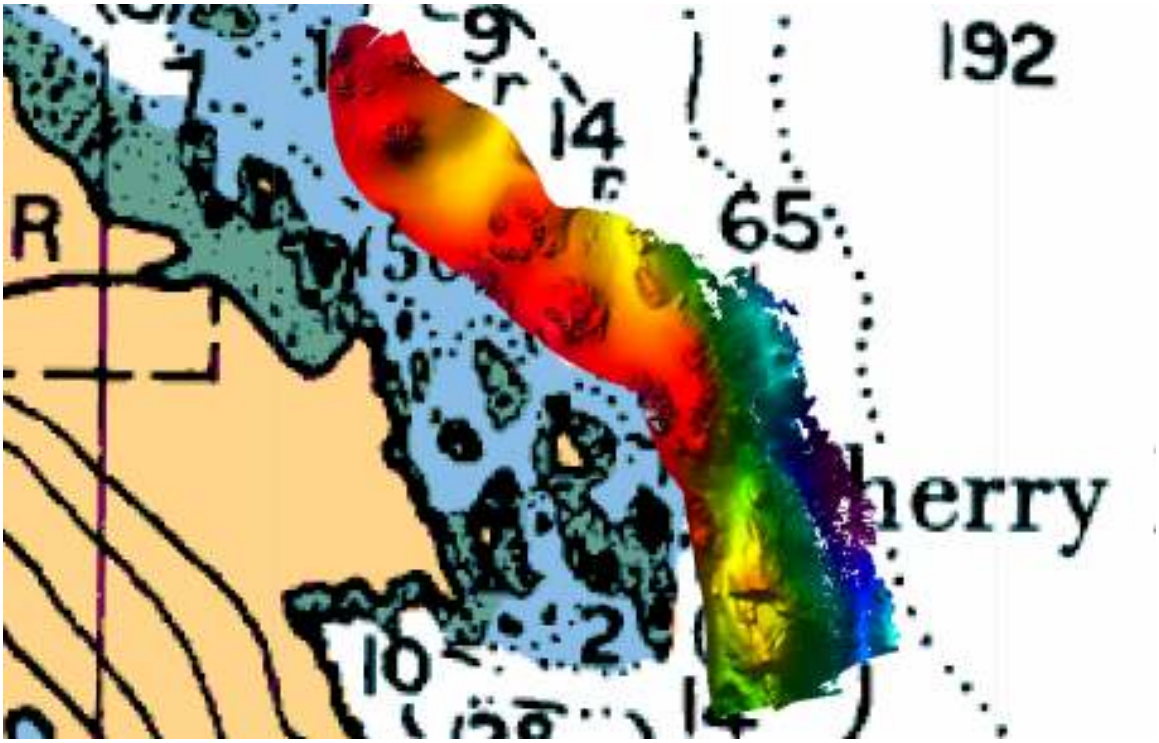
(11) 2006EstevanSouth, July 25 – August 4, 39.7 Sq. km. (chart 3724)

(12) 2006CaamanoTankerRoute (not shown), Otter Bay contributed to shoal portions of Vector survey (image 11 in previous section).

(13) 2006EstevanSoundRk, July 25, 0.1 Sq. km. (chart 3724)



(14) 2006TuwartzNarrows, July 31, 0.1 Sq. km. (chart 3742)



(15) 2006CherryIslets, July 31, 0.4 Sq. km. (chart 3742)

Project Statistics

Project Name	Sounding Days	Area (sq. km)
Cook Bank	9.3	356.0
Malcolm Island	0.8	46.6
Goletas Channel	1.9	100.4
Hardy Bay	0.5	13.3
StAD Sites (MEAD)	0.9	83.1
Shelf Break	0.5	155.0
Seep Sites	0.2	6.3
Laskeek Bank	1.7	78.3
Dana Inlet	0.4	13.0
103B09	2.3	346.0
Caamaño Tanker Route	3.1	215.9
Otter Channel	0.4	29.0
Squitty Bay	0.1	0.5
Copeland Islands	0.1	0.1
Fish Egg Inlet	0.1	0.01
Taylor Bay	0.1	0.01
Nanakwa Shoals	0.2	2.2
Prince Rupert	0.4	6.5
Cecil Patch	0.1	0.5
Atli Inlet	0.3	7.4
Thurston Harbour	0.2	2.0
Estevan South	2.0	39.7
Estevan Sound Rock	0.1	0.1
Tuwartz Narrows	0.1	0.1
Cherry Islets	0.1	0.4
Total	**26.3**	**1502.4**

Vector Time Breakdown

Sounding for CHS	18%
Sounding for NRCan	41%
Sounding for MEAD	4%
Transit	18%
Other (mob/demob, patch test, SAR, fuel, etc)	19%

Additional Otter Bay Work

Hazard Investigations	5
GPS Control Stations Re-observed	39
Nav. Aids Positioned	1

Problems and Recommendations

1. This survey started with very little expertise among hydrographers with regard to the recent developments in equipment software, especially SIS. The learning curve was considered too steep. Future surveys should ensure an overlap of experienced personnel to make the start of season a little smoother. There will be an opportunity in 2007 for some SIS training on the Otter Bay, which should help.

2. The sea strainer in the pipe leading to the surface sound probe was found to be clogged with mussels, causing incorrect sound speed readings or no readings at all. The checking of this is now part of an ISO procedure.

3. Some of the cow-catcher bolts became loose after a few days, and required the services of a diver to retighten them. Modifications to the mounting plates have been made to help mitigate the problem.

4. There is still a need for the electronics technologists to benefit from a Kongsberg-Simrad training course in multibeam electronics and hardware. This may be put on hold until the procurement of an EM710 to replace the EM1002.

5. The MVP-30 diamond spooling gear became damaged by being jammed by a broken tooth. This rendered the MVP unusable for fifteen days, until another diamond gear could be shipped up. It would make sense to obtain and carry a spare for as many parts as possible to reduce this sort of downtime. To this end, a spares kit has been purchased.

6. There is a need for a third computer in the lab, equipped with HIPS and MSProject. The HIC needs MSProject to track the progress of each project, and there are times when HIPS is needed when the main processing computer is in use by other people.

7. SIS has a software bug such that sometimes when logging was stopped for a sound speed cast, then restarted after a new profile was uploaded, SIS may not be recording to a correctly named file. It may instead record to a 9999.all file only, (there is always a 9999.all file in normal operation), but will not rename it to the correct name. It will also not accept a line increment command. The workaround was to shut SIS down and restart. It has also been seen that SIS was not logging when the green “Logging” indicator was on, and was logging when the red “Not Logging” indicator was on. It is not clear whether or not this problem has been addressed by Simrad.

8. The Vector should be equipped with satellite TV. This is now commonplace on the larger CCG vessels. The ability to keep up with local and world news, as well as major sporting events, (hockey playoffs, Olympics, World Cup Soccer, etc), would be appreciated by all aboard and be a significant morale booster.

Closing Comments

The five week period represented here was very productive, with many projects completed for both NRCan and CHS, as well as MEAD. Bad weather did not result in significant downtime, as the vessels were tasked for surveys of opportunity during these brief interludes. The experiment of using the Vector as nightly accommodation proved unsuccessful, but a workaround was adopted keeping both vessels productive. It is clear that if Laskeek Bank is to be surveyed in the future, a dedicated support vessel, like the barge Pender, would be needed. Also, due to the shallow depths, a wide angle swath system would have to be employed. A good start was made on the "Gateway Project" waterways, which was added to in two following survey time blocks, and will continue over the next two years. A number of control stations were repositioned with GPS, which will be used for coastline control in the new charts that are being planned for the "Gateway" area.

The Vector and Otter Bay continue to be good sounding vessels for coastal waters, and the captains and crews of each have been very helpful and accommodating, making the cruise a pleasurable one. Despite a large amount of sounding being done, it was not all work, work, work.