VOYAGE SUMMARY

RV SOUTHERN SURVEYOR

SS02/2007

Title

Survey and monitoring for SE MPAs including the Tasmanian Seamounts Marine Reserve

Itinerary

Depart Hobart 2200hrs, Wednesday 28th March
Arrive Hobart 1030hrs, Wednesday 11th April

Principal Investigator(s)

Dr Alan Williams (Chief Scientist)
Email: Alan.Williams@csiro.au

Mr Rudy Kloser
Email: Rudy.Kloser@csiro.au

Dr Nicholas Bax
Email: Nic.Bax@csiro.au

CSIRO Marine and Atmospheric Research.
GPO Box 1538
Hobart 7001

Scientific Objectives

The scientific objectives of this survey support the process of SER Estate inventory and management performance assessment by providing *interpreted* benthic habitat maps, faunal inventories and documented conservation values in scientific reference sites from selected MPA areas in the SER estate. Data will enable us to further test and refine predictive methods for identifying seabed habitat types using acoustic swath data (primarily backscatter, bathymetry and bathymetric derivative variables such as slope and aspect).

The scientific objectives for the survey – split across two voyages (SS11/2006 for leg 1 and SS012007 for leg 2) are to:

- use advanced sampling tools and techniques that are, to the extent possible, non destructive
- collect precisely georeferenced baseline data at scientific reference sites to enable indicators to be quantified (e.g. biodiversity metrics and levels of fishing effort at each site). These data will be documented and available for use for targeted monitoring during subsequent surveys.
- provide results that can assess the achievement of the TSMR management plan to date (revisit four seamounts photographed in 1997 – Main Pedra, Sister 1, K1 and D1; look for changes in fished and unfished sites) and refine baseline data
- enable future assessment against performance objectives for the TSMR and selected proposed Commonwealth MPAs – Huon, Tasman Fracture and possibly South Tasman Rise depending on the time available at sea
- test efficiency of the various biodiversity metrics to determine effectiveness, cost and potential for monitoring other deepwater reserves
- provide samples for key taxa that can be used in subsequent genetic research to refine definition and extent of endemicity in deepwater fauna
- complete swath mapping of relevant parts of continental slope between Hobart and SW Cape

These scientific objectives aim to:

1. Develop specific and generic research and monitoring options for the benthic ecosystems of offshore MPAs using ecological indicators identified though comparative deep water surveys
2. Trial and develop these through scientific survey of *selected* MPA areas in the SE estate
3. Evaluate and report the baseline data acquired
    a) at established scientific reference/ monitoring sites within and outside MPAs

    b) in forms that can be understood by, and are available to, all stakeholders

    c) in forms that can be presented to general public through the print and television media

Voyage Objectives

The overall voyage objectives were to:

1. Generate swath acoustic maps of target areas with the Simrad EM300 multibeam.

2. Collect targeted biological, physical and photographic ground-truth samples with a sediment grab, rock sled, epibenthic sleds and the CMR SVS or MVS camera platform from regions of upper continental slope seabed (~100-2000 m)

3. Collect and curate benthic invertebrates to provide a biological inventory at various scales of taxonomic resolution, including a functional morphological classification developed for the deep sea fauna

These objectives are split across two legs (separate voyages): during leg 1 (SS11/2006) the areas of interest were mapped using the EM300 multibeam and ground-truthed using the towed camera system. A program of sediment sampling was also undertaken using a Smith-MacIntyre sediment grab. On this voyage we made the complementary biological collections using an epibenthic sled. Sample locations were based on the mapping and photographic ground-truthing done on leg 1. Additional camera work was also completed at new sites, including an offshore site (the Cascade Plateau) not visited during leg 1.

Voyage Track

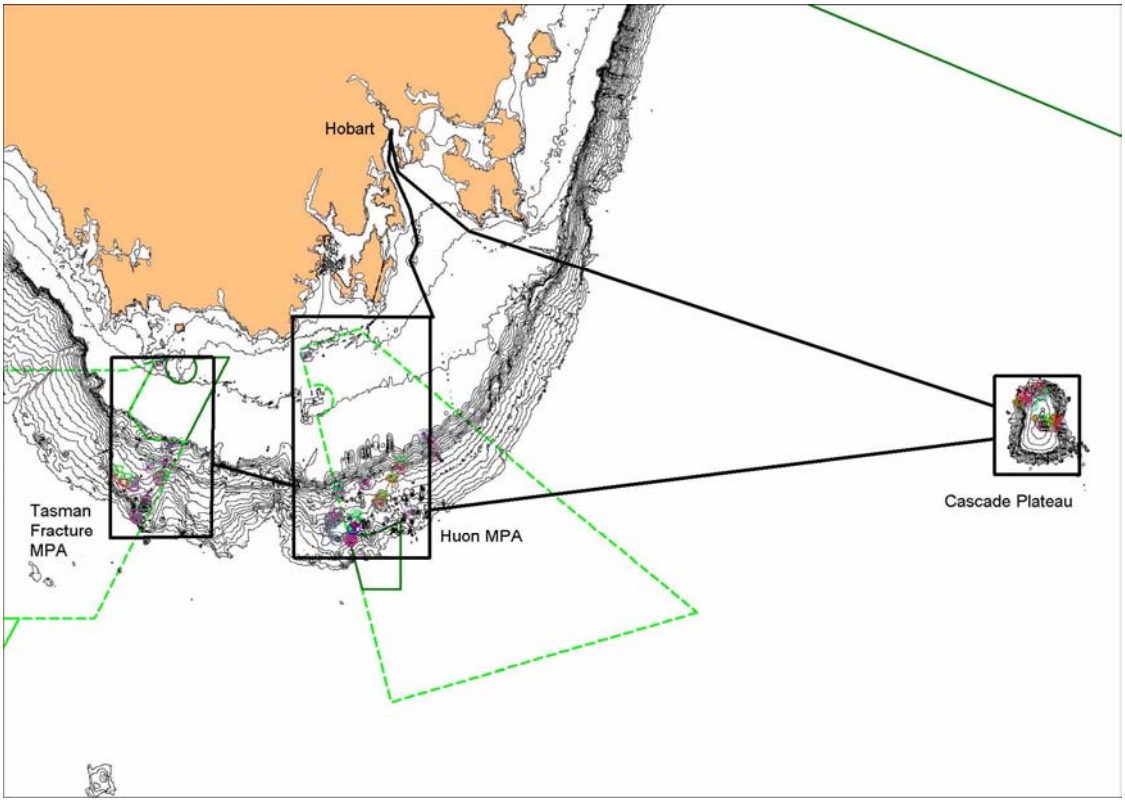

Figure 1. Map showing the survey areas for SS02/2007 within the proposed Huon and Tasman Fracture MPA regions, and the offshore Cascade Plateau.

Results

A total of 78 operations were completed (Table 1): these included calibration of the Sondardyne tracking system, 15 successful camera transect and 52 successful sled transects. In addition, fill-in mapping was completed using the EM300 multibeam sonar (MBS) on the inner and outer shelf, upper and mid-slope and seamounts areas of each of the proposed Huon and Tasman Fracture MPAs, and most of the Cascade Plateau was mapped with high resolution data for the first time. All biological collections were sorted to the lowest possible taxon on board, preserved and packed for immediate distribution to the relevant museum experts. Representatives of all unique taxa were photographed and catalogues made in real time to assist with continuity of identifications. Camera imagery (video tapes and digital still images), together with telemetry data (depth, position, CTD etc.), were archived. Still images were renamed to enable database entry, and were georeferenced. One deep deployment included a calibration bar for experiments to estimate depth-related calibration errors. Seabed mapping data were processed, and electronic copies loaded into a GIS for navigation and mapping of stations. All underway data, ADCP data and single beam acoustic data were logged and archived. All station data were captured in the shipboard Oracle database.

The highly successful sampling program across both voyages will enable all project objectives to be met.

Voyage Narrative

Wednesday 28th March

Southern Surveyor departed Hobart late Wednesday evening at 2200 hours following mobilization.

Thursday 29th March

Early in the morning (daylight) we commenced a Sonardyne calibration (op 1) in 85 meters of water off Adventure Bay. Once the calibration data was collected, we proceeded to retrieve the moored Sonardyne beacon but the float line was cut off as it became entangled with the propeller. A grapple was deployed and a single tow successfully snagged the ground line and the beacon was retrieved. We headed to the Huon site where the first Sherman epibenthic sled operation was completed (op 2) at Huon 100 m. The target was overshot so the shot was repeated (op 3) targeting the reef top and based on camera system and swath information collected during leg 1. An adequate sample of hard and soft bottom epifauna was collected. The next sled shot (op 4) was deployed to sample bryozoan communities at 200 m coinciding along the corresponding camera tow. A large sample was collected.

Friday 30th March

The processing of the two large sled samples was time consuming so lines to the east of the site were steamed to collect swath data. We returned to the Huon study area by breakfast but deteriorating weather conditions prevented us from being able to deploy the sled. We continued collecting swath data in the region until ~1300 hours when we decided to return to Storm Bay to repeat a Sonardyne calibration (op 5) as the previously collected calibration data had problems.

Saturday 31st March

The Sonardyne calibration was started at first light and completed successfully at ~1000 hours when we steamed back to the Huon area for a sled tow in 400 m (op 6). This provided a diverse 2-bin sample. Next sled tow (op 7) was completed in 1000 m (Huon 1000) but the sample size was inadequate.

Sunday 1st April

A repeat tow for Huon 1000 was completed (op 8) resulting in a good sample consisting of several types of corals, pancake urchins, crustaceans and molluscs. Operation 9 was another attempt to sample the Huon 1000 m sit; the net was caught inside the sled mouth, but contained a reasonable quantity and diversity, and was judged acceptable. Another sample from Huon 1000 (op 10) resulted in a good sample of corals and crustaceans. Swath data was collected to allow time for processing the sample and we then positioned ourselves for a sled tow (op 11) down the south west side of Main Pedra. On retrieval of the sled we found only a small sample and the tow bridle broken. The outer protective net was also shredded so a replacement was fitted and repairs made whilst collecting swath data to the south. Once the sled was ready for redeployment we

completed a sled tow down the southern side of Hill U (op 12). A good sample of ~220 kg of coral and other invertebrates was collected.

Monday 2nd April

A deeper sled tow (op 13) on Hill U resulting in a large sample. Another sled tow (op 14) was completed on Hill U but this time down the western side. This also resulted in a good sample of corals and other invertebrates. Operation 15 was a sled tow down the eastern side of Hill U and resulted in a large sample (6+ boxes) largely of dead stony coral but with other animals throughout. A tow down the western side of Hill U (op 16) resulted in a big bag of coral. Operation 17 was a sled tow down the western side of Pedra (op 17); only a small sample was collected, but this was judged to be representative. Data from Sonardyne was becoming unreliable for several sled tows and this greatly compromised our ability to estimate positions for touch-down and lift off of the sled. Another tow down the western side of Pedra (op 18) provided a small adequate sample. Operations 19, 20 and 21 were on Z27 Little Mongrel; these were targeted at the rich coral area at its base, but there were missed on each occasion with only small samples of mostly dead coral and barnacle shells taken.

Tuesday 3rd April

Completed a sled shot on Z16 (op 22) and retrieved a very large sample of ~20 bins, mostly of dead stony coral, but containing many other species. The next two shots (ops 23 and 24) were in a southwesterly direction down Main Pedra. Both samples were small but adequate consisting of some fish, hermit crabs, molluscs, sea stars and urchins. The Sonardyne continued to be unreliable and it seems as though over heating was contributing to this. We started switching the system off between shots and this fixed it. The next two shots (ops 25 and 26) were on Dory Hill and Hill Z15; both produced large samples of coral – mostly dead, but with a range of associated fauna. Swath lines were run to complete coverage to the south of the survey area, and hole-fill along the shelf edge.

Wednesday 4th April

Completed shelf edge swath transect before doing a sled sample (op27) on the margin in 800-1000 m on a previous photo transect. Operation 28 was a sled tow in 1000 meters of water resulting in a large (150 kg+) sample mostly of dead corals with a small number of invertebrates throughout. We then steamed west to the Tasman Fracture MPA collecting shelf-break swath data en-route. A sled tow (op 29) was completed in 200 m resulting in a large sized sample of bryozoans and other invertebrates. Next operation was a sled tow in 100 m targeting hard rocky ground (op 30). This tow was unsuccessful and repeated (op 31) resulting in a good sample of sponges and other inverts.

Thursday 5th April

A sled tow on the upper-slope in 400 m (op 32) was completed before moving to Mini Maat – a small unfished coral hill seaward to the Main Matt seamount. Five consecutive sled tows (ops 33, 34, 35, 36 and 37) on the SSW flank provided replicate samples. Samples were generally good with 5-10 bins collected during each shot. The samples were largely of dead *Solensmilia* with some live corals and other invertebrates. The CTD was deployed to collect LADCP data (op 38) at Main Maat. Operation 39 was a sled tow on the mid-slope in 1200 m of water. A small but interesting sample of animals was collected. A repeat tow was completed at the same site (op 40) but from NW to SE to maximize the opportunity to sample some hard ground on a ridge.

Friday 6th April

By now (Easter Good Friday) the weather had started to improve as winds eased from the persistent and strong W-SW stream we had experienced for most of the trip to date. A sled tow (op 41) was targeted to sample between 800 and 880 meters resulting in a small but diverse invertebrate sample. Operation 42 was the first camera tow for the survey and was a 30 min down-slope tow from 1120 to 1295 m in the Tasman Fracture region. The video revealed a suitable bottom with enough animals to warrant a sled tow. Following this first camera deployment, some minor setting and operational changes were made to improve performance. The sled was deployed (op 43) along the same track as the previous camera tow and a good sample of animals was collected. The camera system was again deployed (op 44) for a 1 hour tow between 1100 and 1200 meters across contrasting areas of backscatter from swath. Another camera tow (op 45) started in 1080 m and transected to 1300 m recording ~1 hour of video. Operation 46 was a sled tow from 1100 to 1200 m. Three LADCP casts (ops 47, 48 and 49) were completed around Main Maat; one dip on the peak, one on the flank and the final at the base of the seamount.

Saturday 7th April

A sled tow (op 50) was completed on the north eastern outer flank of Main Maat between 1050 and 1230 meters. We then steamed to the east returning to the Huon region. Weather and sea conditions remained favorable for deploying our traps. The 1,800 m trap line was set (op 51) on a gently sloping area to the north of Hill Z19 in ~1350 m. The trap line had 30 baited scavenging crustacean traps interspersed with ten baited crab traps. This was followed by a sled tow on Hill Z56 (op 52) to the NW. A large sample was retrieved – much being dead material. Operation 53 was a camera tow down a steep corner on the margin of the Huon region. This tow was also to collect calibration data for the effect of depth on stereo video measurements. A calibration bar was mounted in the field of view of the stereo cameras and the laser array employed throughout the tow. The camera touched-down at ~615 m and was flown down steep escarpments to 1115 m. A significant number of corals (some moderately large) were seen throughout the tow. The work program in Huon was completed with camera tows on three seamounts – Patience (op 54), Z69 (op 55), Z9 (op 56) – the trap line retrieval (op 57), and two sleds (ops 58 and 59) respectively on Z9 and the margin in 1000 m.

Sunday 8th April

Due to the excellent progress made to this point in the survey, and a well-timed window of good weather, we took the opportunity to steam out to the Cascade Plateau (a large, flat-topped seamount named after the famous Hobart brewery). The aim was to make a comparative collection of fauna at corresponding depths and latitude from a relatively highly isolated feature. We began the 140 n.m. nautical mile steam east during the early hours and arrived at about 1600 hours when we commenced swath mapping the northern portion. This was followed by two sled tows (ops 60, 61) on the lightly fished eastern flank (position 1, 'Bitter').

Monday 9th April

Sampling commenced with camera tows at position 1: (op 62) along the line of the sled tows from ~1000 m to 1300 m on the eastern flank, and another (op 63) from 800 to 1000 m.

Two more camera tows (ops 64 and 65) were completed at position 2 ('Draught') on the northeastern part of the plateau. A sled tow (op 66) sampled between 800 and 1000 m at position 1. A long camera tow (op 67) was completed at the head of the canyon feature at the

northern end of the plateau (position 3 'Light') between ~700 and 1300 m depths. Operations 68 and 69 were the sled tows at 'Light', respectively sampling the shallow and deep depth ranges. Operation 68 pinned up on the strip of very rugged rocky bottom running between ~870 and 1050 m depths, but still returned an adequate sample. Very few large epifauna animals were seen by cameras or caught by sleds.

Tuesday 10th April

Operation 70 was a deep sled tow (1200) at position 2 ('Draught'). A camera tow (op 71) targeted a rocky peak at the shallowest point (~580 m) of the Cascade Plateau (position 4, the 'Premium' site), and a repeat tow (op 72) that got closer to the peak, revealed the only area of diverse attached invertebrate fauna seen on the Plateau. A 800-1000 m camera tow (op 73) was completed on the eastern side (Position 4, the 'Pale' site), in the area of several canyon-like drainage features. A mix of sediments and rough rocky steep ground but little epifauna was observed. As a consequence of this, and a shortage of time, no sled samples were taken at 'Pale". A CTD cast (op 74) was made to collect seawater from 200 m but there were problems with firing the bottles. We returned to position 5 at the peak and completed a sled tow (op 75) which yielded a large and diverse sample. Operation 76 was a CTD cast to collect both ADCP data and a water sample. Operation 77 was another sled tow at the shallowest point of the Cascade Plateau that provided a replicate sample at this site. Another CTD cast was made (op 78) to collect more seawater. Two additional swath lines were run before the vessel commenced its steam homeward to Hobart at 18:30.

Wednesday 11th April

After a bumpy return trip from the Cascade Plateau, we berthed at the CMAR wharf in Hobart at 10:30.

Summary

This was a highly successful voyage that succeeded in meeting its ambitious sampling schedule for the proposed Huon and Tasman Fracture marine protected areas, and in addition, was able to take the first scientific benthic samples from the Cascade Plateau. The variety, volume, and quality of the data collected has ensured that the overarching scientific objectives dependent on this voyage can be met.

Acknowledgements

The success of this voyage can be attributed to the wide variety of expertise and hard work provided by the science team which, in addition to staff from CSIRO, also included representatives from Museum Victoria, the Australian Museum, Queensland Museum and New Zealand's National Institute of Water and Atmospheric Research (NIWA). Our success was also attributable to the very high standard of support given by the entire marine crew – but especially the Bridge Officers for skilful deployment of the benthic sled and cameras over challenging seabed terrains. We would also like to acknowledge the efforts of other support staff at CSIRO Marine and Atmospheric Research – particularly Dave Kube and his team from the mechanical and Matt Sherlock from the electronic workshops, as well as the administration section,

particularly Greg Lyden – for their support in getting this survey mobilized and the overarching project organised.

Personnel

Scientific participants

Alan Williams	CMAR	Chief Scientist (Principal investigator)
Bruce Barker	CMAR	Watch Leader/ camera systems
Jeff Cordell	CMAR	Voyage Manager/ NF electronics support/ Camera systems
Bernadette Heaney	CMAR	Computing support
Karen Gowlett-Holmes	CMAR	Invertebrate taxonomy
Mark Lewis	CMAR	Gear operations/ camera systems
Cameron Buchanan	GA	Multibeam sonar
Tim O'Hara	MV	Invertebrate taxonomy
Steve Keable	AM	Invertebrate taxonomy
Karen Miller	UTAS	Invertebrate taxonomy
Monika Schlacher	UQ	Invertebrate taxonomy
Mireille Consalvey	NIWA	Invertebrate taxonomy/ communications
Julian Finn	MV	Invertebrate taxonomy
Trudy Costa	MV	Invertebrate taxonomy

Marine Crew

Ian Taylor	Master
John Boyes	First Mate
Mike Tuck	Second Mate
Roger Thomas	Chief Engineer
Rob Cave	First Engineer
Sean Connolly	Second Engineer
Graham McDougall	Boatswain
John Howard	Integrated Rating
Matt Barrett	Integrated Rating
Darren Guy	Integrated Rating
Paul O'Neill	Integrated Rating
John Hall	Integrated Rating
Craig Waters	Chief Cook
Julie Porch	Second Cook
Lisa Cook	Chief Steward

This voyage summary is in accordance with the directions of the National Facility Steering Committee for the Research Vessel Southern Surveyor.

Dr Alan Williams

Chief Scientist (on behalf of the project investigators, Rudy Kloser and Nic Bax)

Table 1: List of operations

Operation	Gear	Site	Location	Start date time (UTC)	Start Long	Start Lat	End Long	End Lat	Start depth (m)	End depth (m)
1	Sonardyne	Storm Bay	80 m	28-MAR-2007:22:31:10	147.5	-43.3	-	-	80	-
2	Sled	Huon 100	100 m	29-MAR-2007:08:17:10	146.97655	-43.69146	146.97344	-43.69334	100	110
3	Sled	Huon 100	100 m	29-MAR-2007:09:15:10	146.97566	-43.69182	146.97266	-43.69391	100	110
4	Sled	Huon 200	200 m	29-MAR-2007:13:03:00	147.53832	-43.97835	147.53238	-43.97233	180	237
5	Sonardyne	Storm Bay	65 m	30-MAR-2007:21:00:40	147.47181	-43.36914	-	-	65	-
6	Sled	Huon 400	400 m	31-MAR-2007:04:39:00	147.54616	-43.9916	147.56322	-43.9949	370	410
7	Sled	Huon1000	1000 m	31-MAR-2007:06:48:20	147.58026	-44.0307	147.58107	-44.03686	~840	1030
8	Sled	Huon 1000	1000 m	31-MAR-2007:09:08:00	147.5796	-44.03061	147.58187	-44.03559	~830	1030
9	Sled	Huon 1000	1000 m	31-MAR-2007:14:00:50	147.12766	-44.15407	147.131	-44.16193	~800	920
10	Sled	Huon 1000	1000 m	31-MAR-2007:16:09:30	147.12884	-44.15413	147.13204	-44.16355	800	950
11	Sled	Pedra Main	SW	31-MAR-2007:22:28:20	147.09695	-44.25993	147.09173	-44.26587	730	1000
12	Sled	Hill U	S	01-APR-2007:04:34:10	147.17963	-44.32506	147.17949	-44.32654	1140	1200
13	Sled	Hill U	S	01-APR-2007:09:33:20	147.17923	-44.32693	147.179	-44.32885	1200	1300
14	Sled	Hill U	W	01-APR-2007:14:13:30	147.17799	-44.32092	147.17525	-44.32159	1150	1280
15	Sled	Hill U	E	01-APR-2007:15:34:50	147.18085	-44.32245	147.18494	-44.32223	1100	1200
16	Sled	Hill U	Top/ west	02-APR-2007:01:55:40	147.17516	-44.32567	147.17755	-44.32403	1100	1160
17	Sled	Pedra	West	02-APR-2007:06:26:20	147.09201	-44.25853	147.08661	-44.25673	850	1000
18	Sled	Pedra	West	02-APR-2007:09:31:30	147.09325	-44.2592	147.08563	-44.2567	850	1000
19	Sled	Z27 LMongrel	NW	02-APR-2007:11:51:30	147.12393	-44.24491	147.12079	-44.24314	1200	1200
20	Sled	Z27 LMongrel	NW	02-APR-2007:13:13:20	147.12396	-44.24522	147.1207	-44.24166	1200	1200
21	Sled	Z27 LMongrel	NW	02-APR-2007:15:18:10	147.1188	-44.24066	147.12507	-44.24568	1200	1200
22	Sled	Hill Z16	SW	02-APR-2007:17:24:00	147.06693	-44.29226	147.06485	-44.29447	1100	1300
23	Sled	Pedra	SW	02-APR-2007:22:10:40	147.09724	-44.26103	147.09183	-44.26627	730	1000
24	Sled	Pedra	SW	03-APR-2007:00:16:10	147.09705	-44.26161	147.08814	-44.26513	730	1000

Operation	Gear	Site	Location	Start date time (UTC)	Start Long	Start Lat	End Long	End Lat	Start depth (m)	End depth (m)
25	Sled	Dory Hill	W	03-APR-2007:03:53:50	147.11893	-44.32626	147.11401	-44.32606	1100	1200
26	Sled	Hill Z15	SW	03-APR-2007:10:17:00	147.47266	-44.23179	147.46757	-44.23528	1100	1350
27	Sled	Huon 1000	1000 m	03-APR-2007:16:05:00	147.24786	-44.12562	147.24826	-44.13342	800	1000
28	Sled	Huon 1000	1000 m	03-APR-2007:19:00:00	147.24906	-44.12509	147.24981	-44.13145	800	950
29	Sled	Tas Frac 200	200 m	03-APR-2007:15:20:00	146.32959	-44.00001	146.32852	-44.00179	200	220
30	Sled	Tas Frac 100	100 m	04-APR-2007:05:03:20	146.27134	-43.7234	146.26972	-43.72369	110	117
31	Sled	Tas Frac 100	100 m	04-APR-2007:06:13:10	146.27091	-43.72352	146.26814	-43.72407	116	122
32	Sled	Tas Frac 400	400 m	04-APR-2007:11:50:20	146.31158	-44.04167	146.30714	-44.04893	410	450
33	Sled	Mini Matt	SSW	04-APR-2007:14:25:40	146.16427	-44.24473	146.16139	-44.24882	1120	1360
34	Sled	Mini Matt	SSW	04-APR-2007:17:48:20	146.16476	-44.24388	146.16204	-44.24797	1120	1310
35	Sled	Mini Matt	SSW	04-APR-2007:20:53:50	146.16445	-44.24496	146.16105	-44.24873	1120	1360
36	Sled	Mini Matt	SSW	05-APR-2007:01:47:30	146.16426	-44.24493	146.16086	-44.24787	1120	1350
37	Sled	Mini Matt	SSW	05-APR-2007:04:21:00	146.16498	-44.24423	146.16094	-44.24917	1120	1380
38	LADCP	Main Matt	Peak	05-APR-2020:07:14:00	146.19138	-44.21448	-	-	-	-
39	Sled	Tasman 1200	1	05-APR-2007:09:32:00	146.15028	-44.13529	146.14139	-44.14022	1130	1180
40	Sled	Tasman 1200	1	05-APR-2007:11:33:20	146.14415	-44.1322	146.15131	-44.13734	1140	1180
41	Sled	Tasman 1000	SW	05-APR-2007:14:42:10	146.23396	-44.06578	146.22369	-44.07366	800	880
42	Camera tow	Tasman 1200	3	05-APR-2007:18:00:00	146.27936	-44.11147	146.27216	-44.11813	1100	1300
43	Sled	Tasman 1200	3	05-APR-2007:20:29:00	146.27916	-44.11238	146.27409	-44.11594	1100	1200
44	Camera tow	Tasman 1200	4	06-APR-2007:01:32:20	146.11755	-44.12223	146.0972	-44.14221	1100	1200
45	Camera tow	Tasman 1200	5	06-APR-2007:03:33:30	146.07358	-44.09508	146.05043	-44.1085	1080	1300
46	Sled	Tasman 1200	3	06-APR-2007:07:02:40	146.28119	-44.11011	146.27159	-44.11822	1100	1200
47	LADCP	Main Matt	Peak	06-APR-2007:09:24:10	146.19102	-44.21448	-	-	650	-
48	LADCP	Main Matt	Flank	06-APR-2007:10:17:40	146.19736	-44.20353	-	-	1000	-
49	LADCP	Main Matt	Base	06-APR-2007:11:18:00	146.20668	-44.19185	-	-	1183	-
50	Sled	Tasman 1200	7	06-APR-2007:12:30:10	146.19916	-44.20117	146.21029	-44.1865	1050	1230
51	Trap Line	Huon	North Hill U	06-APR-2007:18:31:20	147.17831	-44.29389	147.20034	-44.28222	1350	1350

Operation	Gear	Site	Location	Start date time (UTC)	Start Long	Start Lat	End Long	End Lat	Start depth (m)	End depth (m)
52	Sled	Huon	z56	06-APR-2007:21:47:40	147.21258	-44.25307	147.20467	-44.24749	1240	1270
53	Camera tow	Huon	1000 pos 4		147.42516	-44.06474	147.41951	-44.07921	700	1115
54	Camera tow	Huon	Patience	07-APR-2007:04:18:50	147.38332	-44.12401	147.37941	-44.13057	900	1250
55	Camera tow	Huon	Z69		147.33348	-44.18322	147.32851	-44.18872	1150	1280
56	Camera tow	Huon	Z9	07-APR-2007:07:17:30	147.31813	-44.2013	147.31174	-44.20735	1010	1300
57	Trap line haul	Huon	North of Hill U	07-APR-2007:09:13:30	147.19344	-44.29218	-	-	1350	-
58	Sled	Huon	Z9	07-APR-2007:12:02:30	147.31808	-44.20169	147.32039	-44.19938	1020	1100
59	Sled	Huon	1000 pos 4		147.42342	-44.0692	147.41878	-44.08081	810	1020
60	Sled	Cascade	1200 pos 1	08-APR-2007:11:08:50	150.53067	-43.93363	150.53926	-43.93319	1125	1330
61	Sled	Cascade	1000 pos 1	08-APR-2007:13:36:40	150.5121	-43.93367	150.52556	-43.93368	780	870
62	Camera tow	Cascade	1200 pos 1	08-APR-2007:17:38:10	150.5262	-43.93284	150.53391	-43.93256	1050	1300
63	Camera tow	Cascade	1000 pos 1	08-APR-2007:20:00:10	150.50769	-43.93388	150.52772	-43.93322	723	1028
64	Camera tow	Cascade	wide pos 2	08-APR-2007:22:40:10	150.43063	-43.86223	150.38832	-43.84068	700	1300
65	Camera tow	Cascade	1200 pos 2	09-APR-2007:01:19:10	150.36625	-43.86686	150.36207	-43.86576	1340	1492
66	Sled	Cascade	1000 pos 2		150.42861	-43.86132	150.40735	-43.85047	800	1000
67	Camera tow	Cascade	wide pos 3	09-APR-2007:06:58:50	150.47214	-43.82776	150.45955	-43.81364	835	1350
68	Sled	Cascade	1000 pos 3	09-APR-2007:09:19:40	150.47428	-43.82997	150.46911	-43.82433	835	870
69	Sled	Cascade	1200 pos 3	09-APR-2007:11:31:10	150.46536	-43.82017	150.45736	-43.81106	1050	1360
70	Sled	Cascade	1200 pos 2	09-APR-2007:15:52:20	150.40452	-43.84907	150.39748	-43.8457	1070	1270
71	Camera tow	Cascade	Position 5	09-APR-2007:20:00:10	150.46003	-43.92229	150.44796	-43.92271	640	672
72	Camera tow	Cascade	Position 5	09-APR-2007:21:53:20	150.4632	-43.92212	150.47058	-43.92629	590	640
73	Camera tow	Cascade	Position 4	09-APR-2007:23:11:10	150.5117	-43.91814	150.53613	-43.92066	826	1305
74	LADCP	Cascade	Position 4	10-APR-2007:01:08:00	150.56665	-43.94538	-	-	200	-
75	Sled	Cascade	Position 5	10-APR-2007:02:28:10	150.46517	-43.92231	150.47203	-43.92832	590	660
76	LADCP	Cascade	Position 5	10-APR-2007:03:33:00	150.47583	-43.92218	-	-	570	-
77	Sled	Cascade	Position 5	10-APR-2007:04:45:20	150.46481	-43.92344	150.47253	-43.92963	590	660

Operation	Gear	Site	Location	Start date time (UTC)	Start Long	Start Lat	End Long	End Lat	Start depth (m)	End depth (m)
78	CTD	Cascade	Position 5	10-APR-2007:06:09:00	150.48307	-43.93895	-	-	200	-