TAN1712-1803 voyage report for ocean bottom seismograph recovery in support of seismic surveys (ORCSS 2 and 3): 3D survey offshore East Coast North Island

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ABSTRACT

Deployment and recovery of Ocean Bottom Seismometers (OBSs) occurred on three separate cruises of the RV *Tangaroa* between September 2017 and April 2018 (ORCSS 1 to 3), as part of a multi-national seismic experiment on the Hikurangi subduction margin off the east coast of the North Island. Two cruises (ORCSS 2 TAN1712 and ORCSS 3 TAN1803) were dedicated to the NZ3D experiment where 100 OBSs were positioned on a dense grid offshore Gisborne. TAN1712 deployed the instruments between December 17th and December 19th, 2017, in a rectangular area of 6 km by 48 km centred on the IODP Leg 372/375 Hikurangi Margin drill holes. Cruise TAN1803 recovered the instruments between March 28th and April 6th, 2018. During the three month deployment, the instruments recorded active airgun shots from the RV *Marcus Langseth* that was conducting a 3D streamer survey across the NZ3D area (Voyage MGL1801). A subset of the instruments, with longer battery lives, recorded earthquakes for the period following the completion of the active source experiment. A total of 97 instruments were recovered on TAN1803 with one additional instrument recovered by a recreational fisherman and returned to GNS. In addition to the OBS deployment, a number of additional tasks were completed. Seawater samples were collected on a transect across the entrance to Hawke Bay during TAN1712 for a collaborator at Hawke's Bay Regional Council. Cruise TAN1803 commenced with the delivery of O-rings to the scientific drilling vessel RV *JOIDES Resolution*. These O-rings were crucial for the successful installation of borehole observatories. In total the ORCSS 2 and 3 voyages were very successful with a 98% success rate in instrument deployment and recovery achieved in significantly less time than budgeted.

KEYWORDS

Ocean bottom seismometer, Gisborne, East Coast, Hikurangi subduction margin, RV *Tangaroa*, TAN1712, TAN1803, SHIRE, NZ3D, MGL1801

1.0 INTRODUCTION

The research undertaken by the two voyages included in this report is aimed at investigating the physical processes that control both megathrust slip behaviour and long-term deformation at the Hikurangi margin in a focused region offshore Gisborne, North Island, New Zealand. A wide range of subduction-related processes occur beneath the Gisborne region, including slow-slip events (SSE), tremor, and micro-seismicity, where seamounts are subducting beneath the margin (Wallace et al., 2016). The region has demonstrated high risk for tsunami-generating earthquakes (two events in 1947) and the ultimate aim of this research is to understand the processes that occur during such earthquakes with a goal of increasing the resilience of communities in the region.

Slip on plate boundary faults associated with recorded earthquakes typically fails to account for all of the expected plate motion predicted by geodetic methods or global models. One of the most exciting advances in the last decade is the recognition and documentation of transient SSEs as another mode to accommodate plate convergence at subduction margins. The north Hikurangi margin is the only subduction zone on Earth where well-documented SSEs occur at 5-10 km depth (vs. typical 25- 50 km depths) - shallow enough for detailed seismic imaging and seismic attribute measurements. Furthermore, the unusually shallow SSEs coincide with inferred thick packages of sediment subducting with seamounts (Bell et al., 2010).

This portion of the forearc is extremely complex and 3D seismic imaging is required to understand this complexity and provide a structural context for current and future IODP drilling. The combination of 2D and 3D seismic reflection surveys and the 3D OBS survey (NZ3D) will provide the opportunity to accurately document the structural, stratigraphic, and hydrogeologic conditions that lead to generation of SSEs along a subduction megathrust.

Three expeditions were planned offshore East Coast New Zealand, combining active source reflection and refraction seismic studies and passive earthquake studies (Figure 1.1). The **O**cean bottom seismograph **R**e**C**overy in support of **S**eismic **S**urveys (ORCSS) voyages 1-3 are part of the multi-national research project that included the **S**eismogenesis at **H**ikurangi **I**ntegrated **R**esearch **E**xperiment (SHIRE), a dense deployment of seismometers within the SHIRE region (NZ3D), and the drilling of research wells as part of IODP Leg 372 and 375.

TAN1710 (ORCSS-1) completed the first of these voyages in October and November 2017 during which 114 ocean bottom seismometers (OBS) were deployed and recovered in conjunction with the seismic operations conducted by the RV *Marcus Langseth* (MGL1718). This cruise is described in a separate report (Barker et al., 2019).

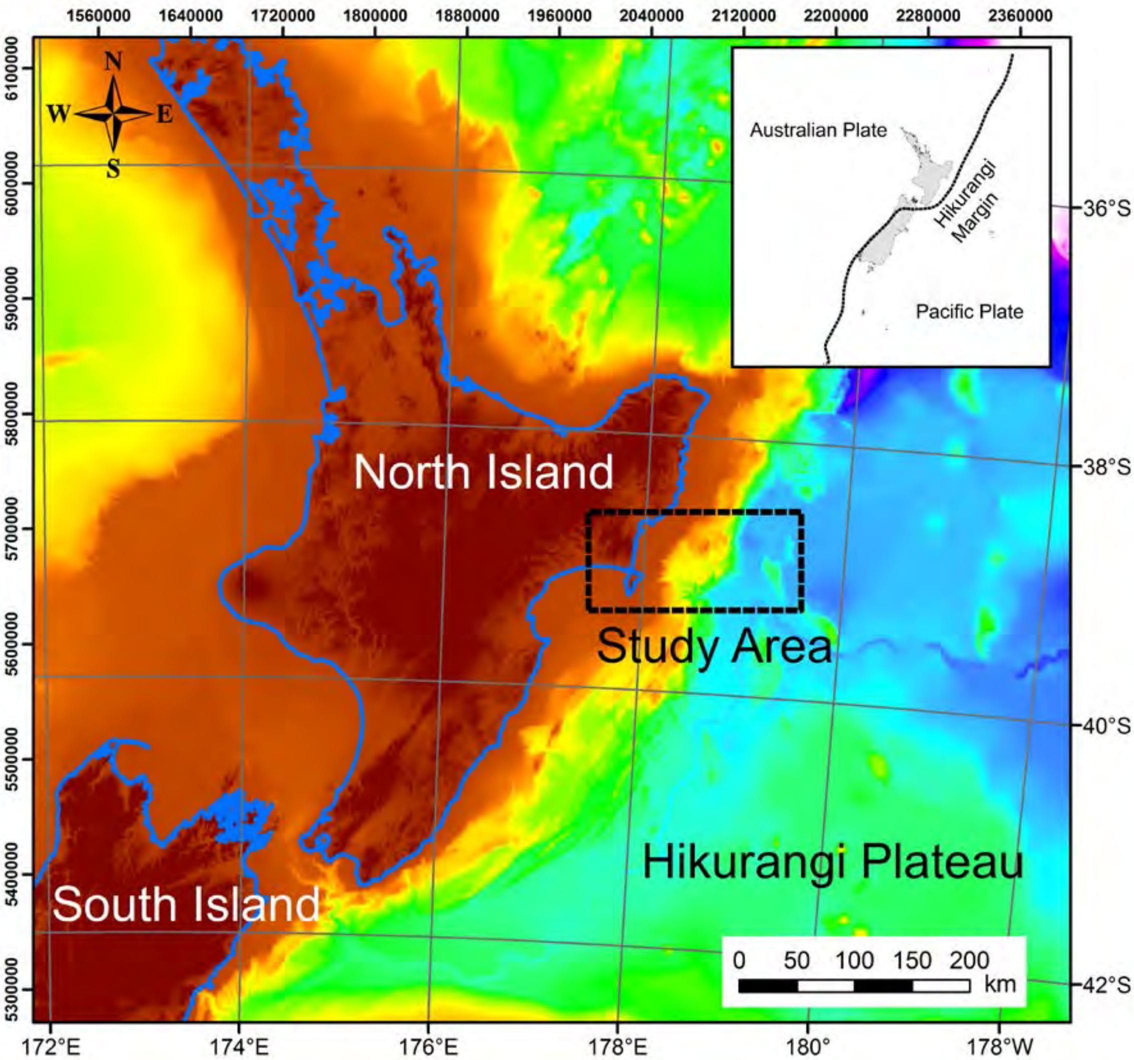

Figure 1.1 Map of the eastern part of New Zealand showing the bathymetry and topography. The inset map shows the tectonic setting of New Zealand between the Pacific and Australian plates. The study area is located off the east coast of the North Island.

2.0 ORCSS 2: TAN1712

TAN1712 is the second ORCSS expedition focussed on redeploying the JAMSTEC OBS on the offshore NZ3D grid in December 2017. During deployment of the seismometers, the NSF funded research vessel RV *Marcus Langseth* completed a narrow azimuth 3D marine seismic reflection survey above the seafloor array (MGL1801). The large volume airgun source produced active shots that were recorded by the seafloor seismometers and a 3D array of onshore seismometers. The availability of the RV *Tangaroa* to deploy the ocean bottom seismometers was critical to the success of the experiment.

2.1 Voyage Objectives

The aim of the voyage was to deploy OBS from the RV *Tangaroa* in a dense array over a rectangular area of 6 km by 48 km centred on the IODP Leg 372/375 Hikurangi Margin drill holes (Figure 2.1). The array is a grid of four 48-km-long lines perpendicular to the coast with instruments spaced at 2 km intervals. The lines are 2 km apart giving a semi-regular 48 x 6 km grid of 100 instruments. OBS deployment occurred well in advance of the arrival of the US research vessel RV *Marcus Langseth* and the instruments were designed to record earthquakes and other seismic sources. On arrival the RV *Marcus Langseth* would undertake a 3D seismic reflection survey over the top of the OBS grid. We planned for the OBS instruments to remain on the seafloor for a further 2 months recording earthquakes. Recovery of the instruments would occur on the ORCSS 3 voyage.

In addition to the deployment of the OBS, the voyage was also an opportunity to undertake some water sampling for Hawke's Bay Regional Council (HBRC). Scientists at the council intend to develop a hydrodynamic model of the Hawke's Bay marine environment. The motivation for this model is the current lack of understanding around sediment, nutrient, and possible contaminant transport in Hawke's Bay. Initial investigations by council staff have made it clear that at the current level of understanding they do not have enough information to develop an accurate model. One important piece of information that council is missing is the establishment of boundary conditions. That is what nutrients and sediment are entering the modelled area from oceanic currents. The only way to determine this is by collecting offshore water samples. Due to their location these water samples are generally prohibitively expensive to collect. For this reason, HBRC contacted GNS to see if it was possible to collect samples during the transits on the TAN1712 voyage.

2.2 Voyage Considerations

The DV *JOIDES Resolution* planned to drill two sites within our survey area during expedition 372 (Pecher et al., 2018). The DV JOIDES Resolution requires a two nautical mile exclusion zone during drilling operations, so the OBS deployments needed to be planned around this work and adjusted as necessary.

Due to the timing and expected demobilisation from the voyage (23 December 2017), no laboratory or transitional facility would be open to receive any water samples. To avoid the need for an MPI transitional facility, it was determined that the 22 water samples collected for Hawke's Bay Regional Council (HBRC) should be collected within the 12 nautical mile limit.

Figure 2.1 shows the planned deployment path. Figure 2.2 shows the final track of TAN1712 including the locations of the 22 water sampling points. Figure 2.3 shows a more detailed map of the final deployment path.

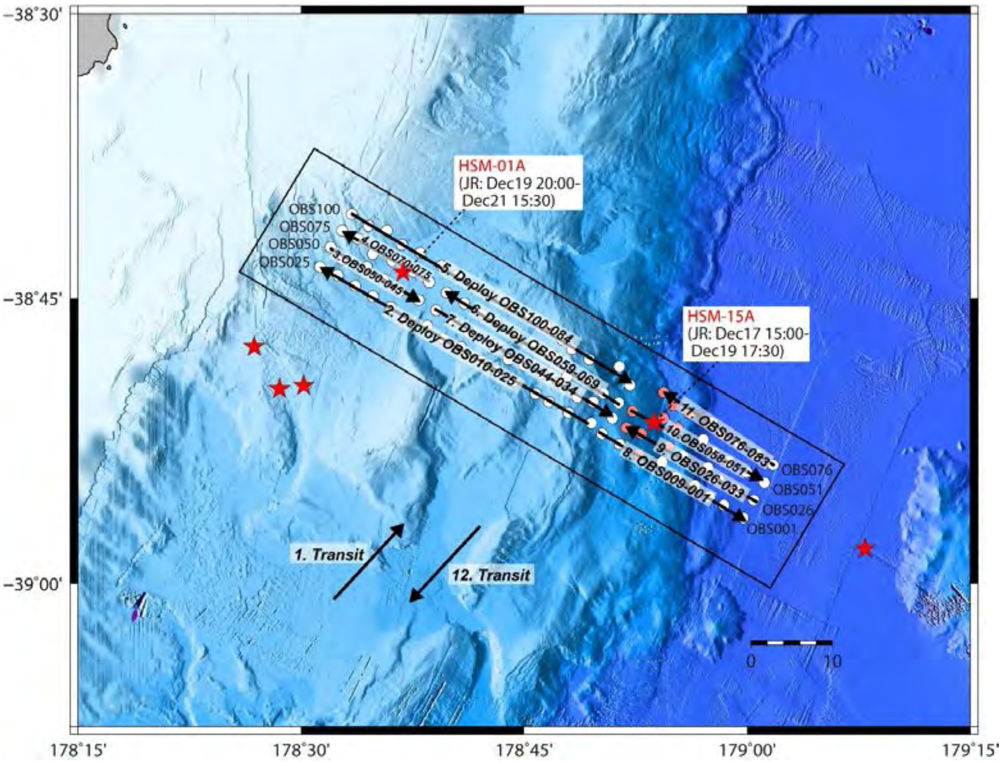

Figure 2.1 Planned OBS deployments, scheduled to avoid entering the DV *JOIDES Resolution* exclusion zone during IODP expedition 372.

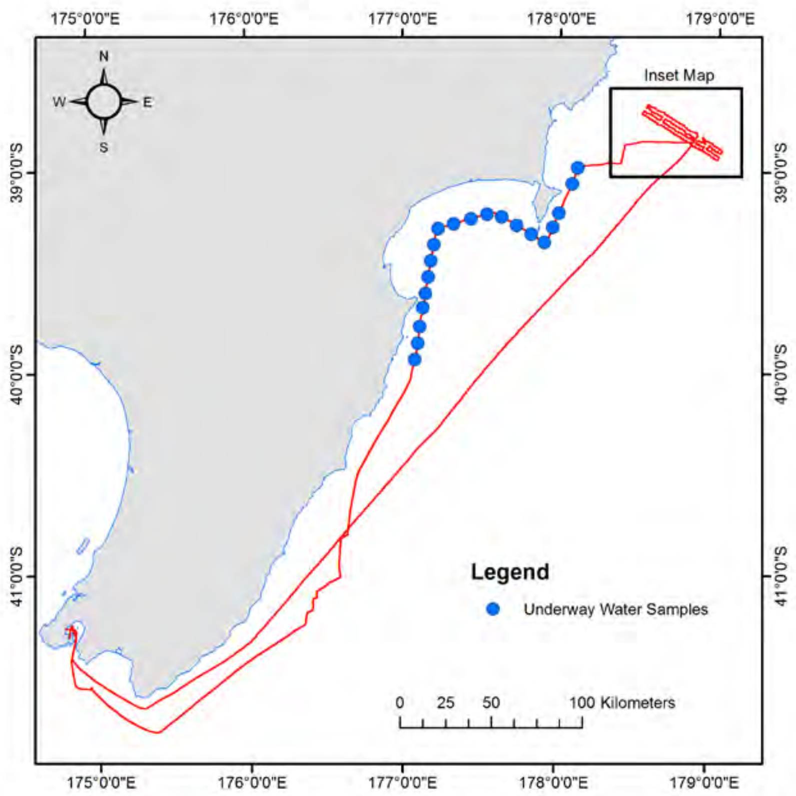

Figure 2.2 Final track log of voyage TAN1712. Figure 2.3 is the inset map.

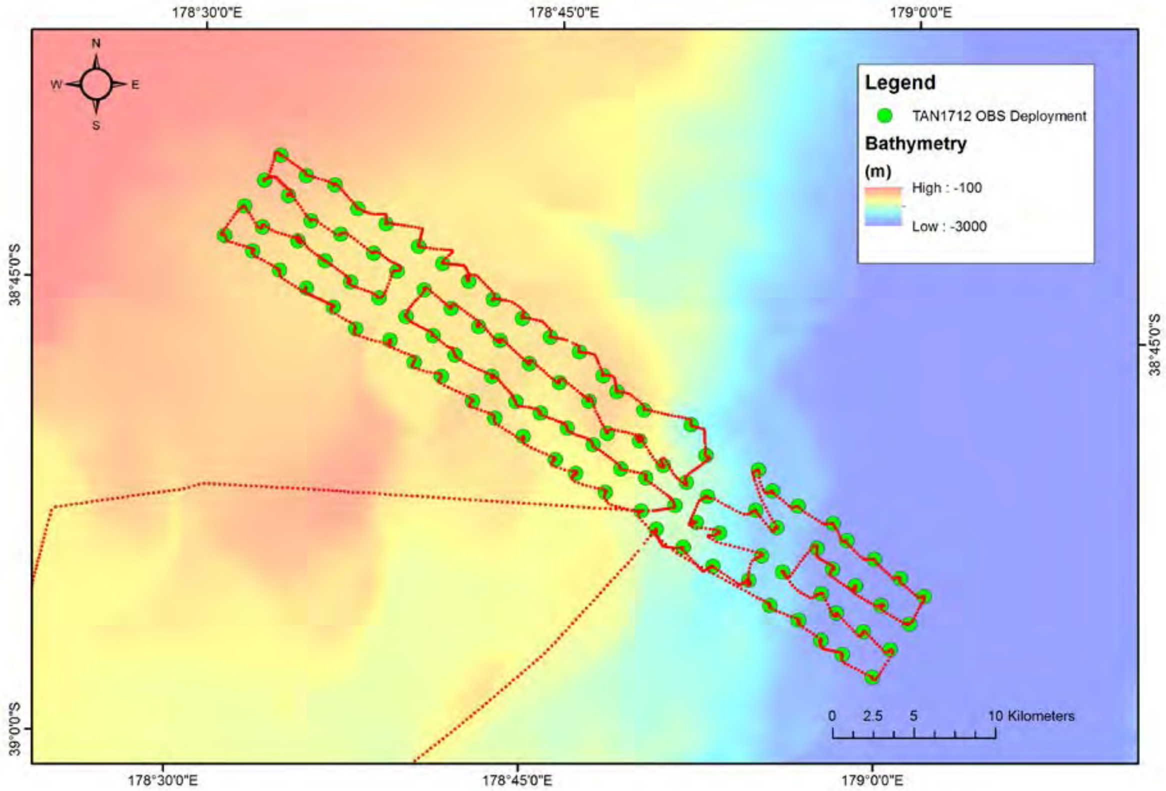

Figure 2.3 Path of TAN1712 during the deployment of the 100 OBS.

2.3 Participants and Roles

The TAN1712 science party consisted of ten scientists and technicians from New Zealand and Japan. They are listed in Table 2.1 along with voyage roles. Nine RV *Tangaroa* crew members assisted in the deployment, and they are listed in Table 2.2.

Table 2.1 TAN1712 participants, institutions, voyage roles and shifts.

Participant Name	Institution	Voyage Role	Shift(s)
Richard Kellett	GNS Science	Voyage Leader, Scientist	0000-1200
Valerie Stucker	GNS Science	Deputy Voyage Lead, Scientist	1200-2400
Ryuta Arai	JAMSTEC	Scientist	0000-1200
Koichiro Obana	JAMSTEC	Scientist	1200-2400
Seiichi Mori	NME	Chemical Officer, Technician	0400-0800; 1600-2000
Takuya Maekawa	NME	Technician	0000-0400; 1200-1600
Kaoru Tsukuda	NME	Technician	0800-1200; 2000-2400
Rory Hart	GNS Science	Support staff	0400-0800; 1600-2000
Konstantinos Michailos	VUW	Support crew	0000-0400; 1200-1600
Sam Davidson	U. Canterbury	Support crew	0800-1200; 2000-2400

Table 2.2 TAN1712 *RV Tangaroa* officers and crew.

Crew Member Name
Evan Solly: Captain
Mark Hansen: First Mate
Jack Clueard: Second Mate
Shane Harvey: Bosun
Daniel Aupaau: AB
Bryce Bennett: AB
Glen Walker: AB
Ian Smith: AB
Peter Wall: AB

2.4 Procedures

Two activities were undertaken during this cruise and are outlined below. The OBS deployment procedure has been adapted from NIWA Standard Operational Procedure "OSM 02: OBS Moorings – Deployment and Recovery".

OBS Deployments:

1. The science party and deck crew should have sufficient notice of ETA at deployment site to allow them time to prepare for deployment. Protocols to be developed on board for appropriate time and communication between bridge and deck. For this cruise, since the transit time between stations was short, deck crew would inform the bridge or preparedness for next deployment and bridge crew would proceed to next station. It took 10 minutes on average for the deck crew to prepare the next OBS (see Figure 2.4) following a deployment, and about 15 minutes to transit. ETA was relayed to the deck at 5 minutes and 1 minute.
2. When Science team is ready for the OBS to be moved to the Cutaway vessel crew and/or science team will lift OBS into position at the cutaway for final pre-deployment preparations. Potential trip hazards should be noted and removed if possible; care should be taken lifting the OBS (two-person minimum; correct lifting technique).
3. When the OBS is ready for deployment it will be attached to the A Frame winch. The connection to the A frame winch will include a 1m soft lifting strop and uses a rope sling through the OBS anchor frame with a quick release mechanism (PVC pipe and rope through sling loop; see Figure 2.5 and Figure 2.6), and a tag line attached to the winch cable/strop (Figure 2.7).
4. After final checks have been carried out, and it is confirmed by the Bridge that the vessel is ready for deployment to commence, the OBS can be lifted outboard using the A frame. At all stages of this procedure the wave gate will remain in the fully up position.
5. When the vessel is in position, as confirmed by the Bridge, and the OBS team are ready the OBS can be lowered into the water and released via the quick release mechanism (Figure 2.6).

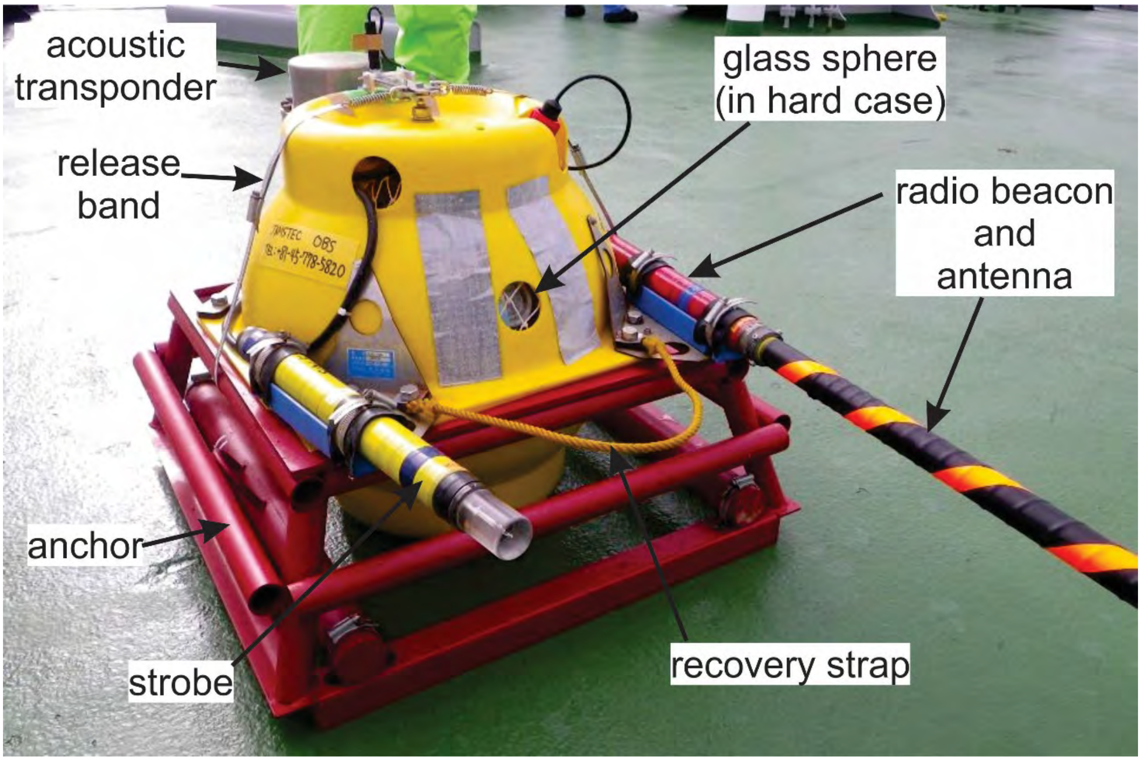

Figure 2.4 JAMSTEC Ocean Bottom Seismograph (OBS) ready for deployment. The anchor frame is ~ 65 x 65cm square and the mass with complete anchor frame is ~82 kg.

Figure 2.5 OBS at the Cutaway ready for deployment. Note rope sling through the anchor frame and quick release system comprising a PVC pipe (attached to a pull rope) as a peg through sling loop.

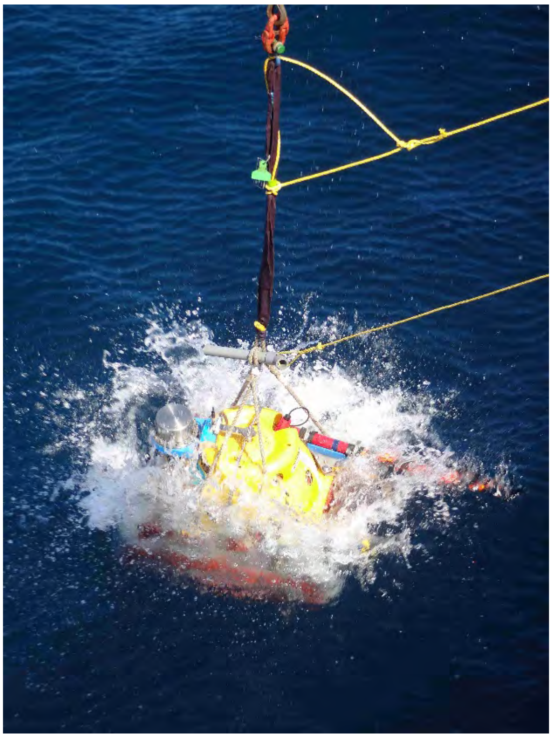

Figure 2.6 OBS in water at release. Note taut rope in action of pulling out quick release peg and tag line used to steady prior to deployment.

Figure 2.7 Preparation of detachable hook on pole. Hook is attached to a hoist rope on the A-frame winch and a tag line.

2.5 Water Sampling

As noted earlier, water samples for HBRC needed to be collected within 12 nautical miles of the coast. The calculated distance around the bay was 95 nautical miles. We were provided with bottles to collect 20 sets of samples, so it was determined that we would collect a water sample approximately every five nautical miles. This corresponded to a sample approximately every 30 minutes.

Water samples were collected using the NIWA underway sampling system, incorporating DAS data found on the *RV Tangaroa* intranet.

1. A radio was provided to the sampling team from the bridge to notify the team that we were approaching the next sample location.
2. A one-minute warning was given. During that time, the sample bag was opened, and each bottle rinsed three times from the underway system (see Figure 2.8).
3. The bridge would call to confirm location reached and sample was taken.
4. At each sampling location, three 1-L sample bottles were filled to about 90% capacity to account for expansion due to freezing.
5. Sample number, label number, time, date, latitude and longitude were recorded at the time of sampling for each site.
6. Sample bottles were returned to their respective numbered plastic bags and stored in the level 2 refrigerator.

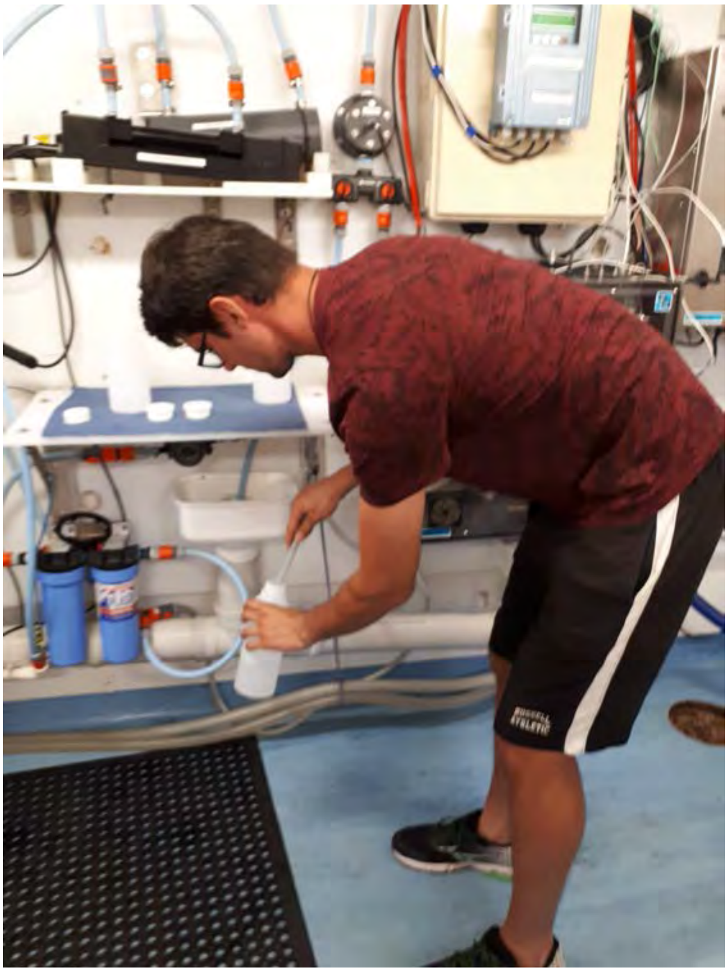

Figure 2.8 Filling sample bottles using the underway water sampling system.

Samples were couriered to the laboratory of choice of HBRC. The samples were analysed at Hill Labs for turbidity and Total suspended sediment, Iron, Nitrogen, Phosphorus and Silica concentrations. The locations for the water samples are shown in Table 2.3.

Table 2.3 Details of water samples collected for Hawke's Bay Regional Council.

Sample Number/ID	Date (UTC)	Time (UTC)	Latitude (S)	Longitude (E)
1-55493	18/12/2017	22:00	38˚59.481'	178˚06.867'
2-55495	18/12/2017	22:32	39˚04.280'	178˚04.812'
3-55496	18/12/2017	23:33	39˚13.089'	177˚59.905'
4-55498	19/12/2017	00:02	39˚17.311'	177˚57.612'
5-55500	19/12/2017	00:36	39˚21.754'	177˚54.312'
6-55502	19/12/2017	01:04	39˚19.485'	177˚49.280'
7-55504	19/12/2017	01:34	39˚16.795'	177˚43.665'
8-55505	19/12/2017	02:04	39˚14.369'	177˚37.993'
9-55507	19/12/2017	02:33	39˚13.614'	177˚32.295'
10-55508	19/12/2017	03:02	39˚14.970'	177˚26.162'
11-55509	19/12/2017	03:34	39˚16.531'	177˚19.534'
12-55512	19/12/2017	04:02	39˚17.874'	177˚13.648'
13-55513	19/12/2017	04:33	39˚22.634'	177˚11.991'
14-55514	19/12/2017	05:04	39˚27.541'	177˚10.817'
15-55518	19/12/2017	05:33	39˚32.263'	177˚09.781'
16-55520	19/12/2017	06:06	39˚37.250'	177˚08.832'
17-66152	19/12/2017	06:33	39˚41.459'	177˚07.857'
18-66153	19/12/2017	07:09	39˚47.088'	177˚06.568'
19-66154	19/12/2017	07:40	39˚51.979'	177˚05.885'
20-66156	19/12/2017	08:12	39˚56.872'	177˚04.632'

2.6 Voyage Narrative

Daily activities are recorded below. The details of the OBS deployments are given in Appendix 1.1 OBS deployment table, and Appendix 1.2 RV *Tangaroa* deployment sheets. The details on the underway water sampling locations and notes are given in Appendix 2.1.

2.6.1 Day 1: Saturday 16 December 2017

7:30 At RV *Tangaroa* in Wellington CentrePort

9:00 First truck arrives and start loading OBSs onto RV *Tangaroa*

12:00 Second truck arrives and continue to load OBSs onto RV *Tangaroa*

14:00 Finish loading

15:00 Toolbox meeting in mess room

16:00 Depart the port

16:30 Fire drill in Wellington Harbour

14:00 – 17:30 On-deck work including checking internal pressure of glass sphere and correcting OBS clock

2.6.2 Day 2: Sunday 17 December 2017

6:30 Find radio beacons working incorrectly due to fault in the magnetic switch

8:00 Science meeting in conference room

8:30-10:30 Fix radio beacon problems (3 were activated), correct OBS clock

10:30-12:00 OBS timer (recording period) setting

12:00 Toolbox meeting on bridge

13:00 OBS deployment practice

19:23 First deployment of the voyage OBS009

19:58 – 23:17 OBS008,7,6,31,32,33,58,57,56 deployed at 15 minute intervals

23:45 Last deployment of the day, OBS083

2.6.3 Day 3: Monday 18 December 2017

00:03 First deployment of the day, OBS082

00:25 – 11:53 OBS081,80, 79, 78, 77, 76, 51, 52, 53, 54, 55, 30, 29, 28, 27, 26, 1,2, 3, 4, 5, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21 deployed at 15 minute intervals.

12:00 Toolbox meeting on the bridge

12:26 – 22:13 OBS022, 23, 24, 25, 50, 49, 48, 47, 46, 45, 70, 71, 72, 73, 74, 75, 100, 99, 98, 97, 96, 95, 94, 93, 92, 91, 90, 89, 88, 87, 86, 85, 84 deployed at 15 minute intervals.

23:36 Last deployment of the day, OBS059

2.6.4 Day 4: Tuesday 19 December 2017

00:00 First deployment of the day, OBS060

00:21 – 06:26 OBS061, 60, 62, 63, 64, 65, 66, 67, 68, 69, 44, 43, 42, 42, 40, 39, 38, 37, 36, 35, deployed at 15 minute intervals.

06:45 Last deployment of the voyage, OBS034

7:30-9:00 Clean up the lab and deck

09:00 Plan water sampling

11:00 First water sample collected: 1-55493

11:32 Second water sample collected: 2-55495

12:00 Toolbox meeting on bridge

12:33 – 20:40 Collected Water samples 3-55496, 4-55498 ,5-55500, 6-55502, 7-55504, 8-55505, 9-55507, 10-55508, 11-55509, 12-55512, 13-55513, 14-55514, 15-55518, 16-55520, 17-66152, 18-66153, 19-66154 collected at 30 minute intervals.

21:12 Last water sample collected: 20-66156

2.6.5 Day 5: Wednesday 20 December 2017

10:30 Safety meeting. Transit to Wellington.

2.6.6 Day 6: Thursday 21 December 2017

08:00 Docked at Aotea Quay

08:30 Part of team departs to GNS Science to unload trucks as they arrive

09:00 First truck arrives for loading

09:30 First truck departs to GNS

10:00 Second truck arrives at port for loading

10:30 Second truck departs at GNS Science

11:40 Departed for GNS Science

12:05 Arrive GNS Science, complete unloading

14:00 End of voyage

18:30 Post-cruise debrief and get together

2.7 Initial Results

The RV *Tangaroa* navigation system SEAPLOT was used to plan the OBS deployment. The team developed a protocol for verifying the station and instrument numbering. The sea conditions were ideal for deployment and the crew were able to position the ship very close to the planned deployment point. The average deviation from the planned location was 28 m, and the largest error was 151 m. Comparing the observed water depth to the expected water depth is also a check on the relative positioning of the OBS. In general, the values agree closely. It was possible to partially verify the position of the OBS grid relative to an independent marker on several occasions when the RV *Tangaroa* was in the vicinity of the DV *JOIDES Resolution* drilling hole TLC-04B (178º 28.5553 E 38º 49.7720 S). The distance to the DV *JOIDES Resolution* was obtained at stations OBS042, OBS041, and OBS040. These calculations confirmed that the deployment grid was close to the planned grid (Table 2.4).

Table 2.4 Calculations of offsets from DV *JOIDES Resolution*.

Station	OBS	Date (UT)	Distance to DV JOIDES Resolution using radar (km)	Distance on GIS map to TLC-04B (U1517B)	Difference (km)
92	OBS042	18/12/2017	19.30	19.22	0.08
93	OBS041	18/12/2017	21.34	21.20	0.14
94	OBS040	18/12/2017	22.46	22.47	0.01

On completion of the deployment, it was noted that OBS058 had been deployed within a 500 m exclusion zone around an active seafloor instrument KU17-2; an Ocean Bottom Pressure Gauge and part of the rolling HOBITTS IV array. The information was passed on to the principal scientist of the HOBITTS IV project but it was concluded that the likelihood of the instruments interfering with each other was small. The KU17-2 instrument was subsequently successfully recovered during voyage TAN1809.

The 22 samples were analysed at Hill Labs for turbidity and total suspended sediment, Iron, Nitrogen, Phosphorus and Silica concentrations. These initial samples suggest that nutrient concentrations entering Hawke’s Bay are generally low. The results are compiled in Appendix 2.2.

During the voyage the RV *Tangaroa* collected underway meteorological and seawater measurements at minute intervals. These data include surface water salinity and temperature. The data are tabulated in Appendix 2.3.

3.0 ORCSS 3: TAN1803

TAN1803 was the third ORCSS expedition and was focussed on recovering 100 JAMSTEC Ocean Bottom Seismographs (OBSs) from the seafloor offshore Gisborne in April 2018. The availability of the RV *Tangaroa* to recover the OBSs was crucial to ensure the efficient use of the OBS instruments from Japan and the RV *Marcus Langseth* acquisition of 3D seismic reflection data (MGL1801).

3.1 Voyage Objectives

The aim of the voyage was to recover 100 OBSs from a rectangular area of 6 km by 48 km centred on the IODP Leg 372/375 Hikurangi Margin drill holes (Figure 2.1). The array was a grid of four 48 km long lines perpendicular to the coast with instruments spaced at ~2 km intervals. The lines are 2 km apart, giving a semi-regular 48 x 6 km grid of 100 instruments. OBS deployment were made during ORCSS2 (TAN1712), in December 2017, and would have recorded 3 months of earthquakes and seismic energy from a 3D seismic reflection survey. In addition to the recovery of the instruments, TAN1803 was also required to deliver O-rings to the scientific drilling vessel DV *JOIDES Resolution*. These O-rings were crucial for the successful installation of borehole observatories, which was a key objective of IODP Expedition 375 (Saffer et al., 2018).

3.2 Voyage Considerations

As with the deployment voyage TAN1712, the DV *JOIDES Resolution* was expected to be operating (IODP expedition 375) in the vicinity of the NZ3D survey area during TAN1803. The DV *JOIDES Resolution* requires a two nautical mile exclusion zone during drilling operations, so the OBS recovery needed to be planned around this work and adjusted as necessary.

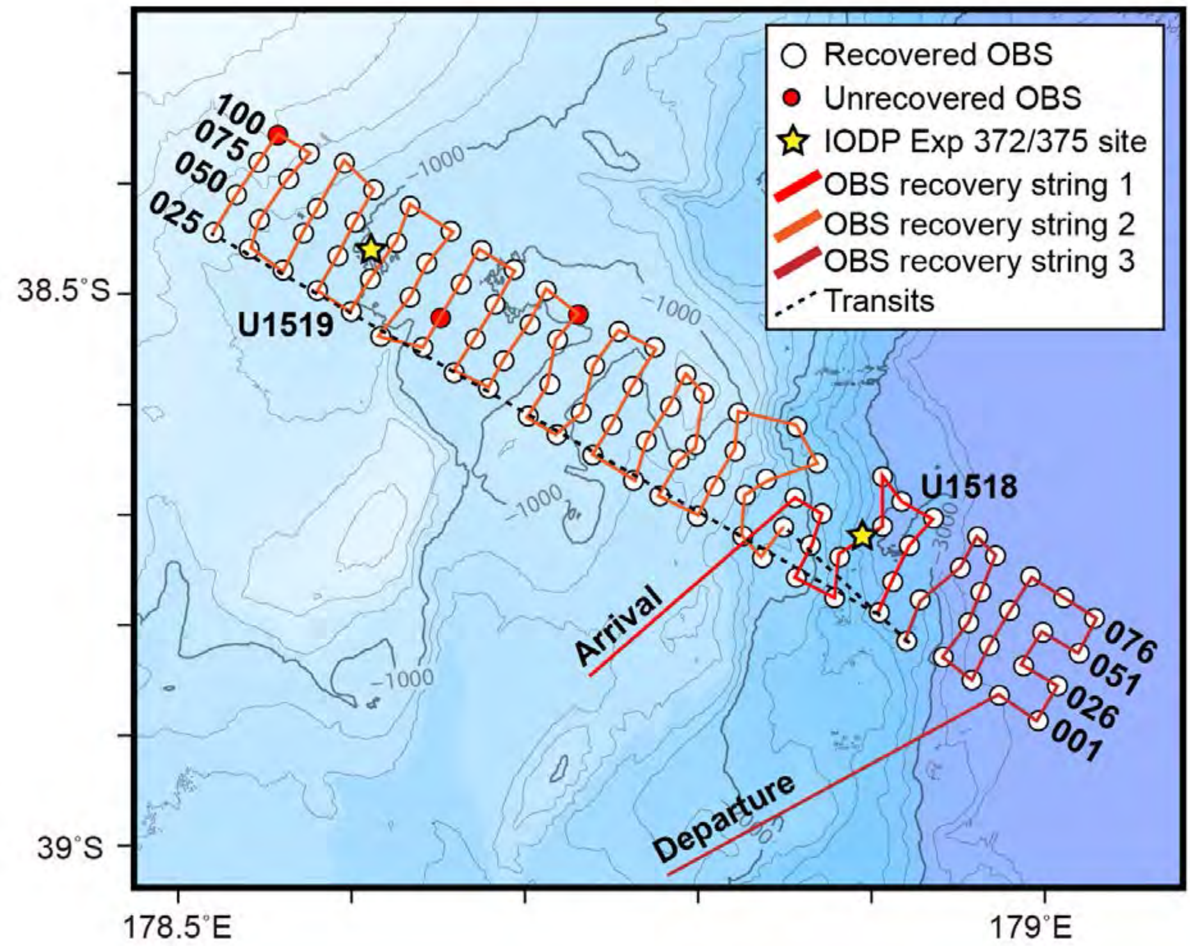

Figure 3.1 Planned and executed OBS recovery order. OBS near IODP borehole U1518 were recovered first (recovery string 1) to avoid entering the DV *JOIDES Resolution* exclusion zone during IODP expedition 375. The remaining OBS were recovered from NW-SE (recovery strings 2 and 3). Red dots demarcate OBSs not recovered during TAN1803, with OBS091 subsequently collected by a fisherman and returned to GNS.

3.3 Participants and Roles

The TAN1803 science party consisted of nine scientists and technicians from New Zealand and Japan. They are listed in Table 3.1 along with voyage roles. Nine RV *Tangaroa* crew members assisted in the deployment, and they are listed in Table 3.2.

Table 3.1 TAN1803 participants, institutions, voyage roles and shifts.

Participant Name	Institution	Voyage Role	Shift(s)
Dan Bassett	GNS Science	Voyage Leader, Scientist	0800-1200,2000-2400
Stuart Henrys	GNS Science	Deputy Voyage Lead, Scientist	0400-0800,1600-2000
Ryuta Arai	JAMSTEC	Scientist	0000-0400,1200-1600
Koichiro Obana	JAMSTEC	Scientist	0800-1200,2000-2400
Shuichi Kodaira	JAMSTEC	Scientist	0400-0800,1600-2000
Seiichi Mori	NME	Chemical Officer, Technician	0400-0800; 1600-2000
Ikumasa Terada	NME	Technician	0000-0400; 1200-1600
Toshinori Saijo	NME	Technician	0800-1200; 2000-2400
Grant O'Brien	GNS Science	Support staff	0000-0400,1200-1600

Table 3.2 R/V *Tangaroa* officers and crew.

Crew Member Name
Doug Monks: Captain
Daniel Hayward: First Mate
Dan: Second Mate
Peter Healey: Bosun
Bruce McIntyre: AB
Chris Healey: AB
Peter Morrison: AB
Mike Mitchie: AB

3.4 Procedures

Three activities were undertaken during this cruise and are outlined below. The OBS recovery procedure has been adapted from NIWA Standard Operating Procedure "OSM 02: OBS Moorings – Deployment and Recovery". Our recovery schedule was calculated based on known rise rates for OBSs, a 5 knot transit speed between sites, and allowing 1 hour per site for acoustic instrument release and recovery by RV *Tangaroa* once the OBS surfaces. Working around the DV JOIDES Resolution was factored into the recovery schedule (Figure 3.1). The DV JOIDES Resolution was expected to be west of the survey site for the duration of TAN1803, however, we remained in constant communication with expedition leaders on board the DV JOIDES Resolution in case it was necessary to adjust our recovery order to maintain safe operating distances. OBS recovery procedures were identical to those employed during TAN1710 (Barker et al., 2019).

3.5 OBS Recovery

1. Position vessel downwind of the OBS position, typically within a radius less than or equal to the deployment water depth and clutch out. Preferred distance will be discussed between science party and Bridge ahead of the activity.

2. Scientists accompanied by a crew member will then lower a transducer over the side of the vessel when informed it is safe to do so by the bridge.
3. A command will be sent to the OBS to release from its anchor frame and float to the surface – the process of releasing the anchor typically takes a few minutes and the ascent rate of the OBS is approximately 35-40 metres per minute. The transducer may remain in the water a short time monitoring slant ranges during the ascent; the vessel should remain clutched out until the deck crew inform the Bridge that the transducer is back onboard.
4. Once the OBS is on the surface the vessel can be clutched in and commence its approach to the OBS. Direction finders and lookouts to locate the OBS when on the surface (Figure 3.2). The stern thruster may be engaged to improve manoeuvrability.
5. Once the OBS is alongside the vessel will use a pole with an attachable hook to attach a line to the mooring, a second line is to also be attached as a tag line (Figure 3.3). There is a specific rope recovery loop on the OBS; crew should familiarise themselves with this during the deployment phase. The wave gate is to remain up at all times and persons involved in the recovery must be harnessed whilst working near the edge of the cutaway area.
6. The attached recovery line is then hauled up using the A frame winch and the swing controlled by the attached tag line (Figure 3.3). The wave gate is to remain up at all times.
7. The OBS can then be landed on the deck and moved to an appropriate deck location for the science team.

3.6 Dragging for OBS to Shunt off Anchor

The goal of this procedure is to knock the OBS with a cable to assist separation from the anchor, or to loosen sediments that may be inhibiting anchor separation. All activities associated with cable deployment would be carried out by the crew with the science party only helping with transducer deployment and the geometry of the cable deployment.

1. Triangulate position of OBS by acquiring slant ranges using transducer at locations around a circle centred on the deployment location.
2. Attach weight to a suitable wire and begin to pay out in a square or circle around OBS location. Dimensions of square will depend on water-depth, sea-state and will be discussed between science party and Bridge.
3. Once square complete, stop paying out and sail over and away from the OBS to tighten the cable around the OBS location.
4. Recover cable and weight and monitor OBS position using transducer.
5. If rising, wait and recover. If stuck fast to the seafloor, move onto next station.

Note - this is a time-consuming procedure and was only attempted at the end of the voyage when time and sea state permitted additional recovery efforts at OBS100.

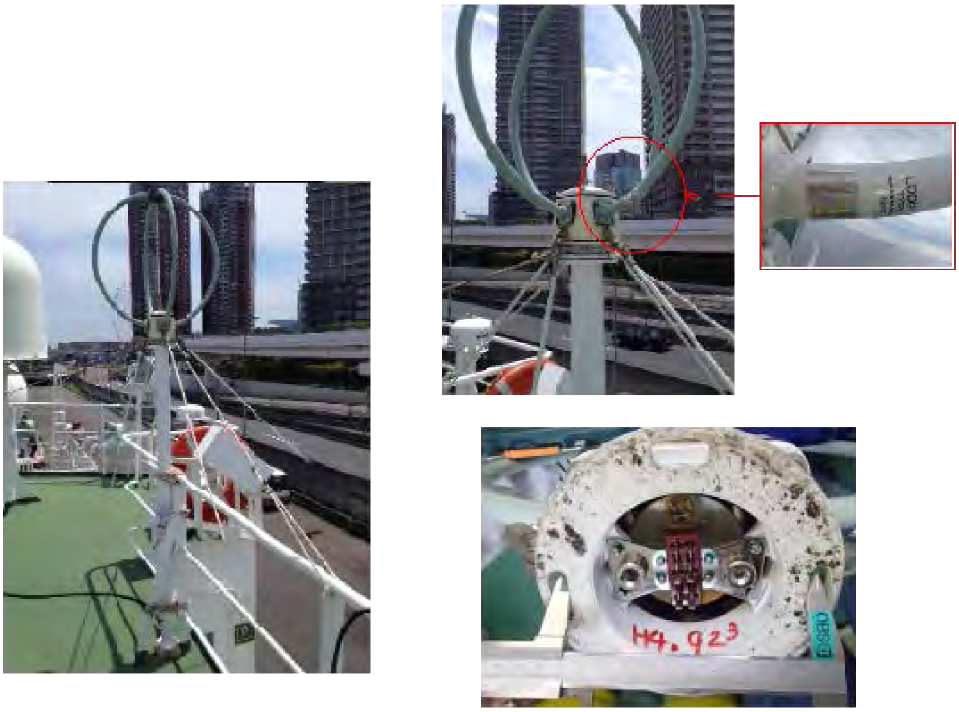

Figure 3.2 Deck-mounted direction finder antenna Uses radio beacon on OBS to assist with detecting where instrument has resurfaced. Other aids are visual, including strobe light, bright yellow hard case, and hi-vis orange/black stripe on the OBS antenna**.**

Figure 3.3 OBS Recovery. Anchors detach from the glass sphere assembly by means of electrolysis when recovered, thus allowing instrument to rise to sea surface. The instrument rotates so that the external transponder-side is down and strobe-side up. Strobe and radio-beacon attached to instrument to assist with recovery.

3.7 Transfer of O-ring Seals to DV *JOIDES Resolution*

In the days leading up to TAN1803 it became apparent to the IODP Expedition 375 science party that the O-rings crucially required to seal borehole CORK observatories from the ocean were not onboard DV *JOIDES Resolution*. When attempts to coordinate helicopter transfer out of Napier failed, it was requested that RV *Tangaroa* bring them up to the NZ3D survey area where they could be transferred to DV *JOIDES Resolution*, which was conducting drilling operations in the same area. Greg Foothead (NIWA) and the DV *JOIDES Resolution* onshore agent arranged transportation of the O-rings from Napier to Wellington, and Greg delivered the O-rings to RV *Tangaroa* during mobilisation at 09:30.

The procedure for small-boat transfer of the O-rings was discussed by Captain Doug Monks and Captain Jacob Robinson during our transit north on March 29, with the DV JOIDES Resolution offering to launch its small rigid-inflatable boat (RIB) from the deck cranes. This was our preferred option because we had a smaller number of deck crew available. RV *Tangaroa* agreed to have its launch on stand-by as a rescue boat.

We arrived at U1520 at 16:00 on March 29. The DV JOIDES Resolution soon had their launch in the water and the O-rings were successfully transferred by 16:30 (Figure 3.4). Both the captain of DV JOIDES Resolution and the co-chief scientists of IODP Expedition 375 were extremely grateful to the captain and crew of RV *Tangaroa* for our willingness to assist in the delivery of this crucial piece of equipment.

Figure 3.4 RIB launch of the DV *JOIDES Resolution* on its way to collect O-rings from RV *Tangaroa.*

3.8 Voyage Narrative

3.8.1 Day 1: Wednesday 28 March 2018

Starting at 08:00 we began mobilisation of RV *Tangaroa* at Aotea Quay, Wellington. Mobilisation was straightforward with 25 Steel OBS racks quickly craned onboard. Greg Foothead made a special delivery of 8 O-rings, which we would deliver to the DV *JOIDES Resolution*. These O-rings were crucial for the successful installation of borehole observatories, which was a key scientific objective of the IODP Expedition 375. The JAMSTEC team was immediately busy setting up their lab and the radio direction finder (Figure 3.3) on the Monkey Island. Mobilisation was complete by 12:00 and the captain held a general meeting in the mess. Dan Bassett gave an overview of the cruise objectives, the background scientific context of our voyage and introduced the science team to the ship's crew. We left the Aotea Quay at 14:00 and conducted a fire drill in Wellington Harbour before starting our transit up to Gisborne.

3.8.2 Day 2: Thursday 29 March 2018

Our transit toward Gisborne progressed smoothly with calm seas and low wind. Our first way-point was adjusted to IODP site U1520 (Figure 3.1) to rendezvous with DV *JOIDES Resolution*. The procedure for transferring O-rings was discussed between the respective captains, with the DV *JOIDES Resolution* offering to deploy their small boat because they had more deck crew available. We arrived at U1520 at 16:00 and the transfer was complete by 16:30. We then completed the short transit to OBS006 which was released from the seabed at 18:09. OBS006 was onboard at 19:28, after which we set about recovered OBSs 031 and 056. Our initial recoveries were concentrated on OBSs within 2 nautical miles of IODP site U1518 (Figure 3.1). This was to ensure the two vessels could maintain safe operating distances when the DV *JOIDES Resolution* returned to this site in several days.

Recovered 3 OBSs (006, 031, 056)

3.8.3 Day 3: Friday 30 March 2018

We started the day clearing the remaining 10 OBSs near IODP HSM-15A. This was complete at 15.30. We then transited up to the north-western extremity of our OBS array to begin the collection of shallow water sites (Figure 3.1). Three sites (OBS 025, 050, 075) were successfully recovered, however, OBS100 gave no acoustic response. We spent approximately three hours around site 100 attempting to acoustically release the OBS from three positions located N, SW and SE from the deployment site. After each attempt, we waited for a time equal to the expected instrument rise time before attempting the next release command. Unfortunately, these attempts were all unsuccessful, so at 23:00 we proceeded with the recovery of OBS099.

Recovered 13 OBSs (081, 082, 083, 057, 032, 007, 008, 033, 058, 059, 025, 050, 075). OBS100 not recovered

3.8.4 Day 4: Saturday 31 March 2018

We proceeded to recover OBSs snaking our way down the array from NW-SE (Figure 3.1). After 17 successful recoveries, we received no acoustic response from OBS045. We repeated the same procedure employed at OBS100, attempting to acoustically release the OBS from three positions located N, SW and SE from the deployment site. When these attempts were unsuccessful, we proceeded with the recovery of OBS020.

Recovered 18 OBSs (099, 074, 049, 024, 023, 048, 073, 098, 097, 072, 047, 022, 021, 046, 071, 096, 095, 070). OBS045 not recovered

3.8.5 Day 5: Sunday 1 April 2018

We proceeded to recover OBSs snaking our way down the array from NW-SE. After 13 successful recoveries, we received no acoustic response from OBS091. We repeated the same procedure as OBS100 and OBS045, attempting to acoustically release the OBS from three positions located N, SW and SE from the deployment site. When these attempts were unsuccessful, we proceeded with the recovery of OBS066.

Recovered 21 OBSs (020, 019, 044, 069, 094, 093, 068, 043, 018, 017, 042, 067, 092, 066, 041, 016, 015, 040, 065, 090, 089). OBS091 not recovered

3.8.6 Day 6: Monday 2 April 2018

Recovered 22 OBSs (064, 039, 014, 013, 038, 063, 088, 087, 062, 037, 012, 011, 036, 061, 086, 085, 084, 060, 035, 010, 009, 034). After recovering OBS34 we completed the short transit SW to OBS005, where we would begin recovery of OBSs deployed in deep-water.

3.8.7 Day 7: Tuesday 3 April 2018

Recovered 14 OBSs (005, 030, 055, 080, 079, 054, 029, 004, 003, 028, 053, 078, 077, 076). Recoveries proceeded at a slower rate than preceding days due to increased water-depth and associated rise-times. At the lunchtime toolbox meeting, we adjusted our recovery procedure to stack ascending OBSs within the water column. This time-saving procedure involved releasing the next OBS in the recovery sequence, while the previous instrument was still ascending through the water column.

3.8.8 Day 8: Wednesday 4 April 2018

We began the day recovering the final 6 deep-water OBSs (051, 052, 027, 026, 001, 002). OBS002 was onboard at 08:15. We then transited up to site 100 where four additional attempts were made to acoustically release the OBS. The first attempt was made at 11:10 directly above the deployment location, with subsequent attempts made S, NE and NW of the deployment site. When all acoustic releases failed to yield an OBS, we held a special toolbox meeting to discuss dragging for the unrecovered OBS. This procedure (described in Section 3.6) involves paying out a weighted wire with grapnel hooks around the deployment site with a radius of approximately half the water-depth. When the loop is complete, paying out ceases and the ship sails back over the deployment site, to tighten the noose around the OBS. The goal is to try and hook the OBS or knock it from its anchor.

Starting at 14:30 we had two attempts dragging for OBS100 paying out 1000 m of trawl wire around the deployment location. Despite this procedure being expertly carried out by the officers and crew, unfortunately these efforts were unsuccessful.

We then transited down to the sites of unrecovered OBS045 where we spent ~3 hours attempting further acoustic releases S, NE and NW of the deployment site. The water depth at these locations precluded attempts at dragging. The final release at OBS045 was sent at 19:25. At 20:19 this attempt was deemed to have failed and we began our transit to OBS091.

3.8.9 Day 9: Thursday 5 April 2018

At OBS091 we spent ~3 hours attempting further acoustic releases S, NE and NW of the deployment site. At 02:20, our final attempt to acoustically release OBS091 was deemed to have failed, so we began our transit back to Wellington.

3.8.10 Day 10: Friday 6 April 2018

We arrived in Wellington at 08:00 and immediately commenced de-mobilisation. All gear was unloaded onto trucks bound for GNS Science by 10:30. Science party stayed for lunch and left RV *Tangaroa* at 13:30.

3.9 Post-Cruise Efforts to Recover Lost OBSs

When we returned to port we promptly contacted the Environmental Protection Authority (EPA), Inshore fisheries (FINZ) and Deep Water Group (DWG) alerting them to the three unrecovered OBSs and asking if any fishing boats find them in a trawl net or, floating on the surface, to contact us. Stuart Henrys also engaged local and national media to raise public awareness of our lost OBSs. This yielded several news stories providing detailed descriptions of the OBSs and contact details for use if anyone happened to come across an OBS at sea or washed up along the coast.

https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=12056473

Miraculously, a recreational fisherman did find OBS091 washed up on a beach near Tolaga Bay. This OBS was encrusted with barnacles, seaweed and crabs indicating it had been drifting for a long period of time. Analysis of the data recovered showed that after deployment OBS091 only remained on the seafloor for 5 days, surfacing on December 26. The data recorded show (yellow box – Figure 3.5) the OBS accepting a release command. The source of this command is unknown, but it would have initiated the burn sequence on the release mechanism, ultimately leading to the OBS dropping its anchor and detaching from the seafloor (red box – Figure 3.5).

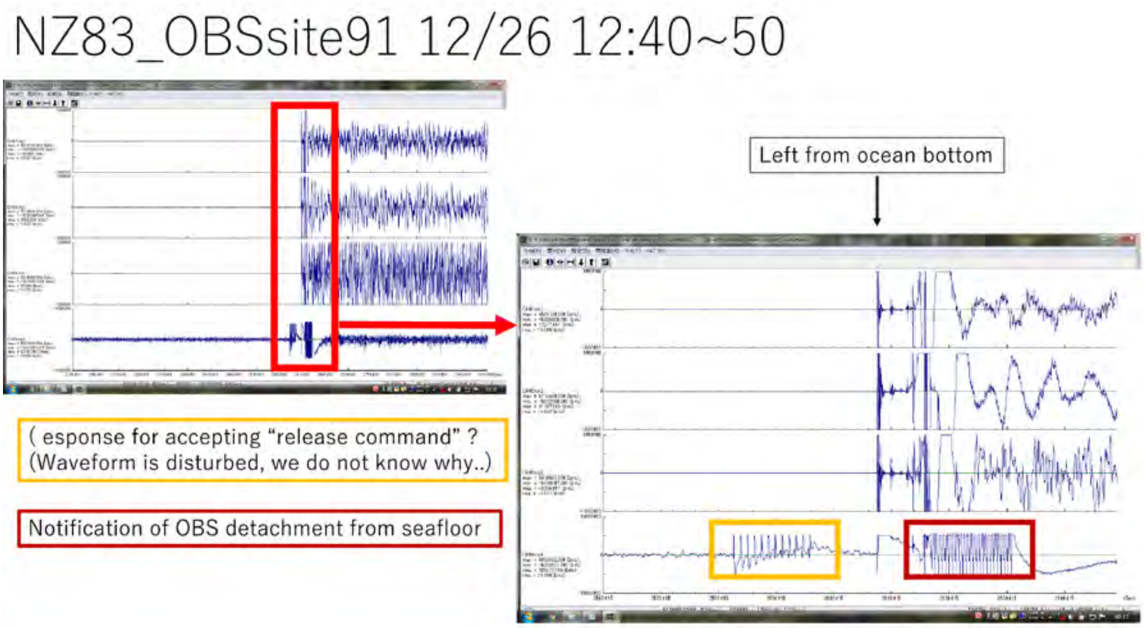

Figure 3.5 Snapshot of the data recorded by OBS091 on 26 December 2017. The yellow box highlights an acoustic response signal, generated by the OBS, after interpreting receipt of a release command. The red box highlights an acoustic signal confirming detachment from the seafloor, which is marked by the high amplitude pulse (labelled) been the two boxes. Figure and analysis supplied courtesy of Yojiro Yamamoto (JAMSTEC).

Recovery of this OBS prompted several additional news stories, but at the time of writing we are yet to recover OBS100 or OBS045.

http://gisborneherald.co.nz/localnews/3477186-135/one-was-found-two-still-lost

https://www.stuff.co.nz/science/104291123/valuable-scientific-instrument-saved-from-life-as-bach-feature-light

4.0 PRELIMINARY RESULTS

Data from the 98 recovered instruments were downloaded by the JAMSTEC/NME crew in New Zealand prior to the instruments being shipped back to Japan.

Initial analysis of OBS data at JAMSTEC has been focussed on determining the precise location of OBSs on the seabed. This is achieved by analysing the travel-time of acoustic energy between surface airgun shots (MGL1801) and seafloor OBSs. Precise relocated positions are presented in Appendix 1.1 and shown in Figure 4.1. The mean horizontal drift between deployment position and seafloor location was 216 m, with minimum and maximum values of 13 m and 662 m respectively.

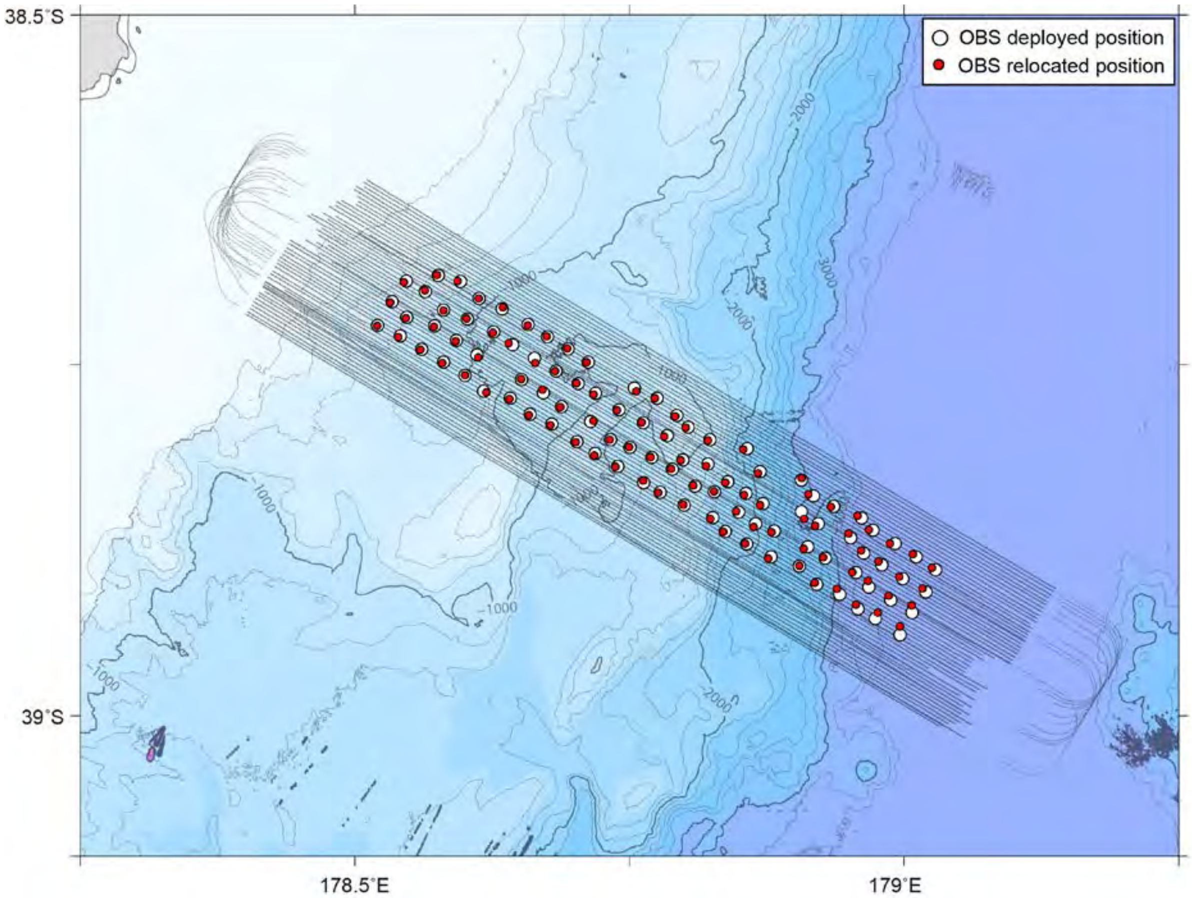

Figure 4.1 Map showing relocated positions of OBSs on the seabed relative to deployed locations (white) dots and the distribution of marine seismic lines acquired during the NZ3D survey (MGL1801). Shots along these black lines were recorded by every OBS on the seabed. Figure and relocated OBS positions supplied courtesy of Ryuta Arai (JAMSTEC).

Of the 98 instruments recovered 97 provided high-quality data with no data gaps, faulty channels or timing issues. Preliminary analysis of the active source seismic records show these data to be of high quality (Figures 4.2 to 4.5), with refracted arrivals well recorded throughout the NZ3D survey region. The short shot interval used during acquisition of the 3D MCS data has produced wrap-around noise in the OBS data. This occurs when refracted arrivals from one shot are obscured by energy remaining in the water-column from a previous shot. Preliminary processing of these data at JAMSTEC is focussed on supressing this wrap-around noise, prior to the interpretation of first arrivals for construction of a 3D tomographic model.

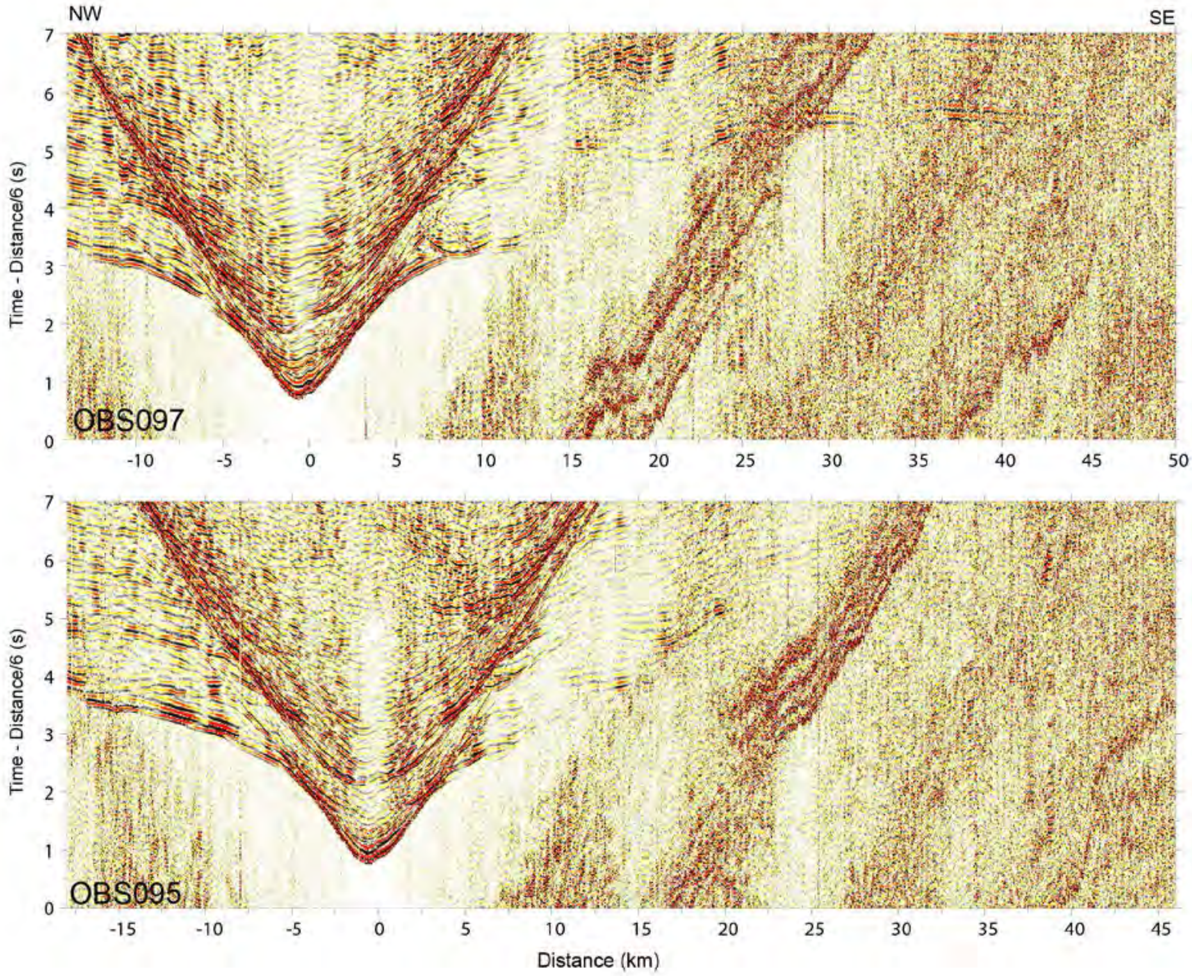

Figure 4.2 Example receiver-gather of active-source seismic data recorded OBS097 and OBS095. Data plots supplied by Ryuta Arai (JAMSTEC)

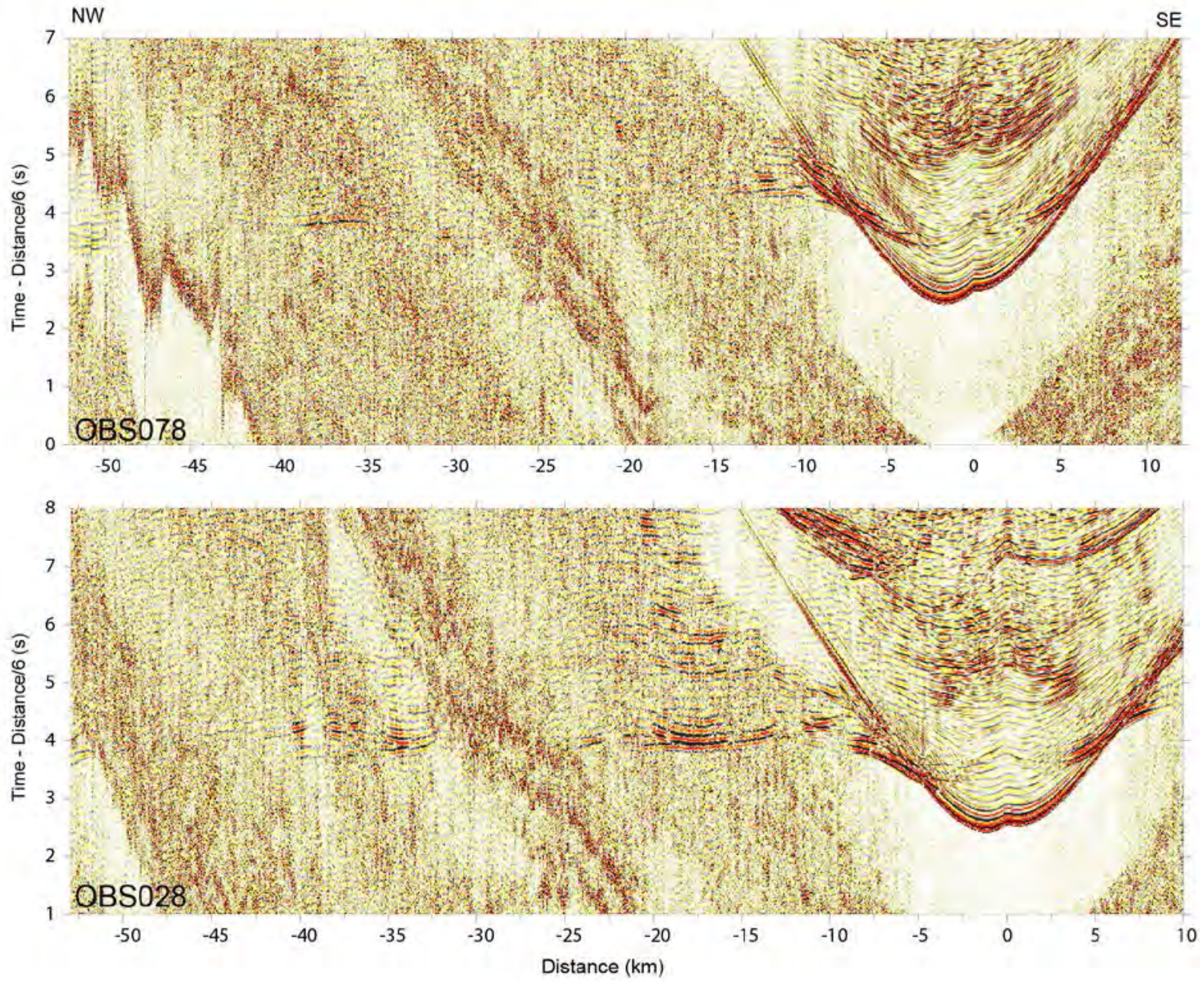

Figure 4.3 Example receiver-gather of active-source seismic data recorded OBS078 and OBS028. Data plots supplied by Ryuta Arai (JAMSTEC)

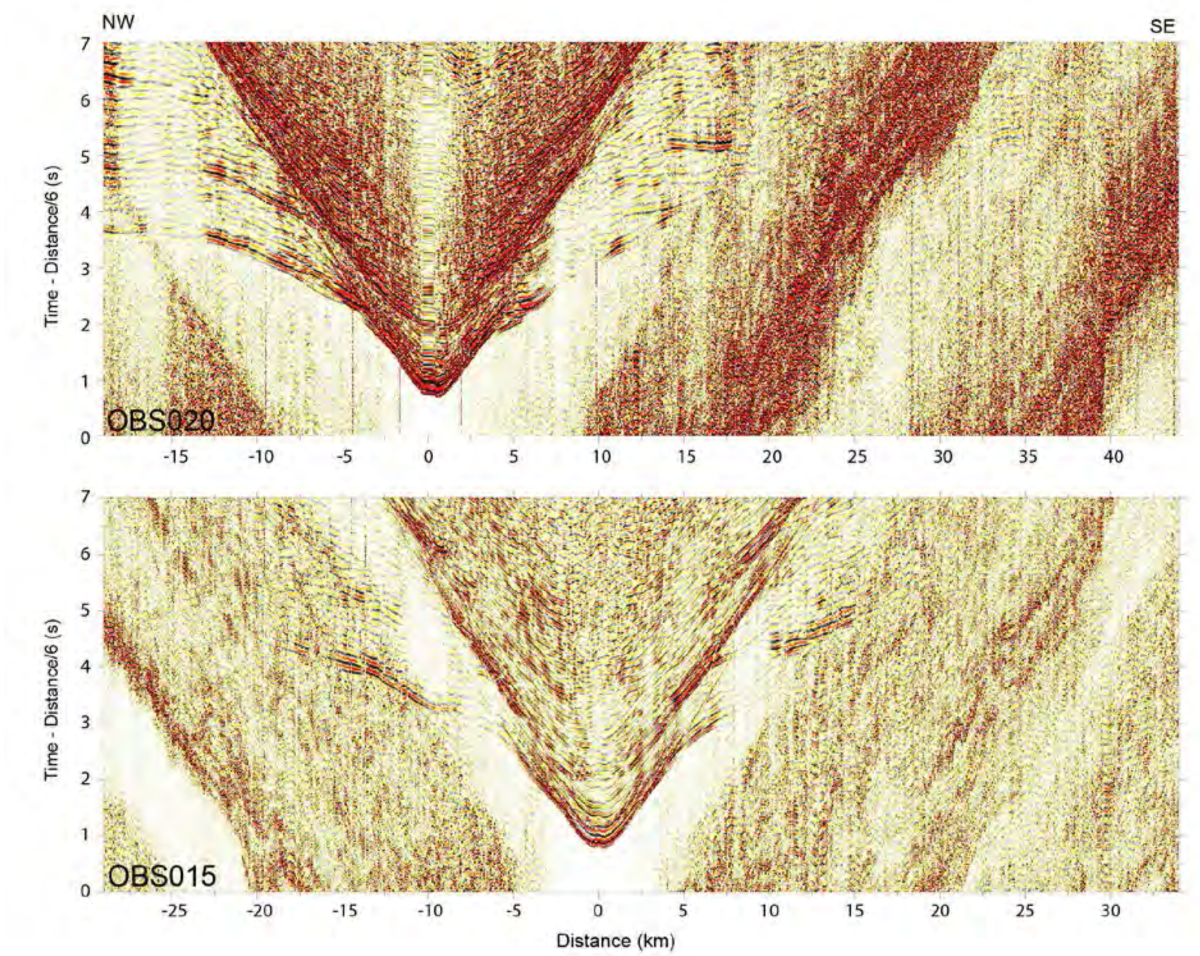

Figure 4.4 Example receiver-gather of active-source seismic data recorded OBS020 and OBS015. Data plots supplied by Ryuta Arai (JAMSTEC)

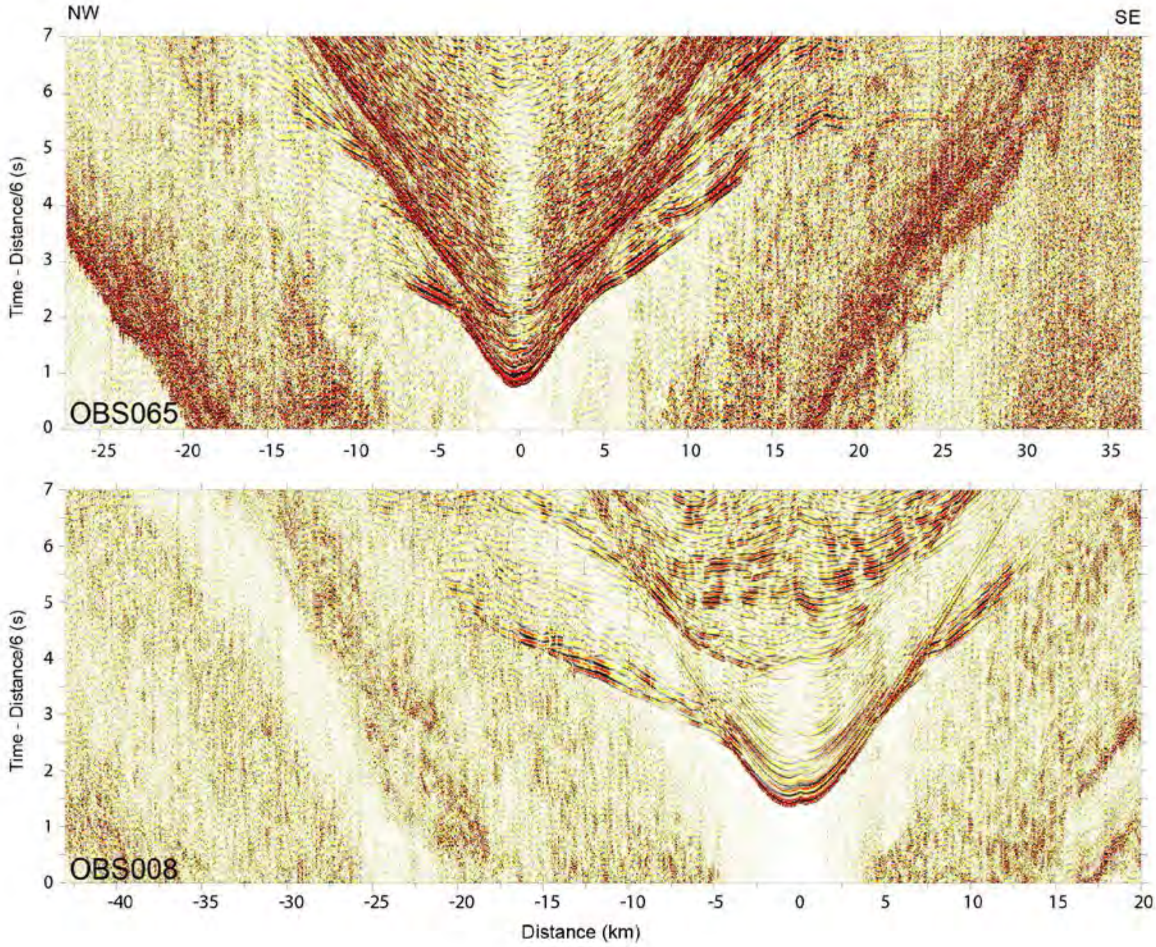

Figure 4.5 Example receiver-gather of active-source seismic data recorded OBS065 and OBS008. Data plots supplied by Ryuta Arai (JAMSTEC)

5.0 ACKNOWLEDGEMENTS

The TAN1712/1803 science parties thank Captains Evan Solly and Doug Monks and the crew of the RV *Tangaroa* for the two highly successful and safe voyages. Ship time for TAN1712/1803 was funded by Ministry of Business Innovation and Employment (MBIE). MBIE have provided funding for up to 80 days of voyage time per year on RV *Tangaroa*. This time is offered to support project activities funded by government stakeholders and government end-users. All projects utilising this government allocation are assessed by a Marine Funding Allocation Reference Group (MFARG) based on the eligibility, scientific excellence and national benefit assessment criteria. Close collaboration with the Environmental Protection Authority (EPA), Maritime New Zealand, Inshore fisheries (FINZ) and Deep Water Group (DWG) helped with the efficient planning and execution of these voyages. Co-ordination with the staff scientists on the DV JOIDES Resolution Expeditions 372 and 375 allowed us to complete the deployment and recovery of the OBS around the active drilling. Figures 5.1 and 5.2 show the science crews.

Figure 5.1 TAN1712 Science Party.

Figure 5.2 TAN1803 Science Party.

6.0 REFERENCES

Barker DHN, Van Avendonk H, Fujie G. 2019. Seismogenesis at Hikurangi Integrated Research Experiment (SHIRE) Report of R/V Tangaroa cruise TAN1710, 23 Oct–20 Nov 2017. Lower Hutt (NZ): GNS Science. 22 p. + appendices (GNS Science report; 2019/01). doi:10.21420/H28Y–5N43.

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Pecher IA, Barnes PM, LeVay LJ, Expedition 372 Scientists. 2018. International Ocean Discovery Program Expedition 372 preliminary report: creeping gas hydrate slides and Hikurangi LWD. [College Station (TX)]: Texas A&M University. https://doi.org/10.14379/iodp.pr.372.2018

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APPENDICES

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APPENDIX 1.0 OBS DEPLOYMENT AND RECOVERY

A1.1 Table of locations for OBS deployment and recovery

Please see attached Excel file.

A1.2 Station logs from Tangaroa Crew

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	100

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	34		156

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0545	08		38°51.31'	S	178°50.95'	E			1769
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	99

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	35		168

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0526	08		38° 50.47'	S	178° 49.63'	E			1422
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

S C O M

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

8

Trip code Vessel	Year	No	Station Number
TAN	17	12	98

RECORDER:

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	36		142

	Day	Month (word)	Year	Time (NZST) 24 hour	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0512	06		38° 50.21'	S	178° 48.55'	E			1217
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	97

RECORDER:

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	37		166

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0454	08		38°49.48'	S	178°47.33'	E			102
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	96

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	38		178

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0437	08		38° 48.98'	S	178° 46.20'	E			1122
FINISH							° . '	S	° . '				

	Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
GEAR																	

	Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
ENVIRONMENT																

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	95

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECA1	39		203

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0418	08		38° 48.53'	S	178° 45.01'	E			1152
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

S C O M

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	94

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	40		152

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0354	08		38° 48.23'	S	178° 43.96'	E			1053
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	93

RECORDER:

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	EC NI	A1		019

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0339	08		38°47.42	S	178°42.87	E			887
FINISH							° .	S	° .				

	Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
GEAR																	

	Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
ENVIRONMENT																

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	92

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	42		163

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0313	08		38° 46.82'	S	178° 41.28'	E			1628
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	91

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS43		105

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix – (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0255	08		38°46.20'	S	178°40.27'	E			1037
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA Taihoro Nukurangi

Trip code Vessel	Year	No	Station Number
TAN	17	12	90

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/Transect code	Course (° true)
	ECNI	44		161

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0234	08		38°45.64	S	178°39.10	E			1035
FINISH								S					

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	89

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS69		131

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0213	08		38°44.72'	S	178°39.81'	E			1001
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

SCOM Station Number:

STATION COMMENTS
continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA
Taihoro Nukurangi

Trip code Vessel	Year	No	Station Number
TAN	17	12	88

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	0B568		250

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0156	08		38°45.27'	S	178°40.97'	E			999
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	87

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	055 067		140

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0136	08		38°45.82'	S	178°42.19'	E			1007
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	86

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN	10BS66		100

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0114	08		38°46.23'	S	178°43.13'	E			1004
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: JC

Trip code Vessel	Year	No	Station Number
TAN	17	12	85

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	65		163

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0050	08		38°46.94'	S	178°44.43'	E			931
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: JC

Trip code Vessel	Year	No	Station Number
TAN	17	12	84

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	08564		170

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0028	08		38° 47.50	S	178° 45.74	E			1058
FINISH							° .	S	° .				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	83

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS063		220

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	19	DEC	17	0008			38° 48.05'	S	178° 47.04'	E			853
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: JC

Trip code Vessel	Year	No	Station Number
TAN	17	12	82

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	085062		200

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	2344	08		38°49.07'	S	178°47.90'	E			930
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

S C O M

Station Number:

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	081

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	0061		132

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	2321	08		38°49.28'	S	178°49.28'	E			1157
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA
Taihoro Nukurangi

Trip code Vessel	Year	No	Station Number
TAN	17	12	80

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	060		157

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	2300	08		38° 56.01'	S	178° 50.35'	E			1566
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Performance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM Station Number:

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	79

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	59		145

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	2236	08		38° 50.52'	S	178° 51.36'	E			1826
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	78

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN4	84		161

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	2212	08		38° 49.57'	S	178° 52.12'	E			2092
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: MH

Trip code Vessel	Year	No	Station Number
TAN	17	12	77

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	85		175

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	2152	08		38° 48.6' 0	S	178° 51.41'	E			2308
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: MH

Trip code Vessel	Year	No	Station Number
TAN	17	12	76

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	86		176

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	2130	08		38° 48.22'	S	178° 49.38'	E			974
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA Taihoro Nukurangi

RECORDER: MH

Trip code Vessel	Year	No	Station Number
TAN	17	12	75

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECW1	87		178

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	2113	08		38°47.67'	S	178°48.20'	E			705
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: MH

Trip code Vessel	Year	No	Station Number
TAN	17	12	74

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	88		157

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	2056	08		38° 47.17'	S	178° 47.57'	E			755
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA Taihoro Nukurangi

Trip code Vessel	Year	No	Station Number
TAN	17	12	73

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	89		170

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	2038	08		38° 46.44'	S	178° 46.49'	E			930
FINISH								S					

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: MH

Trip code Vessel	Year	No	Station Number
TAN	17	12	172

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	90		154

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	2020	08		38° 46.00'	S	178° 45.25'				951
FINISH								S					

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	71

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECW1	91		196

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	2001	08		38°45.45'	S	178°44.00'				915
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: MH

Trip code Vessel	Year	No	Station Number
TAN	17	12	710

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	EICNI	92		136

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1940	08		38° 44.89'	S	178° 42.74'	E			973
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: MH

Trip code Vessel	Year	No	Station Number
TAN	17	12	69

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	93		210

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1913	08		38° 44.33'	S	178° 41.63'	E			990
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: ____

Trip code Vessel	Year	No	Station Number
TAN	17	12	68

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	BCN1	94		151

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1849	08		38°43.86'	S	178°40.51'	E			1020
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number: ____

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	67

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	95		190

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1828	DS		38°43.29'	S	178°39.44'	E			1030
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA
Taihoro Nukurangi

Trip code Vessel	Year	No	Station Number
TAN	17	12	66

RECORDER:

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	96		182

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1804	08		38° 42.61'	S	178° 38.02'	E			1018
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	19	12	65

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	97		164

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1743	08		38°42.17'	S	178°36.78'	E			929
FINISH							° . '	S	° . '				

	Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
GEAR																	

	Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
ENVIRONMENT																

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	64

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	98		172

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	16	DEC	17	1727	08		38° 41.43'	S	178° 36.77'	E			701
FINISH								S					

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

S C O M

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: ____________

Trip code Vessel	Year	No	Station Number
TAN	17	12	63

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	99		183

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1711	08		35° 41.17'	S	178° 34.54'	E			595
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

S C O M

Station Number: ____

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	62

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	100		166

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1655	68		38°46.56'	S	178°53.46'	E			397
FINISH							° . '	S	° . '				

GEAR	Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT	Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

S C O M Station Number:

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	61

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	75		128

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1636	08		38° 41.41'	S	178° 32.79'	E			470
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	60

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	74		121

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1554	08		38° 41.87'	S	178° 33.83'	E			635
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: [signature]

Trip code Vessel	Year	No	Station Number
TAN	17	12	59

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	73		248

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1537	08		38°42.65	S	178°34.84	E			848
FINISH							° .	S	° .				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

S C O M

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	58

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	72		207

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1519	08		38°43.04'	S	178°36.12'	E			985
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

S C O M

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA Taihoro Nukurangi

Trip code Vessel	Year	No	Station Number
TAN	17	12	057

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS71		202

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1504	08		38°43.66'	S	178°37.67'	E			1008
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: JC

Trip code Vessel	Year	No	Station Number
TAN	17	12	056

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS70		134

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1444	08		38°44.16'	S	178°38.61'	E			1019
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	055

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS45		153

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1426	08		38°45.06'	S	178°37.90'	E			1008
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM Station Number:

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: JC

Trip code Vessel	Year	No	Station Number
TAN	17	12	054

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS46		222

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1407	08		38°44.60'	S	178°36.67'	E			990
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: JC

Trip code Vessel	Year	No	Station Number
TAN	17	12	053

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	OBS47		146

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1348	08		38°43.96'	S	178°35.54'	E			974
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Performance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: JC

Trip code Vessel	Year	No	Station Number
TAN	17	12	052

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS48		305

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1325	08		38° 43.34'	S	178° 34.30'	E			881
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	051

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS49		020

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1257	08		38°42.97'	S	178°32.82'	E			743
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

SCOM

Station Number:

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	050

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS050		094

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1240	08		38°42.31'	S	178°32.02'	E			0657
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number:

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: JC

Trip code Vessel	Year	No	Station Number
TAN	17	12	049

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS25		294

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1220	08		38°43.32'	S	178°31.24'	E			745
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	048

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN	1085124		070

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1202	08		38°43.77'	S	178°32.47'	E			811
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Performance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA
Taihoro Nukurangi

Trip code Vessel	Year	No	Station Number
TAN	17	12	047

RECORDER: JC

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	086023		330

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1146	08		38°44.35	S	178°33.65	E			909
FINISH							° .	S	° .				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

S C O M

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: JC

Trip code Vessel	Year	No	Station Number
TAN	17	12	46

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	OBS 22		119

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1126	08		38°44.89'	S	178°34.83'	E			958
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	45

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	21		35

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1053	08		38° 45.45'	S	178° 36.01'	E			979
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	44

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	20		002

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude (° ')	N/S	Longitude (° ')	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1037	09		38 46.13	S	178 37.01	E			900
FINISH								S					

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA
Taihoro Nukurangi

Trip code Vessel	Year	No	Station Number
TAN	17	12	43

RECORDER: MH

STAT	User categories	Area	Station code	Stratum/ Transect code	Course (° true)
S T A T		ECN1	19		60

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1017	08	43	38° 46.43'	S	178° 38.49'	E			1057
FINISH							° . '	S	° . '				

	Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
GEAR								.	.	.		.		.			

	Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
ENVIRONMENT			.	.								.	.			

SCOM	Station Number
S C O M	

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	42

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	18		22

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	1002	08		38° 47.11'	S	178° 39.56'	E			1069
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Performance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: MH

Trip code Vessel	Year	No	Station Number
TAN	17	12	41

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1(	17		6

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0946	08		38° 47.55'	S	178° 40.74'	E			1065
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	40

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	16		35

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0927	08		38° 48.29'	S	178° 42.12'	E			839
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: MH

Trip code Vessel	Year	No	Station Number
TAN	17	12	39

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECW1	15		12

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEK	17	0912	08		38° 48.79'	S	178° 43.11'	E			934
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM Station Number:

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: MH

Trip code Vessel	Year	No	Station Number
TAN	17	12	38

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	14		31

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	16	DEC	17	0852	08		38° 49.34'	S	178° 44.36'	E			1061
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: MH

Trip code Vessel	Year	No	Station Number
TAN	17	12	37

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	13		11

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0835	018		38° 50.02'	S	178° 45.78'	E			1257
FINISH								S					

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA Taihoro Nukurangi

Trip code Vessel	Year	No	Station Number
TAN	17	12	36

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	12		48

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0815	08		38° 50.45'	S	178° 46.66'	E			1281
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: MH

Trip code Vessel	Year	No	Station Number
TAN	17	12	035

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	11		32

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0754	08	.	38° 51.01'	S	178° 47.98'	E			1227
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: MH

Trip code Vessel	Year	No	Station Number
TAN	17	12	034

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	10		294

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0734	08		38° 51.56'	S	178° 49.51'	E			1696
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

S C O M Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	033

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	05		012

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0645	08		38°54.40'	S	178°55.22'	E			2770
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA
Taihoro Nukurangi

Trip code Vessel	Year	No	Station Number
TAN	17	12	032

RECORDER:

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN / OBS	04		022

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0628	08		38°54.83'	S	178°56.47'	E			3055
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	31

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS03		040

	Day	Month	Year	Time (NZST) 24 hour	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0616	08		38°55.44'	S	178°57.48'	E			3386
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

SCOM Station Number

STATION COMMENTS
continue to seperate sheet if necessary

3 CERT IMERSSIONS - CP into MPH

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: ________

Trip code Vessel	Year	No	Station Number
TAN	17	12	30

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS 02		008

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0522	08	.	38°55.87'	S	178°58.43'	E			3377
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

S C O M

Station Number: ________

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: E

Trip code Vessel	Year	No	Station Number
TAN	17	12	029

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ELN1	OBS01		314

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0506	08		38° 56.54'	S	175° 59.74'	E			3471
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	028

RECORDER: [initials]

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN	OBS26		045

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0456	07		38° 55.66'	S	179° 00.45'	E			3484
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	027

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	0S 27		027

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0436	08		38°55.06'	S	178°59.26'	E			3460
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	026

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	OBS 28		026

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0418	08		38°54.50	S	178°58.07	E			344
FINISH							° .	S	° .				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA Taihoro Nukurangi

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	025

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN /	OBS 29		030

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	16	DEC	17	0402	08		38° 53.90'	S	178° 57.36'	E			3312
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Performance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: [signature]

Trip code Vessel	Year	No	Station Number
TAN	17	12	024

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	BS 30		347

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0338	08		38° 53.28'	S	178° 55.69'	E			2777
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

S C O M

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	023

RECORDER: JC

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS055		359

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0314	08		38° 52.41'	S	178° 57.07'	E			3389
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

S C O M Station Number:

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	022

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS054		051

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0253	08		38° 53.07'	S	178° 57.78'	E			3444
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	021

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS053		045

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0230	08		38°53.58'	S	178°58.80'	E			3470
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM Station Number:

STATION COMMENTS
continue to seperate sheet if necessary

NIWA Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: JC

Trip code Vessel	Year	No	Station Number
TAN	17	12	020

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	0BS052		278

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0210			38°54.16	S	178°59.92	E			3484
FINISH							° .	S	° .				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: JC

Trip code Vessel	Year	No	Station Number
TAN	17	12	019

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	0BS051		003

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0144	08		38°54.73'	S	179°01.17'	E			3490
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	018

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS076		063

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0117	08		38° 53.77'	S	179° 01.72'				3500
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA
Taihoro Nukurangi

Trip code Vessel	Year	No	Station Number
TAN	17	12	017

RECORDER: JC

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS 077		074

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0058	08		38° 53.23'	S	179° 00.66'				3490
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

S C O M

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	016

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS078		049

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0025	08		38° 52.66'	S	178° 59.52'				3486
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	015

RECORDER: JC

S T A T

User categories	Area	Station code	Stratum/ Transect code	Course (true)
	ECN1	OBS079		056

	Day	Month (word)	Year	Time (NZST) 24 hour	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	18	DEC	17	0003	08		38°52.09'	S	178°58. '	E			3478
FINISH							° . '	S	° . '				

	Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
GEAR								.	.	.		.		.			

	Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
ENVIRONMENT			.	.								.	.			

S C O M

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER: JL

Trip code Vessel	Year	No	Station Number
TAN	17	12	014

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (true)
	ECN1	OBS080		056

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	17	DEC	17	2346	08		38° 51.56'	S	178° 57.68'	E			3459
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
							.	.	.		.		.			

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
		.	.								.	.			

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	013

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS081		026

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	17	DEC	17	2325	08		38°51.07'	S	178°56.15'	E			2936
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	012

RECORDER: JC

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	OBS082		024

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	17	DEC	17	2303	08		38°50.62'	S	178°55.03'	E			2957
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	011

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN	OBS 083		044

	Day	Month (word)	Year	Time (NZST) 24 hour	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	17	DEC	17	2245			38° 49.95'	S	178° 54.38'	E			2930
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	010

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS Ø56		066

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	17	DEC	17	2217	08		38° 51.81'	S	178° 55.31'	E			2957
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	009

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	OBS 059		058

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	17	DEC	17	2157	08		38° 51.29'	S	178° 54.37'	E			2929
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	008

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN	~~06~~ 058		069

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	17	DEC	17	2135	08		38°50.94'	S	178°52.28'	E			2106
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	007

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	0BS033		001

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	17	DEC	17	2113	08		38° 51.80'	S	178° 51.89'	E			1922
FINISH								S					

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM Station Number:

STATION COMMENTS
continue to seperate sheet if necessary

NIWA Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	006

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	OBS03R		048

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	17	DEC	17	2049	08		38° 52.12'	S	178° 52.90'	E			2302
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS

continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	005

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN1	0B031		051

	Day	Month (word)	Year	Time (NZST) 24 hour	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	17	DEC	17	2020	08		38° 52.78'	S	178° 54.74'	E			2865
FINISH								S					

	Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
GEAR																	

	Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
ENVIRONMENT																

SCOM Station Number:

STATION COMMENTS
continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA
Taihoro Nukurangi

Trip code Vessel	Year	No	Station Number
TAN	17	12	004

RECORDER: MH

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECS1	0BS006		060

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	17	DEC	17	1951	08		38° 53.61'	S	178° 54.27'	E			2847
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

STATION RECORD (2003 EDITION)

NIWA
Taihoro Nukurangi

RECORDER: MH

Trip code Vessel	Year	No	Station Number
TAN	17	12	003

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECS1	0B002		054

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	17	DEC	17	1925	08		38° 53.23'	S	178° 52.71'	E			2290
FINISH							° . '	S	° . '				

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM

Station Number

STATION COMMENTS
continue to seperate sheet if necessary

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

Trip code Vessel	Year	No	Station Number
TAN	17	12	002

RECORDER:

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECN /	0B508		104

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	17	DEC	17	1857	08		38°52.67'	S	178°51.41'	E			1873
FINISH								S		E			

GEAR

Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Performance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth

ENVIRONMENT

Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other

SCOM Station Number:

STATION COMMENTS
continue to seperate sheet if necessary

45 15.
175 57.58E

NIWA
Taihoro Nukurangi

STATION RECORD (2003 EDITION)

RECORDER:

Trip code Vessel	Year	No	Station Number
TAN	17	12	001

STAT

User categories	Area	Station code	Stratum/ Transect code	Course (° true)
	ECNI	0359		092

Ships Head.

	Day	Month (word)	Year	Time (NZST) (24 hour)	Method of fix	Time since fix (mins)	Latitude	N/S	Longitude	E/W	Depth of gear (m)	Bottom at gear (m)	Depth at vessel (m)
START	17	DEC	17	1822	0	8	38°52.13'	S	178°50.22'	E			1807
FINISH							° . '	S	° . '				

	Minimum depth of gear (m)	Maximum depth of gear (m)	Gear method	Gear code	No. of Units	Perform-ance	Path	Speed (knots)	Distance (Naut.miles)	Headline Ht (m)	Code	Distance between wings (m)	Code	Distance between doors (m)	Code	length of warp (m)	Fish at net mouth
GEAR																	

	Wind direction (° true)	Wind force (Beauf't)	Air temperature (°C)	Air pressure (mb)	Cloud cover	Sea cond	Sea col	Swell Ht	Swell dir (° true)	Bottom type	Bottom cont	Surface temp (°C)	Bottom temp (°C)	Wind speed (m/s)	Secchi (m)	Other
ENVIRONMENT																

SCOM Station Number:

STATION COMMENTS
continue to seperate sheet if necessary

APPENDIX 2.0 WATER SAMPLING INFORMATION

A2.1 Water Sampling Notes

			Position information	
Sample number	Date UTC	Sample time	Latitude	Longitude
1-55493	18/12/2017	22:00 UTC	38°59.481'S	178°06.867'E
2-55495	18/12/2017	22:32 UTC	39°04.280'S	178°04.812'E
3-55496	18/12/2017	23:33: UTC	39° 13.089's	177° 59.905'E
4-55498	19/12/2017	00:02 UTC	39° 17.311's	177° 57.612' E
5-55500	19/12/2017	00:36 UTC	39° 21.754's	177° 54.312' E
6-55502	19/12/2017	01:04 UTC	39° 19.485' S	177° 49.280' E
7-55504	19/12/2017	01:34 UTC	39° 16.795' S	177° 43.665 E
8-55505	19/12/2017	02:04 UTC	39° 14.369' S	177° 37.993' E
9-55507	19/12/2017	02:33 UTC	39° 13.614' S	177° 32.295' E
10-55508	19/12/2017	03:02 UTC	39° 14.970' S	177° 26.162' E
11-55509	19/12/2017	03: ~~16.498~~ 34. UTC	39° ~~19.6~~ 16.531 S	177°.19.534 E
12-55512	19/12/2017	04:02 UTC	39° 17.874's	177° 13.648 E
13-55513	19/12/2017	04:33 UTC	39° 22.634's	177° 11.991'E
14-55514	19/12/2017	05:04 UTC	39° 27.541's	177° 10.817'E
15-55518	19/12/2017	05:33 UTC	39° 32.263's	177° 09.781'E
16-55520	19/12/2017	06:06 UTC	39° 37.250's	177° 08.832'E
17-66152	19/12/2017	06:33 UTC	39° 41.459's	177° 07.857'E
18-66153	19/12/2017	07:09 UTC	39° 47.088's	177° 06.568'E
19-66154	19/12/2017	07:40 UTC	39° 51.979's	177° 05 885'E
20-66156	19/12/2017	08:12 UTC	39° 56.872's	177° 04 632'E

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ANALYSIS REQUEST

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W www.hill-laboratories.com

Job No: **190 0724**
Date Recv: 22-Dec-17 06:08
Received by: Alister Kennedy
3119007243

Quote No 89655

Primary Contact Oliver Wade 173316

Submitted By Oliver Wade 173316

Client Name Hawkes Bay Regional Council 91668

Address Private Bag 6006, Napier 4142

Phone 06 835 9200 *Mobile*

Email labresults@hbrc.govt.nz

Charge To Hawkes Bay Regional Council 91668

Client Reference

Order No

Results To *Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.*

☐ *Email Primary Contact* ☐ *Email Submitter* ☐ *Email Client*

☐ *Email Other*

☐ *Other*

ADDITIONAL INFORMATION

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time:
Name:
Signature:
☐ *Tick if you require COC to be emailed back*

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 17.0

☐ Sample & Analysis details checked

Signature:

Priority ☐ **Low** ☑ **Normal** ☐ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 8 working days following the day of receipt of the samples at the laboratory.

Requested Reporting Date:

Quoted Sample Types

Surface Water (SW)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	№ 55493			TN per sulphate method, TKN, Fe, Iron,
2	№ 55494			Silica, TP, The rest as
3	№ 55495			per quote. Same for
4	№ 55496			all samples.
5	№ 55497			
6	№ 55498			
7	№ 55499			
8	№ 55500			
9	№ 55501			
10	№ 55502			

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W www.hill-laboratories.com

Office use only (Job No)

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☐ *Email Primary Contact* ☐ *Email Submitter* ☐ *Email Client*
☐ *Email Other*
☐ *Other*

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
☐ *Tick if you require COC to be emailed back*
Date & Time:
Name:
Signature:

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:*

☐ Sample & Analysis details checked
Signature:

ADDITIONAL INFORMATION

Priority ☐ **Low** ☑ **Normal** ☐ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 8 working days following the day of receipt of the samples at the laboratory.

Requested Reporting Date:

Quoted Sample Types

Surface Water (SW)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	№ 55503			Same as
2	№ 55504			
3	№ 55505			
4	№ 55506			
5	№ 55507			
6	№ 55508			
7	№ 55509			
8	№ 55510			
9	№ 55511			
10	№ 55512			

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Client Reference

Order No

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☐ *Email Primary Contact* ☐ *Email Submitter* ☐ *Email Client*
☐ *Email Other*
☐ *Other*

ADDITIONAL INFORMATION

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories *Date & Time:* *Name:* *Signature:*

☐ *Tick if you require COC to be emailed back*

Received at Hill Laboratories *Date & Time:* *Name:* *Signature:*

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:*

☐ Sample & Analysis details checked

Signature:

Priority ☐ **Low** ☑ **Normal** ☐ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 8 working days following the day of receipt of the samples at the laboratory.

Requested Reporting Date:

Quoted Sample Types

Surface Water (SW)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	№ 55513			Same as
2	№ 55514			
3	№ 55515			
4	№ 55516			
5	№ 55517			
6	№ 55518			
7	№ 55519			
8	№ 55520			
9	66152			
10	66153			

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W www.hill-laboratories.com

Office use only (Job No)

Quote No 89655

Primary Contact Oliver Wade 173316

Submitted By Oliver Wade 173316

Client Name Hawkes Bay Regional Council 91668

Address Private Bag 6006, Napier 4142

Phone 06 835 9200 *Mobile*

Email labresults@hbrc.govt.nz

Charge To Hawkes Bay Regional Council 91668

Client Reference

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☐ *Email Primary Contact* ☐ *Email Submitter* ☐ *Email Client*

☐ *Email Other*

☐ *Other*

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

☐ *Tick if you require COC to be emailed back*

Date & Time:

Name:

Signature:

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*

Temp:

☐ Sample & Analysis details checked

Signature:

ADDITIONAL INFORMATION

Priority ☐ Low ☑ Normal ☐ High

☐ **Urgent** (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 8 working days following the day of receipt of the samples at the laboratory.

Quoted Sample Types

Requested Reporting Date:

Surface Water (SW)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	66154			Same as
2	66155			
3	66156			
4	66157			
5	66158			
6	66159			
7	66160			
8	66161			
9	66162			
10	66163			

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W www.hill-laboratories.com

Job Information Summary

Client:	Hawkes Bay Regional Council	**Lab No:**	1900724
Contact:	Oliver Wade	**Date Registered:**	22-Dec-2017 10:10 am
	C/- Hawkes Bay Regional Council	**Priority:**	Normal
	Private Bag 6006	**Quote No:**	89655
	Napier 4142	**Order No:**	N36315
		Client Reference:	
		Add. Client Ref:	
		Submitted By:	Oliver Wade
		Charge To:	Hawkes Bay Regional Council
		Target Date:	09-Jan-2018 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	55493 18-Dec-2017 10:00 pm	Saline	UP1L, UP1L, UP1L	Turbidity; Total Suspended Solids; Total Nitrogen; Nitrate-N; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
2	55495 18-Dec-2017 10:32 pm	Saline	UP1L, UP1L, UP1L	Turbidity; Total Suspended Solids; Total Nitrogen; Nitrate-N; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
3	55496 18-Dec-2017 11:33 pm	Saline	UP1L, UP1L, UP1L	Turbidity; Total Suspended Solids; Total Nitrogen; Nitrate-N; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
4	55498 19-Dec-2017 12:02 am	Saline	UP1L, UP1L, UP1L	Turbidity; Total Suspended Solids; Total Nitrogen; Nitrate-N; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
5	55500 19-Dec-2017 12:36 am	Saline	UP1L, UP1L, UP1L	Turbidity; Total Suspended Solids; Total Nitrogen; Nitrate-N; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
6	55502 19-Dec-2017 1:04 am	Saline	UP1L, UP1L, UP1L	Turbidity; Total Suspended Solids; Total Nitrogen; Nitrate-N; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
7	55504 19-Dec-2017 1:34 am	Saline	UP1L, UP1L, UP1L	Turbidity; Total Suspended Solids; Total Nitrogen; Nitrate-N; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
8	55505 19-Dec-2017 2:04 am	Saline	UP1L, UP1L, UP1L	Turbidity; Total Suspended Solids; Total Nitrogen; Nitrate-N; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
9	55507 19-Dec-2017 2:33 am	Saline	UP1L, UP1L, UP1L	Turbidity; Total Suspended Solids; Total Nitrogen; Nitrate-N; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
10	55508 19-Dec-2017 3:02 am	Saline	UP1L, UP1L, UP1L	Turbidity; Total Suspended Solids; Total Nitrogen; Nitrate-N; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
11	55509 19-Dec-2017 3:34 am	Saline	UP1L, UP1L, UP1L	Total Suspended Solids; Total Nitrogen; Nitrate-N; Turbidity; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
12	55512 19-Dec-2017 4:02 am	Saline	UP1L, UP1L, UP1L	Total Suspended Solids; Total Nitrogen; Nitrate-N; Turbidity; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
13	55513 19-Dec-2017 4:33 am	Saline	UP1L, UP1L, UP1L	Total Suspended Solids; Total Nitrogen; Nitrate-N; Turbidity; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
14	55514 19-Dec-2017 5:04 am	Saline	UP1L, UP1L, UP1L	Total Suspended Solids; Total Nitrogen; Nitrate-N; Turbidity; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
15	55518 19-Dec-2017 5:33 am	Saline	UP1L, UP1L, UP1L	Total Suspended Solids; Total Nitrogen; Nitrate-N; Turbidity; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
16	55520 19-Dec-2017 6:06 am	Saline	UP1L, UP1L, UP1L	Total Suspended Solids; Total Nitrogen; Nitrate-N; Turbidity; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
17	66152 19-Dec-2017 6:33 am	Saline	UP1L, UP1L, UP1L	Total Suspended Solids; Total Nitrogen; Nitrate-N; Turbidity; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
18	66153 19-Dec-2017 7:09 am	Saline	UP1L, UP1L, UP1L	Total Suspended Solids; Total Nitrogen; Nitrate-N; Turbidity; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
19	66154 19-Dec-2017 7:40 am	Saline	UP1L, UP1L, UP1L	Total Suspended Solids; Total Nitrogen; Nitrate-N; Turbidity; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm
20	66156 19-Dec-2017 8:12 am	Saline	UP1L, UP1L, UP1L	Total Suspended Solids; Total Nitrogen; Nitrate-N; Turbidity; Dissolved Iron; Total Iron; Total Ammoniacal-N; Nitrite-N; Nitrate-N + Nitrite-N; Dissolved Reactive Phosphorus; Reactive Silica; Total Kjeldahl Nitrogen (TKN); Total Phosphorus; Absorbance at 340 nm; Absorbance at 400 nm; Absorbance at 740 nm

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Saline

Test	Method Description	Default Detection Limit	Sample No
Filtration, Glass Fibre	Sample filtration through glass fibre filter.	-	1-20
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	1-20
Total Digestion of Saline Samples	Nitric acid digestion. APHA 3030 E 22nd ed. 2012 (modified).	-	1-20
Total Kjeldahl Digestion - Trace level	Sulphuric acid digestion with copper sulphate catalyst.	-	1-20
Total Phosphorus Digestion	Acid persulphate digestion.	-	1-20
Turbidity	Saline sample. Analysis using a Hach 2100N, Turbidity meter. APHA 2130 B 22nd ed. 2012.	0.05 NTU	1-20
Total Suspended Solids	Saline sample. Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. APHA 2540 D 22nd ed. 2012.	3 g/m^3	1-20
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B 22nd ed. 2012.	-	1-20
Dissolved Iron	Filtered sample, ICP-MS with dynamic reaction cell, ultratrace. APHA 3125 B 22nd ed. 2012.	0.004 g/m^3	1-20
Total Iron	Nitric acid digestion, ICP-MS with dynamic reaction cell, ultratrace. APHA 3125 B 22nd ed. 2012.	0.0042 g/m^3	1-20
Total Nitrogen	Calculation: TKN + Nitrate-N + Nitrite-N. Please note: The Default Detection Limit of 0.05 g/m^3 is only attainable when the TKN has been determined using a trace method utilising duplicate analyses. In cases where the Detection Limit for TKN is 0.10 g/m^3, the Default Detection Limit for Total Nitrogen will be 0.11 g/m^3.	0.05 g/m^3	1-20
Total Ammoniacal-N	Saline sample. Phenol/hypochlorite colorimetry. Flow injection analyser. (NH4-N = NH4+-N + NH3-N). APHA 4500-NH3 H 22nd ed. 2012.	0.005 g/m^3	1-20
Nitrite-N	Saline sample. Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO3- I 22nd ed. 2012 (modified).	0.0010 g/m^3	1-20
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - NO2N. In-House.	0.0010 g/m^3	1-20
Nitrate-N + Nitrite-N	Saline sample. Total oxidised nitrogen. Automated cadmium reduction, Flow injection analyser. APHA 4500-NO3- I 22nd ed. 2012 (modified).	0.0010 g/m^3	1-20
Total Kjeldahl Nitrogen (TKN)	Total Kjeldahl digestion, phenol/hypochlorite colorimetry (Discrete Analysis). Trace level. APHA 4500-Norg D. (modified) 4500 NH3 F (modified) 22nd ed. 2012.	0.05 g/m^3	1-20
Dissolved Reactive Phosphorus	Saline sample. Molybdenum blue colorimetry. Flow injection analyser. APHA 4500-P G 22nd ed. 2012.	0.0010 g/m^3	1-20

Sample Type: Saline			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Phosphorus	Total phosphorus digestion, ascorbic acid colorimetry. Discrete Analyser. APHA 4500-P B & E (modified from manual analysis) 22^{nd} ed. 2012. Also modified to include the use of a reductant to eliminate interference from arsenic present in the sample. NAWASCO, Water & soil Miscellaneous Publication No. 38, 1982.	0.004 g/m^3	1-20
Reactive Silica	Filtered sample. Heteropoly blue colorimetry. Discrete analyser. APHA 4500-SiO_2 F (modified from flow injection analysis) 22^{nd} ed. 2012.	0.10 g/m^3 as SiO_2	1-20
Absorbance at 340 nm	Filtered sample. Spectrophotometry, 1cm cell. APHA 5910 B 22^{nd} ed. 2012.	0.002 AU cm^{-1}	1-20
Absorbance at 400 nm	Filtered sample. Spectrophotometry, 1cm cell. APHA 5910 B 22^{nd} ed. 2012.	0.002 AU cm^{-1}	1-20
Absorbance at 740 nm	Filtered sample. Spectrophotometry, 1cm cell. APHA 5910 B 22^{nd} ed. 2012.	0.002 AU cm^{-1}	1-20

A2.2 Laboratory Analyses

Hill Laboratories
TRIED, TESTED AND TRUSTED

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ANALYSIS REPORT

Client:	Hawkes Bay Regional Council	**Lab No:**	1900724 SPv1
Contact:	Oliver Wade	**Date Received:**	22-Dec-2017
	C/- Hawkes Bay Regional Council	**Date Reported:**	25-Jan-2018
	Private Bag 6006	**Quote No:**	89655
	Napier 4142	**Order No:**	N36315
		Client Reference:	
		Submitted By:	Oliver Wade

Sample Type: Saline

Sample Name:		55493 18-Dec-2017 10:00 pm	55495 18-Dec-2017 10:32 pm	55496 18-Dec-2017 11:33 pm	55498 19-Dec-2017 12:02 am	55500 19-Dec-2017 12:36 am
Lab Number:		1900724.1	1900724.2	1900724.3	1900724.4	1900724.5
Turbidity*	NTU	0.11	0.15	0.12	0.12	0.10
Total Suspended Solids*	g/m³	< 3	< 3	< 3	< 3	< 3
Dissolved Iron*	g/m³	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Total Iron*	g/m³	< 0.042	< 0.042	< 0.042	< 0.042	< 0.042
Total Nitrogen*	g/m³	< 0.08	< 0.08	0.09	< 0.08	0.14
Total Ammoniacal-N	g/m³	0.008	0.008	0.008	0.008	0.007
Nitrite-N	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Nitrate-N	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Nitrate-N + Nitrite-N	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Kjeldahl Nitrogen (TKN)*	g/m³	< 0.08	< 0.08	0.09	< 0.08	0.14
Dissolved Reactive Phosphorus	g/m³	< 0.0010	0.0022	0.0012	0.0020	0.0020
Total Phosphorus*	g/m³	0.008	0.008	0.008	0.004	0.008
Reactive Silica	g/m³ as SiO_2	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Absorbance at 340 nm*	AU cm^{-1}	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Absorbance at 400 nm*	AU cm^{-1}	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Absorbance at 740 nm*	AU cm^{-1}	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Sample Name:		55502 19-Dec-2017 1:04 am	55504 19-Dec-2017 1:34 am	55505 19-Dec-2017 2:04 am	55507 19-Dec-2017 2:33 am	55508 19-Dec-2017 3:02 am
Lab Number:		1900724.6	1900724.7	1900724.8	1900724.9	1900724.10
Turbidity*	NTU	0.14	0.12	0.10	0.15	0.13
Total Suspended Solids*	g/m³	3	4	< 3	6	< 3
Dissolved Iron*	g/m³	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Total Iron*	g/m³	< 0.042	< 0.042	< 0.042	< 0.042	< 0.042
Total Nitrogen*	g/m³	0.13	0.14	0.29	0.10	0.11
Total Ammoniacal-N	g/m³	0.007	0.007	0.008	0.007	0.007
Nitrite-N	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Nitrate-N	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Nitrate-N + Nitrite-N	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Kjeldahl Nitrogen (TKN)*	g/m³	0.13	0.14	0.29	0.10	0.11
Dissolved Reactive Phosphorus	g/m³	0.0018	0.0020	< 0.0010	0.0028	0.0028
Total Phosphorus*	g/m³	0.012	0.010	0.010	0.012	0.010
Reactive Silica	g/m³ as SiO_2	0.11	0.18	0.17	0.22	0.36
Absorbance at 340 nm*	AU cm^{-1}	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Absorbance at 400 nm*	AU cm^{-1}	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Absorbance at 740 nm*	AU cm^{-1}	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Sample Type: Saline

Sample Name:		55509 19-Dec-2017 3:34 am	55512 19-Dec-2017 4:02 am	55513 19-Dec-2017 4:33 am	55514 19-Dec-2017 5:04 am	55518 19-Dec-2017 5:33 am
Lab Number:		1900724.11	1900724.12	1900724.13	1900724.14	1900724.15
Turbidity*	NTU	0.11	0.14	0.12	0.12	0.39
Total Suspended Solids*	g/m^3	< 3	< 3	< 3	< 3	3
Dissolved Iron*	g/m^3	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Total Iron*	g/m^3	< 0.042	< 0.042	< 0.042	< 0.042	< 0.042
Total Nitrogen*	g/m^3	0.11	0.11	0.08	0.08	0.17
Total Ammoniacal-N	g/m^3	0.007	0.007	0.007	0.007	0.007
Nitrite-N	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Nitrate-N	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Nitrate-N + Nitrite-N	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Kjeldahl Nitrogen (TKN)*	g/m^3	0.11	0.11	0.08	0.08	0.17
Dissolved Reactive Phosphorus	g/m^3	0.0013	0.0016	0.0013	0.0011	0.0012
Total Phosphorus*	g/m^3	0.008	< 0.004	0.010	0.008	0.008
Reactive Silica	g/m^3 as SiO_2	0.22	0.28	0.46	0.20	0.13
Absorbance at 340 nm*	AU cm^{-1}	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Absorbance at 400 nm*	AU cm^{-1}	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Absorbance at 740 nm*	AU cm^{-1}	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Sample Name:		55520 19-Dec-2017 6:06 am	66152 19-Dec-2017 6:33 am	66153 19-Dec-2017 7:09 am	66154 19-Dec-2017 7:40 am	66156 19-Dec-2017 8:12 am
Lab Number:		1900724.16	1900724.17	1900724.18	1900724.19	1900724.20
Turbidity*	NTU	0.57	0.15	0.20	0.16	0.14
Total Suspended Solids*	g/m^3	4	3	5	5	< 3
Dissolved Iron*	g/m^3	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Total Iron*	g/m^3	< 0.042	< 0.042	< 0.042	< 0.042	< 0.042
Total Nitrogen*	g/m^3	0.24	0.08	0.09	0.14	0.15
Total Ammoniacal-N	g/m^3	0.007	0.008	0.012	0.012	0.012
Nitrite-N	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Nitrate-N	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Nitrate-N + Nitrite-N	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Kjeldahl Nitrogen (TKN)*	g/m^3	0.24	0.08	0.09	0.14	0.15
Dissolved Reactive Phosphorus	g/m^3	0.0013	< 0.0010	< 0.0010	< 0.0010	0.0010
Total Phosphorus*	g/m^3	0.010	0.008	0.008	0.006	0.006
Reactive Silica	g/m^3 as SiO_2	0.19	< 0.10	< 0.10	< 0.10	< 0.10
Absorbance at 340 nm*	AU cm^{-1}	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Absorbance at 400 nm*	AU cm^{-1}	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Absorbance at 740 nm*	AU cm^{-1}	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Saline

Test	Method Description	Default Detection Limit	Sample No
Filtration, Glass Fibre*	Sample filtration through glass fibre filter.	-	1-20
Filtration, Unpreserved*	Sample filtration through 0.45µm membrane filter.	-	1-20
Total Digestion of Saline Samples*	Nitric acid digestion. APHA 3030 E 22nd ed. 2012 (modified).	-	1-20
Total Kjeldahl Digestion - Trace level*	Sulphuric acid digestion with copper sulphate catalyst.	-	1-20
Total Phosphorus Digestion*	Acid persulphate digestion.	-	1-20
Turbidity*	Saline sample. Analysis using a Hach 2100N, Turbidity meter. APHA 2130 B 22^{nd} ed. 2012.	0.05 NTU	1-20
Total Suspended Solids*	Saline sample. Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. APHA 2540 D 22^{nd} ed. 2012.	3 g/m^3	1-20
Filtration for dissolved metals analysis*	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B 22^{nd} ed. 2012.	-	1-20
Dissolved Iron*	Filtered sample, ICP-MS with dynamic reaction cell, ultratrace. APHA 3125 B 22^{nd} ed. 2012.	0.004 g/m^3	1-20

Sample Type: Saline

Test	Method Description	Default Detection Limit	Sample No
Total Iron*	Nitric acid digestion, ICP-MS with dynamic reaction cell, ultratrace. APHA 3125 B 22nd ed. 2012.	0.0042 g/m^3	1-20
Total Nitrogen*	Calculation: TKN + Nitrate-N + Nitrite-N. Please note: The Default Detection Limit of 0.05 g/m^3 is only attainable when the TKN has been determined using a trace method utilising duplicate analyses. In cases where the Detection Limit for TKN is 0.10 g/m^3, the Default Detection Limit for Total Nitrogen will be 0.11 g/m^3.	0.05 g/m^3	1-20
Total Ammoniacal-N	Saline sample. Phenol/hypochlorite colorimetry. Flow injection analyser. (NH4-N = NH4+-N + NH3-N). APHA 4500-NH3 H 22nd ed. 2012.	0.005 g/m^3	1-20
Nitrite-N	Saline sample. Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO3- I 22nd ed. 2012 (modified).	0.0010 g/m^3	1-20
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - NO2N. In-House.	0.0010 g/m^3	1-20
Nitrate-N + Nitrite-N	Saline sample. Total oxidised nitrogen. Automated cadmium reduction, Flow injection analyser. APHA 4500-NO3- I 22nd ed. 2012 (modified).	0.0010 g/m^3	1-20
Total Kjeldahl Nitrogen (TKN)*	Total Kjeldahl digestion, phenol/hypochlorite colorimetry (Discrete Analysis). Trace level. APHA 4500-Norg D. (modified) 4500 NH3 F (modified) 22nd ed. 2012.	0.05 g/m^3	1-20
Dissolved Reactive Phosphorus	Saline sample. Molybdenum blue colorimetry. Flow injection analyser. APHA 4500-P G 22nd ed. 2012.	0.0010 g/m^3	1-20
Total Phosphorus*	Total phosphorus digestion, ascorbic acid colorimetry. Discrete Analyser. APHA 4500-P B & E (modified from manual analysis) 22nd ed. 2012. Also modified to include the use of a reductant to eliminate interference from arsenic present in the sample. NAWASCO, Water & soil Miscellaneous Publication No. 38, 1982.	0.004 g/m^3	1-20
Reactive Silica	Filtered sample. Heteropoly blue colorimetry. Discrete analyser. APHA 4500-SiO_2 F (modified from flow injection analysis) 22nd ed. 2012.	0.10 g/m^3 as SiO_2	1-20
Absorbance at 340 nm*	Filtered sample. Spectrophotometry, 1cm cell. APHA 5910 B 22nd ed. 2012.	0.002 AU cm^{-1}	1-20
Absorbance at 400 nm*	Filtered sample. Spectrophotometry, 1cm cell. APHA 5910 B 22nd ed. 2012.	0.002 AU cm^{-1}	1-20
Absorbance at 740 nm*	Filtered sample. Spectrophotometry, 1cm cell. APHA 5910 B 22nd ed. 2012.	0.002 AU cm^{-1}	1-20

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

A2.3 Underway Data

Please see attached Excel file.

APPENDIX 3.0 OBS RECOVERY DETAILS

Table A3.1 Table of locations for OBS recovery.

OBS #	Relocated lat	Relocated lon	Seafloor depth (m)	OBS release date	Time (UTC)
OBS001	-38.9366	178.9960	3488	3-Apr-18	16:55:00
OBS002	-38.9268	178.9761	3446	3-Apr-18	18:41:00
OBS003	-38.9212	178.9561	3418	3-Apr-18	01:05:00
OBS004	-38.9099	178.9387	3060	2-Apr-18	23:28:00
OBS005	-38.9055	178.9184	2791	2-Apr-18	12:05:00
OBS006	-38.8935	178.9046	2857	29-Mar-18	04:39:43
OBS007	-38.8882	178.8761	2331	29-Mar-18	20:22:00
OBS008	-38.8777	178.8552	1900	29-Mar-18	21:58:00
OBS009	-38.8694	178.8353	1814	2-Apr-18	09:43:00
OBS010	-38.8601	178.8236	1699	2-Apr-18	08:30:00
OBS011	-38.8500	178.7988	1237	1-Apr-18	23:15:00
OBS012	-38.8413	178.7761	1301	1-Apr-18	22:19:00
OBS013	-38.8328	178.7625	1258	1-Apr-18	14:39:00
OBS014	-38.8230	178.7369	1067	1-Apr-18	13:41:00
OBS015	-38.8149	178.7178	939	1-Apr-18	06:26:00
OBS016	-38.8054	178.7011	846	1-Apr-18	05:34:00
OBS017	-38.7934	178.6778	1077	31-Mar-18	20:22:00
OBS018	-38.7861	178.6582	1079	31-Mar-18	19:29:00
OBS019	-38.7746	178.6406	1066	31-Mar-18	12:07:00
OBS020	-38.7698	178.6197	884	31-Mar-18	11:18:00
OBS021	-38.7576	178.6000	993	30-Mar-18	23:41:00
OBS022	-38.7490	178.5795	968	30-Mar-18	23:08:00
OBS023	-38.7395	178.5595	920	30-Mar-18	15:25:00
OBS024	-38.7305	178.5392	816	30-Mar-18	14:38:00
OBS025	-38.7225	178.5203	756	30-Mar-18	05:27:00
OBS026	-38.9217	179.0068	3497	3-Apr-18	15:18:00
OBS027	-38.9148	178.9859	3477	3-Apr-18	13:55:00
OBS028	-38.9042	178.9671	3456	3-Apr-18	02:32:00
OBS029	-38.8981	178.9528	3350	2-Apr-18	21:39:00
OBS030	-38.8875	178.9263	2793	2-Apr-18	13:47:00
OBS031	-38.8815	178.9087	2860	29-Mar-18	07:52:14
OBS032	-38.8697	178.8792	2311	29-Mar-18	19:24:44

OBS033	-38.8657	178.8629	1927	29-Mar-18	23:36:00
OBS034	-38.8546	178.8472	1770	2-Apr-18	10:51:00
OBS035	-38.8405	178.8267	1496	2-Apr-18	07:32:00
OBS036	-38.8361	178.8079	1227	2-Apr-18	00:31:00
OBS037	-38.8245	178.7877	1041	1-Apr-18	21:20:00
OBS038	-38.8161	178.7691	1145	1-Apr-18	15:49:00
OBS039	-38.8087	178.7495	1158	1-Apr-18	12:39:00
OBS040	-38.8037	178.7319	1064	1-Apr-18	08:00:00
OBS041	-38.7900	178.7171	894	1-Apr-18	04:12:00
OBS042	-38.7802	178.6871	1038	31-Mar-18	21:24:00
OBS043	-38.7679	178.6707	1051	31-Mar-18	17:59:00
OBS044	-38.7605	178.6511	1051	31-Mar-18	13:03:00
OBS046	-38.7450	178.6122	1008	31-Mar-18	00:50:00
OBS047	-38.7334	178.5915	984	30-Mar-18	21:42:00
OBS048	-38.7230	178.5717	895	30-Mar-18	16:35:00
OBS049	-38.7168	178.5464	768	30-Mar-18	13:26:00
OBS050	-38.7057	178.5319	660	30-Mar-18	06:20:00
OBS051	-38.9097	179.0168	3508	3-Apr-18	10:52:00
OBS052	-38.9012	178.9956	3496	3-Apr-18	12:29:00
OBS053	-38.8904	178.9766	3484	3-Apr-18	04:07:00
OBS054	-38.8824	178.9608	3455	2-Apr-18	20:09:00
OBS055	-38.8704	178.9496	3387	2-Apr-18	15:11:00
OBS056	-38.8649	178.9188	2983	29-Mar-18	08:46:29
OBS057	-38.8601	178.9089	3007	29-Mar-18	16:57:00
OBS058	-38.8504	178.8688	2101	30-Mar-18	01:07:00
OBS059	-38.8431	178.8539	1833	30-Mar-18	02:40:00
OBS060	-38.8342	178.8372	1575	2-Apr-18	06:24:00
OBS061	-38.8223	178.8193	1160	2-Apr-18	01:28:00
OBS062	-38.8184	178.7968	952	1-Apr-18	20:27:00
OBS063	-38.8013	178.7814	874	1-Apr-18	16:53:00
OBS064	-38.7912	178.7608	1076	1-Apr-18	11:44:00
OBS065	-38.7826	178.7384	939	1-Apr-18	09:00:00
OBS066	-38.7715	178.7170	1015	1-Apr-18	03:16:00
OBS067	-38.7633	178.7018	1017	31-Mar-18	22:20:00
OBS068	-38.7547	178.6820	1011	31-Mar-18	17:08:00
OBS069	-38.7490	178.6640	1020	31-Mar-18	13:53:00
OBS070	-38.7348	178.6397	1024	31-Mar-18	04:56:00
OBS071	-38.7272	178.6255	1018	31-Mar-18	01:49:00

OBS072	-38.7173	178.6015	995	30-Mar-18	20:54:00
OBS073	-38.7113	178.5804	864	30-Mar-18	17:23:00
OBS074	-38.6971	178.5635	641	30-Mar-18	12:33:00
OBS075	-38.6913	178.5445	485	30-Mar-18	07:05:00
OBS076	-38.8949	179.0253	3515	3-Apr-18	09:10:00
OBS077	-38.8852	179.0081	3507	3-Apr-18	07:29:00
OBS078	-38.8777	178.9870	3500	3-Apr-18	05:58:00
OBS079	-38.8679	178.9679	3492	2-Apr-18	18:33:00
OBS080	-38.8578	178.9577	3467	2-Apr-18	16:45:00
OBS081	-38.8515	178.9332	2949	29-Mar-18	12:31:29
OBS082	-38.8426	178.9125	2930	29-Mar-18	13:47:00
OBS083	-38.8309	178.9067	2938	29-Mar-18	15:28:00
OBS084	-38.8275	178.8668	2108	2-Apr-18	04:53:00
OBS085	-38.8106	178.8535	2328	2-Apr-18	03:35:00
OBS086	-38.8042	178.8214	989	2-Apr-18	02:38:00
OBS087	-38.7951	178.8009	709	1-Apr-18	19:33:00
OBS088	-38.7869	178.7915	767	1-Apr-18	18:29:00
OBS089	-38.7739	178.7732	946	1-Apr-18	10:44:00
OBS090	-38.7692	178.7560	949	1-Apr-18	09:52:00
OBS092	-38.7483	178.7110	987	31-Mar-18	23:10:00
OBS093	-38.7386	178.6933	1002	31-Mar-18	16:02:00
OBS094	-38.7299	178.6743	1030	31-Mar-18	15:01:00
OBS095	-38.7222	178.6570	1039	31-Mar-18	03:51:00
OBS096	-38.7092	178.6345	1030	31-Mar-18	03:00:00
OBS097	-38.7027	178.6127	938	30-Mar-18	19:41:00
OBS098	-38.6905	178.5933	709	30-Mar-18	18:53:00
OBS099	-38.6859	178.5745	601	30-Mar-18	11:26:00

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