

SANDPIPER PROJECT

Verification Programme Report:
Mining Licence Area No. 170

SECTION D : APPENDICES

APPENDIX 2

Fisheries and Biodiversity

- 2.1: *PEP Biodiversity Survey FV Zeerarend*
 - 2.2: *Cruise Report Biodiversity Survey FV Zeearend*
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APPENDIX 2 – FISHERIES AND BIODIVERSITY

2.1 PEP Biodiversity Survey FV Zeearend

NAMIBIAN MARINE PHOSPHATE

BIODIVERSITY SURVEY

PROJECT EXECUTION PLAN

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1 PURPOSE AND OBJECTIVES

Namibian Marine Phosphate (NMP) is proposing to extract marine phosphate from deposits on the Namibian continental shelf. The deposits lie approximately 40-60 km offshore from Conception Bay in water depths of 190 to 300 m and cover an area of 2233 km² (Figure 1). Within the context of increasing international demand for phosphates, the company has been granted a 20-year mining licence (ML 170), subject to the issue of an Environmental Clearance Certificate following the completion of an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP). The phosphate will be extracted by dredging in the target mine areas described as Sandpiper 1 (SP-1), 2 (SP-2) and 3 (SP-3). It is currently estimated that a total resource of 2443 Mt at 15 % P₂O₅ exists in these areas. SP-1 is within ML 170 and is situated south west of Walvis Bay, directly offshore of Conception Bay and Meob Bay (Figure 1). SP-1 (176 km²) is the target dredge area for proposed project, approximately one third of this area would be dredged during the 20 year mining licence approval period.

The purpose of the verification assessment programme is to collect in-situ marine fauna and epibenthic data from SP-1 in order to confirm the results detailed in the EIA specialist report; (*Japp and Smith 2012: Appendix 1a on fish resources, fisheries, marine mammals and birds*). Five primary impacts were identified in the EIA report:

- 1) the likely impact of mining on commercial fisheries;
- 2) the likely impact of mining on the main commercial fish species;
- 3) the likely impact of mining on the recruitment of commercially important species;
- 4) the likely impact of mining on fish biodiversity and
- 5) the likely impact of mining on seabirds and marine mammals.

Responses to the EIA from NatMIRC were outlined in a letter dated 16 June 2012 and discussed with NatMIRC in a meeting (facilitated by the Governor of Erongo Region, The Honourable Cleophas Mutjavikua) on 10 September 2012 in Swakopmund. NatMIRC raised 13 concerns and issues which they felt needed to be addressed. Of these, four related to the component of the EIA relating to fish resources, mammals and seabirds.

Summarised these concerns were:

1. Turbidity affecting marine predators that use visual cues to forage for prey;
2. Spawning activities of fish in the mining area was relatively unknown;
3. The importance of the proposed mining area as a nursery ground for juvenile hake;
4. Impacts of the proposed mining on the ecosystem were uncertain – in particular trophic (feeding) interactions.

As part of the original verification assessment programme of the EIA assessment (*Japp, 2012: Namibian Marine Phosphate – Environmental Impact Assessment of Fish, mammals and seabirds: Proposed monitoring and verification of Impacts in the proposed Mining Area*) it was recommended that a structured biomass survey of the proposed mining area – in particular the area proposed to be dredged in the first phase (SP-1), be undertaken. However, following biomass estimate modelling of demersal survey data by Dr James Gaylard (*Gaylard, 2013: Biomass and stock estimates of Hake and Monk in the mining lease areas of Namibian Phosphates*) and spawning and recruitment statistical

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data assessment by Dr Hillka Ndjaula (*Ndjaula, 2014: Fish Recruitment and Stock Dynamics Study with respect to a Proposed Development of Phosphate Deposits in the Sandpiper Phosphate Licence Area off the Coast of Central Namibia*), it was recommended that a biodiversity (as opposed to biomass) survey was of more value to the fishery assessment requirements and that information outputs will provide more substantive information to assist in refining the assessments of impacts made to date.

It was thus decided to undertake a biodiversity survey to verify the current assumed baseline for biodiversity, fish abundance (density), recruitment (size distribution) and other biological aspects (spawning state of main commercial species etc). An industry owned monkfish trawler, FV *Zeearend*, will be used to carry out the biodiversity survey. The main objectives are to:

- Estimate the abundance (density) of the main commercial species such as hake, monk and horse mackerel etc.;
- Collect biological information (length, sex, maturity stage, stomach content) from the commercially important/exploited species;
- Identify, collect and photograph epibenthic species and at the same time the nature of the substrate and bottom profile;
- Collect environmental data (using visual observations and a CTD) to establish linkages between the environment and species distribution, recruitment and abundance;
- Record/identify the occurrence of surface species such as marine mammals and seabirds in the area; and
- Collect baseline data for future monitoring.

Essentially, the survey will be designed to quantify the biodiversity of the area and compare this with the known information on the region, i.e. a biodiversity verification assessment. The survey will also obtain full commercial data on target catch (monk), hake and the other bycatch species. This will allow for a crude estimate of spawner biomass and recruitment that can then form a baseline for future surveys in the area.

The biodiversity survey will involve sampling the marine species and the water column in the target mining area SP-1. A grid of sampling sites was placed across SP-1 such that a broad distribution of stations was randomly selected across the entire SP-1 and target dredge site of SP-1. Figure 2 shows the sampling station layout. The locations of the environmental reference sites (for a companion investigation) are also shown. The coordinates in decimal degrees of the start and end positions of each trawl are presented in Table 1. Of the 24 stations 12 will be sampled during the day (D) and 12 during the night (N). Four stations will be sampled in a 24 hour period and stations are limited to waters deeper than the 200 m bathymetry contour as per the approval letter from MFMR (Annexure 1).

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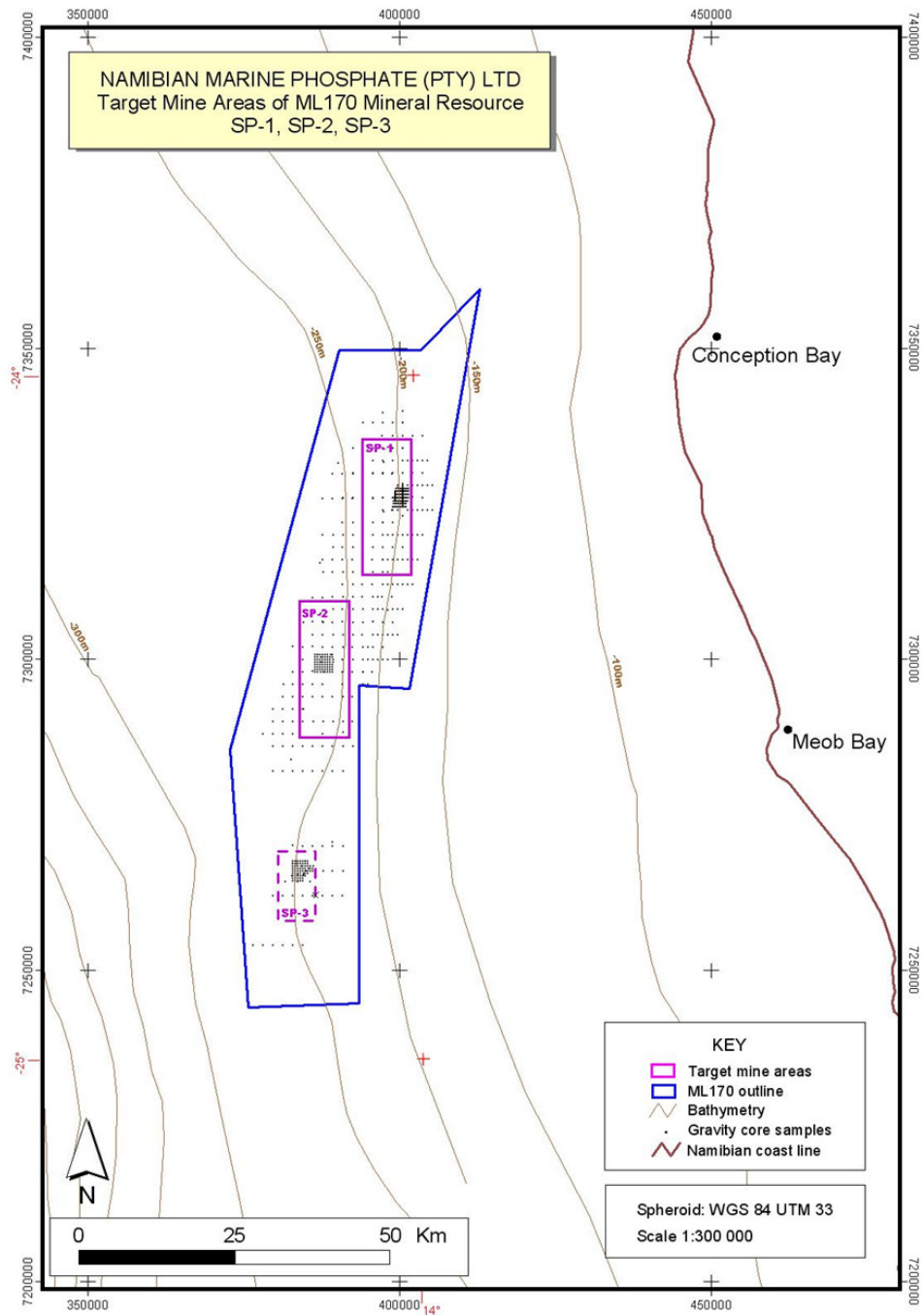


Figure 1: Location of the proposed target dredging sites SP-1 (20-year mine plan established), SP-2 and SP-3 within the three resource areas of the Sandpiper phosphate licence area.

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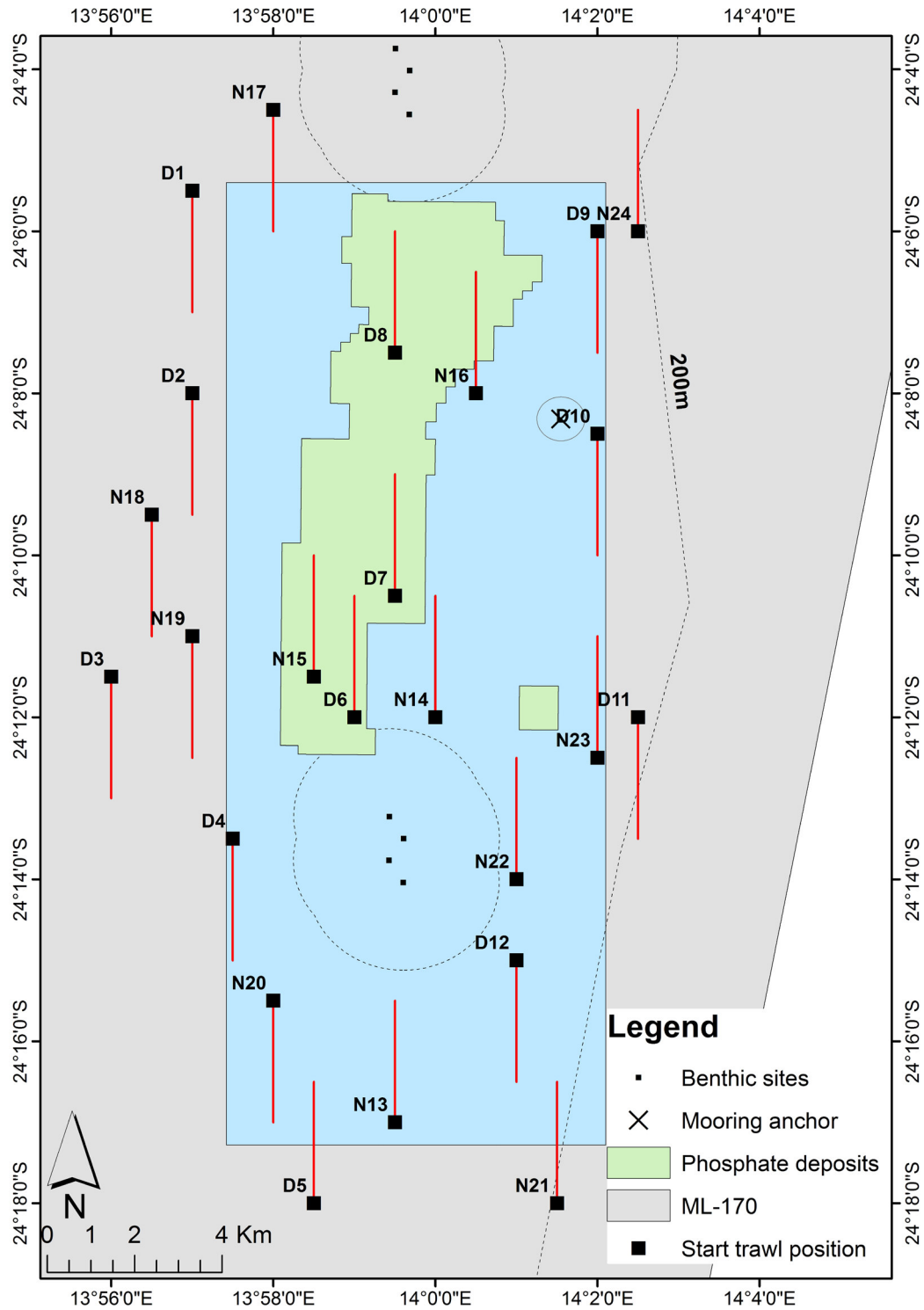


Figure 2: Position of the 24 biodiversity survey stations randomly selected to cover the area within and in close proximity to the target mine area SP-1. Note all stations are in water deeper than 200 m.

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Table 1: Randomly selected start and end positions (decimal degrees) for the 24 biodiversity survey stations. Station codes are also included with D = day time trawl and N = night time trawl.

Station code	Start Latitude	Start Longitude	End Latitude	End Longitude
D1	-24.0917	13.9500	-24.1167	13.9500
D2	-24.1333	13.9500	-24.1583	13.9500
D3	-24.1917	13.9333	-24.2167	13.9333
D4	-24.2250	13.9583	-24.2500	13.9583
D5	-24.3000	13.9750	-24.2750	13.9750
D6	-24.2000	13.9833	-24.1750	13.9833
D7	-24.1750	13.9917	-24.1500	13.9917
D8	-24.1250	13.9917	-24.1000	13.9917
D9	-24.1000	14.0333	-24.1250	14.0333
D10	-24.1417	14.0333	-24.1667	14.0333
D11	-24.2000	14.0417	-24.2250	14.0417
D12	-24.2500	14.0167	-24.2750	14.0167
N13	-24.2833	13.9917	-24.2583	13.9917
N14	-24.2000	14.0000	-24.1750	14.0000
N15	-24.1917	13.9750	-24.1667	13.9750
N16	-24.1333	14.0083	-24.1083	14.0083
N17	-24.0750	13.9667	-24.1000	13.9667
N18	-24.1583	13.9417	-24.1833	13.9417
N19	-24.1833	13.9500	-24.2083	13.9500
N20	-24.2583	13.9667	-24.2833	13.9667
N21	-24.3000	14.0250	-24.2750	14.0250
N22	-24.2333	14.0167	-24.2083	14.0167
N23	-24.2083	14.0333	-24.1833	14.0333
N24	-24.1000	14.0417	-24.0750	14.0417

2 WORK PROCEDURE

Sampling equipment and personnel will be mobilised to the port of embarkation, the Benguella Fishing Company (Walvis Bay). Following loading of the fishing/survey vessel, equipment will be carefully unpacked and assembled. Electronic equipment will be powered up and tested to determine whether any breakages have occurred during transit. Repairs or replacements will be made if and where necessary.

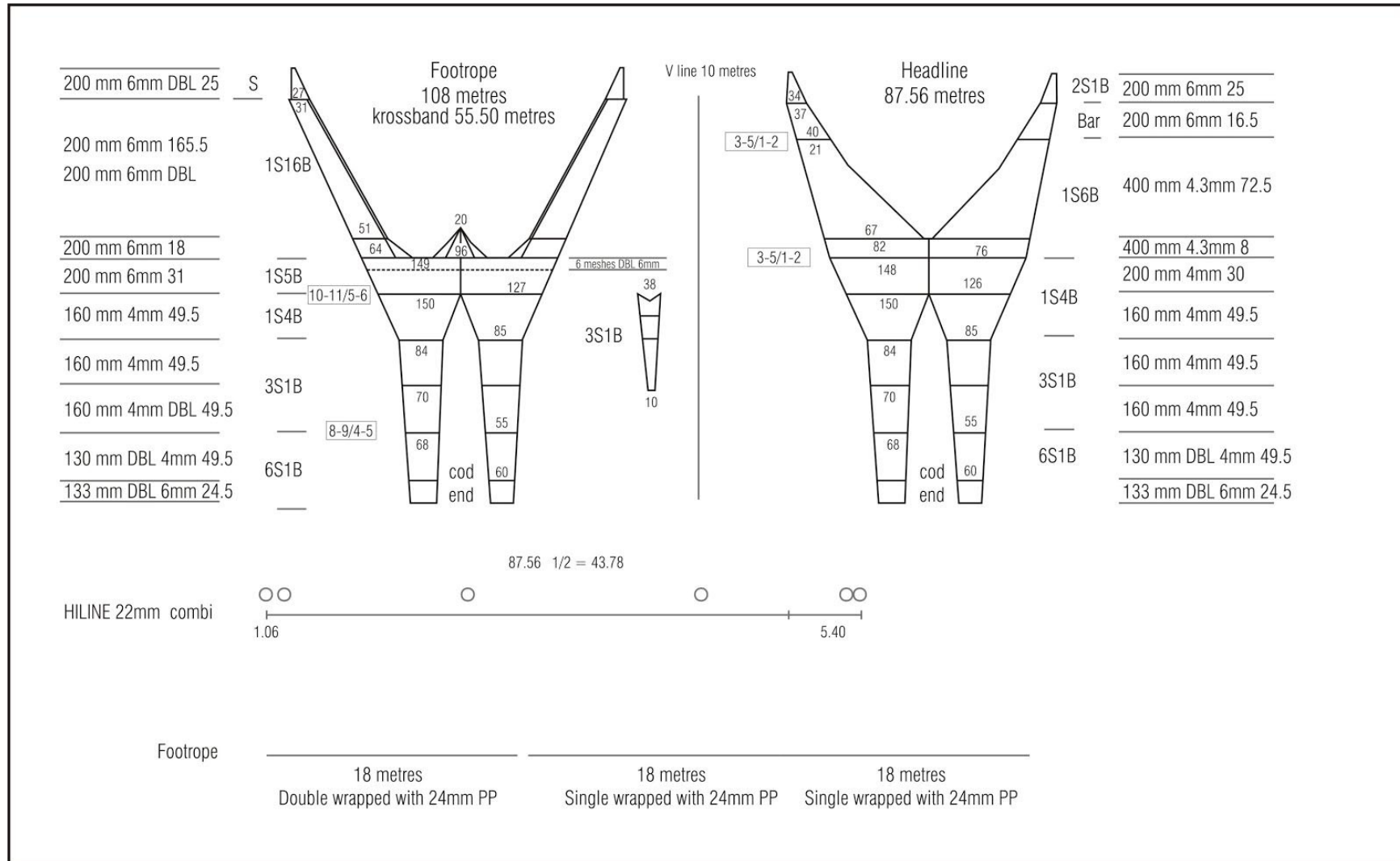
2.1 INSTALLATION AND SAMPLING

Prior to the vessel steaming to the survey area a test run of the sampling equipment will be carried out in Walvis Bay. This will involve a run through of all the procedures outlined below. All sea safety protocols will be advised and demonstrated to the scientific team at this time, under the instruction of the Master of the vessel. After the test deployment of the relevant equipment, the data will be downloaded and quality checked. At this stage any problems that may have emerged during the sampling procedures or with the quality of the captured data can be resolved through adjustments to the instrumentation or the deployment procedures. Should any changes to the deployment procedures be necessary, they must be noted in detail and the procedures described below should be amended accordingly.

The sampling procedures, which will be coordinated and conducted with the cooperation of the marine crew will be explained to the scientific team and the crew that will be involved before the test run commences and each participant should understand their roles and responsibilities during the sampling activities. The importance of following these procedures and of maintaining the integrity of all samples collected during the survey must be emphasised. The importance of ensuring that all work areas are kept clean free from any oil/grease contamination should too be made clear.

2.2 TRAWL AND SAMPLING EQUIPMENT

A commercial Viking Double-Belly monkfish bottom trawl with a head length 88 m, footrope 47 m and vertical net opening 30 – 40 m will be used. The distance between the wings during towing will be approximately 40 m. The trawl will be rigged with tickler chains along the footrope. The “Thyborun” trawl doors will be 4.2 m squared in size, weighing approximately 800 kg. The codend mesh size will be 120 mm but in order to avoid small fish and epibenthic fauna being lost through the meshes, a 20 mm mesh inner-liner will be installed inside the codend. No SCANMAR sensors are onboard, only trawl out will be measured.



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A Multi-probe internal logging Conductivity, Temperature and Depth (CTD) recorder will be encased inside a stainless steel protective casing and specially designed net bag, this will be attached, using shackles and cable ties, to the head rope of the trawl net. The CTD will be lowered at every station with the trawl net through the water column to within 5 m of the seafloor. The CTD will be fitted with temperature, conductivity and dissolved oxygen. The CTD will be removed after each trawl to download the data and change batteries whenever necessary.



Figure 4: Portable multi probe internal CTDs (left) and stainless steel casing (above)

A net scale will be attached to the net crane to weigh the entire catch before the catch is released on board. Two digital scales, tested and calibrated, will be used for measuring fish and epibenthic quantities from 1g to 50 kg.

Hourly measurements from coastal weather stations as well as daily SST imagery will be used to discuss the wind and surface temperature conditions during the survey.



Figure 5: Large scale up to 50kg

2.3 SURVEY DESIGN

The monkfish bottom trawler, FV *Zeearend* will be used to sample 24 stations within and in close proximity to the target dredge area SP-1. Stations are randomly selected by dividing the survey area into grid blocks (2.5 nm x 3 nm). In each grid block two stations were randomly selected (Figure 2) using Excel. Where possible, the first random position was selected. If not, the next position on the list was selected, and this continued until two stations were selected per grid block¹. Stations that were not suitable for trawling include those in water shallower than 200 metres², those inside the environmental reference site areas and within 500 m of the oceanographic mooring anchor.

Trawl speed will be three knots on average with a trawling time of 30 minutes, this being the time the net will spend in contact with the seabed. The fishing operation will be in a north/south direction and the trawl distance covered at each station will be approximately 1.5 nm. The length of the trawl wire will be recorded.

Four stations will be sampled per 24 hour period for six days. Therefore two days will be available in the event of “down-time” due to adverse weather conditions and/or gear damage (torn net). Half the stations will be sampled during the day (07h00 - 17h30) and the other half during the night (20h00 – 07:00) hours. During daytime trawls the net will not be deployed before sunrise and will be raised approximately 30 minutes before sunset. In foggy or overcast conditions, these time restrictions will be extended to 60 minutes after sunrise and 60 minutes before sunset. During night time trawls the net will not be deployed before sunset and will be raised 30 minutes before sunrise.

2.4 ONBOARD SAMPLING

Once the captain/party chief has confirmed the correct position of the vessel, deployment of the sampling equipment will begin. One of the scientific crew members will record the time and GPS coordinates when the trawl settles on the ocean bottom and when it begins its ascent. This person will also drop a way point to ensure that the correct position will be recorded. For each trawl station visual weather observations will be made and the presence of marine mammals and seabirds will be recorded. Subject to sea condition the daily sampling routine will be as follows:

Table 2: The daily sampling routine

Visual environment, marine mammal and bird observations	Fish and benthic sampling Stations D1-D12	Fish and benthic sampling Stations N13 – N24
Day time trawls only	Day time trawls	Night time trawls
07:00 – 08:00	07:00 – 07:30	20:00 – 20:30
11:00 - 12:00	11:00 – 11:30	23:00 – 23:30
14:00 – 15:00	14:00 – 14:30	02:00 – 02:30
17:00 – 18:00	17:00 – 17:30	05:00 - 05:30

¹ Note that two stations per grid block were selected to allow for one day and one night trawl per grid block.

² Related to the survey permit conditions as issued by MFMR – Letter MFMR to NMP 060614

2.4.1 Fish sampling

The entire catch (or a subsample in the case of large catches) will be sorted into species. Monk, hake, horse mackerel and chondrichthyans will be further sorted by sex. The total catch weight (kg) of each species (and sex where applicable) will be recorded. Length frequency (total length) data will be collected for all commercial species (measured by sex if split). For non-commercial species (such as rat tails), only the weight and number of fish raised to the total catch will be used.

If the catch is > 1 tonne, it will be split into two (approximately 50%) and one half will be sampled as above. If the catch is > 5 tonnes then 25% of the catch will be sampled as above. This will be done by estimating the catch in the stocker pond and splitting the catch into the desired proportions e.g. 50 or 25%.

In both cases, biological sampling (individual weight and length measurements, sex, maturity stage, stomach contents) of about 15 – 20 fish will be done for hake and monk per station.

All fish caught during the survey will be handled and disposed off as per routine NatMIRC³ surveys.

2.4.2 Benthic sampling

All invertebrate species retained by the net and landed as part of the catch will be recorded. All invertebrate species will be identified to the lowest possible taxon, counted and weighed. All large, whole epibenthic species retained in the wings of the net will be included in the data counts. A subsample of small, abundant epibenthic organisms (e.g. small sea pens and shrimps) from the wings of the net will be counted and weighed with the remainder being estimated.

Photographs of the invertebrate assemblage will be taken for each trawl. This includes a representative individual of each invertebrate occurring within that trawl and, to provide an overview, a snapshot image of all invertebrates occurring at each station. Where possible, species information will be recorded in a draft identification guide by making use of taxonomic keys and live specimens.

Additional photographs will be taken of all invertebrate species, where possible, to show key identification features. All specimens for which identification to at least genus level is not possible will be appropriately preserved and retained for identification by relevant taxonomic experts.

2.4.3 Marine mammal and seabird sampling

Marine mammal sightings (strategy taken from the Marine Mammal Observation⁴ standard procedures) and seabird observations will be carried out during the day by one of the scientific crew members. The person will visually record and identify the number of species within a 500 m radius of the vessel. Sixty minute observations will be conducted at the start of each trawl.

³ Related to the survey permit conditions as issued by MFMR – Letter MFMR to NMP 060614

⁴ JNCC (2010). Marine mammals recording forms (Detailed sighting records) Joint Nature Conservation Committee

2.4.4 Hydrological and environmental sampling

The CTD will be attached to the head rope (top rope) of the trawl net using shackles and rope and data will be recorded throughout the entire net deployment. The CTD will be removed from the net before it is brought onboard to protect it from any damage. Data will be downloaded and saved onto external hard drives.

At the start of the trawl, air pressure, wind direction, Beaufort scale (wind speed), cloud cover, sea surface colour, sea surface temperature, bottom temperature and depth will be recorded using the equipment on the bridge and by visual observations.

2.5 DATA AND ANALYSIS

All data will be recorded on data sheets (Annexure 5) and entered electronically in an Access (and Excel) database. Hard copies of the data sheets will subsequently be retained by NMP. Three integrated reports; the Cruise Report, the Verification Report and Epibenthic Report will be submitted to NMP approximately three months after the completion of the survey.

3 SAMPLE PRESERVATION AND CURATION

The preservation and curation of all samples collected while on board the research vessel will be the responsibility of the scientific crew carrying out each activity with the assistance of the ship's crew. It is very important that the samples are preserved and stored correctly to avoid any loss of data while the vessel is underway, or during transportation.

All permissions, authorisations and permits required for transporting the chemical/biological samples any associated sampling equipment will need to be organized by NMP.

On board:

- All sample containers to be clearly labelled with the relevant station number, date etc. This information is to match that in the sample record data sheets.
- Check sample conditions in container fridge and freezers daily. Ensure power connection to all fridges / freezers containing samples remains stable.
- Check integrity of biological samples daily (i.e. no leaks/drying etc.).

During transport:

- Benthos
 - Ensure that the biological sample containers are tightly sealed and are stored upright.
 - Use inert packing material to add support to containers.
 - Seal the lid of the sample crate with cable ties.
 - Clearly label the crates with number and type of samples and destination.
 - Samples are to be transported by road.
- Data
 - After each CTD download data and store copies on laptop and portable hard drive.
 - Carry laptop and portable hard drive separately when travelling.
- Gear

- Repack all gear into the original crates that they were delivered in. Ensure that these are numbered and have inventory lists with them.

4 HEALTH AND SAFETY

The Master (FV *Zeearend*), Melanie Smith (Chief scientist) and the relevant vessel authorities will be responsible for overseeing health and safety aspects for the duration of the trip. There will be a Pre-Sea inspection conducted by one of the scientific crew of all the safety equipment.

4.1 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) must be worn on the vessel as directed by the vessel master.

The following general offshore PPE is provided by CapFish to offshore personnel:

- Oil-skins
- Safety footwear (boots)
- Safety hard hat (as required during lift operations)
- Gloves
- Self-inflatable life jackets

4.2 WORK ON DECK

Particular care is required when working on the deck, each member of the scientific team is to ensure that the safety procedures are understood and implemented for all work taking place on the deck of the vessel.

If the weather conditions begin to deteriorate, the scientific team in conjunction with the Master should continually assess the situation and stop work whenever necessary. This is especially true in conditions where sampling equipment (i.e., baskets, bins) becomes unstable.

All the members of the scientific team will have the full authority to issue a “Stop work” command if anyone perceives a hazard during work operations. Most technical/manual activities are to be undertaken by the trained vessel crew.

A toolbox meeting should be held prior to any new tasks being undertaken, and a refresher meeting should occur whenever necessary.

4.3 RISK ANALYSIS

A number of risk assessments have been carried out in alignment with the tasks that the scientific team will be carrying out. The risk assessments have been prepared on the basis of the risk factor table presented in Figure 3.

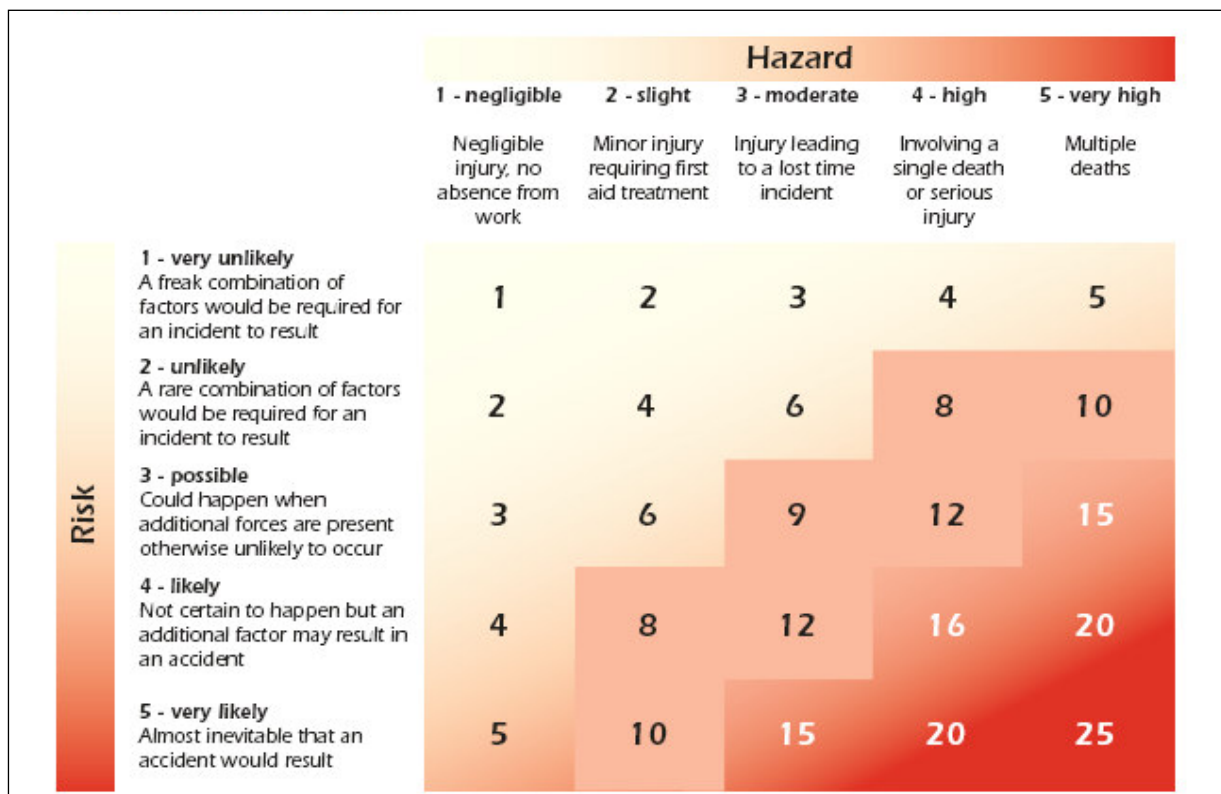


Figure 6: Risk factor table taken from OGP *HS&E Guidelines for Metocean Surveys*⁵.

Table 3: RA for the mobilisation of equipment and loading of ship

Risk	H	R		Mitigation	H	R	
Theft/loss of valuables/ equipment/ personnel	4	3	12	<ul style="list-style-type: none"> Keep all valuables out of sight while travelling. Ensure equipment is securely packaged before transportation. Be vigilant when travelling. 	2	3	6
Injury to personnel and / or damage to equipment from uncontrolled lifting/dropping of boxes/equipment	4	3	12	<ul style="list-style-type: none"> Use of PPE Lift carefully, bend knees and not back. 	1	2	2

⁵ International Association of Oil and Gas Producers. <http://www.ogp.org.uk/pubs/348.pdf>

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Table 4: RA for work on vessel deck

Risk	H	R		Mitigation	H	R	
Personal injury due to slips/trips/falls	4	3	12	<ul style="list-style-type: none"> Use of PPE, especially safety shoes when on deck Ensure deck is cleared of potential trip hazards 	1	2	2
Personal injury due to fishing gear failure	4	3	12	<ul style="list-style-type: none"> Use PPE, especially hardhats when on deck Keep first aid kit near the work station 	2	2	4
Personal injury due to cuts/stab wounds from fish spines and sampling knives/scissors	4	3	12	<ul style="list-style-type: none"> Use PPE, especially gloves, overalls and oil skins Keep first aid kit near the work station 	1	2	2
Personal injury due to falling over gunnel	5	3	15	<ul style="list-style-type: none"> Use of PPE, especially life jackets and safety harnesses when working near the gunnel. Work close to the gunnel only when it is safe to do so, if weather conditions are not favourable –Stop work. 	3	2	6

Table 5: RA for the handling of sampling equipment

Risk	H	R		Mitigation	H	R	
Injury to personnel/equipment from mishandling samples	4	3	12	<ul style="list-style-type: none"> Use of PPE Be vigilant when handling equipment and samples 	1	2	2

Table 6: RA for the deployment and recovery CTD

Risk	H	R		Mitigation	H	R	
Personal (hands/head/feet) injury or damage to equipment due to mishandling of CTD	3	3	9	<ul style="list-style-type: none"> Use of PPE, especially hardhats, safety boots Ensure care is taken when attaching the CTD, keep fingers away from the cables/warps. 	3	2	6

Table 7: RA for the packaging and unloading of samples

Risk	H	R		Mitigation	H	R	
As per Table 3	0	0	0		0	0	0

4.4 EMERGENCY PROCEDURES AND CONTACT NUMBERS

In the case of any emergency the following numbers are to be called either from a satellite phone, local sim card, or on board telephone (Tables 8 and 9). Please ensure that this list of numbers is placed in an area visible to all field staff during work on board the vessel and while travelling.

Table 8: Emergency contact details

Name	Position	Email	Phone number
CapFish Team			Satellite phone number 87 077 645 8726
FV Zearend	Vessel Call sign: V5ZD Licence No: L - 1298	Easy mail no: 581465935911 A.Olivier@benguella.com	+870764905196
Dave Japp	Director, CapFish	dave@capfish.co.za	+ 27 21 4252161 +27 827886737
Melanie Smith	Project manager, CapFish	melanie@capfish.co.za	+ 27 21 4252161 +27 727729876
Jeremy Midgley	NMP representative	mwjmidg@mweb.co.za	+ 27 21 7886212 +27 832649484
Rachel Misika	NMP representative	Rachel.misika@namphos.com	+264 817929047
Mike Woodborne	NMP land project coordinator	mike.woodborne@uclresources.com.au mike.woodborne@gmail.com	+61 410307205 / +37281054658 /+61 893414969
Robin Carter	Lwandle Director	robin@lwandle.co.za	+27 829223504
Hospital	Walvis Bay Medipark T/a Welwitchia Hospital	Street Address: Gertrude Rikumba Kandanga Hilukilwa Street, Walvis Bay	+26 464 21 8911
Police Station	Walvis Bay Police Station	Walvis Bay, Namibia	+264 64 21 9048 / 64 202 055 / 10111/
Sea Rescue	Namibian Sea Rescue		208 2221 or 081 129 6295
SOS international emergency number (for Discovery clients)			+27 11 541 1222

SECTION D, APPENDIX 2 – FISHERIES AND BIODIVERSITY
2.1 PEP Biodiversity Survey FV Zearend

Table 9: Personal Emergency information

Name	Medical aid number	Emergency Contact	Phone number
Melanie Smith Victor Ngcongo Robert Williamson	Griffin Risk Management cc 03GPA505572	Dave Japp (CapFish director)	+27 21 425 2161 + 27 82 788 6737
Timothy McClurg (Scientific Officer)	Discovery number: 223996381	Helen McClurg (wife)	+27 31 762 1356 +27 83 681 67 66
Kate Munnik	Discovery, Coastal Saver. Number: 403004690	Michael Munnik (father) Lynne Munnik (Mother)	+27 (0) 83 6427492 +27 (0) 83 6407600
Ester Nangolo	PSEMAS 134831	Victoria Nangolo (mother)	+264 81215 2809
Malakia Shimhanda	PSEMAS 11600	Anna Shimhanda (wife)	+264 81826 9702

While on board, all scientific crew will be required to follow and adhere to all health and safety requirements/instructions given to them by the vessel captain.

Annexure 1: Approval letter from MFMR



14-20001

REPUBLIC OF NAMIBIA

MINISTRY OF FISHERIES AND MARINE RESOURCES

Tel (00 264 61) 205 3007
Fax (00 264 61) 22 45 66

OFFICE OF THE PERMANENT SECRETARY

Brendan Simbwaye Square
Uhland Street
Private Bag 13355
WINDHOEK

6 June 2014

Michael Woodborne
Chief Operations Officer
Namibia Marine Phosphate (Pty) Ltd
Private Bag 5018
Walvis Bay

Dear Mr Woodborne,

SUBJECT: AUTHORIZATION FOR BIOMASS/BIODIVERSITY SAMPLING IN ML170 (SP1)

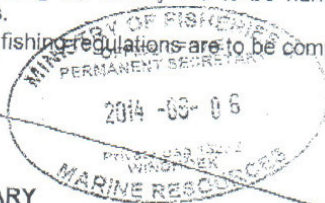
With reference to your letter dated 5 June 2014, on the abovementioned request and your earlier communication on 31 March 2014 on the requirements for the environmental verification programme. The Ministry has considered your request and grants you permission to conduct a biodiversity survey on board of the MV Zearend.

The following conditions are to be strictly adhered to:

- The survey plan to be agreed with the relevant scientists at NatMIRC prior to commencement of the cruise.
- Two NatMIRC scientists are to fully participate in the survey.
- An inner cod end lining of 20 mm to be used to limit escapements in the cod-end.
- All fish caught during the survey are to be handled and disposed off as per routine NatMIRC surveys.
- All other relevant fishing regulations are to be complied with.

Yours sincerely


Ms Ulitala Hiveluah
PERMANENT SECRETARY



Cc : Hon. Bernhard Esau, Minister
Ms Graca D'Almeida, Director : Resource Management
Mr Chris Bartholomae, Deputy Director : NATMIRC

Annexure 2: Ship requirements for samples and their storage

Deployment of sampling equipment

- Power supply for laptops
- GPS system, with relatively accurate depth reading/echo sounder
- Full safety specifications/certifications

Sample preparations

- Deck space for sampling catch
- Sampling table
- 1 x net bag for CTD
- 4 x spades
- Net scale (10 tonnes)
- Small portable scale(50 kg)
- Digital Scale (5 g)
- Portable spot lights
- 10 x large bins (30 kg)
- 10 x blue baskets (25 kg)
- 10 x basins (5 kg)
- Sea water and freshwater supply.
- Ethanol storage area (safety)

Sample storage

- Fridge space
- Freezer space
- Power supply requirements for fridge and freezer.

Annexure 3: Equipment list

Deployment of sampling equipment

- GPS
- Laptops
- 2 x CTD
- 2 x stainless steel casing
- Sonar bell and echo sounder
- Deployment datasheets
- Sampling/deployment species identification guidelines and hand books (all sheets laminated)

Sample preparation

- Stationary (pen, pencils, erasers, markers)
- 8 x knives
- 4 x scissors
- 14 x protective gloves
- 2 x Digital cameras
- 3 x GoPro
- 3 x clip board
- 2 x ring binder files
- 3 x large measuring boards (1.5 m)
- 2 x small measuring board (50 cm)
- 4 x slates
- 7 x head torches
- Binoculars
- Ethanol
- Data sheets
- Water proof paper
- Sample jars/containers
- Storage (lunch box size) for samples
- Plastic bags (sandwich bags/Zip-loc bags)

Sample storage

- Boxes/ crates/drums
- Storage (large boxes) for transport
- Rope/strapping
- External hard drive to duplicate logged memory

Annexure 4: Pre-sailing safety inspection form

PRE-SEA INSPECTION CHECKLIST I

Fill in fields where possible and comments where necessary.

Carrier Vessel Details

Inspected by:

Observer / Co-ordinator		Date		Signature	
Vessel Agent		Date		Signature	
Port / Position					

Vessel Details:

Vessel Name		
Captain Name		
Call Sign		
Flag		
Size GRT		
LOA		
Number of Crew		
Vessel contact Number	Telephone	
	Fax	
	Inmarsat (A/C/M) & No.	
	Email:	
Vessel Agents	Name	
	Telephone	
	Fax	
	Mobile	

Safety Equipment:

Valid Safety Certificate (Y/N)		Issuing Authority		
Life Boats				
Type	Number	Capacity	Launch method Gravity Davit or Free Fall	
Life Rafts				
Type	Number	Capacity	Hydrostatic release Yes / No	Date Service Due
Life Jackets				
Type Inflatable/Packed	Number	Location Cabin /Muster Station/ Both		SOLAS Approved Yes/ No

SECTION D, APPENDIX 2 – FISHERIES AND BIODIVERSITY
2.1 PEP Biodiversity Survey FV Zearend

Immersion Suits			
	Number	Location Cabin/Muster Station/ Both	SOLAS Approved Yes/ No
Life Buoys			
	Number	Free Release Yes / No	Light/SART Attached
Flares: Location		If checked No. / Exp Date	
First Aid Materials Location		Certified Medical Officer	
Fire Extinguishers			
Positioned in main corridor's (Y/N)		Charge seals intact (Y/N)	
Positioned on bridge (Y/N)		Charge seals intact (Y/N)	

GMDSS Requirements:

Radio Equipment	HF Operational yes or no	MF Operational yes or no	VHF Operational yes or no	INMARSAT Operational yes or no	NAVTEX Operational yes or no
EPIRB's					
Type	Number	Location	Release manual / float free		
SART's	Number	Location	Release manual / float free		

Accommodation:

Single Cabin or Sharing	Comment
Vessel Emergency Evacuation and Muster Stations Lists – Displayed (Y/N)	

General Comments:

Annexure 5: Data sheets

TRAWL FORM 1.

TRIP SHEET

Vessel name			
Call sign			
Skipper name		Sign:	
Skipper phone			
Permit No			
Rights holder			

Cruise Itinerary			
Embarkation		Disembarkation	
Port		Port	
Date		Date	
Time		Time	
Sailing		Landing	
Date		Date	
Time		Time	
Days in transit			
Days in fishing area			
Days fishing			
Days lost to weather			
Days lost to gear and equipment failure			

21. Comments
General

TRAWL FORM # 2 **VESSEL DATA SHEET**

Vessel name	
--------------------	--

Vessel Details		
Call sign		
Vessel type		
Hull material		
Owners		
Port of registration		
Flagged state		
Fishing Master		
Captain		
Number of crew		
Length overall (LOA)		
Gross tonnage (GRT)		
Main engines	Make/	Power/
Hold capacity - volume (m ³)		
Hold capacity – mass (t)		

Electronic Equipment Details			
Plotters			
GPS			
Radar	12 Mile	24 Mile	48+mile
Radios	VHF		HF
Echo Sounder			
Sonar			
Temp. recorders			

SECTION D, APPENDIX 2 – FISHERIES AND BIODIVERSITY
2.1 PEP Biodiversity Survey FV Zearend

TRAWL FORM #3	TRAWL GEAR DETAILS		
Net #	1	2	3
Trawl Type			
Top rope length			
Foot rope length			
Vertical opening			
Horizontal opening			
Codend circumference			
Codend mesh orientation			
Mesh size (mm)			
Trawl door type			
Trawl door weight			
Warp diameter (mm)			
Net sounder (yes/no)			
Footrope bobbins fitted			
Footrope bobbins diameter			
Footrope bobbins spacing			
Random mesh measurements (mm)			
Comments			

TRAWL FORM #4

LOG FORMS

Vessel					
Station number					
Net Number					
Barometric pressure					
Wind direction					
Beaufort scale (0 – 12)					
Sea surface colour					
Sea surface temp. (°C)					
Cloud Cover (0 – 8)					
Echo profile retained? Y/N					
Tori lines deployed Y/N					
Shooting away	Date Start	/ /	/ /	/ /	/ /
	Time Net Deployed	:	:	:	:
	Fishing Time Start	:	:	:	:
	Start Latitude (start fish)	° .	° .	° .	° .
	Start Longitude (start fish)	° .	° .	° .	° .
	Start Bottom Depth				
Trawl	Start Bottom Temperature				
	Trawl Speed (knots)				
	Vertical Opening				
Hauling net	End Bottom Depth				
	End Bottom Temperature				
	Fishing Time End	:	:	:	:
	End Latitude (end fish)	° .	° .	° .	° .
	End Longitude (end fish)	° .	° .	° .	° .
	Time net on board	:	:	:	:
Date, net on board		/ /	/ /	/ /	/ /
Skippers Total Catch Weight (Tons)					
Net scale Total Catch Weight (Tons)					

SECTION D, APPENDIX 2 – FISHERIES AND BIODIVERSITY
 2.1 PEP Biodiversity Survey FV Zearend

TRAWL FORM #6 Females **COMMERCIAL SPECIES LENGTH FREQUENCY**

Vessel:		Station No:					Date:					
Species												
Weight (kg)												
Stage:	F1	F2	F3	F4	F5		F1	F2	F3	F4	F5	
0							0					
1							1					
2							2					
3							3					
4							4					
5							5					
6							6					
7							7					
8							8					
9							9					
0							0					
1							1					
2							2					
3							3					
4							4					
5							5					
6							6					
7							7					
8							8					
9							9					
0							0					
1							1					
2							2					
3							3					
4							4					
5							5					
6							6					
7							7					
8							8					
9							9					
Total:						Total:						

SECTION D, APPENDIX 2 – FISHERIES AND BIODIVERSITY
 2.1 PEP Biodiversity Survey FV Zearend

TRAWL FORM #6 Males COMMERCIAL SPECIES LENGTH FREQUENCY

Vessel:		Station No:					Date:						
Species													
Weight (kg)													
Stage:	M1	M2	M3	M4	M5		M1	M2	M3	M4	M5		
0							0						
1							1						
2							2						
3							3						
4							4						
5							5						
6							6						
7							7						
8							8						
9							9						
0							0						
1							1						
2							2						
3							3						
4							4						
5							5						
6							6						
7							7						
8							8						
9							9						
0							0						
1							1						
2							2						
3							3						
4							4						
5							5						
6							6						
7							7						
8							8						
9							9						
Total:							Total:						



TRAWL FORM #7 **RETAINED BYCATCH SPECIES LENGTH-FREQUENCY**

Vessel:				Station No:				Date:			
Species:											
Weight (Kg):											
0							0				
1							1				
2							2				
3							3				
4							4				
5							5				
6							6				
7							7				
8							8				
9							9				
0							0				
1							1				
2							2				
3							3				
4							4				
5							5				
6							6				
7							7				
8							8				
9							9				
0							0				
1							1				
2							2				
3							3				
4							4				
5							5				
6							6				
7							7				
8							8				
9							9				
0							0				
1							1				
2							2				
3							3				
4							4				
5							5				
6							6				
7							7				
8							8				
9							9				
Total:							Total:				

TRAWL FORM # 8

BIRD OBSERVATIONS

Observer		Station No		Start time	
Vessel		Date		End time	

SETTING PERIOD (observe the entire setting period)					
Wind direction relative to vessel		Discarding (Y/N)		Time doors deployed	
Bird approach relative to vessel		Discards (port/starboard)		Time tori line deployed	
Net cleaned (Y/N)		Tori lines deployed (Y/N)		% tori line covering warps	
Species (including adults and juveniles)	Maturity (Juvenile or Adult)	Interactions/collisions		Impact (H,M,L)	Outcome
		Surface	Flying		
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

BIRD COUNT (Count birds for 10 minutes)			
Species (including adults and juveniles)	Total number of birds	Species (including adults and juveniles)	Total number of birds
<i>Shy Albatross (adult)</i>		<i>Giant petrel (southern or northern)</i>	
<i>Shy Albatross (juvenile)</i>		<i>Great Shearwater</i>	
<i>Black-browed Albatross (adult)</i>		<i>Sooty Shearwater</i>	
<i>Black-browed Albatross (juvenile)</i>		<i>Cory's Shearwater</i>	
<i>Indian Yellow-nosed Albatross</i>		<i>Sub-Antarctic Skua</i>	
<i>Atlantic Yellow-nosed Albatross</i>			
<i>Cape Gannet (adult)</i>			
<i>Cape Gannet (juvenile)</i>			
<i>Kelp Gull (Adult)</i>			
<i>Kelp Gull (Juvenile)</i>			
<i>Storm Petrel</i>			
<i>White-chinned Petrel</i>			
<i>Pintado Petrel</i>			

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HAULING – NET INTERACTIONS (record bird interaction with net)				
29. Date:	30. Time:	31. Species	32. Where caught (wings, belly, codend):	33. Outcome (sample taken)
1.				
2.				
3.				
4.				
5.				
6.				
7.				

Comments (i.e. tori lines not set; lots of seals)

.....

Impact	Outcome
H = Heavy (dragged under)	D = Dead, P = Possibly dead, I = injured, U = Uninjured
M = Medium (collide, flight path changed)	I = injured, U = Uninjured
L = Light (just touched)	U = Uninjured

SECTION D, APPENDIX 2 – FISHERIES AND BIODIVERSITY
 2.1 PEP Biodiversity Survey FV Zearend


TRAWL FORM #9

EPI-BENTHIC DATASHEET

Station number:	Date:		Vessel:		
Species ID	Count (number)	Weight (g)	Comments/descriptions and ID guidebook reference	Photo number	Retained reference number

TRAWL FORM #10

MARINE MAMMAL DATASHEET

Date	Start time: End time: Time of sighting:	Station No	Sighting no.
How did this sighting occur? (please tick box)			
While you were keeping a continuous watch for marine mammals			<input type="checkbox"/>
Spotted incidentally by you or someone else			<input type="checkbox"/>
Other (please specify)			
Vessel		Observer	
Ship's position (latitude and longitude)			Water depth (metres)
Species		Certainty of identification	
Total number		Number of adults	
		Number of juveniles	
Description (include features such as •			Photograph or video taken
			Direction of travel of animals in relation to vessel (draw arrow) 
Behaviour			Direction of travel of animals (compass points)
Activity of ship	Closest distance of animals from the vessel(metres)		Comments

TRAWL FORM #11

BIOLOGICAL FORM

Station number:						Date:				
Species	Length (cm)	Weight (g)	Maturity stage	Stomach state	Prey spp name)	Prey spp length	Digest state	Photo number	Retained reference no	Comments

Stomach State	Digest state
E = Everted	0 = Trawl caught
R = Regurgitated	1 = Very fresh
0 = Empty	2 = Possibly digested
1 - 4 = Fullness	3 = Well digested
	4 = Only traces left