Form 1: Pre-activity notice

_Regulation 11(a), Exclusive Economic Zone and Continental Shelf (Environmental Effects–Permitted Activities) Regulations 2013_

**How to use this form:**
This form should be completed by organisations planning to carry out a permitted activity (except seismic survey) as defined in the Exclusive Economic Zone and Continental Shelf (Environmental Effects-Permitted Activities) Regulations 2013. It fulfils, in part, the pre-activity requirements of Schedule 1 of the Regulations.

This form must be provided to the Environmental Protection Authority (EPA) at least 40 working days before commencing the activity.

Note: Items marked in italics are non-compulsory fields; however, inclusion of this information will assist the EPA in processing this form.

Please note that this completed form, once received and processed by EPA, will be posted on the EPA website.

**Submitting in hard copy:**
If you wish to provide this form in hard copy, please post your completed form to: Environmental Protection Authority, Private Bag 63002, Wellington, 6140.

**Submitting electronically:**
If you wish to provide this form electronically, please email your form to: eez.compliance@epa.govt.nz

Any form submitted electronically should be attached to an email that sets out:
- The details of the person undertaking the permitted activity (the operator);
- The name of the person supplying the completed form; and
- A statement that the person is authorised to supply the form on behalf of the operator.

Note: there is an 8 MB limit on electronic files submitted via email.

All forms prescribed by the Exclusive Economic Zone and Continental Shelf (Environmental Effects – Permitted Activities) Regulations 2013, as well as suggested templates for providing other information, may be viewed and downloaded from our website at www.epa.govt.nz or requested by contacting us:

Private Bag 63002, Wellington, 6140
Email info@epa.govt.nz
Ph +64 4 916 2426
Fax +64 4 914 0433
Operation name:

Name used by operator to reference the activity described in this form: Kermadec Ridge

Details of person undertaking permitted activity

<table>
<thead>
<tr>
<th>Company name</th>
<th>Auckland War Memorial Museum</th>
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</thead>
<tbody>
<tr>
<td>Contact person</td>
<td></td>
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<tr>
<td>Phone number</td>
<td></td>
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<tr>
<td>Mobile number</td>
<td></td>
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<tr>
<td>Fax number</td>
<td></td>
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<tr>
<td>Physical address</td>
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</tr>
<tr>
<td>Postal address (if different)</td>
<td></td>
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<tr>
<td>Email address</td>
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</tbody>
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General description of permitted activity

Type of activity: Marine scientific research

(e.g. Marine scientific research, prospecting)

Marine scientific research

The main aims of the voyage are:

1) To describe and quantify the diversity of benthic invertebrate fauna and fish communities of the central Kermadec Islands and Ridge, and determine the environmental variables influencing community composition.

2) To develop and expand marine mammal identification around the Kermadec Islands, and determine links to regional populations.

3) To characterise the demographic and genetic connectivity of populations within the proposed Kermadec-Rangitahua Ocean Sanctuary and quantify morphological adaptation in shallow reef communities.

This research survey is being carried out collaboratively by Auckland Museum, University of Auckland, Massey University, NIWA and Te Papa.

Description of methods to be used to undertake the activity:

There are three separate activities being carried out during the voyage, with coastal marine mammal work (Objective 2) and diving operations (Objective 3) being conducted within the 12 n.mi MPA around the Kermadec Islands. Objective 1 will also largely take place within the MPA, but sampling at greater depths will extend out into the EEZ on some transects. Therefore, the description of activities in this form relate to the deep water sampling component of Objective 1, although we describe the full activities that will occur both within and outside the 12 n.mi limits.

Data on faunal composition and distribution will be obtained primarily by the use of NIWA’s deep towed imaging system (DTIS). This will operate approximately 2-3 m above the...
seafloor while collecting imagery. This gear does not touch the seafloor under normal operations.

The collection of specimens to confirm the identification of taxa seen in the video and still imagery, as well as regular sampling to establish baseline characteristics of benthic fish and invertebrate communities will be made by direct sampling. The remote gear used for this sampling will depend on the seafloor type; hard or rocky substrate is expected on many parts of the Kermadec Ridge, and an epibenthic sled (1 m wide) will be the main tool used. Baited fish traps (2m diameter) and a rough bottom fish trawl (25 m width) will be deployed at a subset of the main stations, and on soft sediment a box or multi-corer (surface area <0.25m²) or beam trawl (4 m width) may be deployed. To examine pelagic and midwater fauna, a midwater trawl that does not contact the bottom will be deployed only at deep stations (>2,000m).

### Timing of permitted activity

<table>
<thead>
<tr>
<th><strong>Proposed commencement date:</strong></th>
<th>21 October 2016</th>
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<tbody>
<tr>
<td><strong>Approximate duration of activity (in days):</strong></td>
<td>Voyage duration is 19 days, with an expected 13 days of sampling time</td>
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<tr>
<td><strong>Timetable:</strong></td>
<td>20 October: Mobilisation, and sail from Auckland.</td>
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<td>21 October: Commence towed camera and sled sampling operations off l’Esperance Rock.</td>
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<td>26 October: Commence survey operations off Raoul Island</td>
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<td>1 November: Complete survey off Raoul Island, transit to Macaulay Island and commence survey.</td>
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<td>5 November: Complete survey off Macaulay Island. Possible transit to Havre Rock for brief coastal survey, then transit to Wellington</td>
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<td>8 November: Return to Wellington</td>
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### Location of permitted activity

| **Co-ordinates of area where activity will be undertaken:** | Kermadec Ridge |
| **(latitude and longitude):** | We intend to survey and sample the eastern side of the Ridge, along transects off Raoul and Macaulay islands, and l’Esperance Rock. |
| | The general area to be sampled is covered by a rectangle with coordinates of: |
| | North: 28°30’ S |
| | South: 33°00’S |
The white crosses in the lower image indicate the location of existing samples in the NIWA Invertebrate Collection. Within this general area are the islands and slope to be surveyed (yellow transect lines). In the unlikely event bad weather forces a change...
in the areas we are able to work, some flexibility has been allowed to survey areas to the west of the Ridge, or towards the southwest of the target area along the Ridge and back-arc volcanoes.

**Description of the current state of the area and the surrounding environment, including any known sensitive environments:**

Sampling of the coastal waters (to 30 m) of the Kermadec Islands has been reasonably comprehensive (Trnski & Schlumpf, 2015) but sampling in deeper waters has been more sporadic and focussed on particular habitats. The majority of sampling in deep areas of the proposed Kermadec–Rangitahua Ocean Sanctuary has occurred on the seamounts along the back-arc west of the Kermadec Ridge (largely at depths shallower than 1,000m), with limited sampling in the Kermadec Trench, between 6,000 and 10,000m (Clark et al. 2016).

The southern parts of the Kermadec Ridge and back-arc have been relatively well researched (Wysoczanski & Clark 2012). Over 150 fish species (mostly pelagic sharks, tunas, billfishes, and bramids) have been identified in the general region, although the fish fauna below 600 m is largely unknown (Stewart & Clark 2010). Invertebrate assemblages on hard substrate in the southern Kermadec region are characterised by the presence of gorgonian corals, echinoids, ophiuroids, alcyonaceans, gastropods, and asteroids (Wysoczanski & Clark 2012). The echinoids, such as Dermechinus horridus, can form dense patches on rocky summits and flanks of the ridge and seamounts. Coarse substrate is dominated by ophiuroids, asteroids, gastropods, and anemones, with the first three groups also occurring on soft substrate.

Hydrothermal vents occur on many of the seamounts (including in caldera features off Macaulay Island), and their communities consist of over 20 invertebrate species. Many of the vent communities are dominated by bathymodiolid mussels, but there are considerable differences in faunal composition between the seamounts (Rowden et al. 2016). Shallow seamounts such as Macauley and Giggenbach, have different species of Bathymodiulus from further south, beds of a lucinid clam Bathyaustriellia thionipta, and xenogapsid vent crabs Gandelus puia and Xenograpus ngatama. Hydrothermal vent sites are regarded as sensitive environments, but these are not known on the eastern side of the Ridge.

Although coral diversity in the region is dominated by solitary gorgonian corals (Families Primnoidae and Pleaxauridae-sea fans) (Tracey et al. 2016), it is possible that reef-like coral habitat could occur, composed of stony coral species such as Solenosmilia variabilis and Madrepora oculata. These offer an open-lattice type structure that is habitat for diverse benthic invertebrate communities, including squat lobsters, seastars, brittle stars, polychaete worms, and crabs (Clark & Rowden 2009). These corals have not been sampled in the very northern region, but are predicted to occur (e.g., Anderson et al. 2016).

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Description of the likely effects of the activity on the environment:

Minor impacts are expected.

There are three planned transects, sampling 6 strata at depths of 50 m to 2000 m (potentially up to 3000 m). In total we expect to sample a maximum of 30 sites. Of these, 5-6 may be in EEZ waters beyond 12 n.mi. Each site will be sampled with DTIS and epibenthic sled equipment, and on 4 per transect we will deploy baited fish traps and undertake a short fish trawl (and consider other gear where appropriate) if the seafloor is suitable.

The sampling plan will be designed to minimise the catch from direct sampling in areas where there is a high likelihood of encountering sensitive environments or taxa. Each sampling transect will be surveyed first with multibeam so that accurate bathymetry and topographic information can be obtained to structure the sampling programme. The towed camera system DTIS will then be deployed, and this enables a direct visual examination of the seabed over a distance of about 1 n.mi. Subsequent sampling will be determined on the basis of these data to avoid sensitive environments.

DTIS will be towed at a target height of 2-3 m above the seafloor. A strobe light on DTIS will flash at 20 second intervals to obtain high quality still images. Several of the other activities that may occur are non-invasive, as instruments don’t touch the seafloor. CTD (Conductivity-temperature-depth) equipment will be deployed on 3 occasions to measure environmental conditions and collect water samples from the water column, but will not contact the seabed. Plankton samples at the surface, and midwater trawling will also not touch the seafloor.

Epibenthic sled deployments are planned for each DTIS transect, in order to describe species-level benthic biodiversity, and establish baseline data on species composition. However, the width of each sled is 1m, and tows will be short, with a maximum duration of 15 minutes (covering a distance of about 300 m on each tow).

The use of other gear types is more limited. A multicorer, or boxcorer (the latter with an area = 0.25m²) may be deployed if the seafloor is soft. Hence impact of sensitive habitat will be minimal. Fish traps have a diameter of 2 m, and so can cause some crushing of benthos. However, their position can be determined with reference to the DTIS line, and placed (as much as possible) in areas clear of sensitive fauna. The bottom fish trawl is the most damaging. This gear is required to catch large or fast-swimming fish. It has heavy ground gear to avoid snagging on rough bottom. The bathymetry we have available at present from the region suggests we may be unlikely to deploy even this trawl very much, given the extremely volcanic and rugged nature of some areas of the seafloor. But where possible, we will judge the suitability for trawling from the DTIS data, and avoid using the trawl in areas of very rough seafloor or high densities of sensitive fauna. A beam trawl (4 m width) may be able to sample the fish in areas of smooth seafloor, and reduce use of the larger trawl.

Assuming up to 30 sled deployments, 12 fish traps, 6 fish trawls, 3 corers, and 6 beam trawls, the total footprint of direct bottom sampling (both inside and outside the EEZ) will be less than 0.2 km².

Other information

<table>
<thead>
<tr>
<th>Name of ship involved in activity:</th>
<th>RV Tangaroa</th>
</tr>
</thead>
<tbody>
<tr>
<td>International call sign or vessel number of the ship:</td>
<td>ZMFR</td>
</tr>
<tr>
<td>Associated licence number (under the Continental Shelf Act 1964):</td>
<td>NA</td>
</tr>
<tr>
<td>Associated permit number (under the Crown Minerals Act 1991):</td>
<td>NA</td>
</tr>
</tbody>
</table>
Signature of authorised contact person

Name: [Redacted]

Title: [Redacted]

Date 18 August 2016

Note: A signature is not required for electronic (email) forms.