

## Assessment of report by Biosearches Group Ltd (2014), titled “Fisheries and Ecological Effects of the Proposal for Leaving the Wreck of MV Rena on Astrolabe Reef”.

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### ***Executive Summary***

This report provides a predominantly desktop-based assessment of the effects on fisheries and ecological values of leaving the MV Rena and associated cargo and debris on Astrolabe Reef. The authors assess a small amount of ecological data on the soft-sediment ecosystems around Astrolabe Reef, present anecdotal observations and provide ecological information from other sites within the wider Bay of Plenty environment, in order to describe the potential effects of the wreck on Astrolabe Reef. The report also discusses monitoring data and observations from other shipwrecks, in New Zealand and Australian waters.

While acknowledging the paucity of data on the specific ecological and fisheries values of Astrolabe Reef, I found the report to be lacking in a number of areas. In particular, a number of statements are made without identifying the information source, there is a focus on the value of the wreck as an artificial reef while largely ignoring the effects of the wreck on the reef environment itself and there is no analysis of the ecological data presented in this report. The report relies heavily on anecdotal information and popular literature, while some known relevant information sources are absent. The analysis of effects of the proposal on fisheries values is particularly poor and limited to a high level assessment, with limited reference to any existing studies of the ecology of harvested species considered to be potentially affected by the proposal.

Overall, I consider that a comprehensive, robust assessment of the ecological and fisheries effects of leaving the MV Rena on Astrolabe Reef has not been provided by this report.

### ***Overview***

Biosearches Group Limited were contracted to produce a report assessing the ecological and fisheries effects of the wreck of the MV Rena remaining on Astrolabe Reef, to accompany a resource consent application. The resulting report provides an overview of the ecological and fisheries values of the area, assesses the potential effects of the proposal and provides recommendations for ongoing monitoring of the wreck and reef environment.

My review of the report is structured around these three components. However, a comment that applies throughout the report is that many of the statements made are unreferenced and therefore the source and potential validity of statement cannot always be verified. For example, in section 3.1 a paragraph describes the reef fish fauna, but the source of the information is not referenced. A minor point is that some of the latin names for species are incorrect.

### ***Comments on Section 3 of the report: Description of Existing Environment***

This section of the report provides a description of Astrolabe Reef, including its physical aspects and fish communities. Descriptions of the algal and invertebrate communities are based largely on reports relating to other islands of the Bay of Plenty, the authors stating that “no direct information on biological communities in the specific area of Astrolabe Reef of interest to this study (i.e. in the vicinity of the wreck) has been found from the period prior to the MV Rena grounding”. The authors describe the marine ecology of Mayor Island / Tuhua and Motuotau / Rabbit Island, stating that the ecology of Astrolabe Reef is likely to be similar.

However, there are datasets available that include relevant biological data. Examples of published reports that would have provided useful biological information include Roberts and Stewart (2006), which included fish survey data from inshore and offshore Bay of Plenty Islands (although excluding Motiti Island and Astrolabe Reef) and Smith et al. (2013), which models the distribution of reef fish across New Zealand’s rocky reefs. In addition, taxonomic records from research institutes and museums could have provided information useful for this report. The Department of Conservation is also aware of a dataset held by independent researcher Dr Franz Smith, which includes photoquadrat data from throughout the Bay of Plenty marine environment, potentially including Astrolabe Reef. Presumably the studies being undertaken to monitor the effects of the grounding would contain information relevant here for description of the existing environment, but results from those studies are not cited in this report.

In section 3.2, a description of the soft sediment communities around Astrolabe Reef and the wider Bay of Plenty marine environment is provided. A survey of the biological communities undertaken by BioResearches is described, but a number of details and analyses are missing from this report. For example, sample depth and distance from the Rena and/or Astrolabe Reef are not provided; there is no legend for the red and blue sites indicated on Figure 3.2; and a total of only 16 samples were collected (which is highly likely to have undersampled the fauna). These data are presented as an appended species list, with no statistical analysis of the data at all. An assessment of the spatial patterns in diversity would have enhanced the report considerably and may have allowed some assessment of whether some species are more likely to be affected than others due to their proximity to the Rena and associated debris.

Section 3.3 provides an assessment of the rare and threatened species that may occur on Astrolabe Reef. However, the assessment only includes marine invertebrates, uses solely the New Zealand Threat Classification System (rather than other systems such as the IUCN classification system) and does not acknowledge that the vast majority of New Zealand’s marine species have not been assessed for their conservation status. It is not clear why only species with “declining” status have been included within the “at risk” category, while others such as those that are naturally uncommon have not been included. The authors’ assessment that it is unlikely for there to be an issue regarding effects on threatened species cannot be made based on the information presented in this report, as only marine invertebrates were considered. This section would also have benefitted from an assessment of the potential occurrence of protected species (i.e. seabirds, marine mammals and marine invertebrates and fish listed under Schedule 4 of the Wildlife Act), in addition to those with rare or threatened conservation status.

The fisheries operating in the Bay of Plenty are described in section 3.4, but this description is constrained to aspects such as the total allowable catches for the wider Fisheries Management Area. This section contains no specific fisheries information about Astrolabe Reef. Little of the information in this section is referenced and the authors do not state where the information appended as Appendix 8.4 has been sourced from.

Information on other shipwrecks in the Bay of Plenty, in particular the Taioma, is provided in section 3.5 and Appendix 8.5. However, most of the information is reproduced from popular articles on the wrecks and while the report states that an annual monitoring programme has been conducted for the Taioma, no information on the programme is presented and it is also unclear who has been conducting the programme or whether reports or monitoring data are available. In addition, Taioma rests on a sandy bottom, which will likely attract a different suite of species than a wreck that is on rocky reef, such as the Rena.

#### ***Comments on Section 4 of the report: Assessment of Effects of Proposal***

This section of the report would have benefitted from the addition of a bathymetric map showing the exact location of the Rena and associated debris. This would have allowed a more complete assessment of the extent to which particular depth strata, substrate complexity, exposures and therefore species and biological habitat types are affected by the proposal. The authors state that the proportion of Astrolabe Reef that the wreck covers is small, but data on the extent to which different habitats may be affected is not presented but could be estimated from a bathymetric chart, sidescan sonar or multibeam imagery. While the proportion of reef occupied by the Rena may be small, some habitats will likely be affected more than others, but this is not discussed in the report.

Much of section 4.2.1 relating to recovery from completed salvage works focuses on the effects of disturbance on soft sediment communities, which are only a subset of the biological communities on and around Astrolabe Reef. There is little, if any, discussion of some effects on the reef community, such as shading and changes in hydrodynamic conditions, with the assessment focussing largely on the provision of additional surface area and structure for marine species to occupy. In section 4.2.2, the authors state that “full development of encrusting biological communities is expected to take some time”. It is not only unclear what “some time” is, but it is also not clear whether this is the view of the authors or other parties.

This section of the report contains several reproduced figures, but these are poorly captioned, and cannot easily be interpreted as presented. For example, in figure 4.3 the caption suggests that the figure represents cover of fauna, but it is not known what the rest of the cover is comprised of (bare hull, algae, obscured by mobile invertebrates etc); in figures 4.4 and 4.5 it is not stated what the error bars represent. In addition, data from other studies are not described in enough detail to allow adequate interpretation, for example, on page 26 the authors note that a high number of rock lobsters were recorded in a wreck, but it is not stated whether this was the total number in the wreck, or those recorded in sampled areas. The report presents data from hull scrapings from Rena, but the surface area sampled is not provided, so it is difficult to interpret the data listed in table 4.2. The report also states that there is debate over research on whether artificial reefs contribute to the overall biomass of an area or whether fish occurring on artificial reefs have moved there from elsewhere. However, no studies are cited on this topic.

The authors’ assessment of effects of the proposal on fisheries is particularly light in detail and the reasoning behind most of the authors’ statements is not presented. For example, the authors state that “fish likely to show increases in numbers are snapper, tarakihi, groper, john dory, blue cod and possibly kingfish”, but no existing data or information sources are cited to support this statement and it is therefore unclear how the authors reached their conclusions. The authors state that the adverse effects on fisheries are expected to be minor, but the only adverse effect mentioned is the possible ingestion of contaminants or contaminated organisms. This section would have benefitted from some discussion of the ecology of species known to occur on Astrolabe Reef (such as requirement for shelter,

longevity, preferred settlement conditions, home range sizes, migratory behaviour etc). There are also some effects on fisheries that are not discussed in the report, including the potential for increased risk of gear entanglement and reduced area available to safely anchor. While the authors state that the topography of the wreck will “potentially create additional habitat for crayfish and kina”, there is no assessment of the catchability of these species, such as the physical ability of fishers to access any increased stock. The possibility that an increase in species abundance in the wreck represents a shift in distribution rather than an increase in actual abundance should also have been discussed here.

### ***Comments on Section 5 of the report: Mitigation***

This section of the report is comprised of an opening sentence and three bullet points: monitoring of the state of the environment and the state of the wreck; review monitoring conditions; and provide restoration and mitigation. I am unable to comment on these proposals in relation to fisheries and ecological effects, given the lack of detail provided in this report.

### ***Overall conclusion***

The purpose of this report was to assess the fisheries and ecological effects of the proposal to leave the wreck of MV Rena on Astrolabe Reef. The authors of the report conclude that the increase in habitat space and three dimensional structural complexity is likely to have a positive effect on the abundance and diversity of biological communities on Astrolabe Reef and that in the long term there is likely to be a minor positive effect on the fisheries aspect of the reef itself.

I have no reason to consider that the material that is presented in the report is inaccurate. However, in my view, the report does contain material gaps. Some information sources have not been presented and some ecological and fisheries effects have not been considered in sufficient detail. The information that is presented could be presented in a more comprehensive way, which would have strengthened the report. In addition, the reasoning for the authors’ conclusions is not always presented well (for example, due to the lack of referencing).

Overall, I consider that a robust, comprehensive assessment of the fisheries and ecological effects of the proposal to leave the MV Rena on Astrolabe Reef is not provided by this report.

### ***References***

Roberts, C.D., Stewart, A.L. (2006) Diversity and biogeography of coastal fishes of the East Cape Region of New Zealand. Science for Conservation 260. Department of Conservation, Wellington.

Smith, A.N.H., Duffy, C.A.J., Leathwick, J.R. (2013) Predicting the distribution and relative abundance of fishes on shallow subtidal reefs around New Zealand. Science for Conservation 323. Department of Conservation, Wellington.