



Davidson Environmental Limited

Ecologically significant marine sites in Marlborough: recommended protocols for survey and status monitoring

Research, survey and monitoring report number 792

A report prepared for:
Marlborough District Council and Department of Conservation
Seymore Square
Blenheim

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Anchor damage to rhodolith bed (Photo: Rob Davidson)

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1.0 Introduction

The Resource Management Act requires local authorities to monitor the state of the whole or any part of the environment (s35(2)(a)). There also exist a variety of other obligations such as managing indigenous biodiversity (s30(1)(g)(a)). The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna is a matter of national importance (Section 6(c)).

Since 2010, the Marlborough District Council (MDC) has supported a programme for surveying and assessing marine sites within its region. A key milestone in this programme was the publication of a 170 page report identifying and ranking known ecologically significant marine sites in Marlborough (Davidson *et al.* 2011).

The goals of the present document are to:

- Provide MDC guidance on how to continue a survey and monitoring programme for ecologically significant marine areas in Marlborough and to assist with the management and overarching design of such work to optimize the collection of biological information within resource limitations.

Towards this goal the present report has the following objectives:

1. Provide survey and monitoring options for MDC to consider based on different levels and types of investigation (e.g. health checks, regular monitoring, surveys of new sites, and surveys to fill information gaps at existing sites).
2. Prioritization of survey and monitoring based on factors such as ecological distinctiveness, rarity and representativeness, as well as vulnerability, issues and threats to marine values.
3. Recommend a simple, robust, and repeatable methodology that enables site health to be monitored and assessed.
4. Provide guidance on the assessment of a site's health that can be conveyed to Council and the community in a simple but effective way that will aid tracking of changes in site condition.

2.0 Background

In 2011, a report outlining Marlborough's known ecologically significant marine sites was produced for MDC and Department of Conservation (DOC) (Davidson *et al.* 2011). The assembled group of expert authors developed a set of criteria to assess the relative biological importance of a range of sites. Sites that received a medium or high score were ranked "significant". A total of 129 significant sites were recognized and described during this process.

The authors stated that their assessment of significance was based on existing data or information, but was not complete. Many marine areas had not been surveyed or the information available was incomplete or patchy. It is likely, therefore, that many ecologically significant marine sites remain undiscovered. In addition, some significant sites were assessed on limited information and in some cases existing sites required more investigation to confirm their status. The authors also stated that many sites that were not assessed as being significant had the potential to be ranked higher in the future as more information became available. Further, they recognized that the quality of some existing significant sites may decline over time due to natural or human related events or activities. The authors therefore acknowledged that their report would require updating on a regular basis.

Davidson *et al.* (2013) produced a protocol for receiving information for new candidate sites and for reassessing existing ecologically significant marine sites. The goal of that protocol was to establish consistency and to ensure a rigorous and consistent process for site identification, data collection and assessment. The aims of that report were to establish:

- (a) The level of information required for new candidate sites.
- (b) The process for assessment of new sites and the reassessment of existing sites.
- (c) A protocol for record keeping, selection of experts and publication of an updated ecologically significant marine sites report.

The present report adds to MDC's ecologically significant marine sites programme by providing guidance for the collection, storage and publication of biophysical data from potential new significant sites as well as existing sites. The biological investigation process is separated into three main elements:

1. Survey of new sites;

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2. Collection of additional information from existing significant sites or sites that previously were not ranked as being ecologically significant; and
3. Status monitoring of existing significant sites (i.e. site health checks).

3.0 Biophysical data

3.1 Data collection

As part of the ecologically significant marine sites programme, collection of biophysical data falls into one of four categories which are summarised below and described in more detail in the following subsections:

- (1) **Collection of data from new sites** that have not been surveyed or described. These candidate sites may have been suggested by the public, scientists, or organizations (e.g. fishing, conservation). Alternatively reports produced for other reasons (e.g. for resource consents or biosecurity surveys) may have identified a biological feature that may warrant further investigation.
- (2) **Collection of data from sites not previously ranked as being significant**, but have the potential to rank higher if more was known about their biological attributes.
- (3) **Collection of additional information on existing significant sites** that are not well known, have poorly defined boundaries, or have not been surveyed for a considerable time.
- (4) **Monitoring existing significant sites** to assess their biological status. In effect, this methodology aims at checking on the ecological health of sites (e.g. human impacts, natural impacts, issues, site vulnerability). Monitoring may include:

(a) **Repeat and regular collection of data** from particular significant sites in order to establish a time series; and

(b) **Intermittent collection of data** from other selected significant sites. The selection of these sites would be based on factors such as the level of information known for the site, the size of the site, the vulnerability of the site to threats, or on an issue-driven basis.

3.2 Collection of data from new sites or known but unranked sites

Davidson *et al.* (2013) stated that “candidate sites enter the process after a submitter (usually a scientist or someone with a good local knowledge of the area) proposes a site be considered for ecological significance status.” A minimum level of information was outlined in that report (see Appendix 1 in the present report).

The survey of new potential sites aims to collect sufficient data to enable an assessment of significance. Not all surveyed sites will be ranked “significant” during the assessment process and it will be necessary to design and carry out field surveys to maximize the coverage while collecting sufficient information to be able to make an informed assessment. It is therefore recommended that the survey of new sites adopts a rapid, cost effective methodology (e.g. using remote sensing technologies such as sonar, drop camera stations, and where appropriate video sled tows) to ensure as many sites as possible can be surveyed.

Some known sites that were not ranked as “significant” by Davidson *et al.* (2011) may have the potential to be ranked “significant” once more biophysical information has been collected. Again it is recommended that rapid remote sensing technologies such as sonar, video sled tows, and drop camera stations be adopted initially.

Additional more detailed surveys (e.g. using divers to collect specimens, underwater imagery or quantitative data) can be undertaken on a case by case basis; for example if particularly significant or sensitive ecological features are encountered during the initial survey. However, these types of investigations are relatively time consuming and costly, and it may be necessary to reprioritize the work programme or seek additional funding should this scenario occur.

A total of 14 new sites (Appendix 2) have been identified by members of the expert group since the report by Davidson *et al.* (2011) was published. These sites have not been surveyed or ranked and their importance is therefore unknown. Based on the limited or preliminary information available, they have the potential to be ranked as ecologically significant marine sites.

3.3 Collection of data from existing significant sites

Some of the site assessments undertaken by Davidson *et al.* (2011) were based on limited and in some cases anecdotal accounts and historical information. Some existing significant

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sites may also change in size or quality over time. Therefore, there is a need to survey or resurvey some of these sites to review their status and ensure the assessment is current and accurate. Suggested survey sites are listed in Appendix 3a (priority 1) and 3b (priority 2). As an example, the north-west D'Urville Island bryozoan beds are known from anecdotal accounts from fishers, but have not been scientifically surveyed. Regular bottom fishing in this area has likely had an adverse impact on these beds.

In the long term, all significant sites should be intermittently field investigated. For some existing significant sites, field work is underway through programmes run by other organizations (e.g. DoC, MPI, OSNZ, Cawthron, NIWA, Universities). For example Cawthron is presently investigating the interaction between mussel farms and dusky dolphins in Admiralty Bay, while MDC funds an estuary investigation programme. DoC is also piloting a programme assessing ecological integrity at a number of sites around New Zealand. They hope to implement that assessment programme over particular areas of New Zealand (Thrush *et al.* 2011, Davidson and Freeman in prep.). Field data collected as part of the present protocol, field data collected by other organizations and information from the literature will be integrated into the significant area programme when it is reviewed (see Davidson *et al.* 2013 for review protocols). Work undertaken as part of other science based programmes has not therefore been listed in the present report (e.g. MDC estuarine programme, DOC bird surveys, OSNZ counts).

It is recommended that field data be primarily collected using rapid survey techniques and remote sensing methods such as sonar, drop camera stations, observational descriptions and where appropriate video sled tows. For subtidal sites, some ground-truthing using divers may also be required. Sampling of certain species for expert identification and curation is also suggested.

3.4 Monitoring of significant sites

Davidson *et al.* (2013) stated that “existing marine sites may continue to be adversely affected by human activities raising the potential for sites to lose their significance status”. The loss or degradation of any “significant” sites should be avoided. It is also noted that not all “significant” sites have the same level of vulnerability to adverse impacts. For example, rocky reef habitats located in high energy environments (e.g. offshore rocky reefs) are likely to be more robust than sheltered soft sediment habitats (e.g. estuaries and subtidal soft bottom habitat).

Repeat monitoring of a selected number of sites using rapid survey methodologies is

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recommended. It may be necessary to increase the survey intensity should the situation require it; for example if adverse impacts are detected and more intensive surveys, including the use of divers, are needed to document accurately the scale and nature of the impact. Additional or reprioritised funding may be required in such cases.

A total of 15 candidate sites for regular (every 3-5 years) have been identified in Appendix 4. Site selection was based on six criteria (note significant estuaries are not listed as they will be part of a separate MDC programme):

1. High representativeness
2. High distinctiveness
3. Vulnerability
4. Existing time series or baseline data
5. Cost effectiveness
6. Issues

In addition to the regular monitoring of sites, we recommend that MDC and DoC survey and /or monitor all other significant sites at least once every 10 years. This will ensure all significant sites would be visited within a reasonable timeframe and their condition checked. This timeframe is also appropriate for state of the environment monitoring. This recommendation is also aimed to assist MDC with meeting their statutory responsibilities. Further, this timeframe also sets performance targets for the programme and assists both agencies to demonstrate the value and the ongoing investment to ensure significant sites are appropriately managed.

3.5 One-off investigations of significant sites (health/status checks)

Selection of sites for one-off checks would be based on vulnerability, threats, and/or on an issue driven basis. Issues may include recent human activities in close proximity to the significant site (e.g. new mussel or salmon farm in vicinity, logging in the catchment, natural events such as storms and floods, recent bottom impacts from fishing activities).

The methods used would depend on the site and would be comparable to those outlined above for other surveys. Again, rapid survey methodologies are recommended, though with the ability to increase survey intensity should the situation require it (refer above).

4.0 Health and vulnerability assessments

4.1 Health assessment

For all surveys, it is recommended a site condition (health) assessment be produced as part of the site report. Information important for the assessment of condition/health of each site has been separated into the following four categories.

SITE DESCRIPTION (Existing biophysical characteristics)

A description of the site location (GPS) and a description of the biophysical features and their boundaries is vital. Information on key habitats and communities and the density or abundance of key species should be provided where possible. For example, key-stone species such as those that form biogenic structures should be described and where appropriate their abundance and distribution should be mapped. Collections of species for identification may be appropriate, especially in areas with high species diversity or for unusual or rare biological features.

ECOLOGICAL VALUES (Biophysical features and values)

A summary of the biophysical features that make the site ecologically significant is required. The site should be placed into context with regard to other sites in the region, New Zealand and internationally. The set of criteria developed by Davidson *et al.* (2011) should be applied by a group of appropriate experts (see Davidson *et al.* (2013) for ranking protocols).

ISSUES AND THREATS (potential for adverse impacts)

A description of issues and potential threats specific to the site, including the site's vulnerability to impact is required. Davidson *et al.* (2011) listed issues and threats to marine values in Marlborough (refer Table 2 below).

EXISTING IMPACTS (Indicators of an existing impact)

A description of any indicators of an impact occurring at the site should be provided. These indicators have been described for the marine environment by a variety of authors (e.g. Robertson *et al.*, 2002; Robertson and Stevens 2012) (Table 2). Impacts can include: smothering by fine sediment, physical damage to organisms including biogenic structures, dead or dying organisms, loss of communities or species, and signs of physical disturbance such as dredge tracks (Table 2).

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Table 2. List of major issues and threats and the indicators that suggest an impact.

Issues and threats	Indicators of impact
Land clearance and sedimentation	Muddiness, eelgrass loss, smothering
Rubbish	Inorganic debris
Bottom towed devices and anchoring	Damage to benthic species, loss of long-lived species
Infilling and reclamation	Reduced salt-marsh, herb-field communities, riparian veg.
Stock and vehicle damage	Pugging, tracking
Exotic species	Presence, spread and biomass, change in ecosystem processes, species composition and abundance
Pollution and enrichment	Eutrophication, change to species assemblages, redox layer
Shipping and boating impacts	Movement of substrata, changed biomass and species assemblages
Marine farms	Sedimentation, smothering, shell debris
By-catch of seabirds and marine mammals	Entanglements
Predator colonization of islands	Presence, spread, abundance

4.2 Ecological vulnerability and indicators of impact

Where possible, each significant site investigated as part of the ecologically significant marine sites programme should be rated for vulnerability based on an assessment of the information collected as part of Section 3.0 of this report.

Robertson and Stevens (2012) used similar information to produce an overall vulnerability assessment for estuaries in Tasman and Golden Bays. They applied scores (high, moderate, low and very low) for (a) human use, (b) ecological value, and (c) overall stressor influence or influence of impacts (Figure 1). These authors also noted key issues relevant to each site such as sedimentation. A similar approach is recommended for reporting on the ecological health of ecologically significant marine sites in Marlborough.

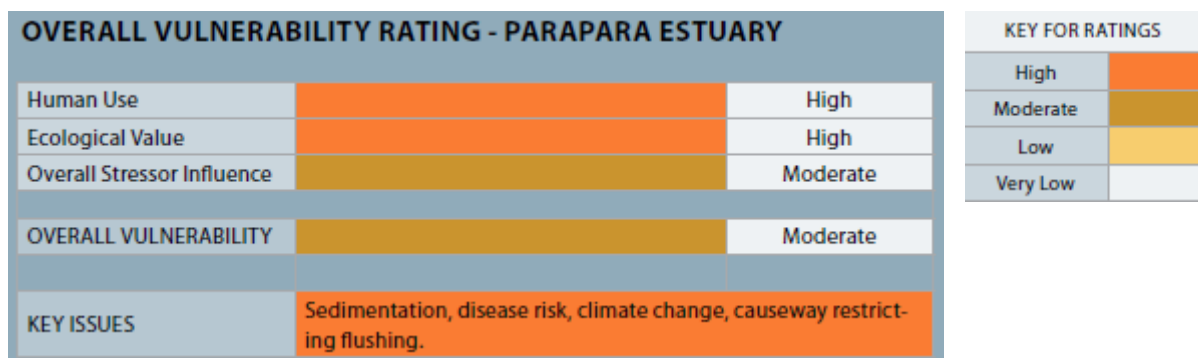


Figure 1. Example of a vulnerability rating applied by Robertson and Stevens (2012).

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4.3 Assessment of change

For sites that are monitored over time, the opportunity exists to assess changes in site condition since the previous survey. A “traffic light” approach is suggested:

- **Green** (no negative change since previous survey)
- **Amber** (small negative change)
- **Red** (negative change common or widespread over site or high in parts of the site)
- **Black** (site severely impacted; biological values severely compromised or lost)

5.0 Data entry, storage, write-up and reporting

All data including photographs should be entered into the Marlborough District Council’s SMART MAP/GIS system. It is also recommended that a small report be produced for each site or group of sites surveyed or monitored. Repeat monitoring of selected sites may be written up every fourth or fifth sample event.

Reports should be presented annually to the MDC Environment Committee with the aim of raising the profile of ecologically significant marine sites in the Marlborough community.

6.0 Update and publication of significant area report

The first ecologically significant marine sites report was produced by MDC and DOC in 2011 (Davidson *et al.*, 2011). This report built on an earlier DOC study identifying ecologically important marine, freshwater and terrestrial areas in Marlborough (Davidson *et al.*, 1995). Sixteen years separated these two reports.

As new sites and existing sites are surveyed as part of the present programme, there will come a time when an update of the Davidson *et al.* (2011) report is required. Davidson *et al.* (2013) recommended this report be updated and published when either:

(A) >35 new sites have been identified, assessed and stored in the significant site database or file (i.e. sufficient sites to represent a large addition or change to the ecologically significant marine sites database), or

(B) 10 years have elapsed since the previous report (i.e. in 2021).

7.0 Costs

There are two major components to the cost of running the present programme: field work and documentation. Most sites are located in subtidal areas and require a boat equipped with suitable survey equipment. Documentation consists of recording data and writing up each site into a form that can be stored electronically. Documentation does not include ranking of sites as this is regarded as a separate exercise involving a group of experts (Davidson *et al.*, 2013).

Survey and monitoring programme costs are variable depending on a number of factors. For example, small sites close to port located in a sheltered location would be considerably less expensive to survey than large remote sites located in variable weather/sea locations and deep water. In years where difficult sites are investigated, the number of sites surveyed would be dramatically lower than in years where easy sites are surveyed.

Table 3 provides a very approximate outline of the number of sites that could be surveyed and documented annually and over a ten year programme. The number of each type of site investigated could be adjusted based on issues or priorities. These costs are indicative and costs will vary between science providers.

Table 3. Indication of the scale of field operations and associated documentation based on three funding levels *2.

	Survey new or unranked sites	Survey poorly known significant sites	Regular monitoring of significant sites	Surveys of known significant sites *1	Total sites per year	Total number of investigations in 10 years
Type of work	Survey	Survey	Regular repeat monitoring	Infrequent repeat monitoring		
Total number of known sites (2014)	14			129		
Existing monitoring or survey work			4*3			
Fully protected significant sites				1 marine, 16 terrestrial (birds)		
Low funding (e.g. 20k per year)	3	1	2	1	7	70
Moderate funding (e.g. 35k per year)	4	2	3	2	12	120
Higher funded (e.g. 50k per year)	4	4	5	4	17	170

*1 The number of known significant sites (n = 129) will increase over time as more new sites are surveyed and subsequently ranked as significant.

*2 The number of sites surveyed within the budgets is indicative and highly variable between science providers and also between sites (i.e. site size, depths, weather constraints and distance form port).

*3 Long Island-Kokomohua MR (DOC monitoring programme, site 7.5). MDC East Bay marine farm recovery study (sites 4.21, 4.22, 4.23) Note: MDC study ceased 2014.

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Appendix 1. Information that may be provided for new sites (Davidson *et al.* (2013))

Attribute	Required	Comment
Site name & location	Yes	Name of bay or locality
Person or organization and contact details	Yes	Name, address, contact phone number and e-mail address
Date	Yes	Present date
Site location & GPS coordinates	Yes	Specific details of location and centroid GPS position
Approximate boundaries	No	Include if known or approximated
List biological attributes that make it potentially significant	Yes	Comment on biological features that make the site a potential significant site
<i>New assessment:</i> List known information and any survey data or reference reports	No	Provide details of any reports or survey carried out
<i>Reassessment:</i> Source of information	Yes	Provide source or sources of new information , including details, reports or surveys carried out

*Information should be submitted in writing to the Marlborough District Council with the heading “Suggested significant marine site”.

Appendix 2. Candidate new sites

1. **Port Underwood**

Bispira bispira A tubeworm bed (location known)

Work required: survey extent, collect samples for identification

2. **Waikawa Bay (QCS)**

Bispira bispira A tubeworm bed (approximate location known)

Work required: find tubeworm bed, survey extent, collect samples for identification

3. **Grant Bay (Pelorus)**

Lancelet bed (location known)

Work required: collect samples, diver survey to determine extent

4. **Tuhitarata Bay**

Tubeworm bed (location known)

Work required: survey extent, collect samples for identification

5. **Penzance Bay**

Elephantfish egg laying area (location known)

Work required: survey extent, determine density using diver transects

6. **Lochmara Bay (QCS)**

Solitary ascidian bed (location known)

Work required: survey extent, determine density using diver transects

7. **Tory Channel**

Current communities (southern side of Tory Channel)

Work required: sonar, drop camera, spot dive checks, collect samples of hydroids for identification.

8. **Okiwi Bay (Croisilles Harbour)**

Rhodolith bed (near Hobbs Bay)

Work required: find reported rhodolith bed, drop camera, collect samples for Museum identification.

9. **Nikau Bay (Pelorus)**

Red algae/ascidians

Work required: map red algae and ascidian bed, drop camera, collect samples for Museum identification.

10. **Port Underwood**

Tubeworm mounds and red algae beds, plus western shoreline of the Port.

11. **Stella Rock (Queen Charlotte Sound)**

Current swept rock

Work required: describe site, drop camera images.

12. **East Entry Point (Kaitira, Pelorus Sound)**

Current swept headland

Work required: describe site, drop camera images.

13. Post Office Point (Pelorus Sound)

Current swept headland

Work required: describe site, drop camera images.

14. Mahau (Ohinetaha Estuary) and Mahau Sound Estuary

Estuarine habitats poorly known

Work required: map habitats, collect data on bird usage.

Appendix 3a. Significant sites with limited information (Priority 1)

The “Priority 1” sites were assessed as significant based on either a brief visit (a level of information of “1” in Davidson et al. 2011) or through personal communications (a ‘4’). Based on these data, the panel of experts involved in the significant site publication considered sites held sufficient potential to be ranked as significant, however, they stated that additional information was required to more reliably assess their status.

Council and DoC have recognised that further investigative work is required to thoroughly verify the presence, diversity and extent of the biological values. Prioritization for additional survey work will be based on whether the site is listed as:

- (A) **Priority 1** (Appendix 3a): the level of information is a “4” (i.e., personal communication), the site is listed in Table 11 of Davidson et al. (2011) (identified as the highest priority for survey).
- (B) **Priority 2** (Appendix 3b): The significant site information is dated, limited or an issue is involved that may influence the significant site.

There are seven sites recognised as significant terrestrial sites for marine birds that have limited information. These sites have been omitted from Appendix 3a and 3b. The Department of Conservation collects data with regard to these sites as part of their ongoing programmes.

Site number	Site Name	Defining biota
1.6	Rahuinui Island	King Shag
2.8	Takawhero Stack	Sooty shearwater
2.14	Stewart Island	King Shag
4.2	Papakura Point	Gannet
4.26	Blumine Island	King Shag
7.12	Brothers Island	Diving petrel; Fairy prion
7.3	Motuara Island	Reef heron; sooty shearwater

Significant sites

Site 2.3 North-west D’Urville Island

Features: Biogenic soft bottom habitat.

Issues: Information limited, potentially damaged or destroyed.

Work required: collect drop camera images, sonar. Map boundaries and assess impact level.

Site 2.9 Jag Rocks

Features: Diverse and distinct outer Sounds reef community.

Issues: Information limited.

Work required: collect drop camera and diver images. Map boundaries, describe habitats and species assemblages, assess impact levels.

Site 2.15 Clay Point

Features: Diverse and distinct outer Sounds reef community.

Issues: Information limited.

Work required: collect drop camera and diver images. Map boundaries, describe habitats and species assemblages, assess impact levels.

Site 2.16 French Pass

Features: Diverse and distinct outer Sounds reef community.

Issues: Information limited.

Work required: collect drop camera and diver images. Map boundaries, describe habitats and species assemblages, assess impact levels.

Note: diving in this area is hazardous and should be conducted with extreme caution.

Site 2.18 Papanoa

Features: high current habitats.

Issues: Information limited, may be trawled and potentially impacted.

Work required: collect drop camera images. Describe community, map boundaries and assess impact level.

Site 2.20 Chetwodes

Features: Biogenic soft bottom habitat.

Issues: Information limited, may be trawled and potentially impacted.

Work required: collect drop camera images, sonar. Map boundaries and assess impact level.

Site 2.22 Goat Point

Features: Diverse outer Sounds reef community.

Issues: Information limited.

Work required: collect drop camera and diver images. Map boundaries, describe habitats and species assemblages, assess impact levels.

Site 2.23 Culdaff Point

Features: Diverse outer Sounds reef community.

Issues: Information limited.

Work required: collect drop camera and diver images. Map boundaries, describe habitats and species assemblages, assess impact levels.

Site 2.30 Waitui Bay

Features: Biogenic soft bottom habitat (horse mussels).

Issues: Information historic and limited. May be trawled and potentially impacted.

Work required: collect drop camera images, sonar. Map boundaries and assess impact level.

Site 2.31 Port Gore (outer)

Features: Biogenic soft bottom habitat.

Issues: Information limited. May be trawled/dredged and potentially impacted.

Work required: collect drop camera images, sonar. Map boundaries and assess impact level.

Site 2.32 Port Gore

Features: Biogenic soft bottom habitat.

Issues: Information limited. May be trawled/dredged and potentially impacted.

Work required: collect drop camera images, sonar. Map boundaries and assess impact level.

Site 3.11 Tapapa, Kauauroa and Tawero Points

Features: Current swept high diversity sloping shores.

Issues: Information limited.

Work required: collect drop camera images, sonar, map boundaries and assess impact level.

Site 3.17 Chance Bay

Features: Large intact catchment, potential for adjacent marine values to be elevated.

Issues: Information limited (no marine survey has been conducted).

Work required: collect drop camera images. Assess impact level.

4.3 Bottle to Umungara Bays

Features: Large intact catchment, potential adjacent marine values.

Issues: No marine survey has been conducted.

Work required: collect drop camera images. Assess impact level.

Site 4.7 Iwirua Point

Features: Low relief benthos supporting tubeworm mounds.

Issues: Information limited.

Work required: collect drop camera images. Map boundaries and assess impact level.

Site 4.9 Wedge Point

Features: Biogenic habitat (tubeworm mounds).

Issues: Information limited.

Work required: collect drop camera images. Map boundaries and assess impact level..

Site 4.11 Bobs Bay

Features: Biogenic soft bottom habitat.

Issues: Information limited.

Work required: collect drop camera images. Map boundaries and assess impact level.

Site 4.14 Pihaka Point

Features: Giant lampshells.

Issues: Information limited.

Determine density of lampshells, map distribution and assess impact levels.

Site 4.15 Kumutoto Bay

Features: Known elephantfish egg laying area.

Issues: Information limited.

Determine density of egg cases, map distribution and assess impact levels as this area may be dredged.

Site 4.18 Patten Passage

Features: High current channel habitat.

Issues: Information limited.

Work required: Describe habitats and species. Collect drop camera or hand images.

Site 4.19 Ships Cove to Cannibal Cove

Features: Large intact catchment, potential adjacent marine values.

Issues: No marine survey has been conducted. Commercial fishing may occur in this area.

Work required: collect drop camera images. Assess impact level.

Site 4.24 Onauku Bay

Features: Horse mussel beds.

Issues: Information dated. May be intermittently dredged and potentially impacted.

Work required: collect drop camera images, sonar. Map boundaries and assess impact level.

Site 5.1 Dieffenbach Point

Features: Current swept headland habitats and communities.

Issues: information limited.

Work required: Describe habitats and species. Collect drop camera and/or hand images.

Site 5.6 Te Pangu to Tio Point

Features: Biogenic habitats.

Issues: Information limited.

Work required: collect drop camera images, sonar, map boundaries.

Site 5.8 Tory Channel (eastern north coast) *1

Features: Biogenic, current swept soft and hard bottom habitats.

Issues: Information limited.

Work required: collect drop camera images, sonar, map boundaries, collect samples of hydroids for ID and assess impact level.

Site 5.9 Tory Channel entrance

Features: High flow habitats.

Issues: Information limited.

Work required: Describe habitats and species. Collect drop camera or hand images.

Site 7.1 Cape Jackson

Features: Current swept reef habitats in outer Sounds. Biogeographic border.

Issues: Information limited.

Work required: collect drop camera images, sonar. Map boundaries and assess impact level.

Site 7.2 Cape Jackson

Features: Current swept biogenic habitat.

Issues: No survey has been conducted, information limited.

Work required: collect drop camera images, sonar. Map boundaries and assess impact level.

Site 7.4 Motuara horse mussels

Features: Horse mussel bed.

Issues: Information dated and sparse. May be intermittently trawled and potentially impacted.

Work required: collect drop camera images, sonar. Map boundaries and assess impact level.

Site 7.9 White Rocks

Features: Diverse and distinct outer Sounds reef community.

Issues: Information limited.

Work required: collect drop camera and diver images. Map boundaries, describe major habitats and species assemblages, assess impact levels.

Site 9.2 Offshore Cape Campbell to Ward Beach

Features: Offshore macroalgal forest.

Issues: Information limited.

Work required: collect drop camera images. Map boundaries and assess impact level.

*1 identified as a monitoring site

Appendix 3b. Significant sites with limited information (Priority 2)

For Priority 2 a significant site information is dated, limited or an issue has arisen that may influence the significant site or its biological features.

Site 2.33 Port Gore inshore

Features: Horse mussels, red algae, scallops, tubeworms, dog cockles.

Potential issues: Habitats and communities may have been impacted by bottom towed devices.

Work required: collect drop camera images, sonar. Map boundaries and assess impact level.

Site 4.16 Perano Shoal

Features: Dense biogenic habitat (tubeworm mounds).

Issues: Biogenic holes characteristic of *Protulophila*, a putative hydroid previously known only from Europe and the Middle East, Jurassic to Pliocene have been identified from samples collected by Davidson *et al.* (2011) by Dennis Gordon of NIWA. This site represents the only known site where living examples of this ancient species has been found.

Work required: collect samples and send to NIWA. Sonar and map extent of tubeworm mounds.

Site 6.3 Cutters Bay red algae

Features: Dense and diverse red algae bed.

Issues: Recent marine farm related work has revealed that the red algae bed identified as site 6.13 in Davidson *et al.* (2013) is considerably larger than previously known (Davidson 2013).

Work required: Continue mapping distribution of red algae in Port Underwood (drop camera, algae samples collected for identification).

Appendix 4. Candidate significant sites for monitoring

It is recommended that particular significant sites be regularly monitored (3-5 year cycle). Site selection was based on six criteria:

1. High representativeness
2. High distinctiveness
3. High vulnerability
4. Existing time series or baseline data
5. Cost effectiveness
6. Issues

Notes: Puriri Bay (Site 4.22) and Matiere Point (4.25) were used as candidate sites instead of Onauku Bay (Site 4.25) as they have been regularly sampled between 2002 and 2013. Both sites support comparable biological features to Onauku Bay (Site 4.25).

MDC have requested that two additional sites be included for consideration for regular monitoring. Croisilles Harbour entrance (Site 1.2) and Ship Cove to Cannibal Cove (Site 4.19). These sites overlap with commercial fishing effort, and Council is working with the Ministry for Primary Industries to understand the effects of commercial activity on the values within these sites.

Three rhodolith sites are included in the list candidate monitoring sites. These communities are relatively rare in the Marlborough Sounds. As they inhabit soft bottoms, they are vulnerable to sedimentation and physical disturbance and in two cases are located close to mussel farming areas.

Jag Rocks (Site 2.9) and Oke Rock (Site 3.2) both have values ranked high for distinctiveness and representativeness. Jag Rocks was not recommended because of its rocky terrain, remoteness and exposure thereby minimising human use and impact. Oke Rock was not recommended as this site is afforded a high level of natural protection from dredging by nature of the bottom topography and adjacent reef areas.

Rangitoto Passage (Site 2.6) was elevated for monitoring as it is one of the best examples of its kind in Marlborough and it is threatened by intermit trawling of bottom towed devises.

1. Site 1.2 Croisilles Harbour entrance

Features: Shallow, moderate current habitats supporting scallop beds.

Criteria for selection: Distinctive, regularly dredged by recreational fishers.

Potential issues: Sedimentation, physical damage.

Method: drop camera, dive inspection/quadrats (optional).

- 2. Site 1.5 Coppermine and Ponganui Bays**
Features: Rhodolith bed.
Criteria for selection: Vulnerable and distinctive. Control for other rhodolith areas close to greater human activities such as marine farming.
Potential issues: Sedimentation, physical damage.
Methods: drop camera, dive quadrats sampling percentage cover of rhodoliths and counts of conspicuous invertebrates.
- 3. Site 2.6 Rangitoto Passage**
Features: Relatively large area of dense bryozoans.
Criteria for selection: May be intermittently trawled and potentially impacted.
Candidate for closed dredging, trawling area.
Methods: collect drop camera. Map boundaries (baseline) and assess impact levels.
- 4. Site 2.13 Catherine Cove**
Feature: Rhodolith bed.
Criteria for selection: Vulnerable to physical damage.
Potential issues: Sedimentation, physical damage, proximity of mussel farms.
Methods: drop camera, dive quadrats sampling percentage cover of rhodoliths and counts of conspicuous invertebrates.
- 5. Site 3.7 Picnic Bay**
Features: 1.9 ha area of rhodoliths.
Criteria for selection: Vulnerable and distinctive. Close to numerous mussel farms.
Potential issues: Sedimentation, physical damage.
Methods: drop camera, dive quadrats sampling percentage cover of rhodoliths and counts of conspicuous invertebrates.
- 6. Site 3.8 Fitzroy Bay**
Features: elephantfish spawning site.
Criteria for selection: Scientific importance of elephantfish. State of the environment monitoring of soft bottom community in a heavily marine farmed area with long water residence times. Some background data exists.
Potential issues: Sedimentation, physical damage, marine farming.
Methods: diver quadrats sampling elephantfish egg cases and other conspicuous surface dwelling invertebrates.
- 7. Site 4.11 Bobs Bay**
Features: Tubeworm bed (*Bispira bispira* A).
Criteria for selection: Vulnerable and representative. Close to main port and urban area.
Potential issues: Sedimentation, physical damage, water quality.
Methods: drop camera, dive inspection/quadrats (optional).
- 8. Site 4.16 Perano Shoal**
Features: Tubeworm mounds (*Galeolaria hystrix*).

Criteria for selection: Vulnerable, representative and distinctive.
Potential issues: Sedimentation, physical damage.
Methods: drop camera, dive inspection/quadrats (optional), side scan (baseline).

9. Site 4.19 Ships Cove to Cannibal Cove

Features: Large forested catchment
Criteria for selection: Marine values may be elevated due to stable catchment. Fishing methods may impact biological values.
Potential issues: Physical damage.
Methods: drop camera, dive inspection/quadrats (optional), side scan.

10. Site 4.22 Puriri Bay

Features: Red algae bed (*Adamsiella chauvinii*)
Criteria for selection: Existing time series data (2002-2013), issues (logging in catchment), mussel farming common in area.
Potential issues: Sedimentation, physical damage.
Methods: drop camera, dive transect (quadrat sampling of red algae percentage cover and conspicuous invertebrates).

11. Site 4.23 Matiere Point (comparable features to site 4.25)

Features: Giant lampshell, burrowing anemone
Criteria for selection: Existing time series data, issues (logging in catchment), mussel farming in East Bay.
Potential issues: Sedimentation, physical damage, water quality, food depletion.
Methods: drop camera, dive transect (quadrat sampling of red algae percentage cover and conspicuous invertebrates).
Note: two sites along this coast have been monitored from 2002 to 2013 (Davidson and Richards 2014).

12. Site 5.4 Tory Channel

Features: Bryozoan mounds, hydroids, sponges.
Criteria for selection: Vulnerable and distinctive. Commercial dredging occurs in the Channel. Salmon farms located in Channel.
Potential issues: Sedimentation, physical damage.
Methods: drop camera, dive inspection/quadrats (optional).

13. Site 5.8 Tory Channel

Features: Hydroid colonies, bryozoans, sponges, ascidians
Criteria for selection: Vulnerable and distinctive
Potential issues: Sedimentation, physical damage, water quality.
Methods: drop camera, dive inspection (optional), collect hydroid samples for ID (baseline).

14. Site 6.1 The Knobbies

Features: Tubeworm mounds.
Criteria for selection: Vulnerable and distinctive.
Potential issues: Sedimentation, physical damage.

Methods: drop camera, dive inspection (optional).

15. Site 6.2 Whataroa Bay

Features: Tubeworm mounds.

Criteria for selection: Vulnerable, distinctive, existing data.

Potential issues: Sedimentation, physical damage.

Methods: drop camera, dive inspection (optional).