Davidson Environmental Limited

Reassessment of selected significant marine sites (2014-2015) and evaluation of protection requirements for significant sites with benthic values

Research, survey and monitoring report number 824

A report prepared for:
Marlborough District Council and Department of Conservation
C/o Seymour Square
Blenheim

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Authors

Rob Davidson has been involved in marine biology for 31 years. Rob holds a Master of Science with First Class Honours from the University of Canterbury, 1987 and has presented 18 conference papers and published 10 papers in internationally peer reviewed scientific journals. He has worked for MAF and the Department of Conservation and since 1994 is the director of an independent science consultancy. During his time at DOC, he coordinated or was involved in many large scale ecological surveys of coastal areas throughout Nelson and Marlborough. Rob compiled this information into the Department's Coastal Resources Inventory which was later reproduced as reports for the Councils' coastal plans. He has implemented monitoring programmes spanning up to 22 years, relating to Cook Strait ferry impacts, marine farm recovery and marine reserve monitoring. As a consultant, Rob has provided scientific information for over 800 resource consent applications and impact assessments. His company has also coordinated a marine ecological database for the Marlborough District Council. Over his working career he has conducted over 4000 dives throughout the Marlborough area and has an extensive knowledge of the underwater features and values of Marlborough.

Clinton Duffy is a marine scientist employed with the Marine Conservation Section of the Department of Conservation. He holds a M.Sc. (Hons) in Zoology from the University of Canterbury, 1990, and worked as a marine and freshwater technical support officer for the Department's Nelson/Marlborough, East Coast Hawke's Bay and Wanganui Conservancies from 1990-1999, and as Scientific Officer (marine ecology) attached to National office since 1999. He is a member of the New Zealand Marine Sciences Society, Oceania Chondrichthyan Society and the IUCN Shark Specialist Group – Australia and Oceania. Clinton has published 22 papers in internationally peer reviewed scientific journals and authored nine other scientific publications and reports. His areas of expertise include marine survey and monitoring; biogeography of New Zealand reef fishes, algae and invertebrates; and the conservation biology, taxonomy and behaviour of sharks and rays. He has dived, either in a professional or private capacity, around much of New Zealand's coastline from the Kermadec Islands to Stewart Island, including co-ordination of a dive survey of shallow subtidal habitats of the Marlborough Sounds in 1989-90.

Peter Gaze worked for many years with Ecology Division of DSIR, involved with research into the distribution, conservation and economic value of birdlife in New Zealand. This included a study of forest bird ecology, in particular rifleman, kereru and mohua. Peter is a co-author of the first atlas of bird distribution in New Zealand. Various research projects took him to the sub-Antarctic, the Kermadecs, Cook Islands and Tahiti. He then moved to the Department of Conservation where his role was primarily to provide technical advice on fauna conservation work in Nelson and Marlborough. This role enabled him to bring a national perspective to the local matters. Related fields of interest include the impact and control of mammalian predators as well as reptile conservation including leading the department's recovery of tuatara for the last ten years. Both roles have included projects working on the islands and wildlife of the Marlborough Sounds. A plan written for the management of these islands continues to guide the work of the Department. He has a long association with bird research and conservation throughout the country and was for some time the secretary for the Ornithological Society of NZ. Peter has now works for charitable trusts committed to conservation in Abel Tasman National Park and the outer Marlborough Sounds.

Andrew Baxter has over 30 years experience in coastal and marine management, specialising in marine ecology including marine mammals. He graduated from the University of Canterbury in 1981 with a BSc with First Class Honours in Zoology. Following two years working for the Taranaki Catchment Commission as a marine biologist, Andrew worked as a fisheries management scientist for MAF Fisheries based in Wellington from 1984 to 1987. He has been employed as a marine ecologist for the Department of Conservation in Nelson since October 1987. Andrew is currently a Technical Advisor in DOC's Marine Species and Threats Team.

Sam Du Fresne has over 15 years of experience studying marine mammals, beginning with his master's thesis in 1998. He has conducted a number of dolphin surveys in New Zealand focussed mainly on Hector's dolphins and has worked in places as diverse as Far East Russia, Hawaii and Western Australia. After graduating with a PhD from the University of Otago in 2005, Sam worked as an independent consultant, specialising in marine mammals. As a consultant, Sam worked closely with DoC, MFish, NIWA, Cawthron, various regional councils and a number of industry clients, providing expert advice and research services on a range of species and issues. Sam also spent time at SMRU Ltd in St Andrews (Scotland) where he worked as a senior research scientist, focussing mainly on marine mammals and renewable energy projects. Recently, after working for more than three years in Western Australia on mega-projects such as the Gorgon and Wheatstone LNG developments, Sam returned to New Zealand to join the EEZ Compliance team at the Environmental Protection Authority in Wellington.

Shannel Courtney is a Nelson-based plant ecologist with the Department of Conservation, working as a Technical Advisor in the Terrestrial Ecosystems Unit. In 1983 he attained a Master of Science in plant ecology at Canterbury University and before DOC has worked for the NZ Wildlife Service, NZ Department of Lands and Survey and NZ Forest Service on management issues. For much of the earlier part of his career, he has been involved in the assessment of natural areas for ecological significance and has led various ecological surveys of the East Cape, Taranaki, Marlborough and Nelson regions. Relevant publications and co-authorships include Protected Natural Area reports for North Taranaki, Motu and Pukeamaru Ecological Districts and for Molesworth Station, habitat restoration guides for Nelson City and Tasman District, and several publications on the development of a natural character framework for the Marlborough Sounds. For the last 20 years, he has specialised in threatened plant conservation and co-ordinates the recovery of nationally threatened and at-risk species in the Nelson region and Marlborough Sounds. He is currently on the National Threatened Plant Panel and on the committee of the NZ Plant Conservation Network. In 2008 he was awarded the Loder Cup in recognition of his services to plant conservation.

Bruno Brosnan qualifications include a Bachelor of Science in Zoology and Psychology from Massey University, a post graduate diploma in Marine Science from Otago University, a Master of Science in Marine Science from Otago University investigating recovery and succession of benthic environments after disturbance, a post graduate diploma in Environmental Management from the University of Waikato, a Master of Management Studies majoring in environmental management and a Master of Planning from Massey University. Bruno is also a qualified diver instructor. Bruno presently works for the Marlborough District Council as a coastal planner.

1.0 Summary

Davidson *et al.* (2011) described a total of 129 significant marine sites in Marlborough. The Marlborough District Council (MDC) and Department of Conservation have embarked on an ongoing survey and monitoring programme aimed at updating this information and to monitor selected sites. Davidson *et al.* (2014) provided a detailed range of survey protocols including techniques suited for rapid reconnaissance (qualitative descriptions) and techniques suitable for monitoring (quantitative data).

The first of these follow-up surveys was conducted in the summer of 2014/2015. That investigation targeted 21 sites and sub-sites in the eastern Marlborough Sounds. Sites selection was guided by:

A. Sites identified as having limited or old biological information (Davidson *et al.,* 2011).
B. Sites where additional information was needed (Davidson *et al.,* 2014).
C. Recommended sites suitable for monitoring (Davidson *et al.,* 2014).

Results from that 2014/2015 survey were summarized in Davidson and Richards (2015); raw data were lodged with MDC. The authors also provided comment on site boundary alterations and recommendations for their reassessment based on the new data.

The present report reassesses those sites based on the new information provided in Davidson and Richards (2015) and using the seven criteria developed and applied by Davidson *et al.* (2011). The wording of the original criteria in Davidson et al. (2011) has been slightly modified by the expert panel to avoid misinterpretation and help clarify their meaning.

The present report also assesses the protection needs of significant sites that support benthic biological values. The aim of this exercise is to assess the level of site sensitivity to a range of physical disturbance types, and to categorise sites according to anthropogenic threats. This assessment also provides guidance for peripheral management areas (buffers) around sites.

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 ("expert panel") developed a set of criteria to assess the relative biological importance of each site. Sites that received a medium or high score were termed “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; however, they noted that many sites had limited or old information. Particular marine sites had not been surveyed or the information available was incomplete, patchy or potentially not reflective of the current state of the sites. The authors stated that more investigation was required to better assess the status of many significant sites.

The authors also stated that many of the sites assessed below significant status 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.

Davidson et al. (2014) provided guidance on the collection, storage and publication of biophysical data from potential new significant sites as well as existing sites. The biological investigation process was separated into three main elements:

1. Survey of new sites;
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).

Davidson *et al.* (2014) also detailed a range of candidate sites for survey and monitoring. The authors also provided comment on survey protocols including techniques suited for rapid reconnaissance (i.e. qualitative descriptions) and techniques suitable for monitoring (i.e. quantitative data collection).

In the summer of 2014-2015 a survey of 21 sites and sub-sites was undertaken in eastern

Marlborough Sounds. Davidson and Richards (2015) presented a summary of the new biological data; raw data was provided to MDC for storage. The authors also commented on site boundary alterations and recommended any necessary changes to the assessments of significance.

The expert panel was reconvened to reassess the new information for the 21 sites and sub-sites outlined in Davidson and Richards (2015). The present report presents the findings of that reassessment. It also comments on issues associated with physical disturbance of significant sites supporting benthic biological values and appropriate management categories for the protection of those values.

3.0 The reassessment process

3.1 Data collation

All data collected by Davidson and Richards (2015) were compiled and made available to the expert panel during the reassessment of the 21 sites and sub-sites. Data included: drop camera photographs, hand held photographs, hand held video, remote video, sonar images, diver quadrat counts and diver observations (note: all data held at MDC).

Information relating to each original site was also compiled including: site description, site boundaries, the original assessment, and any data previously compiled or known for the site or sub-site.

3.2 Expert panel

Most experts involved in the original assessment of significant sites (Davidson *et al.* (2011) were involved in the present reassessment. The MDC representative on the 2011 panel (Peter Hamill) was replaced by Bruno Brosnan.

The expert panel, apart from Peter Gaze (marine birds), Sam duFresne (marine mammals) and Shannel Courtney (plants) reconvened for a group discussion for the reassessment of the 21 sites and sub-sites on 21 August 2015. The assessment of a new bird site was undertaken separately by Peter Gaze and was reviewed by the remaining expert panel members to ensure consistency. Sam duFresne and Shannel Courtney were not involved in the reassessment meeting as no new or surveyed marine mammal or plant sites were under scrutiny; however, all experts contributed to the present report.

4.0 Wording of the assessment criteria

During the reassessment, panel members recognized the need to clarify some of the wording for particular assessment criteria first applied to assess candidate sites in Davidson *et al.* (2011). The expert panel applied the revised version of the criteria during the present reassessment of the 21 sites and sub-sites.

The revisions clarify the meaning of the criteria to avoid any possible misinterpretation. They are relatively minor and do not create an inconsistency between the sites assessed in Davidson *et al.* (2011) and the present reassessment.

Alterations to the Assessment Criteria

Criteria 1 (Representativeness)

Original:
The site is significant if it contains biological features (habitat, species, community) that represent a good example within the biogeographic area.
H: The site contains one of the best examples of its type known from the biogeographic area.
M: The site contains one of the better examples, but not the best, of its type known from the biogeographic area.
L: The site contains an example, but not one of the better or best, of its type known from the biogeographic area.

Revised:
H: The site contains ~~one of~~ the best example~~s~~ of its type known from the biogeographic area.

Criteria 3 (Diversity and Pattern)

Original:
The site is significant if it contains a range of species and habitat types notable for their complexity (i.e. diversity of species, habitat, community).
H: The site contains a high diversity of species, habitats or communities.
M: The site contains a moderate diversity of species, habitats or communities.
L: The site contains a low diversity of species, habitats or communities.

Revised:
Diversity ~~and Pattern~~

Criteria 5 (Size)

Original:

The site is significant if it is moderate to large in size relative or other habitats or communities of its type in the study area.
H: The site is large in size.
M: The site is moderate in size.
L: The site is small in size.

Revised:
The site is significant if it is moderate to large in size relative or other habitats or communities of its type in the **biogeographic area** ~~study area~~.

Criteria 6 (Connectivity)

Original:
The site is significant if it is adjacent to, or close to other significant marine, freshwater or terrestrial areas.

H: The site is close to or well connected to a large significant area or several other significant areas.
M: The site is in the vicinity of other significant areas, but only partially connected to them or at an appreciable distance.
L: The site is isolated from other significant areas.

Revised:
The site is significant if it is adjacent to, or close to other significant marine, freshwater or terrestrial areas**; or the site is sufficiently close to other sites of its kind to enable biological interchange (e.g. larval transport, settlement of juveniles).**

Criteria 7 (Adjacent catchment modification)

Original:
Catchments that drain large tracts of land can lead to high sediment loading into adjacent marine areas. A site is significant if the adjacent catchment is >400 ha and clad in relatively mature native vegetative cover resulting in a long term stable environment with markedly reduced sediment and contaminant run-off compared to developed or modified catchments.

H: The site is dominated by a stable and relatively mature native vegetated catchment (>400 ha) that is legally protected.
M: The site is dominated by a stable and relatively mature native vegetated catchment (>400 ha) with partial or no legal protection.
L: The site is surrounded by a catchment (>400 ha) that is farmed, highly modified or has limited relatively mature vegetative cover.

Revised:
H: The site is dominated by a stable and relatively mature native vegetated catchment (>400 ha) that is legally protected.
M: The site is dominated by a stable and relatively mature native vegetated catchment (>400 ha) with partial or no legal protection.
L: The site is surrounded by a catchment (>400 ha) that is farmed, highly modified or has limited relatively mature vegetative cover.
NA: The site is little influenced by catchment effects (e.g. offshore site, current swept site).

5.0 Reassessment of sites in Davidson and Richards (2015)

The expert panel reassessed 15 sites and 6 sub-sites based on data presented in Davidson and Richards (2015) (Table 1). The assessment used the modified criteria outlined in section 4 above.

The Panel recommended:

a) three sites be removed from the list of significant sites due to the loss or significant degradation of biological values (Hitaua Bay Estuary, Port Gore (central) horse mussel bed and Ship Cove) (Table 1).
b) the offshore site located north of Motuara Island be removed and replaced with a small area located around a rocky reef structure.
c) adjustments to the boundaries of most of the remaining significant sites in accordance with the recommendations of Davidson and Richards (2015).

Based on the removal of the three sites and a number of boundary adjustments, a total of 1544 ha was removed and 113.8 ha added as significant sites. The overall change between that recorded in 2011 and 2015 was a loss of 1430.8 ha (Table 1).

Table 1. Summary of significant sites reassessed, the biological value, and expert recommendations

Site	Biological features	Expert recommendations	Change (ha)	Reason for change
Site 2.31 Port Gore (outer)	Horse mussel bed	Adjust boundary to fit values	-156.80	Reduced area with biological values
Site 2.32 Port Gore (central)		Remove from significant site list	-635.60	No remaining medium of high biological values
Site 2.33 Port Gore (inner)	Tubeworm bed	Adjust boundary to fit values	-4.67	Reduced area with biological values
Hunia king shag site, Port Gore	King shag	Establish new significant site	0.03	New site described
Site 4.11 Bobs Bay	Tubeworm bed	Adjust boundary to fit values	-2.54	Survey defined smaller area than first thought
Site 4.16 Perano Shoal	Tubeworm bed	Adjust boundary to fit values	1.69	New area discovered with medium or high values
Site 4.19 Ship Cove		Remove from significant site list	-437.70	Reduced area with biological values
Site 4.22 Puriri Bay	Red algae bed	Retain boundary and monitor	0.00	Reduced area with biological values
Site 4.23 Matiere Point	Burrowing anemone, giant lampshell	Adjust boundary to fit values	-17.55	Survey defined smaller area than first thought
Site 5.3 Hitaua Bay		Remove from significant site list, study recovery	-1.86	Biological values degraded due to sedimentation
Site 5.4A Ruaomoko Coast	Biogenic clumps	Adjust boundary to fit values	20.95	New area discovered with medium or high values
Site 5.4B Wiriwaka Point	Biogenic clumps	Adjust boundary to fit values	5.30	New area discovered with medium or high values
Site 5.4C Tokakaroro Point	Biogenic clumps	Adjust boundary to fit values	3.20	New area discovered with medium or high values
Site 5.4D Te Uira-Karapa Point	Biogenic clumps	Adjust boundary to fit values	6.57	New area discovered with medium or high values
Site 5.8 Tory Channel north-east	Biogenic clumps, hydroid trees	Adjust boundary to fit values	76.05	New area discovered with medium or high values
Site 7.4 Motuara subtidal	Offshore reef community	Adjust boundary to fit values	-287.90	Reduced area with biological values
Overall total change (ha)			-1430.83	
Increase to significant sites (ha)			113.79	
Decrease to significant sites (ha)			-1544.62	

6.0 Significant site sensitivity and protection from physical damage

6.1 The need for protection from physical damage

Many significant sites contain biological features considered to be remnants of species, habitats and/or communities that were likely once more widespread (Davidson *et al*. 2011). Globally, biogenic habitats have been reduced and their loss has often been linked to wider ecological consequences. For example, a decline in biogenic habitats has been linked to a decline in juvenile fish habitats and a consequential decline in fish abundance and biomass (see Morrison et al. 2014 for review).

The site assessment criteria used by Davidson *et al*. (2011) relied heavily on identifying the best or better sites remaining in each biogeographic area. In certain cases the biological values represented the last of their kind based on existing knowledge. Their existence was often due to environmental factors such as topography or substratum that provided some level of natural protection from anthropogenic (human) impacts.

Loss and degradation of marine biological values around New Zealand and internationally has been linked to anthropogenic activities (Lauder 1987, Stead 1991, Cranfield *et al.* 1999, Cranfield *et al.* 2003, Morrison *et al.* 2009, Davidson *et al.* 2011, MacDiarmid *et al.* 2012, Paul 2012, Morrison *et al.* 2014, 2014a, Handley 2015). In particular, direct physical disturbance has been assessed as one of the main causes of damage to marine benthic biological values (MacDiarmid *et al.*, 2012). It is likely that without protection or strong management Marlborough's significant marine sites will continue to be lost or degraded. Davidson and Richards (2015) highlighted the decline of biological attributes at a number of the significant sites identified by Davidson *et al.* (2011). In some cases the loss of benthic biological values resulted in the removal of part of or the entire significant site.

Significant sites that support benthic biological values are vulnerable to physical damage from activities such as dredging, trawling and anchoring. An assessment of each significant site's sensitivity to physical disturbance provides a guide to the type and level of protection required. The present assessment of site sensitivity and appropriate protection therefore aimed to:

a) List significant sites that support benthic biological values vulnerable to physical disturbance
b) Outline their sensitivity based on environmental variables (e.g. habitat type, water currents and impact level).
c) Recommend management protection at a level appropriate for each significant site.

6.2 Defining significant site vulnerability to benthic physical damage

For each of the significant sites known to support benthic values listed in Davidson *et al.* (2011), the site's vulnerability to benthic physical damage was assessed based on:

a) The three environmental variables outlined in Table 2; and
b) Expert panel knowledge of each significant site (i.e. personal knowledge and/or from the literature).

A similar approach was adopted by Halpern *et al.* (2007) and further adapted for the assessment of New Zealand's marine environment by MacDiarmid *et al.* (2012). Further, Robertson and Stevens (2012) described an ecological vulnerability assessment (EVA) developed from UNESCO (2000) for use at estuarine sites in Tasman and Golden Bays. The UNESCO methodology was designed to be used by experts to represent how coastline ecosystems were likely to react to the effects of potential "stressors".

6.2.1 Environmental variables

Habitat sensitivity was defined as the sensitivity of habitats, species and communities to disturbance and ultimately damage. These ranged from extremely sensitive biological values such as lace corals and brittle tubeworm mounds (low scores) to relatively robust species or habitats such as coarse substrate shores and high energy kelp forests (high scores).

Wave exposure reflects a site's location relative to the open sea (i.e. Tasman Bay, Cook Strait and the Pacific Ocean). Sheltered sites are located within bays or inside the Sounds whereas exposed sites are open to oceanic or open sea conditions. In general, significant sites with low wave exposure tend to support species, habitats or communities that are vulnerable to disturbance, slow growing and/or limited in spatial extent compared to exposed sites that support biological features often (but not always) more resilient to disturbance.

Disturbance level is the level of anthropogenic disturbance known from or expected to occur at each significant site. Disturbance levels ranged from little or no disturbance (low score) to sites regularly subjected to significant physical disturbance (high score).

Table 2. Selected environmental variables used to assess the vulnerability of significant sites to benthic damage from physical disturbance.

Variables	Score	Description and definition
1. Habitat sensitivity:		
Extremely sensitive	1	Lace or fragile bryozoan colonies, tubeworm mounds, rhodoliths, burrowing anemone
Very sensitive	2	Massive bryozoans, sponges, hydroids
Sensitive	3	Horse mussels, soft tubeworms, shellfish beds, red algae bed
Resilient	4	Algae forest, coarse substrata, reefs, boulder banks, high energy shore
2. Wave exposure:		
Sheltered	1	Sheltered from oceanic swells, only exposed to wind driven waves
Exposed	2	Exposed to oceanic swells and wind driven waves (<1 m)
3. Disturbance level:		
Low	1	Subjected to little or no known physical seabed disturbance
Moderate	2	Subjected to seabed disturbance from light equipment and/or anchoring. If heavy disturbance occurs it is rare and impacts a small part of the site
High	3	Subjected to seabed disturbance from heavy equipment

6.3 Benthic habitat protection categories

MacDiarmid *et al.* (2012) listed a range of anthropogenic activities that have an adverse impact on New Zealand’s marine environment. Physical damage from activities such as dredging and trawling was ranked as one of the highest threats in terms of impacts on seabed values.

For the purposes of the present assessment, it was recognised that activities which damage benthic habitats can be separated based on their relative effect, with heavy commercial equipment having greater impacts compared to light recreational gear or intermittent anchoring. Further, the type of habitat and the nature of the environment also influence the level of effect.

Significant sites supporting benthic habitats were categorized into five groups ranging from sites intolerant of most forms of physical disturbance through to sites tolerant of some physical disturbance and to sites already legally protected (e.g. marine reserves) (Table 3). Sites that had once supported significant benthic values but had lost them due to damage were also categorized as potential recovery sites should their management be changed in the future.

Categories A, B and C (Table 3) require active management aimed at restricting certain types of activities that disturb the sea floor. Category D requires no action as these sites are fully protected. Category E sites no longer support significant benthic values, but are candidates for habitat recovery.

Table 3. Description of significant site vulnerability to types of benthic physical damage and the suggested protection categories recommended for managing sites.

Protection category	Description of significant site vulnerability to benthic physical damage
A (all gear)	Sites intolerant most forms of benthic physical seabed disturbance (including anchoring and all forms of dredging and trawling).
B (Anchoring OK)	Sites generally intolerant of benthic physical disturbance, but can tolerate occasional anchoring (resilience often due to the nature of the substrata and hydrodynamic regimes).
C (light gear and anchoring OK)	Sites that cannot tolerate heavy benthic physical disturbance, but can tolerate disturbance from light (< 25 kg) gear.
D (fully protected)	Sites with benthic habitats legally protected from physical disturbance.
E (recovery possible)	Sites not presently considered significant after reassessment, but benthic habitats may recover if impacts reduced.

6.5 Significant sites in each protection category

Eleven significant sites supporting benthic biological values were ranked as category A requiring the highest level of protection (Figure 1, Tables 4 and 5, Appendix 2). These significant sites support communities dominated by fragile species such as rhodoliths, upright tubeworms mounds, and brittle bryozoans mounds. These sites are the best of their kind in their respective biogeographic areas in Marlborough. Presently none of these sites is protected from benthic physical disturbance and all are considered to be sites that would degrade over time without a high level of protection.

Most sites (n=60) were categorized into group B (Figure 2, Table 4, Appendix 2). These sites support benthic values which are able to tolerate low intensity anchoring activities, but cannot survive more damaging activities such as dredging and trawling.

Only two sites were categorized into group C. These sites either (1) supported species, habitats or communities able to cope with anchoring and disturbance from light weight gear such as recreational dredges (i.e. Croisilles Harbour entrance) or (2) were located in an area not known to support specific habitats, species or communities of importance (i.e. Tennyson Inlet where the site was important for other more general reasons).

Only one marine site in Marlborough is fully protected (Long Island-Kokomohua Marine Reserve) meeting the requirements of Category D (Figure 3).

Three sites were listed in category E. These sites were originally listed in Davidson *et al.* (2011) but no longer retain their particular benthic values (Figure 3). These sites are suitable candidates for rehabilitation.

Four sites had insufficient information to enable a reliable assessment at this time and accordingly are recorded as “TBC” in Tables 4 and Appendix 2. (Note: the western sub-site of site 2.10 Trio Bank is also regarded as TBC) (Figure 3).

Table 4. Number of significant sites supporting benthic habitats scored into each of the protection categories.

Protection category	Number of sites
A	11
B	60
C	2
D	1
E	3
TBC	4
Total	81

(Note: TBC = to be confirmed)

6.6 Level of information

The level of information available for assessing each site was assigned to one of four categories based on the criteria used by Davidson *et al*. (2011) (Table 6).

In some circumstances there was insufficient information to make a reliable judgment either due to old data or the low reliability of the source information. In these cases the site was ranked TBC (to be confirmed) and a note made regarding the collection of new data before an assessment can be reliably made (Appendix 2). In some instances the expert panel considered that, despite the information having a low level of confidence, there was sufficient potential for the site to retain values to justify categorization of the site for protection. It is, however, recommended that these sites be prioritized for the collection of additional information.

Table 5. Protection Category “A” for significant sites supporting benthic biological values.

Site No	Site Location Name	Species/community/habitat	Habitat sensitivity	Wave exposure	Impact level	Vulnerability score	Management category	Buffer	Last survey/ Monitoring dates)	Level of Information
1.5	Coppermine Bay	Rhodolith bed	1	1	1	***3***	**A**	100	2010	2
2.13	Catherine Cove Rhodoliths	Rhodolith Bed	1	1	1	***3***	**A**	50	2010	2
2.24	Allen Strait	Bryozoan dominated community	1	1	1	***3***	**A**	100	1990, 2010	2
2.6	Rangitoto Roadstead	Bryozoan dominated community	1	1	2	***4***	**A**	200	1994	2
3.7	Picnic Bay	Rhodolith bed	1	1	1	***3***	**A**	100	1999, 2010	2
4.11	Bob's Bay	Tubeworm bed	3	1	1	***5***	**A**	50	2015	3
4.9	Wedge Point (subtidal rocky shores)	Tubeworm mounds	1	1	2	***4***	**A**	100	2010	3
4.16	Perano Shoal	Tubeworm mounds	1	1	2	***4***	**A**	100	2015	3
4.25	Onauku Bay (Northern Coastline)	Giant lampshell, tubeworm mounds, burrowing anemone	1	1	2	***4***	**A**	100	2002	2
6.1	The Knobbys	Tubeworm mounds	1	1	1	***3***	**A**	100	1995	2
6.2	Whataroa Bay	Tubeworm mounds	1	1	1	***3***	**A**	100	1995, 2011	2

Table 6. Level of information for each site and the relative confidence applied.(from Davidson *et al*. (2011).

Category	Description	Confidence
1	Brief visit	Moderate
2	Qualitative report	High
3	Qantitative report	Very high
4	Personal communication	Low

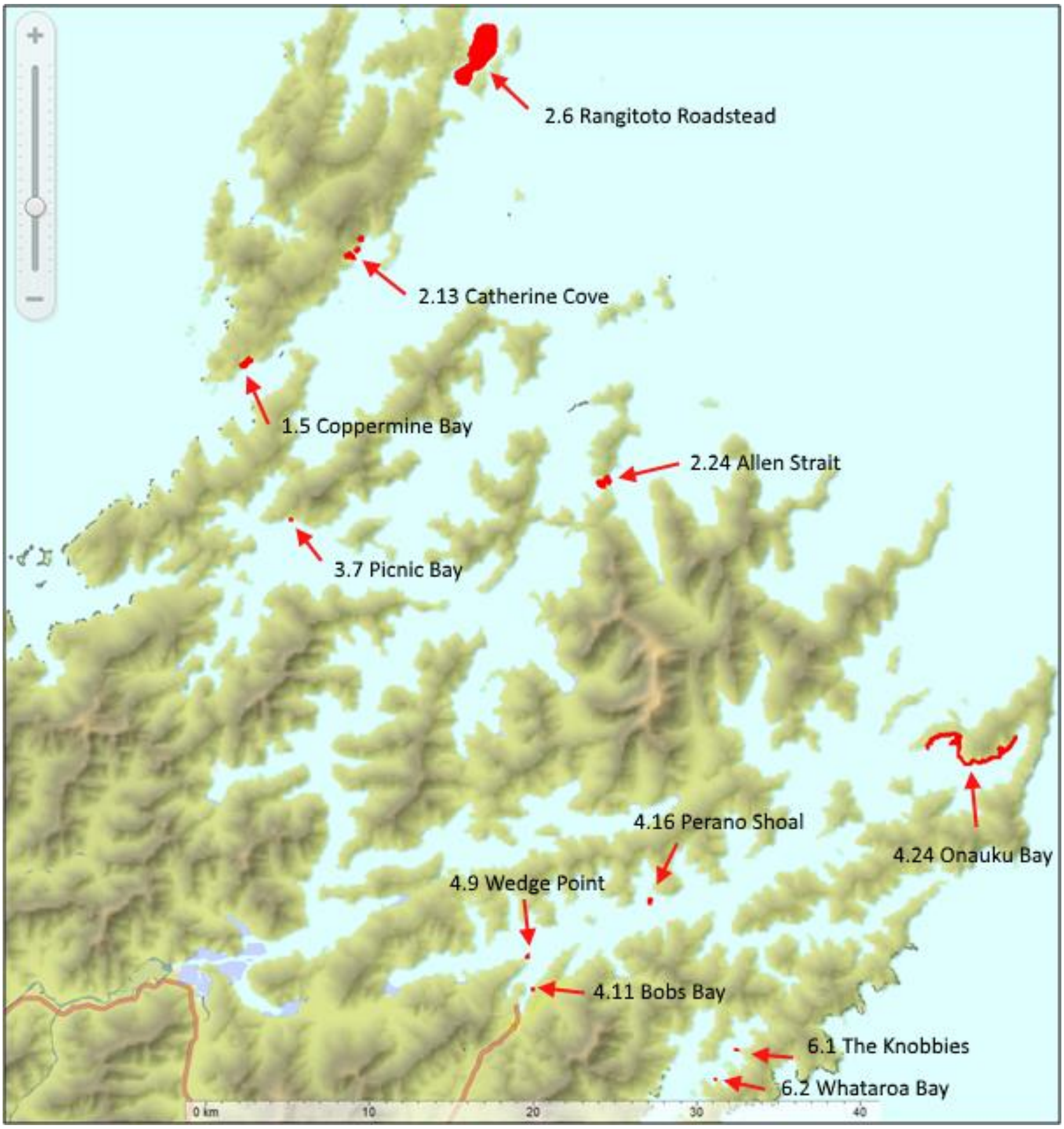

Figure 1. Known category A sites (n = 11 sites) (i.e. sites intolerant most forms of benthic physical seabed disturbance (including anchoring and all forms of dredging and trawling)). Note: three sub-sites in Catherine Cove are treated as one significant site.

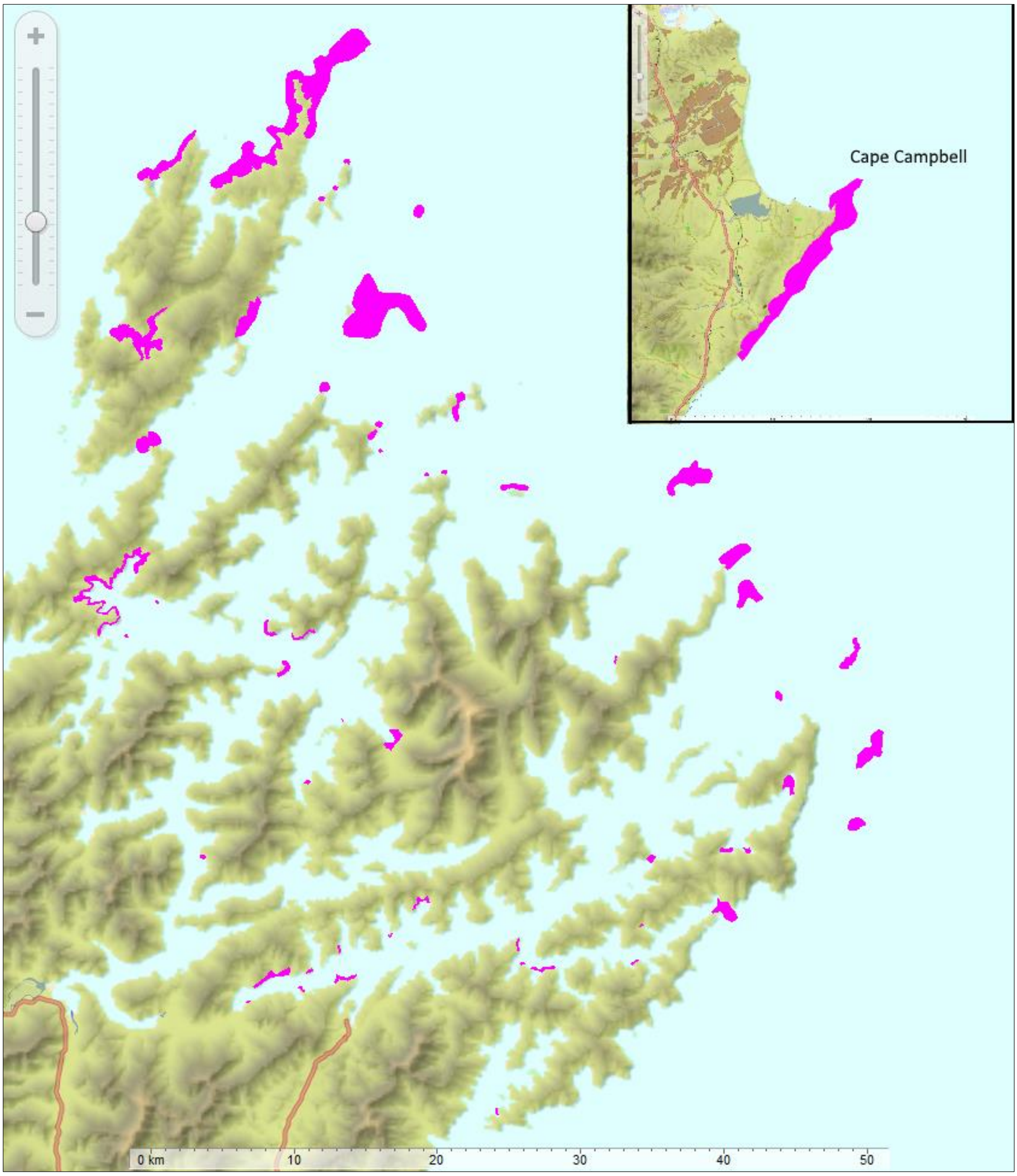

Figure 2. Known Category B sites (n = 60 sites) (i.e. sites generally intolerant of benthic physical disturbance, but can tolerate occasional anchoring (resilience often due to the nature of the substrata and hydrodynamic regimes)).

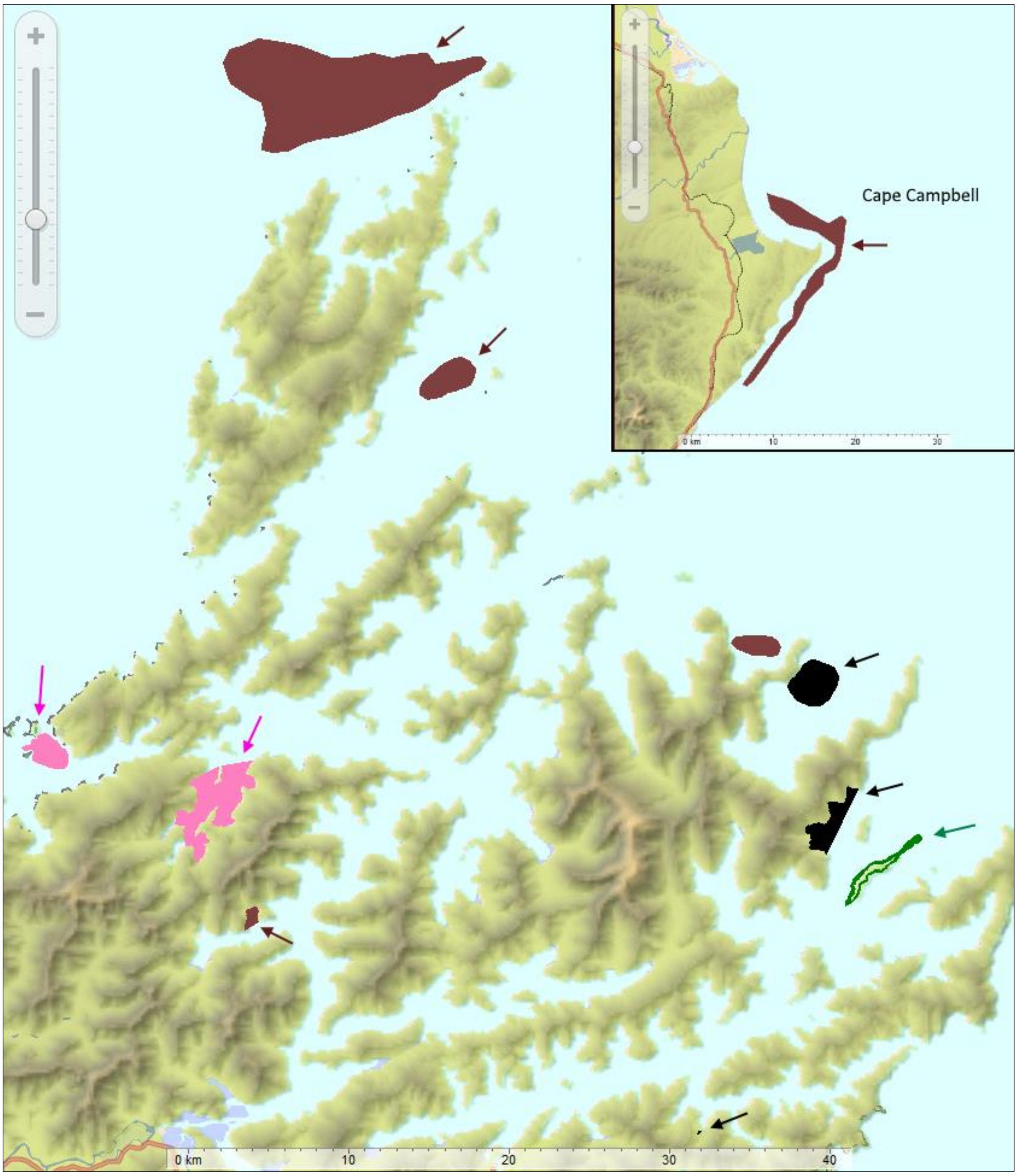

Figure 3. Known category C sites (pink) (i.e. sites that cannot tolerate heavy benthic physical disturbance, but can tolerate disturbance from light (< 25 kg) gear), D sites (green) (i.e. sites with benthic habitats legally protected from physical disturbance), E sites (black) (i.e. sites not presently considered significant after reassessment, but benthic habitats may recover if impacts reduced, and TBC sites (brown) (i.e. sites to be confirmed).

7.0 Peripheral management areas (PMA)

A number of New Zealand studies have documented the vulnerability of soft bottom habitats to dredging and trawling (Cranfield *et al.,* 1999; Thrush *et al.,* 1998, 2001; Grange *et al.,* 2003). In an effort to enhance protection from physical damage, it is recommended that a peripheral management area (i.e. buffer zone) be established around each significant site (see review on buffer zones by Martino 2001).

The aim of a PMA is to reduce the chance of accidental (GPS error and equipment constraints e.g. hauling of trawl gear); or intentional encroachment. Bloomfield *et al.* (2012) suggested that the absence of positive effects for fish populations in prohibited trawling areas in the North Sea was partly attributable to regular trawling within protected sites.

A PMA also provides a buffer against indirect effects such as sedimentation from nearby dredging (Grange *et al.* 2003; see also review on the effects of sediment and sedimentation on marine habitats by Morrison *et al.* (2009)).

A PMA (buffer of 50 m, 100 m or 200 m) is recommended for each site and sub-site investigated by Davidson and Richards (2015) (Table 7 and Appendix 2). These buffers are based on the location of each significant site and the likelihood of accidental encroachments. The expert panel considered that sites located close to shore were less likely to be accidentally encroached upon compared to offshore sites well away from reference points such as headlands and the shoreline generally.

In general a PMA of 200 m is recommended for offshore sites in large bays or the open coast. For small bays or sites located near the shore, a buffer of 100 m is suggested. For small significant sites (< approximately 4 ha) located in enclosed waters, a smaller buffer of 50 m is recommended (Table 7).

These recommended distances should be regarded as guidance only and the PMA around significant sites should also consider other factors such as whether a site supports very sensitive species (e.g. filter feeding animals) that could be adversely affected from a greater distance (e.g. by sediment plumes from dredges) (see review on the effects of sediment on benthic organisms by Hewlitt and Lohrer, 2013).

Table 7. Guidelines for PMA size (buffer distance) around significant sites.

Significant site location	PMA size (m)
Offshore (most or all of site >1 km from shore)	200 m
Moderate distance (most of site located 200 m to 1 km from shore)	100 m
Site <4ha in size and close to shore	50 m

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Appendix 1 Summary of expert panel assessments

Site 2.31 Port Gore (outer)

	Davidson et al. (2011) assessment	2015 expert assessment
Site number	2.31	2.31
Site name	Port Gore offshore	Port Gore (offshore) horse mussel bed
Site description	Port Gore is a large bay approximately 7 km wide between Cape Lambert on the west and Cape Jackson on the east. it opens directly into Cook Strait and has 37.5km of coastline and a sea area of 5550 ha.	This site is located in outer Port Gore between Cape Lambert and Cape Jackson. The original significant site 2.31 (Port Gore outer) was based on personal communications with commercial fishers (Davidson *et al.* 2011). Data collected from site 2.31 in 2015 shows a remnant horse mussel bed; however, no bryozoans were observed. It is possible that fishers who described the attributes of site 2.31 confused bryozoans with the presence of a dense horse mussel bed. It is probable that the horse mussel bed has survived trawling due to its location on a sloping shore.
Biogeographic area	Outer Pelorus	Outer Pelorus
Level of original information	4. Personal communication	2. Qualitative internal report
Assessment of ecological significance	An area south-east of Cape Lambert is dominated by bryozoans, probably Separation Point "Coral", according to commercial fishers. A wide variety of invertebrates and fish live in association with bryozoan reefs. This area has not been scientifically surveyed and little is known about it. This area is estimated to be approximately 314 ha in size.	This horse mussel bed represents the highest density bed of its kind known from Marlborough and biogeographic area. . Dense horse mussel beds are now uncommon in the outer Pelorus Sound. Supports elevated species due to biogenic habitat, typical of horse mussel beds, not as high diversity of species as some beds in NZ.
Suggested actions		Adjust original boundary. Protect habitats and establiush a 200 m peripheral management area (PMA) around this site.
Assessment criteria scores		
1. Representativeness	Unknown	H (high)
2. Rarity	Unknown	L (low)
3. Diversity and pattern	Unknown	M (medium)
4. Distinctiveness	Unknown	M (medium)
5. Size	Unknown	H (high)
6. Connectivity	Unknown	L (low)
7. Catchment	Unknown	NA
Date of assessment	1/09/2011	21/08/2015
Assessment	Davidson *et al.* 2011	Clinton Duffy Rob Davidson Andrew Baxter Bruno Brosnan
Reports	Hay, C.H. 1990. The ecological importance of the horse mussel (*Atrina zelandica*) with special reference to the Marlborough Sounds. Prepared for Nelson Marlborough Regional Office, DOC.	Davidson, R.J. and Richards, L.A. 2015. Significant marine site survey and monitoring programme: Summary 2014-2015. Prepared by Davidson Environmental Limited for Marlborough District Council. Survey and monitoring report number 819

Site 2.32 Port Gore (central)

	Davidson et al. (2011) assessment	2015 expert assessment
Site number	2.32	NA
Site name	Port Gore shallow offshore	NA
Site description	Based on historic surveys, a large area of central outer Port Gore supports a horse mussel bed and associated encrusting species.	The site is characterised by a flat shore characterised by mud with a small component of natural shell. A microalgal mat was widespread.
Biogeographic area	Outer Pelorus	Outer Pelorus
Level of original information	4. Personal communication	2. Qualitative internal report
Assessment of ecological significance	This is one of the two largest horse mussel beds in this biogeographic area however this area has been trawled regularly and their present condition is unknown. Beds on this scale are important components of the ecosystem. They provide a substratum for other species to settle and refuge from predators; they influence water flows and sedimentation rates; they produce deposits rich in organic carbon and nitrogen. Horse mussels are also capable of filtering up to 80% of small particles from the water, affecting phytoplankton concentrations and water clarity.	The site no longer supports a horse mussel bed. This is likely due to dredging/trawling activities.
Suggested actions		**Remove from significant site list**
Assessment criteria scores		
1. Representativeness	M (medium)	
2. Rarity	L (low)	
3. Diversity and pattern	M (medium)	
4. Distinctiveness	M (medium)	
5. Size	H (high)	
6. Connectivity	L (low)	
7. Catchment	L (low)	
Date of assessment	1/09/2011	21/08/2015
Assessment	Davidson *et al.* 2011	Rob Davidson Clinton Duffy Andrew Baxter Bruno Brosnan
Reports	Hay, C.H. 1990. The ecological importance of the horse mussel (*Atrina zelandica*) with special reference to the Marlborough Sounds. Prepared for Nelson Marlborough Regional Office, DOC.	Davidson, R.J. and Richards, L.A. 2015. Significant marine site survey and monitoring programme: Summary 2014-2015. Prepared by Davidson Environmental Limited for Marlborough District Council. Survey and monitoring report number 819.

Site 2.33 Port Gore (inner)

	Davidson et al. (2011) assessment	2015 expert assessment
Site number	2.33	2.33
Site name	Port Gore (inshore)	Port Gore (Hunia) tubeworm beds
Site description	This stretch of coast extends from Hunia north to southern Pig Bay. The coastline of approximately 2 km supports a variety of species often in good numbers.	The coast from Hunia to Pig Bay supports patches of shallow seabed with tubeworm beds.
Biogeographic area	Outer Pelorus	Outer Pelorus
Level of original information	4. Personal communication	2. Qualitative internal report
Assessment of ecological significance	Within this area there are dense beds of horse mussels, scallops and red algae as well as a variety of other species associated with these communities. Up to 14 horse mussels per square metre have been reported. Beds of tubeworm (*Owenia petersenae*), and small and large dog cockle are also known along this coastline. Egg cases from elephant fish have also been recorded and blue cod are common.	Three sites supporting endemic tubeworms (*Owenia petersenae*) were found along this coast. Tubeworms were most abundant between 11m and 14m depth on gently sloping shores. *Owenia* tubeworm beds are uncommon in the Marlborough Sounds. Another larger tubeworm zone is known from significant site 2.34 at Gannet Point (south-eastern, Port Gore). Tubeworm beds are vulnerable to sedimentation, smothering and physical damage.
Suggested actions		Adjust site boundaries to encompass tubeworm beds. Survey northern area to determine boundary. Protect habitats. Establish a 100 m PMA.
Assessment criteria scores		
1. Representativeness	M (medium)	M (medium)
2. Rarity	L (low)	M (medium)
3. Diversity and pattern	M (medium)	M (medium)
4. Distinctiveness	M (medium)	M (medium)
5. Size	M (medium)	M (medium)
6. Connectivity	L (low)	M (medium)
7. Catchment	L (low)	L (low)
Date of assessment	1/09/2011	21/08/2015
Assessment	Davidson *et al.* 2011	Clinton Duffy Rob Davidson Andrew Baxter Bruno Brosnan
Reports	Hay, C.H. 1990. The ecological importance of the horse mussel (*Atrina zelandica*) with special reference to the Marlborough Sounds. Prepared for Nelson Marlborough Regional Office, DOC.	Davidson, R.J. and Richards, L.A. 2015. Significant marine site survey and monitoring programme: Summary 2014-2015. Prepared by Davidson Environmental Limited for Marlborough District Council. Survey and monitoring report number 819

New Site: Hunia king shag roost

	Davidson et al. (2011) assessment	2015 experts assessment
Site number	NEW SITE	
Site name	NA	Port Gore king shag colony (Hunia)
Site description	NA	The Hunia coast stretches around a promontory located in Port Gore. The Hunia king shag colony is on the eastern side of the promontory north of Hunia. The latest aerial count recorded 53 king shags at Hunia in February 2015. The survey recorded a total of 839 birds in the Sounds (Schuckard 2015). A previous site in Port Gore (Taratara) was previously used by approximately 28 birds (Bell 2010) but this site appears to have been abandoned in favour of the Hunia site. Limited breeding was recorded at Taratara in 2006 (Bell 2006).
Suggested actions		Investigate protection of roost from predators.
Biogeographic area	Outer Pelorus	Outer Pelorus
Level of original information		2. Qualitative internal report
Assessment of ecological significance	NA	
Assessment criteria scores		
1. Representativeness		M (medium)
2. Rarity		H (high)
3. Diversity and pattern		L (low)
4. Distinctiveness		M (medium)
5. Size		L (low)
6. Connectivity		M (medium)
7. Catchment		L (low)
Date of assessment		
Experts involved in assessment		Pete Gaze Rob Davidson
Reports		Bell, M. 2010. Numbers and distribution of New Zealand king shag (*Leucocarbo carunculatus*) colonies in the Marlborough Sound, September-December 2006. Notornis Vol 57, 33-36.
		Davidson, R.J. and Richards, L.A. 2015. Significant marine site survey and monitoring programme: Summary 2014-2015. Prepared by Davidson Environmental Limited for Marlborough District Council. Survey and monitoring report number 819.
		Schuckard, R. 2015. King shag - buffer area management plan. Prepared for New Zealand King Salmon Company Limited.

Site 4.11 Bobs Bay

	Davidson et al. (2011) assessment	2015 expert assessment
Site number	4.11	4.11
Site name	Bob Bay	Bobs Bay (tubeworm bed)
Site description	Bob's Bay is a small bay along the eastern shoreline of Picton Harbour approximately 1.4 km north-west from the marina. The bay is 300m wide and 130m long.	Bob's Bay is a small bay along the eastern shoreline of Picton Harbour approximately 1.4 km north-west from the marina. The bay is 300m wide and 130m long. The seafloor is predominantly silty sand up to 15m depth, grading into soft mud below this. From 3-6m depth the surface of the sediment is completely covered by the tubes of a small sabellid polychaete with distinctive white feeding tentacles. At present the species is being treated as an undescribed native *Bispira bispira* A. This species has only been recorded from Blow Hole Point, Pelorus Sound, the northern shore of Waikawa Bay and Houhora Harbour in northland (Geoff Read, NIWA, pers. comm.).
Biogeographic area	Queen Charlotte Sound	Queen Charlotte Sound
Assessment of ecological significance	This is one of only two locations in Marlborough and the only known area with such a high densities of this small sabellid worm.	At present, the tubeworm species located at this site is being treated as an undescribed native Bispira bispira sp.A. Until recently, this species had only been recorded from one other site in the Marlborough Sounds as an individual from Blow Hole Point, Pelorus Sound (Davidson et al. (2010). There are however, two other sittings in the Sounds (Waikawa Bay and Port Underwood) that require further investigation. It is also known from Wellington Harbour, Whangarei Harbour, Mount Manganui, and Houhora Harbour in Northland. This site is smaller than originally, however the change is not due to a decline in the extent of the tubeworm bed, rather because the bed had not been accurately mapped originally.
Suggested actions		Adjust site boundaries to encompass tubeworm beds. Protect habitats and establish a 50m PMA.
Assessment criteria scores		
1. Representativeness	H (high)	H (high)
2. Rarity	M (medium)	M (medium)
3. Diversity and pattern	M (medium)	M (medium)
4. Distinctiveness	H (high)	M (medium)
5. Size	L (low)	H (high)
6. Connectivity	L (low)	L (low)
7. Catchment	H (high)	L (low)
Date of assessment	1/09/2011	21/08/2015
Assessment	Davidson *et al.* 2011	Rob Davidson Clinton Duffy Andrew Baxter Bruno Brosnan
Reports	Davidson, R.J.; Richards, L.A.; Duffy, C.A.J.; Kerr, V.; Freeman, D.; D'Archino, R.; Read, G.B.; Abel, W. 2010. Location and biological attributes of biogenic habitats located on soft substrata in the Marlborough Sounds. Prepared by Davidson Environmental Ltd. for Department of Conservation and Marlborough District Council. Survey and monitoring report no. 575.	Davidson, R.J. and Richards, L.A. 2015. Significant marine site survey and monitoring programme: Summary 2014-2015. Prepared by Davidson Environmental Limited for Marlborough District Council. Survey and monitoring report number 819

Site 4.16 Perano Shoal

	Davidson et al. (2011) assessment	**2015 expert assessment**
Site number	4.16	4.16
Site name	Perano Shoal	Perano Shoal (tubeworms)
Site description	Perano Shoal is an offshore bank in the entrance to Blackwood Bay and adjacent to the smaller Tauranga Bay, 10.7 km north-east of Picton by sea. The top of the shoal is between 5m and 7m depth and is predominantly exposed bedrock. Below and surrounding the bedrock outcrop are areas of shell and fine sand, approximately 160m long, that are swept by moderate tidal currents.	Perano Shoal is an offshore bank in the entrance to Blackwood Bay and adjacent to the smaller Tauranga Bay, 10.7 km north-east of Picton by sea. The top of the shoal is between 5m and 7m depth and is predominantly exposed bedrock. Below and surrounding the bedrock outcrop are areas of shell and fine sand, approximately 160m long, that are swept by moderate tidal currents. Perano Shoal supports a high density bed of tubeworms dominated by *Galeolaria hystrix, Spirobranchus latiscapus* and an unidentified *Serpula* sp.
Biogeographic area	Queen Charlotte Sound	Queen Charlotte Sound
Level of original information	2. Qualitative internal report	3. Quantitative internal report
Assessment of ecological significance	The shoal supports very high densities of tubeworm mounds (*Galeolaria hystrix*) that provide habitat for a variety of other species. The shoal has the largest area of high density tubeworm mounds in Marlborough. Burrowing anemone and dog cockle live in soft sediment between the mounds. Blue cod and scallops are also present.	Perano Shoal supports a high density (76% cover) bed of tubeworms dominated by *Galeolaria hystrix*, *Spirobranchus latiscapus* and an unidentified *Serpula* sp. Perano Shoal is the only known locality for a living example of Protulophila a putative hydroid previously known only from Europe and the Middle East, Jurassic to Pliocene (Dennis Gordon pers.comm.). Based on new data collected during the present investigation (sonar and drop camera), the extent of the shoal and
Suggested actions		Anchor drag marks were observed running off the high point of the Shoal into deeper waters. From diver collected quadrats 13.6 % of the substratum sampled was damaged by anchoring activities. Protect habitats and include a 100 m PMA around the site.
Assessment criteria scores		
1. Representativeness	H (high)	H (high)
2. Rarity	L (low)	H (high)
3. Diversity and pattern	M (medium)	H (high)
4. Distinctiveness	H (high)	H (high)
5. Size	L (low)	H (high)
6. Connectivity	L (low)	L (low)
7. Catchment	L (low)	
Date of assessment	1/09/2011	21/08/2015
Assessment	Davidson *et al.* 2011	Rob Davidson Clinton Duffy Andrew Baxter Bruno Brosnan
Reports		Davidson, R.J. and Richards, L.A. 2015. Significant marine site survey and monitoring programme: Summary 2014-2015. Prepared by Davidson Environmental Limited for Marlborough District Council. Survey and monitoring report number 819

Site 4.19 Ship Cove

	Davidson et al. (2011) assessment	2015 expert assessment
Site number	4.19	4.19
Site name	Ship Cove to Cannibal Cove	Ship Cove to Little Waikawa Bay (coastal edge)
Site description	This coastline stretches from Ship Cove north to little Waikawa Bay along the outer western Queen Charlotte Sound.	This site is located along the northern coast of outer Queen Charlotte Sound. Most of the offshore area is characterised by silt and clay substrata with no notable species or communities being observed during the survey. Recreational and commercial dredging is common offshore. Areas of reduced visibility due to re-suspension of fine sediment following dredging activities were observed by the remote camera during the present survey. The inshore areas ranged from characteristic sheltered Sounds communities in the south to outer Sounds communities in the north. This area therefore represents a transition in community types associated with wave exposure.
Biogeographic area	Queen Charlotte Sound	Queen Charlotte Sound
Level of original information	1. Brief visit	2. Qualitative internal report
Assessment of ecological significance	This coastline is surrounded by a catchment of mature native forest, protected within the Ship Cove Historic Reserve and Cannibal Cove Scenic Reserve. A forest catchment reduces sedimentation into subtidal habitats during floods and this is one of the best examples in Marlborough of such a site. There has not been a biological survey of this marine area.	The site was initially ranked significant due to the protected catchment and lack of human land impacts. The site is, however, regularly dredged offshore and therefore influenced by physical disturbance and resuspension and subsequent smothering by disturbed sediments. The inshore area is notable as it represents a stretch of coast forming the transition between inner and outer Queen Charlotte Sound habitats and communities. Overall, marine biological values are not high. Catchment score high, but unlikely to confer importance to marine area due to intense dredging activity.
Suggested actions		Remove from significant site list.
Assessment criteria scores		
1. Representativeness	L (low)	L (low)
2. Rarity	L (low)	L (low)
3. Diversity and pattern	L (low)	L (low)
4. Distinctiveness	L (low)	L (low)
5. Size	M (medium)	L (low)
6. Connectivity	L (low)	L (low)
7. Catchment	H (high)	H (high)
Date of initial assessment (original)	1/09/2011	
Date of assessment	1/09/2011	21/08/2015
Assessment	Davidson *et al.* 2011	Rob Davidson Clinton Duffy Andrew Baxter Bruno Brosnan
Reports		Davidson, R.J. and Richards, L.A. 2015. Significant marine site survey and monitoring programme: Summary 2014-2015. Prepared by Davidson

Site 4.22 Puriri Bay

	Davidson et al. (2011) assessment	2015 expert assessment
Site number	4.22	4.22
Site name	Puriri Bay	Puriri (red algae)
Site description	Puriri Bay is a small bay located on the southern shore of Otanerau Bay, East Bay. it has a coastline approximately 2km long, a sea area of 39.4 ha, and is 1040m wide at the bay mouth. The bay is 34 km by water from Picton. There are extensive beds of red algae between 15-23m depth, which are dominated by *Adamsiella chauvinii* . A variety of sponges and hydroids as well as horse mussels and scallops have been observed from the wider bay as well as within the algae beds.	Puriri Bay is located in East Bay, Queen Charlotte Sound. Divers estimated the percentage cover of red algae from one transect in 2002 (Davidson and Richards 2014). The extent of the red algae bed in the wider bay was first sampled using a drop camera in November 2008 and used to map the its boundaries for the Davidson *et al* . (2011) report. Photos collected during the present study in January 2015 showed a reduction in the area occupied by red algae since 2008, however, percentage cover estimates by divers in 2002 showed an increase from mean 10-15% cover to 40-45% in 2015. The transect located in the red algae bed was sampled regularly by Davidson and Richards (2014) from 2002 to 2011 and the authors reported that it consistently supported red algae. Unfortunately percentage cover estimates were only collected in 2002 and again during the present study in 2015. The reason for the decline of red algae area over the wider bay is unknown and may be natural as red algae in the western bay was less dense compared to the eastern side of the bay in 2008. However, the decline may also be related to recent logging activities leading to increased turbidity.
Biogeographic area	Queen Charlotte Sound	Queen Charlotte Sound
Level of original information	3. Quantitative internal report	3. Quantitative internal report
Assessment of ecological significance	At 14.3ha, this is the largest known red algae beds in the Queen Charlotte Sound. The red algae *Adamsiella chauvinii* often covers 100% of the seabed in association with a variety of other important species including scallops, giant lampshell and horse mussels.	Puriri Bay supports a large red algae bed. Some of this bed has remained stable since 2002.
Suggested actions		Collect drop camera photos annually to monitor change in an attempt to determine if fluctuations in red algae abundance are human influenced or natural. Leave significant site boundaries per Davidson *et al.* (2011) untill more data available. Review the size and location of the significant site until this data is collected. Establish habitat protection area with a 100 m PMA.
Assessment criteria scores		
1. Representativeness	M (medium)	M (medium)
2. Rarity	L (low)	L (low)
3. Diversity and pattern	M (medium)	M (medium)
4. Distinctiveness	M (medium)	M (medium)
5. Size	H (high)	H (high)
6. Connectivity	L (low)	L (low)
7. Catchment	L (low)	L (low)
Date of assessment		
Assessment	1/09/2011 Davidson *et al.* 2011	21/08/2015 Rob Davidson Clinton Duffy Andrew Baxter Bruno Brosnan
Reports	Davidson R.J.; Duffy C.A.J.; Gaze P.; Baxter A.; Du Fresne S.; Courtney S. 2011. Ecologically significant marine sites in Marlborough, New Zealand. Co-ordinated by Davidson Environmental Limited for Marlborough District Council and Department of Conservation.	Davidson, R.J. and Richards, L.A. 2015. Significant marine site survey and monitoring programme: Summary 2014-2015. Prepared by Davidson Environmental Limited for Marlborough District Council. Survey and monitoring report number 819

Site 4.23 Matiere Point

	Davidson et al. (2011) assessment	2015 expert assessment
Site number	4.23	4.23
Site name	Matiere Point	Matiere Point (burrowing anemone and
Site description	Matiere Point is a headland along the eastern shore of Otanerau Bay, East Bay. The bay is 34 km by boat from Picton.	Matiere Point is a headland located along the eastern shore of Otanerau Bay, East Bay.
Biogeographic area	Queen Charlotte Sound	Queen Charlotte Sound
Level of original information	2. Qualitative internal report	3. Quantitative internal report
Assessment of ecological significance	The seabed around Matiere Point supports a variety of species uncommon in many areas in Marlborough. Of particular interest are giant lampshell, burrowing anemone, anemone (*Epiactus* sp.) and the habitat forming tubeworm (*Galeolaria hystrix*). These species have been recorded from the site in high densities. The bivalve *Cuspidaria wellmani* is also common at this site. Traditionally this species has been regarded as rare, but NIWA have recorded it from other localities in the Marlborough Sounds in recent years.	The seabed around Matiere Point supports a variety of species uncommon in many areas in Marlborough. Of particular interest are giant lampshell, burrowing anemone, anemone (*Epiactus* sp.) and the habitat forming tubeworm (*Galeolaria hystrix*). These species have been recorded from the site in high densities. The bivalve *Cuspidaria wellmani* is also common at this site. Traditionally this species has been regarded as rare, but NIWA have recorded it from other localities in the Marlborough Sounds in recent years. Burrowing anemones are uncommon in Marlborough.
Suggested actions		Establish a habitat protection area with a 100 m PMA.
Assessment criteria scores		
1. Representativeness	M (medium)	M (medium)
2. Rarity	L (low)	M (medium)
3. Diversity and pattern	M (medium)	M (medium)
4. Distinctiveness	M (medium)	M (medium)
5. Size	L (low)	L (low)
6. Connectivity	L (low)	M (medium)
7. Catchment	L (low)	L (low)
Date of assessment	1/09/2011	21/08/2015
Assessment	Davidson *et al.* 2011	Rob Davidson Clinton Duffy Andrew Baxter Bruno Brosnan
Reports	Davidson R.J.; Duffy C.A.J.; Gaze P.; Baxter A.; Du Fresne S.; Courtney S. 2011. Ecologically significant marine sites in Marlborough, New Zealand. Co-ordinated by Davidson Environmental Limited for Marlborough District Council and Department of Conservation.	Davidson, R.J. and Richards, L.A. 2015. Significant marine site survey and monitoring programme: Summary 2014-2015. Prepared by Davidson Environmental Limited for Marlborough District Council. Survey and monitoring report number 819

Site 5.3 Hitaua Bay head

	Davidson et al. (2011) assessment	2015 expert assessment
Site number	5.3	NA
Site name	Hitaua Bay Estuary	NA
Site description	Hitaua Bay is located on the southern shoreline of Tory	Hitaua Bay is a bay located on the southern shoreline of Tory Channel
	Tory Channel	Tory Channel
Biogeographic area		
Level of original information	2. Qualitative internal report	3. Quantitative internal report
Assessment of ecological significance	The head of Hitaua Bay has a small freshwater wetland and a tidal wetland that grades into salt marsh. There are small areas of sea grass on the eastern side of this and extensive cockle beds in the shallow subtidal zone. This is one of the few estuaries in Tory Channel.	The site is no longer the best example of an estuarine habitat in Tory Channel, however, the intertidal saltmarsh vegetation located around the edge of the site remains intact.
Suggested actions		Monitor recovery of intertidal flats and biota. Remove site as a significant site and investigate alternative estuarine site in biogeographic area (e.g.Ngaruru Bay Estuary).
Assessment criteria scores		
1. Representativeness	M (medium)	
2. Rarity	L (low)	
3. Diversity and pattern	M (medium)	
4. Distinctiveness	M (medium)	
5. Size	L (low)	
6. Connectivity	L (low)	
7. Catchment	L (low)	
Date of assessment		21/08/2015
Assessment	1/09/2011	Rob Davidson
	Davidson *et al.* 2011	Clinton Duffy
		Andrew Baxter
		Bruno Brosnan
Reports	Davidson R.J.; Duffy C.A.J.; Gaze P.; Baxter A.; Du Fresne S.; Courtney S. 2011. Ecologically significant marine sites in Marlborough, New Zealand. Co-ordinated by Davidson Environmental Limited for Marlborough District Council and Department of Conservation.	Davidson, R.J. and Richards, L.A. 2015. Significant marine site survey and monitoring programme: Summary 2014-2015. Prepared by Davidson Environmental Limited for Marlborough District Council. Survey and monitoring report number 819.

Site 5.4 Tory Channel north-west

	Davidson et al. (2011) assessment	2015 expert assessment
Site number	5.4A (4 sites located along northern side of Tory Channel comprising site 5.4)	5.4A-D
Site name	Tory Channel western coast (north)	Tory Channel (north-west)
Site description	There are a number of tidal current communities located along the northern coast at the western end of Tory Channel. These include a 2.8 km stretch of coast from Ruaomoko to Ngaionui Point, a small area at Wiriwaka Point, and an area between Tokakaroro and Te uira-Karapa Points. The steep seafloor of bedrock, boulder, cobble and shelly habitats are swept by strong and regular tidal currents on the incoming and outgoing tides.	There are four tide swept communities located along the north western coast of Tory Channel.
Biogeographic area	Tory Channel	Tory Channel
Level of original information	2. Qualitative internal report	2. Qualitative internal report
Assessment of ecological significance	All these communities are dominated by habitat forming bryozoan mounds, hydroids, sponges (*Callyspongia* spp., *Crella incrustans*) and ascidians. Large schools of butterfly perch and tarakihi have been observed associated with these biogenic habitats.	These subsites are swept by moderate to strong tidal currents. The predominantly rocky and coarse substratum habitats support a range of biogenic habitats dominated by bryozoans, sponges, ascidians and tubeworms as well as areas of red and brown macroalgae located in shallow areas. The present survey identified biogenic habitats further north towards Queen Charlotte Sounds than previously recorded in Davidson et al. (2011). Data collected by Clark *et al*. 2011 also shows biogenic habitats north and into Queen Charlotte Sound.
Suggested actions		Adjust site boundary to encompass new areas with recognised biological features. Move inner boundary closer to shore to encompass brown and red macroalgal areas. Establish a habitat protection area with a 100 m PMA area.
Assessment criteria scores		
1. Representativeness	H (high)	M (medium)
2. Rarity	L (low)	M (medium)
3. Diversity and pattern	H (high)	H (high)
4. Distinctiveness	H (high)	M (medium)
5. Size	M (medium)	M (medium)
6. Connectivity	L (low)	H (high)
7. Catchment	L (low)	NA
Date of assessment	1/09/2011	21/08/2015
Assessment	Davidson *et al.* 2011	Rob Davidson Clinton Duffy Andrew Baxter Bruno Brosnan
Reports	Clark, D.; Taylor, D.; Keeley, N.; Dunmore, R.; Forrest, R.; Goodwin, E. 2011. Assessment of effects of farming salmon at Ruaomoko, Queen Charlotte Sound: deposition and benthic effects. Prepared for the New Zealand King Salmon Company Limited. Cawthron Report No 1992, 59p.	Davidson, R.J. and Richards, L.A. 2015. Significant marine site survey and monitoring programme: Summary 2014-2015. Prepared by Davidson Environmental Limited for Marlborough District Council. Survey and monitoring report number 819

Site 5.8 Tory Channel north-east

	Davidson et al. (2011) assessment	2015 expert assessment
Site number	5.8 (Note: this site originally comprised seven separate sites with comparable habitats and communities)	5.8
Site name	Tory Channel eastern north coast	Tory Channel (Deep Bay to Whekenui Bay)
Site description	Tidal current communities on rock, boulder and cobble substrata have been recorded at seven locations along the northern coastline between Deep Bay and Whekenui Bay. These communities are on outcrops and headlands where tidal currents are strongest.	Tidal current communities on rock, boulder, cobble and shell substrata have been recorded at a number of locations along the northern coastline or Tory Channel between Deep Bay and Whekenui Bay. These communities are on outcrops and headlands where tidal currents are strongest.
Biogeographic area	Tory Channel	Tory Channel
Level of original information	1. Brief visit	2. Qualitative internal report
Assessment of ecological significance	These communities are dominated by dense colonies of hydroids, many of them large. This dense hydroid dominated community is found nowhere else in Marlborough. Hydroid trees (*Solandaria* sp.), bushy bryozoans, sponges, zooanthids, macroalgae and ascidians are common.	This site originally comprised seven separate sub-sites with comparable habitats and communities. One new sub-site has been described and four have been amalgamated into two larger sub-sites. Sub-sites are swept by regular strong currents on both incoming and outgoing tides. The substrate is predominantly rocky dominated by bedrock, boulder and cobbles off points and promontories and coarse substratum at greater depth. The coast supports a range of biogenic habitats including sponges and ascidians as well as dense brown and red macroalgae beds. Of note are often dense areas of hydroid trees. The present survey identified additional biogenic habitats adjacent to existing sites previously recorded in Davidson *et al*. (2011). This potentially adds another 76ha to these sub-sites.
Suggested actions		It is recommended that the existing sub-sites be enlarged to encompass the new areas. It is also suggested that the inner boundary be adjusted closer to shore to encompass brown and red macroalgal areas. It is also suggested that more survey work be conducted to further survey and map habitats along this coast. Establish a habitat protection area with a 100 m PMA.
Assessment criteria scores		
1. Representativeness	H (high)	H (high)
2. Rarity	L (low)	M (medium)
3. Diversity and pattern	H (high)	H (high)
4. Distinctiveness	H (high)	H (high)
5. Size	M (medium)	M (medium)
6. Connectivity	L (low)	H (high)
7. Catchment	L (low)	NA
Date of assessment	1/09/2011	21/08/2015
Assessment	Davidson *et al.* 2011	Rob Davidson Clinton Duffy Andrew Baxter Bruno Brosnan
Reports	Clark, D.; Taylor, D.; Keeley, N.; Dunmore, R.; Forrest, R.; Goodwin, E. 2011. Assessment of effects of farming salmon at Ngamahau, Queen Charlotte Sound: deposition and benthic effects. Prepared for the New Zealand King Salmon Company Limited. Cawthron Report No 1993, 52p.	Davidson, R.J. and Richards, L.A. 2015. Significant marine site survey and monitoring programme: Summary 2014-2015. Prepared by Davidson Environmental Limited for Marlborough District Council. Survey and monitoring report number 819

Site 7.4 Motuara subtidal

	Davidson et al. (2011) assessment	2015 expert assessment
Site number	7.4	7.4
Site name	North Motuara (subtidal)	Motuara Island (north reef)
Site description	This site covers a large area north of Motuara island and includes a combination of reefs and soft bottom habitats supporting horse mussel beds. Outcrops of bedrock rise to approximately 4-6 m below the surface from about 9m depth. The top of the reef supports a forest of *Macrocystis* kelp. Below the *Macrocystis* zone the reef is covered in dense turfing red seaweed, coralline crusts, large sponges (*Polymastia fusca, Iophon minor, Raspalia topsenti, Polymastia* sp., pink golfball sponge), *Actinothoe,* large pale colonies of jewel anemone, and brachiopods (*W. inconspicua*). Between 9-12m depth the bottom is soft mud and horse mussels, eleven-arm seastar, sea cucumber and kina are common. The snakestar *Ophiopsammus maculata* is abundant.	This site is located north and offshore of Motuara Island, Queen Charlotte Sound. The site was described by Davidson *et al*. (2011) as a combination of reefs and soft bottom habitats supporting horse mussel beds. Outcrops of bedrock occur in the site and rise to approximately 4-6m below the surface from about 9m depth. The top of the reef supports algal forest dominated by Macrocystis kelp. Below the *Macrocystis* zone, the reef is covered in dense turfing red seaweed, coralline crusts, large sponges (Polymastia fusca, *Iophon minor, Raspalia topsenti, Polymastia* sp., pink golfball sponge), *Actinothoe*, large pale colonies of jewel anemone, and brachiopods (*W. inconspicua*). Between 9-12m depth, the bottom is soft mud and horse mussels, eleven-arm seastar, sea cucumber and kina are common. The snakestar *Ophiopsammus maculata* is abundant (Davidson *et al*. 2011).
Biogeographic area	Cape Jackson to Rarangi	Cape Jackson to Rarangi
Level of original information	4. Personal communication	2. Qualitative internal report
Assessment of ecological significance	Beds of horse mussels provide habitat for a variety of species including fish. There are few of these sites in Marlborough and this is the largest known area of horse mussels in the Cape Jackson to Rarangi biogeographic area.	The original significant site 7.4 was based on early data (Hay 1990), however, the extent and boundaries of the horse mussel bed were not accurately mapped in that work. The present data collected in 2015 shows horse mussels are present over most of the original site 7.4. Horse mussel relative abundance is low compared to other sites which are known to support densities of up to 10 individuals per m^2. Present densities appear well below those described by Hay (1990). It is not possible to attribute the sites present state to human activities such as dredging as no prior data on the abundance and distribution of horse mussel are available (although the data may exist at NIWA). Reef is one of two known for this part of the biogeographic area.
Suggested actions		Site 7.4 be reduced to a 12.7ha area to encompass the reef, macroalgae forest and red algae beds that are associated with shell and sand habitats that surround the reef. Request historical horse mussel data from NIWA. Establish a habitat protection area and 100 m PMA.
Assessment criteria scores		
1. Representativeness	M (medium)	M (medium)
2. Rarity	L (low)	L (low)
3. Diversity and pattern	M (medium)	M (medium)
4. Distinctiveness	M (medium)	M (medium)
5. Size	M (medium)	M (medium)
6. Connectivity	L (low)	M (medium)
7. Catchment	M (medium)	NA
Date of assessment		
Assessment	1/09/2011 Davidson *et al.* 2011	21/08/2015 Rob Davidson Clinton Duffy Andrew Baxter Bruno Brosnan
Reports		Davidson, R.J. and Richards, L.A. 2015. Significant marine site survey and monitoring programme: Summary 2014-2015. Prepared by Davidson Environmental Limited for Marlborough District Council. Survey and monitoring report number 819.

Appendix 2 Site categorization data

Site No	Site Location Name	Species/community/habitat	Habitat sensitivity	Wave exposure	Impact level	Vulnerability score	Resilience level	Management category	Buffer	Last survey/ Monitoring dates)	Comment and references	Level of Information
1.2	Croisilles Harbour (Entrance)	Lancelet and scallops	4	2	2	***8***	Tolerant of light disturbance (<25kg gear & anchoring OK)	**C**	100	1992	Davidson and Duffy (1992) Lancelet and scallops, coarse sands & shell	2
1.4	Motuanauru Island Boulder Bank	Boulder bank	4	2	1	***7***	Intolerant of most physical disturbance (anchoring OK)	**B**	200	1992	Davidson and Duffy (1992)	2
1.5	Coppermine Bay	Rhodolith bed	1	1	1	***3***	Intollerant of most phsyical disturbance	**A**	100	2010	Davidson et al. (2010)	2
1.7	Inner Greville Harbour	Protected Stable Catchments	3	1	1	***5***	Intolerant of most physical disturbance (anchoring OK)	**B**	NA	1990	Duffy et al. (in prep.)	2
1.8	Greville Harbour Channel	Current Communities	2	1	1	***4***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al. (in prep.)	2
2.1	North West D'Urville Island Coast	Reef Inshore	4	2	2	***8***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al. (in prep.)	2
2.10	Trio Bank	Sponge, ascidian, hydroid, bryozonan remnants	2	2	3	***7***	Intolerant of most physical disturbance (anchoring OK)	**B**	200	2010	Davidson et al. (2010). **Western area requires more survey data to confirm habitats**. Remnant biogenic habitats.	2
2.12	Penguin Island Coastline	Protected stable catchments, 1 dense dog cockle bed	3	2	1	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1994	Davidson and Brown (1994)	3
2.13	Catherine Cove Rhodoliths	Rhodolith Bed	1	1	1	***3***	Vulnerable to most physical disturbance	**A**	50	2010	Davidson et al. (2010)	2
2.15	Clay Point	Current swept communities	4	2	2	***8***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al. (in prep.)	1
2.16	French Pass	Current swept communities	2	1	2	***5***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al. (in prep.)	1
2.18	Paparoa Point	Current swept communities	2	2	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al. (in prep.)	1
2.20	Chetwode Islands	Current swept communities	2	2	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al. (in prep). Bryozoans, sponges, hydroids, ascidians.	1
2.22	Goat Point	Current swept communities	4	2	1	***7***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davdison drop camera photos (bryozoans, sponges, hydroids, tubeworms)	1
2.23	Culdaff Point	Current swept communities	4	2	1	***7***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davdison drop camera photos (bryozoans, sponges, hydroids, tubeworms)	1
2.24	Allen Strait	Current Communities - bryozoans	1	1	1	***3***	Vulnerable to most physical disturbance	**A**	100	1990, 2010	Duffy et al. (in prep.)	2
2.27	Titi Island	Bryozoan community	2	2	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davidson et al. 2010	2
2.28	McManaway Rocks	Reef offshore	2	2	1	***5***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al. (in prep) sponges, hydroids, zooanthids, bryozoans.	3
2.29	Witt Rocks Offshore Reef	Reef offshore	2	2	1	***5***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al. (in prep), bryozoans & macroalgae.	3
2.3	Northwest D'Urville Island	Bryozoan dominated community	2	2	3	***7***		**TBC**	TBC	2015	Neil et al. (2015) Multibeamed by NIWA. **Needs survey of biological features before it can be assessed for significance by Expert Panel.**	3
2.30	Waitui	Horse mussel bed	3	2	3	***8***		**TBC**	TBC	1980's	Hay 1990. **Requires survey to clarify if horse mussels remain.**	4
2.31	Port Gore	Horse mussel bed	3	2	1	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	200	2015	Davidson and Richards (2015)	2
2.32	Port Gore	Originally surveyed as a horse mussel bed (Hay 1990)	X	X	X	***0***		**E**	X	2015	Davidson and Richards (2015) Horse mussel bed not recorded	2
2.33	Port Gore	Soft tubeworm beds	3	1	1	***5***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2015	Davidson and Richards (2015)	2
2.34	Gannet Point	Tubeworm Bed	3	1	1	***5***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2009	Morrisey et al 2009a, 2009b	2
2.5	Rangitoto Islands	Current Communities	4	2	1	***7***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davdison drop camera photos (bryozoans, sponges, hydroids, tubeworms)	2
2.6	Rangitoto Roadstead	Bryozoan Community	1	1	2	***4***	Vulnerable to most physical disturbance	**A**	200	1994	Davidson and Brown (1994)	2
2.9	Jag Rocks	Reef Inshore	4	2	1	***7***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1994, 2004	Davidson and Brown (1994)	1
3.1	Harris Bay	Red algae bed - soft bottom	3	1	1	***5***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davidson et al. 2010	2
3.11	Tapapa, Kauauroa & Tawero Current Communities	Current swept communities	2	1	2	***5***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davdison drop camera photos (bryozoans, sponges, hydroids, tubeworms)	1
3.12	Piripaua Reef	Reef Inshore	4	1	1	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	?	Marine farm report	2
3.15	Grant Reef	Reef Inshore	4	1	2	***7***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2000	Davidson (2000) Marine farm report	2
3.16	Crail Bay	Horse Mussel Bed	3	1	3	***7***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davidson et al. 2010	2
3.17	Chance Bay	Protected Stable Catchments	?	?	?			**TBC**	TBC		**Has not been surveyed.**	1
3.18	Little Nikau	Sea Pen	1	1	2	***4***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2001	Davidson (2001) Marine farm report	2
3.2	Oke Rock	Burrowing anemones	1	2	2	***5***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al. (in prep), burrowing anemone. Notoplax chiton, hydroids, mussels, encrusting bryozoans, sponges	2
3.6	Tawhitinui Reach	Reef community	4	1	2	***7***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al. (in prep.)	2
3.7	Picnic Bay	Rhodolith bed	1	1	1	***3***	Vulnerable to most physical disturbance	**A**	100	1999	Davidson 1999 cited in Davidson et al. 2010	2
3.8	Fitzroy Bay / Hallam Cove	Elephantfish	3	1	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990, 2004	Duffy et al. (in prep.) , Davidson (2004)	4
3.9	Tennyson Inlet	Protected stable catchments	3	1	2	***6***	Tolerant of light disturbance (<25kg gear & anchoring OK)	**C**	100	1995, 2004	Duffy et al. (in prep.). Davidson et al. (1995)	3
4.11	Bob's Bay	Tubeworm bed	3	1	1	***5***	Vulnerable to most physical disturbance	**A**	50	2015	Davidson & Richards 2015. Molecular analysis occurring to check if Bispira is an invasive species	3
4.13	Lochmara Bay	Red algae bed - soft bottom	3	1	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davidson et al. 2010	2
4.14	Pihaka Point	Giant lampshell	3	1	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al. (in prep.)	1
4.15	Kumutoto Bay	Elephantfish	3	1	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davidson et al. 2010	1
4.16	Perano Shoal	Tubeworm mounds	1	1	2	***4***	Vulnerable to most physical disturbance	**A**	100	2015	Davidson & Richards 2015	3
4.18	Patten Passage	Current communities	3	1	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davidson et al. (2010) Tubeworm mounds, sponge, red algae	1
4.19	Ships Cove	Protected stable catchments	X	X	X	***0***		**E**	X	2015	Davidson & Richards 2015	2
4.2	The Grove	Sea squirts	3	1	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davidson et al. 2010	2
4.21	Te Aroha Bay	Horse mussel bed	3	1	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2012	Davidson and Richards 2014	4
4.22	Puriri Bay	Red algae bed - soft bottom	3	1	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2015	Davidson and Richards 2015	3
4.23	Matiere Point	Burrowing anemone, giant lampshell	1	1	2	***4***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2015	Davidson and Richards 2016	3
4.24	Onauku Bay	Scallops	4	1	2	***7***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1980's	Hay 1990	1
4.25	Onauku Bay (Northern Coastline)	Giant lampshell, tubeworm mounds, burrowing anemone	1	1	2	***4***	Vulnerable to most physical disturbance	**A**	100	2002	Davidson and Pande (2002)	2
4.3	Bottle and Umungata Bays	Protected stable catchments	3	1	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davidson et al. 2010	1
4.4	Houhou Point	Red algae bed - soft bottom	3	1	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davidson et al. 2010	2
4.6	Ngakuta Point	Red algae bed - soft bottom	3	1	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al. (in prep.)	2
4.7	Iwirua Point	Red algae bed - soft bottom	3	1	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davidson et al. 2010	4
4.8	Wedge Point (subtidal soft shores)	Giant lampshell & elephant Fish	3	1	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990, 2010	Duffy et al (in prep), Davidson et al. (2010)	3
4.9	Wedge Point (subtidal rocky shores)	Tubeworm mounds	1	1	2	***4***	Vulnerable to most physical disturbance	**A**	100	2010	Davidson et al. 2010	3

Appendix 2(continued) Site categorization data

Site No	Site Location Name	Species/community/habitat	Habitat sensitivity	Wave exposure	Impact level	Vulnerability score	Resilience level	Management category	Buffer	Last survey/ Monitoring dates)	Comment and references	Level of Information
5.1	Diffenbach Point	Bryozoan, hydroid, sponge community	1	1	2	***4***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2010	Davidson et al. 2010	1
5.2	Tikimaeroero Point	Bryozoan, hydroid, sponge community	1	1	2	***4***	Intolerant of most physical disturbance (anchoring OK)	**B**	50	2010	Davidson et al. 2010	2
5.3	Takatea Point, Hitaua Bay entrance	Bryozoan, hydroid, sponge community	1	1	2	***4***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2011	Davidson et al. 2010	2
5.4	Tory Channel subsites: 5.4A Ruaomoko, Site 5.4B Wiriwaka Point; Site 5.4C Tokakaroro Point; Site 5.4D Te Uira-Karapa Point	Bryozoan, hydroid, sponge community	1	1	2	***4***	Intolerant of most physical disturbance (anchoring OK)	**B**	50	2015	Davidson and Richards 2015. **Collect data on anchoring and potential damage. Review protection status as appropriate.**	2
5.5	Hitaua Bay	Estuary	X	X	X	***0***		**E**	X	2015	Davidson & Richards 2015 smothering of estuary	
5.6	Tio Point	Current swept communities	2	1	2	***5***	Intolerant of most physical disturbance (anchoring OK)	**B**	50		Davidson et al. 2010	4
5.7	Deep Bay	Cockle bed	3	1	1	***5***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2003	Davidson and Richards 2003	2
5.8	Tory Channel	Hydroid community	2	1	2	***5***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2015	Davidson & Richards 2015. Sponges, red algae	2
5.9	Tory Channel Entrance	Current swept communities	2	2	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100		Davidson (qualitative inspection) Bryozoans, hydroids, sponges, macroalgae	1
6.1	The Knobbys	Tubeworm mounds	1	1	1	***3***	Vulnerable to most physical disturbance	**A**	100	1995	Davidson et al. (1995)	2
6.2	Whataroa Bay	Tubeworm mounds	1	1	1	***3***	Vulnerable to most physical disturbance	**A**	100	1995, 2011	Davidson et al. (1995), Davidson and Richards (2011)	2
6.3	Cutters Bay	Red algae bed - soft bottom	3	1	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2015	Davidson (2015). Report #821	2
7.1	Cape Jackson	Current swept communities	2	2	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al. (in prep.)	4
7.4	Motuara subtidal	Reef community	4	2	2	***8***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	2015	Davidson & Richards 2015. Macroalgal forest. Red algae	2
7.10	Cook Rock Reef	Reef Offshore	2	2	1	***5***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al (in prep) bushy bryozoans, sponges, hydroids	3
7.11	Brothers Island Reef	Reef Offshore	2	2	1	***5***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al (in prep) bushy bryozoans, sponges, hydroids	3
7.13	Awash Rock	Reef Offshore	2	2	1	***5***		**B**	100	1990	Duffy et al (in prep) bushy bryozoans, sponges, hydroids	3
7.2	Cape Jackson Bryozoan Community	Bryozoan Community	2	2	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100		Bryozoans. **Needs survey to before status can be confirmed**	4
7.5	Long Island Marine Reserve	Reef Inshore	2	2	1	***5***	Vulnerable to most physical disturbance	**D**		2015	Davidson (2015). Marine Reserve Report #771	2
7.8	White Rocks Current Community	Current swept communities	2	2	2	***6***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1990	Duffy et al. (in prep.)	4
9.1	Cape Campbell / Ward Reef	Inshore reef community	4	2	2	***8***	Intolerant of most physical disturbance (anchoring OK)	**B**	100	1993	TePapa 1993	2
9.2	Ward Algal forest	*Macrocystis pyrifer*a bed	4	2	2	***8***		**TBC**	100	1993	Poorly known, requires survey	4