Expert panel review of selected significant marine sites surveyed during the summer of 2021-2022

A report prepared for:
Marlborough District Council
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1.0 Background and Summary

Davidson *et al.* (2011) identified 129 ecologically significant marine sites in Marlborough (). An ongoing survey and monitoring programme aimed at updating and improving the database of significant sites commenced in 2015.

Summer surveys have been undertaken on seven previous occasions (Davidson and Richards, 2015; 2016; Davidson *et al*., 2017a, 2018a, 2020, 2022a, 2022b). Reports and raw data from surveys were lodged separately with the Marlborough District Council (MDC). The authors commented on and made recommendations on site boundaries and significance of the sites. At the end of each survey period, the MDC Ecologically Significant Marine Site (ESMS) Expert Panel reviewed data, assessed sites using accepted criteria and made recommendations about the surveyed sites.

The present report outlines the ESMS Expert Panel review of sites reported from the eighth survey programme conducted in the Marlborough Sounds (Davidson *et al*., 2022a). The Expert Panel assessed sites using the seven criteria originally developed by Davidson *et al.* (2011) and modified by the Expert Panel in 2015 and 2016 (see Davidson *et. al.,* 2015; 2016). The updated criteria were presented in Appendix 1 of the Davidson et al. (2017c) report. No changes to the criteria were made during the present assessment (see Appendix 1).

The Expert Panel mostly accepted the recommendations proposed by Davidson *et al*. (2022a) with some minor modifications. Six new sites were accepted by the Panel. Two existing subsites at Houhou Point were tagged for additional surveys.

The Panel also assessed site sensitivity/impacts from a range of anthropogenic threats including physical disturbance.

2.0 The assessment process

2.1 Data collation

Data for candidate sites were collated by Davidson *et al*. (2022a) were made available to the Expert Panel. Davidson et al., (2022a) also surveyed several sites that were not presented as candidate sites to the expert panel. The data relating to these sites were. However, entered into the ESMS database for future reference. Based on the candidate site, the expert panel recommended that 844.95 ha of new ESMS area be approved at six locations (Table 1).

Data from the 2021-2022 fieldwork included: high definition and low-resolution drop camera photographs, remote video, sonar images, and observations (note: all raw data are held by MDC).

Davidson *et al*. (2022a) also compiled data from a variety of other sources including previous reports, significant site surveys or other sampling programmes (e.g. marine reserve monitoring; marine farm monitoring; NIWA's multibeam bathymetric survey). In addition, NIWA modelling of the potential location of biogenic communities was used to assist with field data interpretation (Anderson *et al*. 2020; 2020b). These data were integrated with other historical data and with data collected during annual significant site surveys. For example, multibeam depth contour data were used to delineate boundaries for existing sites where drop camera, diver, high-definition camera or other data had been previously collected.

2.2 Expert Panel

For the present review, most of the Expert Panel involved in the Davidson *et al*., (2011) report and previous reviews were reconvened, apart from Sam du Fresne (marine mammals), Peter Gaze (birds) and Shannel Courtney (plants). Sean Handley (NIWA) replaced existing member Bruno Brosnan in 2017. Sam du Fresne, Peter Gaze and Shannel Courtney were not involved in the present reassessment as no new or resurveyed marine mammal, bird or plant sites were under scrutiny.

2.3 Wording of the assessment criteria

During earlier Expert Panel reviews (Davidson *et al.* 2015; 2016), panel members recognized a need to clarify some of the original assessment criteria used by Davidson *et al.* (2011) to avoid any possible misinterpretation. Some further minor revisions to the criteria were also proposed and adopted during the 2017 review (Davidson et al., 2017c).

The present assessment made no alterations to the 2017 criteria (see Appendix 1 for the revised current criteria). During this process, the Expert Panel took care not to create an inconsistency between the sites assessed in Davidson *et al*. (2011) and subsequent reassessments. It is recognised, however, that some 2011 significant sites will require reassessment using the 2017 criteria to ensure consistency. Existing sites may also need to be reassessed considering information from new or other existing sites (e.g. where criteria are relative scores such as "the best of their kind").

3.0 Review of survey sites (2021-2022)

The Expert Panel assessed all sites based on the information and proposed changes presented in Davidson *et al*. (2022a) and recommended:

- Accepting six new sites in Queen Charlotte Sound, Port Underwood and Okuri Bay.
- Additional surveys be conducted at the Houhou Point subsites to confirm the absence or presence of giant lampshells and to re-map the red algae bed.

An overall increase of 844.95 ha of ESMS was approved by the Panel (Table 1).

Table 1. Summary of significant sites (from Davidson et al., 2022a).

Sites	No. (old format)	No. (new format)	Subsites	Expert panel decision	Original sites (2011)	Original area (ha)	Recent surveys	Previous area (ha)	New area (ha)	Existing ESMS	change (ha)	Change %	Benthos type	Reason for change	Notes
Okuri Bay (horse mussel)	1.10	1.010		New site					19.7		19.7	100	Soft	New data	Bed may extend outside present boundary.
Houhou Point-east (red algae)	4.4	4.004		Resurvey	2.07	2.07		2.07		2.07	0.00	0	Rocky and soft		Red algae bed may be declining.
Houhou Point-west (brachiopod)	4.4	4.004		Resurvey	3.16	3.16		3.16		3.16	0.00	0	Soft		Giant lampshell not seen in 2022.
Amerikiwhati Island (*Galeolaria* mounds & invertebrates)	4.32	4.032		New site					3.69		3.69	100	Rocky and soft	New data	
Kumutoto Point (*Galeolaria* mounds)	4.33	4.033	a, b, c	New sub-sites					2.57		2.57	100	Rocky and soft	New data	
Golden Point (*Galeolaria* mounds)	4.34	4.034	a,b	New sub-sites					1.68		1.68	100	Rocky and soft	New data	
Kaikoura Bay headland (*Galeolaria* mounds & macroalgae)	6.4	6.004	a, b	New site					1.11		1.11	100	Rocky and soft	New data	
Queen Charlotte Sound entrance (biogenic habitats)	7.19	7.019	a, b, c	New sub-sites					816.20		816.20	100	Soft	New data	

Recommended new ESMS (ha)	**844.95**

4.0 Site summaries including Expert Panel review.

Site 1.010 (1.10) Okuri Bay (horse mussel)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	1.010	
Site name	Okuri Bay (horse mussel)	
Site description	Okuri Bay is located on the outer, western shores of the Marlborough Sounds at the southwestern end of Current Basin, approximately 7 km southwest of French Pass. The Bay's coastline is approximately 8.8 km, and it occupies sea area of approximately 348 ha. Okuri Bay is roughly 2.1 km long and up to 2.1 km wide.	
Ecological description of attributes	There are enough adult horse mussels at this site to be called a bed. In the Tasman Bay biogeographic zone there are no other beds known making this the best bed. The presence of horse mussels has likely assisted colonisation of patches of red algae and tubeworms further adding to the site's ecological importance.	
Biogeographic area	Tasman Bay	
Level of original information	2. Qualitative internal report	
Date of original assessment		
Previously reported in or identified by	Anderson et al. (2020)	

Field work (present)	
Date	28 September 2021
Lead organisation	Davidson Environmental
Personnel	Rob Davidson, Laura Richards, Tom Scott-Simmonds

Methods	
Method of assessment	Drop camera (cable remote) HD photographs (remote underwater) Sonar Scan

Substratum (revised site)	
Substrata (widespread and dominant >50% cover)	Silt
Substrata (widespread and dominant >50% cover)	
Substrata (widespread and dominant >50% cover)	
Substrata (common 30-50% cover)	
Substrata (common 30-50% cover)	
Substrata (common 30-50% cover)	Fine sand
Substrata (minor <30%)	Dead whole shell
Substrata (minor <30%)	Dead broken shell
Substrata (localised patch or patches)	
Substrata (localised patch or patches)	
Substrata (localised patch or patches)	

Important species (revised site)	
Are important species present?	Yes
Important species 1	Horse mussel
Species status	Biogenic habitat forming
Biogenic type (if applicable)	Horse mussel
Important species 2	Red algae
Species status	Biogenic habitat forming
Biogenic type (if applicable)	Turfing algae
Important species 3	
Species status	
Biogenic type (if applicable)	

Significant site summary	Existing and present survey information
Original area of significant site (ha)	
Recommended area of significant site (ha)	19.7
Change to original site	Increase
Change (ha)	19.7
Percentage change from original area (%)	100%
Marine zone	Sublittoral (low tide to continental shelf)
Depth range (m)	7m to 22m
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)

Human Impacts	Comments	Expert panel assessment
Damage and or impacts noted	None	
Proportion of significant site effected		
Level of impact	This area is occasionally visited by recreational fishers, many of who would likely drift fish, but some may anchor in the area. There is no historical data for commercial scallop dredging in this bay. Commercial trawling events have not been documented for this bay but the site is sufficiently offshore for dredging to be conducted.	Trawling unlikely due to inshore location and proximity ro reefs.

Sensitivity & buffer calculation	Existing and present survey information	Expert panel assessment
Anthropogenic disturbance description	B: Sensitive = 50	B: Sensitive = 50
Threat multiplier	A: Effects are likely = 2	B: Effect unlikely = 1
Suggested buffer (m)	100m	50m

Assessment criteria scores	Assessment criteria scores (original)	Assessment criteria scores (present review)
1. Representativeness		M (medium)
2. Rarity		M (medium)
3. Diversity		M (medium)
4. Distinctiveness		M (medium)
5. Size and shape		M (medium)
6. Connectivity		H (high)
7. Sustainability		
8. Catchment		L (low)
Comments	Only known horse mussel in the Tasman Bay biogeographic zone. Horse mussels appears healthy.	Representativeness = medium, due to presence of large HM bed offshore of Cable Bay. The site appears in very good condition with low sedimentation.
Recommendations	Adopt as a new significant site. Survey adjacent areas to determine if bed is larger.	Approve site

Site 4.004 (4.4) Houhou Point east and west (red algae & brachiopod)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	4.004	
Site name	Houhou Point	
Site description	Houhou Point is located on the northern shoreline of Grove Arm immediately west of Onahau Bay, and 3.2km west of Wedge Point and 6.7km by sea from Picton.	
Ecological description of attributes	The site was first described in Davidson et al. (2011) as supporting a population of giant lampshell and some of the highest density red algae beds known in the Queen Charlotte Sound. The survey was conducted in 2008 and documented red algae in 6-15m depth around a bedrock outcrop, with up to 100% coverage in many places (Plate	
Biogeographic area	Queen Charlotte Sound	
Level of original information	3. Quantitative internal report	
Date of original assessment	4/04/2022	
Previously reported in or identified by	Davidson et al. (2011); Anderson et al. (2020)	

Field work (present)	
Date	4 April 2022
Lead organisation	Davidson Environmental
Personnel	Rob Davidson, Oliver Wade, Pauline Mitterwallner

Methods	
Method of assessment	Drop camera (cable remote) HD photographs (remote underwater) HD video (remote underwater)

Substratum (revised site)	
Substrata (widespread and dominant >50% cover)	Silt
Substrata (widespread and dominant >50% cover)	
Substrata (widespread and dominant >50% cover)	
Substrata (common 30-50% cover)	Bedrock
Substrata (common 30-50% cover)	
Substrata (common 30-50% cover)	
Substrata (minor <30%)	Dead whole shell
Substrata (minor <30%)	Dead broken shell
Substrata (localised patch or patches)	Cobble
Substrata (localised patch or patches)	
Substrata (localised patch or patches)	

Important species (revised site)	
Are important species present?	Yes
Important species 1	Red algae
Species status	Biogenic habitat forming
Biogenic type (if applicable)	Turfing algae
Important species 2	
Species status	
Biogenic type (if applicable)	
Important species 3	
Species status	
Biogenic type (if applicable)	

Significant site summary	Existing and present survey information
Original area of significant site (ha)	5.2
Recommended area of significant site (ha)	3.2
Change to original site	Decrease
Change (ha)	2.1
Percentage change from original area (%)	40%
Marine zone	Sublittoral (low tide to continental shelf)
Depth range (m)	0-15
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)

Human Impacts	Comments	Expert panel assessment
Damage and or impacts noted	Fine sediment apparent on deeper substrate and organisms	Fine sediment obvious on substrate.
Proportion of significant site effected	10-25%	
Level of impact	In April 2022 colonisation by ChaetXFD60opterus sp. was well advanced, especially on the reef structure (Plate 3). Anderson et al. (2020) noted sediment smothering at depths >15m. The present survey confirmed high levels of water turbidity and sediment accumulating on biotic features at depth.	
Type of damage or activity observed	Elevated turbidity	
Type of damage or activity observed	Sedimentation	

Sensitivity & buffer calculation	Existing and present survey information	Expert panel assessment
Anthropogenic disturbance description	B: Sensitive = 50	
Threat multiplier	B: Effect unlikely = 1	
Suggested buffer (m)	50 m	

Assessment criteria scores	Assessment criteria scores (original)	Assessment criteria scores (present review)
1. Representativeness	H (high)	
2. Rarity	L (low)	
3. Diversity	L (low)	
4. Distinctiveness	M (medium)	
5. Size and shape	L (low)	
6. Connectivity	L (low)	
7. Sustainability		
8. Catchment	L (low)	
Comments	One of the a few *Adamsiella chauvinii* beds in QCS,	Assessment not done due to insufficient survey information.
Recommendations	Delete western polygon. Survey red algae and adjust eastern polygon as necessary. Monitor red algae over time.	Survey western polygon using divers. Survey red algae bed.

Site 4.032 (4.32) Amerikiwhati Island (*Galeolaria hystrix* mounds)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	4.032	
Site name	Amerikiwhati Island	
Site description	Amerikiwhati Island is a small island and submerged ridge located on the north-western side of Arapawa Island located along the southern coastline of Queen Charlotte Sound. The Island is approximately 26km north-east of Picton.	
Ecological description of attributes	During a widespread survey, Anderson et al. (2020a) identified the presence of tubeworm mounds at this site. Anderson et al. (2020b) modelled the likely location of biogenic structures and identified several potential polygons in Queen Charlotte Sound. During the present survey, many of these areas including Amerikiwhati Island were surveyed.	
Biogeographic area	Queen Charlotte Sound	
Level of original information	3. Quantitative internal report	
Date of original assessment		
Previously reported in or identified by	Anderson et al. (2020)	

Field work (present)	
Date	5 April 2022
Lead organisation	Davidson Environmental
Personnel	Rob Davidson, Oliver Wade, Pauline Mitterwallner

Methods	
Method of assessment	Drop camera (cable remote) Photographs (handheld surface) HD photographs (remote underwater)

Substratum (revised site)	
Substrata (widespread and dominant >50% cover)	
Substrata (widespread and dominant >50% cover)	
Substrata (widespread and dominant >50% cover)	
Substrata (common 30-50% cover)	Bedrock
Substrata (common 30-50% cover)	Cobble
Substrata (common 30-50% cover)	Silt
Substrata (minor <30%)	Dead whole shell
Substrata (minor <30%)	Dead broken shell
Substrata (localised patch or patches)	
Substrata (localised patch or patches)	
Substrata (localised patch or patches)	

Important species (revised site)	
Are important species present?	Yes
Important species 1	Galeolaria hystrix mounds
Species status	Biogenic habitat forming
Biogenic type (if applicable)	Tubeworm mounds (e.g. G. hystrix)
Important species 2	Hydroid trees
Species status	Conservation/scientific importance
Biogenic type (if applicable)	
Important species 3	
Species status	
Biogenic type (if applicable)	

Significant site summary	Existing and present survey information
Original area of significant site (ha)	
Recommended area of significant site (ha)	3.7
Change to original site	Increase
Change (ha)	3.7
Percentage change from original area (%)	100%
Marine zone	Sublittoral (low tide to continental shelf)
Depth range (m)	5m to 30m
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)

Human Impacts	Comments	Expert panel assessment
Damage and or impacts noted		
Proportion of significant site effected		
Level of impact	The site is located on a sloping rocky and soft bottom. Recreational fishers anchor along this coast and likely cause damage to mounds. It is unlikely commercial trawling and dredging occur in this area. Species, habitats or communities present at the site cannot tolerate anthropogenic seabed disturbance due to their fragile status.	Some species and communities present are vulnerable to physical damage.

Sensitivity & buffer calculation	Existing and present survey information	Expert panel assessment
Anthropogenic disturbance description	A: Very sensitive = 100	A: Very sensitive = 100
Threat multiplier	A: Effects are likely = 2	A: Effects are likely = 2
Suggested buffer (m)	200 m	200 m

Assessment criteria scores	Assessment criteria scores (original)	Assessment criteria scores (present review)
1. Representativeness		H (high)
2. Rarity		M (medium)
3. Diversity		H (high)
4. Distinctiveness		H (high)
5. Size and shape		H (high)
6. Connectivity		H (high)
7. Sustainability		
8. Catchment		L (low)
Comments	One of several tubeworm beds in QCS. A wide variety of filter deeding organisms were observed on the reef.	Site supports more stoney corals than seen elsewhere in the Marlborough Sounds.
Recommendations	Establish a new site.	Tidal flows likely lessen sediment effects. Sediment particles seen are often coarse relative to depths. Approve site.

Site 4.033 (a, b & c) (4.33 a,b,c) Kumutoto Point (*Galeolaria hystrix* mounds)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	4.033 a, b, & c	
Site name	Kumutoto Point	
Site description	Kumutoto Point is a small promontory located on the north-western side of Kaipapa Bay located along the northern coastline of Queen Charlotte Sound. The point is approximately 8.5km north-east of Picton.	
Ecological description of attributes	During a widespread survey, Anderson et al. (2020a) identified the presence of tubeworm mounds at this site. Anderson et al. (2020b) modelled the likely location of biogenic structures and identified several potential polygons in Queen Charlotte Sound. During the present survey, many of these areas including Kumutoto Point were surveyed.	
Biogeographic area	Queen Charlotte Sound	
Level of original information	3. Quantitative internal report	
Date of original assessment		
Previously reported in or identified by	Anderson et al. (2020)	

Field work (present)	
Date	4 April 2022
Lead organisation	Davidson Environmental
Personnel	Rob Davidson, Oliver Wade, Pauline Mitterwallner

Methods	
Method of assessment	Drop camera (cable remote) Photographs (handheld surface) HD photographs (remote underwater)

Substratum (revised site)	
Substrata (widespread and dominant >50% cover)	
Substrata (widespread and dominant >50% cover)	
Substrata (widespread and dominant >50% cover)	
Substrata (common 30-50% cover)	Bedrock
Substrata (common 30-50% cover)	Cobble
Substrata (common 30-50% cover)	Silt
Substrata (minor <30%)	Dead whole shell
Substrata (minor <30%)	Dead broken shell
Substrata (localised patch or patches)	
Substrata (localised patch or patches)	
Substrata (localised patch or patches)	

Important species (revised site)	
Are important species present?	Yes
Important species 1	Galeolaria hystrix mounds
Species status	Biogenic habitat forming
Biogenic type (if applicable)	Tubeworm mounds (e.g. G. hystrix)
Important species 2	Burrowing anemone
Species status	Conservation/scientific importance
Biogenic type (if applicable)	
Important species 3	
Species status	
Biogenic type (if applicable)	

Significant site summary	Existing and present survey information
Original area of significant site (ha)	
Recommended area of significant site (ha)	2.6
Change to original site	Increase
Change (ha)	2.6
Percentage change from original area (%)	100%
Marine zone	Sublittoral (low tide to continental shelf)
Depth range (m)	7m to 26m
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)

Human Impacts	Comments	Expert panel assessment
Damage and or impacts noted		
Proportion of significant site effected		
Level of impact	The site is located on a sloping rocky and soft bottom. Recreational fishers anchor along this coast and likely cause damage to mounds. It is unlikely commercial trawling and dredging occur in this area. Species, habitats or communities present at the site cannot tolerate anthropogenic seabed disturbance due to their fragile status.	Mounds vulnerable to physical damage.
Type of damage or activity observed	Anchor marks on benthos	
Type of damage or activity observed		
Type of damage or activity observed		
Type of damage or activity observed		

Sensitivity & buffer calculation	Existing and present survey information	Expert panel assessment
Anthropogenic disturbance description	A: Very sensitive = 100	A: Very sensitive = 100
Threat multiplier	A: Effects are likely = 2	A: Effects are likely = 2
Suggested buffer (m)	200 m	200 m

Assessment criteria scores	Assessment criteria scores (original)	Assessment criteria scores (present review)
1. Representativeness		M (medium)
2. Rarity		M (medium)
3. Diversity		H (high)
4. Distinctiveness		M (medium)
5. Size and shape		M (medium)
6. Connectivity		H (high)
7. Sustainability		
8. Catchment		M (medium)
Comments	One of the better tubeworm beds in QCS.	
Recommendations	Establish three new sub-sites. Monitor for effect of anchoring and *Chaetopterus*.	Approve site

Site 4.034 (a&b) (4.34 a&b) Golden Point (*Galeolaria hystrix* mounds)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	4.034 a & b	
Site name	Golden Point	
Site description	Golden Point is a small promontory located on the eastern side of Kaipapa Bay located along the northern coastline of Queen Charlotte Sound. The point is approximately 8.5km north-east of Picton.	
Ecological description of attributes	The site has been part of the biological ferry monitoring programme since 2020 (Davidson et al. 2017). This programme collected data from the shallow <2m depth zone. During a widespread survey, Anderson et al. (2020a) identified the presence of tubeworm mounds. Anderson et al. (2020b) modelled the likely location of biogenic structures and identified several potential polygons in Queen Charlotte Sound. During the present survey, many of these areas including Golden Point were surveyed.	
Biogeographic area	Queen Charlotte Sound	
Level of original information	3. Quantitative internal report	
Date of original assessment		
Previously reported in or identified by	Anderson et al. (2020)	

Field work (present)	
Date	6 April 2022
Lead organisation	Davidson Environmental
Personnel	Rob Davidson, Oliver Wade, Pauline Mitterwallner

Methods	
Method of assessment	Drop camera (cable remote) Photographs (handheld surface)

Substratum (revised site)	
Substrata (widespread and dominant >50% cover)	
Substrata (widespread and dominant >50% cover)	
Substrata (widespread and dominant >50% cover)	
Substrata (common 30-50% cover)	Bedrock
Substrata (common 30-50% cover)	Cobble
Substrata (common 30-50% cover)	Silt
Substrata (minor <30%)	Dead whole shell
Substrata (minor <30%)	Dead broken shell
Substrata (localised patch or patches)	
Substrata (localised patch or patches)	
Substrata (localised patch or patches)	

Important species (revised site)	
Are important species present?	Yes
Important species 1	Galeolaria hystric mounds
Species status	Biogenic habitat forming
Biogenic type (if applicable)	Tubeworm mounds (e.g. G. hystrix)
Important species 2	Burrowing anemone
Species status	Conservation/scientific importance
Biogenic type (if applicable)	
Important species 3	
Species status	
Biogenic type (if applicable)	

Significant site summary	Existing and present survey information
Original area of significant site (ha)	
Recommended area of significant site (ha)	1.7
Change to original site	Increase
Change (ha)	1.7
Percentage change from original area (%)	100%
Marine zone	Sublittoral (low tide to continental shelf)
Depth range (m)	5.5m to 22m
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)

Human Impacts	Comments	Expert panel assessment
Damage and or impacts noted	Anchor and chain damage	Mounds are vulnerable to physical damage.
Proportion of significant site effected	< 10%	
Level of impact	The site is located on a sloping rocky and soft bottom. Recreational fishers anchor along this coast and likely cause damage to mounds. It is unlikely commercial trawling and dredging occur in this area. Species, habitats or communities present at the site cannot tolerate anthropogenic seabed disturbance due to their fragile status.	
Type of damage or activity observed	Anchor marks on benthos	

Sensitivity & buffer calculation	Existing and present survey information	Expert panel assessment
Anthropogenic disturbance description	A: Very sensitive = 100	A: Very sensitive = 100
Threat multiplier	A: Effects are likely = 2	A: Effects are likely = 2
Suggested buffer (m)	200 m	200 m

Assessment criteria scores	Assessment criteria scores (original)	Assessment criteria scores (present review)
1. Representativeness		M (medium)
2. Rarity		M (medium)
3. Diversity		H (high)
4. Distinctiveness		M (medium)
5. Size and shape		M (medium)
6. Connectivity		H (high)
7. Sustainability		
8. Catchment		M (medium)
Comments	One of the better tubeworm beds in QCS.	
Recommendations	Establish two new sub-sites. Monitor for effect of anchoring and *Chaetopterus*.	Approve site

Site 6.004 (a & b) (6.4 a,b) Kaikoura Bay headland (*Galeolaria hystrix*-mounds)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	6.004 (a & b)	
Site name	Kaikoura Bay headland (*Galeolaria* & macroalgae)	
Site description	The headland is located immediately south of Kaikoura Bay along the eastern coastline of central Port	
Ecological description of attributes	Prior to the survey, the biological features of this headland were unknown. The navy chart shows the shore is sloping down to approximately 16m depth where is becomes flat and contiguous with the wider Port Underwood benthos. The headland coast supported two small patches of *Galeolaria* tubeworm mounds and widespread red algae beds. A small area supporting the tubeworm *Bispira bispira* sp.A was also recorded in the north.	
Biogeographic area	Port Underwood	
Level of original information	2. Qualitative internal report	
Date of original assessment		
Previously reported in or identified by		

Field work (present)	
Date	21 April 2021
Lead organisation	Davidson Environmental
Personnel	Rob Davidson, Laura Richards, Tom Scott-Simmonds

Methods	
Method of assessment	Drop camera (cable remote) Photographs (handheld surface) Sonar Scan

Substratum (revised site)	
Substrata (widespread and dominant >50% cover)	
Substrata (widespread and dominant >50% cover)	
Substrata (widespread and dominant >50% cover)	
Substrata (common 30-50% cover)	
Substrata (common 30-50% cover)	Fine sand
Substrata (common 30-50% cover)	Silt
Substrata (minor <30%)	Dead whole shell
Substrata (minor <30%)	Dead broken shell
Substrata (localised patch or patches)	Bedrock
Substrata (localised patch or patches)	Cobble
Substrata (localised patch or patches)	

Important species (revised site)	
Are important species present?	Yes
Important species 1	Galeolaria hystric mounds
Species status	Biogenic habitat forming
Biogenic type (if applicable)	Tubeworm mounds (e.g. G. hystrix)
Important species 2	Macroalgae
Species status	Biogenic habitat forming
Biogenic type (if applicable)	Turfing algae
Important species 3	
Species status	
Biogenic type (if applicable)	

Significant site summary	Existing and present survey information
Original area of significant site (ha)	
Recommended area of significant site (ha)	8.4
Change to original site	Increase
Change (ha)	8.4
Percentage change from original area (%)	100%
Marine zone	Sublittoral (low tide to continental shelf)
Depth range (m)	5m to 16m
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)

Human Impacts	Comments	Expert panel assessment
Damage and or impacts noted		
Proportion of significant site effected		
Level of impact	The site is located on a sloping rocky and soft bottom. Recreational fishers anchor along this coast and likely cause damage to mounds. It is unlikely commercial trawling and dredging occur in this area. *Galeolaria* mounds at the site cannot tolerate anthropogenic seabed disturbance due to their fragile status.	The loss of tubeworm mounds at The Knobbys makes any area in Port Underwood with mounds important.
Type of damage or activity observed	Anchor marks on benthos	

Sensitivity & buffer calculation	Existing and present survey information	Expert panel assessment
Anthropogenic disturbance description	A: Very sensitive = 100	A: Very sensitive = 100
Threat multiplier	A: Effects are likely = 2	A: Effects are likely = 2
Suggested buffer (m)	200 m	200m

Assessment criteria scores	Assessment criteria scores (original)	Assessment criteria scores (present review)
1. Representativeness		M (medium)
2. Rarity		M (medium)
3. Diversity		H (high)
4. Distinctiveness		M (medium)
5. Size and shape		M (medium)
6. Connectivity		H (high)
7. Sustainability		
8. Catchment		L (low)
Comments	One of a small number of tubeworm beds in Port Underwood.	
Recommendations	Establish new sub-sites.	Adjust boundary to include reef area with tubeworm mounds. Approve site.

Site 7.019 (a, b & c) (7.19 a,b,c) Queen Charlotte Sound entrance (biogenic habitats)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	7.019	
Site name	Queen Charlotte Sound entrance (biogenic habitats)	
Site description	The entrance to Queen Charlotte Sound is relatively large body of water extending approximately 10.5 km from the south-eastern and north-western Sound sides. The area is swept by moderate to strong tides, particularly the outgoing tide (up to 0.3 m/sec) (Broekhuizen et al., 2015) and at times the area receives wind driven waves and oceanic swells. Depths are relatively shallow inside the Sound, but increase dramatically towards Cook Strait proper (i.e. north-east of White Rocks).	
Ecological description of attributes	Upright and intact biogenic structures characterised by a variety of bryozoans, hydroids, ascidians and sponges were present. Bryozoans appeared to be dominated by Celleporaria agglutinans with occasional Galeopsis sp. colonies present.	
Biogeographic area	Cape Jackson to Rarangi	
Level of original information	3. Quantitative internal report	
Date of original assessment	4/04/2022	
Previously reported in or identified by	Anderson et al. (2020b)	

Field work (present)	
Date	4 April 2022
Lead organisation	Davidson Environmental
Personnel	Rob Davidson, Oliver Wade, Pauline Mitterwallner

Methods	
Method of assessment	Drop camera (cable remote) HD photographs (remote underwater) HD video (remote underwater)

Substratum (revised site)	
Substrata (widespread and dominant >50% cover)	Silt
Substrata (widespread and dominant >50% cover)	
Substrata (widespread and dominant >50% cover)	
Substrata (common 30-50% cover)	
Substrata (common 30-50% cover)	
Substrata (common 30-50% cover)	
Substrata (minor <30%)	Dead whole shell
Substrata (minor <30%)	Dead broken shell
Substrata (localised patch or patches)	
Substrata (localised patch or patches)	
Substrata (localised patch or patches)	

Important species (revised site)	
Are important species present?	Yes
Important species 1	Bryozoans, sponges, ascidians, anemones
Species status	Biogenic habitat forming
Biogenic type (if applicable)	High relief biogenic (variety of species)
Important species 2	Red algae
Species status	Biogenic habitat forming
Biogenic type (if applicable)	Turfing algae
Important species 3	
Species status	
Biogenic type (if applicable)	

Significant site summary	Existing and present survey information
Original area of significant site (ha)	
Recommended area of significant site (ha)	816.2
Change to original site	Increase
Change (ha)	816.2
Percentage change from original area (%)	100%
Marine zone	Sublittoral (low tide to continental shelf)
Depth range (m)	0-42
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)

Human Impacts	Comments	Expert panel assessment
Damage and or impacts noted	Fine sediment apparent on deeper substrate and organisms	
Proportion of significant site effected	< 10%	
Level of impact	The site is located on a gently sloping soft bottom shore swept by regular moderate to strong tidal flows. Most recreational fishers do not anchor at this site due to currents. It is likely commercial trawling and dredging are either rare or do not occur in this area. If they did, the biogenic structures would likely be absent. Species, habitats or communities present at the site cannot tolerate anthropogenic seabed disturbance.	Site closed to commercial trawling. Some dredging may have occurred in the past.
Type of damage or activity observed	Elevated turbidity	
Type of damage or activity observed	Sedimentation	

Sensitivity & buffer calculation	Existing and present survey information	Expert panel assessment
Anthropogenic disturbance description	A: Very sensitive = 100	A: Very sensitive = 100
Threat multiplier	A: Effects are likely = 2	A: Effects are likely = 2
Suggested buffer (m)	200 m	200m

Assessment criteria scores	Assessment criteria scores (original)	Assessment criteria scores (present review)
1. Representativeness		H (high)
2. Rarity		H (high)
3. Diversity		H (high)
4. Distinctiveness		H (high)
5. Size and shape		H (high)
6. Connectivity		H (high)
7. Sustainability		
8. Catchment		NA
Comments	Largest biogenic community found of soft sediment benthos in Marlborough. Site appears healthy.	Polygons are based on modelling of multibeam data (Anderson et al., 2020). The expert panel recognise that modelling is a tool. It is therefore important that ground truthing occurs to verify the models predictions.
Recommendations	Adopt as a new significant site.	Approve site

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	Anderson, T.J., Stewart, R., D'Archino, R., Stead, J., Eton, N. 2020b. Life on the seafloor in Queen Charlotte Sound, Tory Channel and Cook Strait. NIWA Client Report No. 2019081WN. Prepared for Marlborough District Council: 343.

5.0 Site sensitivity and anthropogenic threats

5.1 Threat assessment process

Habitat sensitivity and the likelihood of anthropogenic threats were used to determine an appropriate buffer zone for each significant site. The method requires a site to be assessed for its expected sensitivity (very sensitive, sensitive, or robust/not known), from which a sensitivity score is assigned (Table 2a). The level of perceived threat is then used to determine a corresponding threat multiplier for the sensitivity scores, and subsequently a recommended buffer zone (Table 2b). The buffer zones aim to reduce the likelihood of damage from anthropogenic activities (e.g. dredging, trawling, anchoring, sedimentation, pollution).

Davidson et al. (2022a) used this method to calculate proposed buffers for each of the significant sites. The expert panel reviewed these buffer zone distances based on the panel's collective knowledge of the biophysical characteristics of each significant site (e.g. personal knowledge) and/or from the literature (including bathymetry charts), as well as information on the distribution and intensity of marine pressures such as bottom trawling and dredging.

5.2 Threat assessment summary

Sensitivity to anthropogenic disturbance is likely to be an important consideration for the management of significant sites. Sites that support sensitive and very sensitive species, communities and/or habitats are vulnerable to human activities and management action is usually appropriate to ensure the continuation of natural values at the site (Table 2a).

Davidson *et al*. (2022a) ranked all sites as supporting either "very sensitive" or "sensitive" species, habitats or communities using Table 2a. Threats were also outlined in that report ranging from physical disturbance from anchoring to effects from sedimentation.

Of particular concern to the Expert Panel is recreational anchoring at sites that support very sensitive habitats, communities or species (e.g. *Galeolaria* tubeworm mounds). The Panel note it is in fisher's best interest to ensure habitats that support fish and their juveniles are protected from all forms of damage.

The horse mussel bed in Okuri Bay was ranked as sensitive and able to cope with low-intensity anchoring.

The Panel agreed with the proposed buffers calculated for each significant site by Davidson *et al*. (2022a). Full details are provided in Table 3.

Table 2a . Sensitivity assessment criteria for species, community or habitat to perceived threats.

Sensitivity to anthropogenic factors.

Category	Disturbance description	Examples	Score
A	**Very sensitive:** Site supports species, habitats or communities that cannot tolerate anthropogenic impacts (e.g. nutrient enrichment, sedimentation, pollution, colonisation by invasive species, anchoring, all forms of trawling and dredging).	Bryozoans mounds/field, sponges garden, tubeworm mounds, eelgrass bed, rhodolith bed, soft tubeworm bed.	100
B	**Sensitive:** Site supports species, habitats or communities that can tolerate low level of elevated turbidity, enrichment, invasive species or pollution. Can tolerate low-level anthropogenic seabed disturbance due to the nature of the substrata, community, species and/or hydrodynamic regimes (i.e. tolerant of occasional recreational anchoring). Not tolerant of dredging and trawling.	Benthic algae bed, elephantfish egg laying, hydroid field, burrowing anemones, horse mussel bed, shellfish bed, shrimp burrows, brachiopod bed, algal forest, rocky reef.	50
C	**Robust and/or not known:** Site supports species, habitats or communities that can tolerate high turbidity, enrichment, pollution or invasive species; and/or site not known to support sensitive or very sensitive attributes. Can be tolerant of anchoring, dredging and trawling.	Shell or coarse substrata, high energy shore, short-lived species/communities, drift macroalgae.	0

Table 2b . Buffer zone distance calculator using sensitivity score and the assessed likelihood of an effect occurring from a perceived threat.

Threat multiplier (chance of threats occuring)

Threat level	Location type	Description	Multiplier
A	Effects are likely	Physical disturbance: offshore, and/or sites accessible to dredging and/or trawling. Other: sites exposed or near threats (i.e. source of sediment, near human development, regularly human activity).	2
B	Effects are unlikely	Physical disturbance: sites close to shore and/or protected by physical barriers or legislation (e.g. reef structure, marine reserve). Other: sites well removed from threats or located at remote locations.	1

Buffer zone calculation (for each site type multiply the scores from each table above)

Sensitivity category	Threat level	Scores	Buffer (m)
A	A	100 x 2	200
A	B	100 X 1	100
B	A	50 x 2	100
B	B	50 x 1	50
C	A	0 x 2	0
C	B	0 x 1	0

Table 3. Summary of anthropogenic disturbance and vulnerability assessment, and corresponding buffers, for listed ecologically significant marine sites. Colours are from Table 2a and 2b.

Sites	Original number format	Sensitivity (species, habitat)	Physical anthropogenic threats	Other anthropogenic threats	Main issues	Buffer (m)	Comments
Site 1.010 Okuri Bay (horse mussel)	1.10	Sensitive	Unlikely	Unlikely	None at present	50	No historical dredging or trawling. Site occasional visited by recreational fishers, however, low level anchoring unlikely to have an impact.
Site 4.004 Houhou Point east (red algae)	4.4	Sensitive	Unlikely	Likely	Sedimentation at depth, *Chaetopterus* sp present and common.	100	The present survey confirmed high levels of water turbidity and sediment accumulating on biotic features at depth. The *Adamsiella* bed may be declining in % cover and extent.
Site 4.004 Houhou Point west (brachiopods)	4.4	Very sensitive	Unlikely	Likely	Sedimentation at depth.	200	The present survey confirmed high levels of water turbidity and sediment accumulating on biotic features at depth. *Neothyrus* was not observed at the site.
Site 4.032 Amerikiwhati Island (*Galeolaria* mounds & invertebrates)	4.32	Very sensitive	Likely	Likely	Physical damage from anchoring likely.	200	Site is located along and close to the reef edges thereby reducing the chance of dredging or trawling. Anchoring occurs and has probably resulted in damage.
Site 4.033 (a, b & c) Kumutoto Point (*Galeolaria* mounds)	4.33	Very sensitive	Likely	Likely	Physical damage from anchoring likely.	200	Site is located along and close to a rubble bank thereby reducing the chance of dredging or trawling. Anchoring occurs and has probably resulted in damage to mounds.
Site 4.034 (a & b) Golden Point (*Galeolaria* mounds)	4.34	Very sensitive	Likely	Likely	Physical damage from anchoring observed.	200	Site is located along and close to a rubble bank thereby reducing the chance of dredging or trawling. Anchoring occurs and has resulted in damage to mounds.
Site 6.004 (a & b) Kaikoura Bay headland (*Galeolaria* & macroalgae)	6.4	Very sensitive	Likely	Likely	Physical damage from anchoring likely. Sedimentation observed.	200	Site is located along and close to a rubble bank thereby reducing the chance of dredging or trawling. Anchoring occurs and has probably resulted in damage to mounds.
Site 7.019 (a, b & c) Queen Charlotte Sound entrance (biogenic habitats)	7.19	Very sensitive	Likely	Unlikely	Area is open to commercial dredging.	200	No damage observed, however, the site is well offshore and over a soft benthos. The risk of damage from trawling is high.

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Appendix 1. Assessment criteria (2017)

The following section presents the updated assessment criteria used to evaluate the ecological significance in the present review report. The ranking for each criterion are: H = High (which can be thought of as outstanding), M = Medium (which is still highly significant) and L = Low (which is more representative or typical of ecosystems that pre-dated human disturbance). Criteria scores collectively contribute to the overall site ranking and indicate the reason/s for the significance of a site. A site that does not achieve "H" or "M" is not ranked as reaching the planning threshold of being an ecologically significant site in the present report, however, such sites may possess a variety of biological attributes considered important for other reasons or have insufficient data to enable ranking.

1 Representativeness

The site is significant if it contains biological features (habitat, species, community) that represent a good example within the biogeographic area.

High: The site contains the best example of its type known from the biogeographic area.
Medium: The site contains one of the better examples, but not the best, of its type known from the biogeographic area.
Low: The site contains an example, but not one of the better or best, of its type known from the biogeographic area.

2 Rarity

The site is significant if it contains flora and fauna listed as nationally threatened nationally endangered, nationally vulnerable, or in serious decline. The site is also considered significant if it supports flora and fauna that are sparse, locally endemic, or at an extreme in their national distribution. The site is also significant if it supports a habitat or habitats or community assemblages that are rare nationally, regionally or within the biogeographic area.

High: The site contains a nationally important species, habitat or community; or the site contains several species, habitats, communities that are threatened within the biogeographic area.
Medium: The site contains one or a few species, habitats or communities that are threatened but not nationally, or contains rare or uncommon species, habitats or communities within the biogeographic area.
Low: The site is not known to contain flora, fauna or communities that are threatened, rare or uncommon in the biogeographic area, region or nationally.

3 Diversity

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).

High: The site contains a high diversity of species, habitats or communities.
Medium: The site contains a moderate diversity of species, habitats or communities.
Low: The site contains a low diversity of species, habitats or communities.

4 Distinctiveness

The site is significant if it contains ecological features (e.g. species, habitats, communities) that are outstanding or unique nationally, in the region, or in the biogeographic area.

High: The site contains any ecological feature that is unique nationally, in the region, or in the biogeographic area, or it contains several features that are outstanding regionally or in the biogeographic area.
Medium: The site contains any ecological feature that is notable or unusual but not outstanding or unique nationally, in the region or in the biogeographic area.
Low: The site contains no known ecological features that are outstanding or unique nationally, in the region or in the biogeographic area (i.e. ecological features are typical rather than distinctive).

5 Size

The site is significant if it is moderate to large relative or other habitats or communities of its type in the biogeographic area.

High: The site is large relative to other habitats or communities of its type in the biogeographic area.
Medium: The site is moderate size relative to other habitats or communities of its type in the biogeographic area.
Low: The site is small relative to other habitats or communities of its type in the biogeographic area.

6 Connectivity

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).

High: The site is near or well connected to a large significant site or several other significant sites.
Medium: The site is near other significant sites, but only partially connected to them or at an appreciable distance.
Low: The site is isolated from other significant sites.

7 Adjacent catchment modifications

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.

High: The site is dominated by a stable and relatively mature native vegetated catchment (>400 ha) that is legally protected.
Medium: The site is dominated by a stable and relatively mature native vegetated catchment (>400 ha) with partial or no legal protection.
Low: The site is surrounded by a catchment (>400 ha) that is farmed, highly modified or has limited, relatively mature, vegetative cover.
Not applicable: The site is little influenced by catchment effects (e.g. offshore site, current swept site).

Appendix 2. Background information

In 2011, a report outlining Marlborough's ecologically significant marine sites was produced for MDC and 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 candidate sites. Sites that received a medium or high score were termed "significant". A total of 129 significant sites were recognized and described during that process.

The authors stated that their assessment of significance was based on existing data or information; however, they noted many sites had limited or old information. Some 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 more investigation was required to better assess the status of many significant sites.

The authors also stated that many of the sites not assessed as "significant" had the potential to be ranked higher in the future as more information became available. Further, they recognized the quality of some existing significant sites may decline over time due to natural or human-related events or activities. The authors, therefore, acknowledged their assessments would require updating regularly.

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. That report aimed to establish:

- The level of information required for new candidate sites.
- The process for assessing new sites and reassessing existing sites.
- A protocol for record-keeping, selection of experts and publication of new reports.

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:

- Investigation and survey of new sites.
- Collection of additional information from existing significant sites or sites that previously were not ranked as being ecologically significant.
- 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. combinations of both qualitative and quantitative data collection).

Follow-up surveys or assessments were undertaken in the summers of:

Year 1: 2014-2015, 21 sites and sub-sites in eastern Marlborough Sounds.
Year 2: 2015-2016, 15 sites, subsites in Croisilles Harbour and D'Urville Island.
Year 3: 2016-2017, 15 sites, subsites Croisilles to Waitui Bay, outer Sounds.
Year 4: 2017-2018, 14 sites in central Pelorus Sound.
Year 5: 2018-2019, 11 sites in Pelorus (8), Tory Channel (2) and Catherine Cove (1).
Year 6: 2019-2020, 17 sites QCS, Tory Channel, Cook Strait and Port Underwood.
Year 7: 2020-2021, 3 new sites in QCS and Tory Channel, reject one existing significant site and adjust boundary for 13 existing significant sites.

Davidson and Richards (2015, 2016) and Davidson *et al*. (2017a, 2018a, 2019, 2020) summarised the new biological data, while raw data and compiled spreadsheets summarising data were provided to MDC for storage. The authors also commented on site boundary alterations and recommended changes to the assessments of significance. After all summer surveys, the Expert Panel was reconvened to reassess the new information and make recommendations.

Davidson *et al*. (2020) reported on a mix of sites which were assessed based on new surveys from the 2019-2020 field season (year 6; five sites) or new information from other data sources notably Anderson *et al*. (2020) and Neil *et al*. (2018a, 2018b). The present report presents the subsequent review by the Expert Panel. The Panel also commented on anthropogenic threats and vulnerability of significant sites.

Davidson et al. (2022) conducted a survey for year 7 and reported on a total of 17 sites. Two of those significant sites have associated subsites: Site 5.4 Tory Channel west (18 subsites) and Site 5.8 Tory Channel east (12 subsites).