Davidson Environmental Limited

Expert panel review of selected significant marine sites surveyed in 2017-2018

Research, survey and monitoring report number 897

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

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September 2018

Bibliographic reference:

Davidson, R. J;[1] Baxter, A. S;[2] Duffy, C. A. J;[2] Handley, S;[5] Gaze, P;[4]; du Fresne, S;[3] Courtney, S.[2] 2018. Expert panel review of selected significant marine sites surveyed in 2017-2018. Prepared by Davidson Environmental Limited for Marlborough District Council and Department of Conservation. Survey and monitoring report no. 897.

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Significant Marine Site Expert Panel

Rob Davidson has been involved in marine biology for over 30 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 12 papers in internationally peer reviewed scientific journals. He has previously worked for MAF and the Department of Conservation. Presently Rob 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 26 years, relating to Cook Strait ferry impacts, marine farm recovery and marine reserve monitoring. As a consultant, Rob has provided scientific information for over 900 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 as a Technical Advisor (Marine) with the Department of Conservation's Marine Ecosystems Team. 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 a Scientific Officer (marine ecology) in the Science & Research and Marine Conservation Units from 1999-2012. He has authored over 80 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, and co-ordinated of a dive survey of shallow subtidal habitats of the Marlborough Sounds in 1989-90.

Andrew Baxter has over 35 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.

Sean Handley is a Marine Ecologist based at NIWA in Nelson. Sean was awarded his PhD in 1997 by the University of Auckland with support from the Cawthron Institute, where he was studying the ecology of shellfish and their pests (spionid polychaetes). He has a broad range of research and consultancy experience and expertise interacting with a range of marine sectors including: aquaculture, fisheries, conservation, iwi, NGO'S and regional councils. Sean has a very wide range of skills, working on research projects relating to: aquaculture of shellfish and sponges, ballast water testing, biosecurity surveys, ecological surveys and biological collections throughout NZ, Fiordland ecological surveys including deep reef communities, and benthic ecology. More recently he has undertaken reviews of historical changes to seabed and fish communities and has an interest in palaeoecology to establish baselines to inform future management and restoration of coastal resources.

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.

Sam du Fresne has over 20 years of experience studying marine mammals, beginning with his master's thesis in 1998. He has conducted several 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 several 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.

1.0 Summary

In 2011, a total of 129 significant marine sites were identified for the first time in Marlborough (Davidson *et al.,* 2011). In 2015, the Marlborough District Council (MDC) and Department of Conservation (DOC) embarked on an ongoing survey and monitoring programme aimed at updating and improving the database of significant sites. The programme also collects data for monitoring change at selected significant sites. This programme was guided by a detailed range of survey protocols including techniques suited for rapid reconnaissance (i.e. qualitative descriptions) and techniques suitable for monitoring (i.e. quantitative and certain qualitative data) (Davidson *et al.,* 2014). Significant sites selected each year for investigation were chosen by a MDC and DOC Steering Committee that prioritized sites on the basis of that they:

- Had limited or old biological information.
- Where areas where additional information was needed for management purposes.
- Were under threat or vulnerable to impacts.
- Were suitable for monitoring.
- May contain significant undocumented values.

Summer surveys based on recommendations from the Steering Committee have been undertaken on three previous occasions (Davidson and Richards, 2015; 2016; Davidson *et al*., 2017a). Reports and raw data from surveys were lodged separately with the MDC. The authors also provided comment on site boundary alterations and made recommendations. At the end of each survey period the MDC Significant Marine Site Expert Panel reviewed data, assessed sites using accepted criteria and made recommendations.

The present report outlines the Significant Marine Site Expert Panel review of sites surveyed during the fourth survey programme conducted in Pelorus Sound (Davidson *et al*., 2018). 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 2017 report. No changes to the criteria were made during the present assessment (see Appendix 1).

Overall, the Expert Panel accepted all the boundary modifications proposed by Davidson *et al*. (2018). Five new sites were also accepted by the Panel, while one site proposed by Davidson *et al*. (2018) will be reassessed in the future once more data is collected.

The Panel also assessed site sensitivity/impacts from a range of anthropogenic threats including physical disturbance. Five sites are recommended for urgent management actions, of which four have ongoing impacts that will result in further degradation of significant site biological values.

2.0 Background

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 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:

- 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 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, sub-sites in Croisilles Harbour and D'Urville Island.
Year 3: 2016-2017, 15 sites, sub-sites Croisilles to Waitui Bay, outer Sounds.
Year 4: 2017-2018, 14 sites in central Pelorus Sound.

Davidson and Richards (2015, 2016) and Davidson *et al*. (2017a, 2018) summarised the new biological data, while raw 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.

The present report presents the Expert Panel review of the 2017-2018 (year 4) survey season reported in Davidson *et al*. (2018). The Panel also comments on anthropogenic threats and vulnerability of significant sites.

3.0 The assessment process

3.1 Data collation

All data collected by Davidson *et al*. (2018) were compiled and made available to the expert panel during the present review. Davidson *et al*. (2018) described six new significant sites and provided new data for eight existing significant sites (Table 1).

Information collected during field work included: high definition and low-resolution drop camera photographs, hand held still photography, hand held video, remote video, sonar images, and observations (note: all raw data are held by MDC). Information relating to each original site surveyed by Davidson *et al.* (2011) was also compiled and made available including: site description, site boundaries, ecological assessment, and any data previously compiled or known for the site or sub-site.

3.2 Expert Panel

For the present review, most of the Expert Panel involved in the Davidson *et al*., (2011) report and 2015, 2016 and 2017 reviews were reconvened, apart from Sam du Fresne (marine mammals) and Shannel Courtney (plants). Sean Handley (NIWA) replaced existing member Bruno Brosnan. Peter Gaze did not attend the meeting but reviewed new data for the

Tawhitinui Bay king shag site prior to the group assessment. Information was also reviewed by the other panel members to ensure consistency. Sam du Fresne and Shannel Courtney were not involved in the present reassessment meeting as no new or resurveyed marine mammal or plant sites were under scrutiny.

4.0 Wording of the assessment criteria

During previous 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.

The present assessment made no alterations to the criteria used in the 2017 review (see Appendix 1 for revised criteria). During this process, the Expert Panel took great care not to create inconsistency between the sites assessed in Davidson *et al*. (2011) and the 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"). A more comprehensive review of the criteria to incorporate recent advancements in assessment criteria is also being considered.

5.0 Review of survey sites (2017-2018)

The Expert Panel assessed all sites based on the information and proposed changes presented in Davidson *et al*. (2018) and recommended:

- Accept 5 of the 6 new sites, with more data required for the rejected site (Treble Tree coast) (Table 1).
- Accept boundary adjustments at seven existing significant sites.
- Accept new data for a king shag site.

Boundary refinements lead to both increases (165.2 ha) and decreases (-112.7 ha) to the size of individual significant sites with an overall increase of 52.5 ha (Table 1).

Table 1. Summary of significant sites and assessment by expert review panel.

Sites (Davidson *et al.* , 2018)	Biological features	Review panel recommendations	Original data	New area (ha)	Change (ha)	Reason/s for change
Site 3.7 Picnic Bay rhodoliths	Rhodolith bed	Accept new data	1.9	1.1	-0.80	Additional quantitative data
Site 3.8 Fitzroy Bay elephantfish spawning	Elephantfish spawning habitat	Adjust boundary to encompass values	252.6	160.4	-92.20	Improved detail of survey
Site 3.9 Tennyson Inlet	Stable catchments	Adjust boundary to encompass values, complete survey	1211.68	1354.8	143.12	Improved detail of survey
Site 3.11 Tapapa coastline	Current swept biogenic habitats	Adjust boundary to encompass values	24.11	13.03	-11.08	Improved detail of survey
Site 3.12 Piripaua reef	Large reef	Adjust boundary to encompass values	0.685	1.86	1.18	Improved detail of survey
Site 3.15 Grant Bay reef	Large reef	Adjust boundary to encompass values	0.987	2.92	1.93	Improved detail of survey
Site 3.22 Tawhitinui Bay king shag colony	King shag colony	Accept new data	0.16	0.16	0.00	
Site 3.23 Woodlands (west) rhodoliths	Rhodolith bed	Accept new site		0.188	0.19	Data for new site
Site 3.24 Tuhitarata Bay reef	Large reef	Accept new site		3.398	3.40	Data for new site
Site 3.25 Kauauroa coast	Current swept biogenic	Adjust boundary to encompass values	14.9	6.3	-8.60	Improved detail of survey
Site 3.26 Ouokaha Island (west coast)	Tubeworm mounds	Accept new site		6.5	6.50	Data for new site
Site 3.27 Matai Bay tubeworms	Tubeworm bed	Accept new site		2.23	2.23	Data for new site
Site 3.28 Penzance Bay elephantfish spawning	Elephantfish spawning habitat	Accept new site, collect quantitative data		6.68	6.68	Data for new site
Site 3.29 Treble Tree coastline	Recovering soft benthos	Reject site until more information available				
Totals			1507.022	1559.566	52.5	
Increase to significant sites (ha)					165.2	
Decrease to significant sites (ha)					-112.7	

6.0 Site summaries including expert panel review for each site (green shading).

Site 3.7 Picnic Bay (rhodolith bed)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	3.7	3.7
Site name	Picnic Bay rhodoliths	Picnic Bay rhodoliths
Site description	The rhodolith bed is located in Picnic Bay, along the northern coastline of Tawhitinui Reach. The bay is approximately 5.2 ha in size and the entrance to the bay is approximately 400 m in width.	
Ecological description of attributes	The present survey mapped the rhodolith bed first described in Davidson (1999) and subsequently by Davidson and Richards (2005; 2006). The bed is small compared to most beds known from Marlborough measuring 1.1 ha or approximately 130 m in length and up to 120 m. Depths ranged from 11 m to 18.6 m. Comparable sea floor depths were located around the bed, however, the rhodoliths were not recorded anywhere outside a defined zone.	
Biogeographic area	Pelorus Sound	
Level of original information	2. Qualitative internal report	
Date of original assessment	1/09/2011	
Report	Davidson R. J.; Duffy C.A.J.; Gaze P.; Baxter, A.; DuFresne S.; Courtney S.; Hamill P. 2011. Ecologically significant marine sites in Marlborough, New Zealand. Co-ordinated by Davidson environmental limited for Marlborough District Council and Department of Conservation.	
Field work (present)		
Date	25/1/2018	
Lead organisation	Davidson Environmental	
Personnel	Rob Davidson, Laura Richards, Courtney Rayes, Tom Scott-Simmonds	
Site Characteristics		
Original area of significant site (ha)	1.9	
Suggested revision of significant site (ha)	1.1	
Marine zone	Sublittoral (low tide to continental shelf)	
Depth range (m)	11 - 18.6	
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)	
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)		
Substrata (widespread and dominant >50% cover)		
Substrata (widespread and dominant >50% cover)		
Substrata (common 30-50% cover)	Fine sand	
Substrata (common 30-50% cover)	Silt	
Substrata (common 30-50% cover)		
Substrata (minor <30%)	Dead whole shell	
Substrata (minor <30%)	Dead broken shell	
Substrata (localised patch or patches)	Shell hash	
Substrata (localised patch or patches)		
Substrata (localised patch or patches)		
Important species (revised site)		
Are important species present?	Yes	
Important species 1	Rhodolith bed	
Species status	Biogenic habitat forming	
Biogenic type (if applicable)	Rhodoliths	
Human Impacts		
Damage and or impacts noted	None	
Proportion of significant site effected		
Level of damage		
Type of damage or activity observed		
Type of damage or activity observed		
Type of damage or activity observed		
Type of damage or activity observed		

SIGNIFICANT SITE SUMMARY	Existing and present survey information	Expert panel assessment
Original area of significant site (ha)	1.9	1.9
Recommended area of significant site (ha)	1.1	1.1
Change to original site	Decrease	Decrease
Change (ha)	0.8	0.8
Percentage change from original area (%)		
Anthropogenic disturbance	Moderate-high	Moderate-high
Species/habitat sensitivity	Extremely sensitive	Extremely sensitive
Anthropogenic vulnerability	Moderate	Moderate
Assessment criteria scores	**Assessment criteria scores (original)**	**Assessment criteria scores (present review)**
1. Representativeness	H (high)	H (high)
2. Rarity	M (medium)	H (high)
3. Diversity	M (medium)	M (medium)
4. Distinctiveness	H (high)	M (medium)
5. Size	L (low)	H (high)
6. Connectivity	L (low)	L (low)
7. Catchment	L (low)	L (low)
Comments	Reduced area due to improved survey resolution. A small site but it supports good quality rhodoliths. Forestry plantation located in adjacent catchment represents a potential threat from sedimentation.	Rhodolith beds are a nationally rare, threatened and vulnerable habitat (Nelson, 2009; Nelson et al., 2012). One of two known rhodolith beds in the biogeographic area. Largest bed in biogeographic area. Low connectivity as rhodoliths are sterile and increase in size by vegetative growth. Log loading site in this bay represents a threat.
Recommendations	Modify boundary. Log loading site in this bay represents a threat.	Accept boundary adjustment. Protect from all physical disturbance.

REFERENCES		
	Davidson, R.J. and Richards, L.A. 2006: Biological report for an off-site marine farm (Li 465, site 8180) located in Picnic Bay, Pelorus Sound. Prepared by Davidson Environmental Ltd for L.M. Godsiff. Survey and Monitoring Report No. 542.	Nelson WA 2009. Calcified macroalgae - critical to coastal ecosystemsand vulnerable to change: A review. Mar Freshwat Res 60:787–801
	Davidson, R.J.; Richards, L.A. 2005: Biological report on a proposed marine farm renewal (U991786, Li 465) located in Picnic Bay, Pelorus Sound. Prepared by Davidson Environmental Ltd for LM Godsiff. Survey and Monitoring Report No. 475.	Neill, K.; Nelson, W.; D'Archino, R. Leduc, D.; & Farr, T. 2014. Northern New Zealand rhodoliths: assessing faunal and floral diversity in physically contrasting beds. Marine Biodiversity. 45. 63-75. 10.1007/s12526-014-0229-0.
	Davidson, R.J. 1999. Biological report on a proposed marine farm extension located east of Picnic Bay, Tawhitinui Reach, Pelorus Sound. Prepared by Davidson Environmental Limited for L.M. Godsiff. Survey and Monitoring Report No. 299.	
	Nelson, W.A.; Neil, K.; Farr, T.; Barr, N.; D'Archino; Miller, S.; Stewart, R. 2012. Rhodolith Beds in Northern New Zealand: Characterisation of Associated Biodiversity and Vulnerability to Environmental Stressors. New Zealand Aquatic Environment and Biodiversity Report No. 99.	

Site 3.8 Fitzroy Bay (elephantfish spawning)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	3.8	3.8
Site name	Fitzroy elephantfish spawning	
Site description	Fitzroy Bay complex, including Hallam Cove, Garne, Savill and Canoe Bays, are situated at the western end of Tawhitinui Reach. The Garne and Savill Bay Scenic Reserves cover much of the catchment of these bays.	
Ecological description of attributes	The shallow edges of these bays are used as spawning grounds by elephantfish. This is one of two regularly used spawning areas in the Marlborough Sounds, the other site is in inner Queen Charlotte Sound (Davidson *et al*., 2011).	Elephantfish lay large leathery egg cases, containing a single egg, on the seabed during springsummer, and the young elephantfish hatch 5-10 months later (Waite 1909, Graham 1956, Gorman 1963). Elephantfish lay their eggs in many parts of the Marlborough Sounds, on sand or mud in 6-20 m of water (McClatchie & Lester 1994, Didier et al. 1998). Other known egg laying sites are Pegasus Bay, Wellington Harbour, Canterbury Bight, and inshore Otago waters including Blueskin Bay (Waite 1909, Graham 1956, Jones & Hadfield 1985).
Biogeographic area	Pelorus Sound	
Level of original information	2. Qualitative internal report	
Date of original assessment	01/09/2011	
Report	Davidson R. J.; Duffy C.A.J.; Gaze P.; Baxter, A.; DuFresne S.; Courtney S.; Hamill P. 2011. Ecologically significant marine sites in Marlborough, New Zealand. Co-ordinated by Davidson environmental limited for Marlborough District Council and Department of Conservation.	
Field work (present)		
Date	14 & 15 February 2018	
Lead organisation	Davidson Environmental	
Personnel	Rob Davidson, Laura Richards, Courtney Rayes, Tom Scott-Simmonds	
Site Characteristics		
Original area of significant site (ha)	252.6	
Suggested revision of significant site (ha)	160.4	
Marine zone	Sublittoral (low tide to continental shelf)	
Depth range (m)	4-20 m	
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)	
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)		
Substrata (widespread and dominant >50% cover)		
Substrata (widespread and dominant >50% cover)		
Substrata (common 30-50% cover)	Fine sand	
Substrata (common 30-50% cover)	Silt	
Substrata (common 30-50% cover)		
Substrata (minor <30%)	Dead whole shell	
Substrata (minor <30%)	Dead broken shell	
Substrata (localised patch or patches)	Granule	
Substrata (localised patch or patches)	Shell hash	
Substrata (localised patch or patches)		
Important species (revised site)		
Are important species present?	Yes	
Important species 1	Elephantfish spawning	
Species status	Conservation/scientific importance	
Human Impacts		
Damage and or impacts noted	Exotic species. *Asperococcus bullosus* covered much of the benthos is Garne and Savill Bays. Unkown impact on spawning but may deter spawning. Introduced tubeworms common around coastal edges. Unknown impact on spawning. Fine sediment appeared more apparent in Garne and Savill Bays. Aquaculture has impacted spawning habitat at a small number of sites.	
Proportion of significant site effected	10-25%	
Level of impact	Exotic algae has had a high level of impact at Garne and Savill Bays. Aquaculture impact at particular sites is high (i.e. under backbones). Sedimentation levels appear higher in Garne and Savill Bays (R Davidson pers. obs.).	
Type of damage or activity observed	Introduced or exotic species	
Type of damage or activity observed	Sedimentation	
Type of damage or activity observed	Aquaculture	
Type of damage or activity observed		

SIGNIFICANT SITE SUMMARY	Existing and present survey information	Expert panel assessment
Original area of significant site (ha)	252.6	252.6
Recommended area of significant site (ha)	160.4	160.4
Change to original site	Decrease	Decrease
Change (ha)	92.2	92.2
Percentage change from original area (%)	36.5%	36.5%
Anthropogenic disturbance	Moderate-high	
Species/habitat sensitivity	Unknown	
Anthropogenic vulnerability	Moderate-high	
Assessment criteria scores	**Assessment criteria scores (original)**	**Assessment criteria scores (present review)**
1. Representativeness	H (high)	H (high)
2. Rarity	M (medium)	M (medium)
3. Diversity	L (low)	L (low)
4. Distinctiveness	M (medium)	M (medium)
5. Size	L (low)	H (high)
6. Connectivity	M (medium)	M (medium)
7. Catchment	H (high)	H (high)
Comments	Reduced area due to improved survey resolution. Density of egg cases is lower compared to historic data. Exotic algae *Asperococcus bullosus* (Nelson and Knight, 1995) was abundant and covered a high proportion of the benthos at Garne and Savill Bays spawning areas. It presence in Pelorus Sound was noted in Duffy et al. (in prep.). Historic surveys in the early 1990's in Garne Bay did not mention the presence of this alga. Exotic tubeworm (Chaetopteridea) were abundant at some locations around coastal edges in the Fitzroy Bay complex. In New Zealand there have been many recent reports of the parchment-like tubes of *Chaetopterus* littering beaches, especially after storms (Wikipedia, 2018). Since about 1995, large areas of shallow sea have been invaded by the worm, believed to be C. variopedatus. Since about 1995, divers reported seeing whole areas of the sea bed covered in parchment-like tubes (http://www.seafriends.org.nz/indepth/invasion.htm). Washed up by storms, these tubes break parchment shreds that litter our beaches, decaying very slowly. *C. variopedatus* builds and lives permanently in a tough, flexible, papery U-shaped tube buried in soft substrate with both ends protruding like little chimneys. The worm itself is segmented, pale coloured and up to twenty-five centimetres long. The anterior end is short and has bristle-bearing segments and a shovel-like mouth. The middle section bears parapodia. On the 12th segment these are modified into long wing-like structures which secrete mucus and form a bag. The parapodia on segments 13, 14 and 15 are fused into three paddle-shaped, piston-like structures, the purpose of which is to pump water through the tube. The water is drawn in through the anterior end and expelled through the posterior end, passing through the fine mesh of the mucus bag where food particles get trapped. The mucus bag is later rolled up and passed by a conveyor belt of whipping hairs in the ciliated dorsal groove to the mouth where it is swallowed whole. The posterior half of the worm is segmented and tapers towards the rear, bearing appendages on each segment. It presence along the southern side of Garne Bay was noted in the early 1990's by Duffy et al. (in prep.).	The review group recognise low numbers of egg cases were recorded during the present survey. It is unknown whether this is an abnormal event. A brief quantitative survey of Garne Bay in the subsequent years would provide useful data.
Recommendations	Adopt new site boundaries. Monitor elephantfish egg case densities. Investigate options for marine farms that overlap with spawning habitat. Implement low impact moorings where they overlap with spawning habitat.	

REFERENCES		
	Nelson, W.A.; Knight, G.A. 1995. *Asperococcus bullosus* - A new record for northern New Zealand of an adventive marine brown alga. Tane, Vol. 35, PP 121-125.	Hurst, R.J.; Stevenson, M.L.; Bagley, N.W.; Griggs, L.H.; Morrison, M.A.; Francis, M.P. 2000. Areas of importance for spawning, pupping or egg-laying, and juveniles of New Zealand coastal fish. NIWA Technical Report. Final Research Report for Ministry of Fisheries Research Project ENV1999/03 Objective 1.
	Francis, M.P. 1997. Spatial and temporal variation in the growth rate of elephantfish (*Callorhinchus milii*). New Zealand Journal of Marine and Freshwater Research, Vol. 31: 9—23.	Duffy, C.; Francis, M.; Dunn, M.; Finucci, B.; Ford, R.; Hitchmough, R.; Rolfe, J. 2016. Conservation status of New Zealand chondrichthyans (chimaeras, sharks and rays), 2016. New Zealand Threat Classification Series. Department of Conservation.
	Didier, D. A. 1995: Phylogenetic systematics of extant chimaeroid fishes (Holocephali, Chimaeroidei). American Museum novitates 3119. 86 p.	
	Didier, D.A. 1993. The chimaeroid fishes: a taxonomic review with notes on their general biology. Chrondros 4(5).	

Site 3.9 Tennyson Inlet (stable catchment)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	3.27 SURVEY INCOMPLETE	3.27
Site name	Tennyson Inlet	
Site description	Tennyson inlet is located at the western end of Tawhitinui Reach, 22 km north of Havelock. It has a main reach with many small bays including Tawa, Tuna, Deep and Matai Bays (Godsiff Bay). The Inlet is well separated from the rest of the Sound due to its geographic location, as a result water residency time are likely to be some of the longest in the Sounds. There is a relatively low variety of subtidal habitats and species compared to other areas in the Marlborough Sounds (Davidson *et al*., 2011).	
Ecological description of attributes	Tennyson Inlet is recognised as the largest bay complex in the Marlborough Sounds surrounded by stable and protected native forest catchments (Davidson *et al*., 2011).	
Biogeographic area	Pelorus Sound	
Level of original information	2. Qualitative internal report	
Date of original assessment	01/09/2011	
Report	Davidson R. J.; Duffy C.A.J.; Gaze P.; Baxter, A.; DuFresne S.; Courtney S.; Hamill P. 2011. Ecologically significant marine sites in Marlborough, New Zealand. Co-ordinated by Davidson environmental limited for Marlborough District Council and Department of Conservation.	
Field work (present)		
Date	17-18 March 2018	
Lead organisation	Davidson Environmental	
Personnel	Rob Davidson, Courtney Rayes, Tom Scott-Simmonds	
Site Characteristics		
Original area of significant site (ha)	1211.68	
Suggested revision of significant site (ha)	1354.8 (preliminary)	
Marine zone	Sublittoral (low tide to continental shelf)	
Depth range (m)	3-25 m	
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)	
Methods		
Method of assessment	Drop camera (cable remote) HD photographs (remote underwater) HD video (remote underwater) 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)	Fine sand	
Substrata (common 30-50% cover)	Silt	
Substrata (common 30-50% cover)		
Substrata (minor <30%)	Dead whole shell	
Substrata (minor <30%)	Dead broken shell	
Substrata (localised patch or patches)	Bedrock	
Substrata (localised patch or patches)	Boulder	
Substrata (localised patch or patches)	Cobble	
Important species (revised site)		
Are important species present?	Yes	
Important species 1	Elephantfish egg cases present	
Species status	Conservation/scientific importance	
Human Impacts		
Damage and or impacts noted	Exotic species. *Asperococcus bullosus* was observed in Ngawhakawhiti Bay. Introduced tubeworms (*Chaetopterus*) common an some locations around coastal edges.	
Proportion of significant site effected	< 10%	
Level of impact	Patchy	
Type of damage or activity observed	Introduced or exotic species	
Type of damage or activity observed	Sedimentation	

SIGNIFICANT SITE SUMMARY	Existing and present survey information	Expert panel assessment
Original area of significant site (ha)	1211.68	1211.68
Recommended area of significant site (ha)	1345.9	1345.9
Change to original site	increase	increase
Change (ha)	134.2	134.2
Percentage change from original area (%)	11.1%	11.1%
Anthropogenic disturbance	Low	
Species/habitat sensitivity	Sensitive	
Anthropogenic vulnerability	Low-moderate	
Assessment criteria scores	**Assessment criteria scores (original)**	**Assessment criteria scores (present review)**
1. Representativeness	H (high)	H (high)
2. Rarity	L (low)	L (low)
3. Diversity	L (low)	L (low)
4. Distinctiveness	L (low)	L (low)
5. Size	H (high)	H (high)
6. Connectivity	H (high)	H (high)
7. Catchment	H (high)	H (high)
Comments	SURVEY INCOMPLETE. New elephantfish spaning area documented in Penzance Bay (see site 3.29). New site in Matai Bay (see site 3.28). Exotic algae *Asperococcus bullosus* (Nelson and Knight, 1995) was present in Ngawhakawhiti Bay. Exotic tubeworm (Chaetopteridea) abundant at some locations around coastal edges. In New Zealand there have been many recent reports of the parchment-like tubes of *Chaetopterus* littering beaches, especially after storms (Wikipedia, 2018). Since about 1995, large areas of shallow sea have been invaded by the worm, believed to be C. variopedatus. Since about 1995, divers reported seeing whole areas of the sea bed covered in parchment-like tubes (http://www.seafriends.org.nz/indepth/invasion.htm). Washed up by storms, these tubes break into millions of parchment shreds that litter our beaches, decaying very slowly. Large beds of *Chaetopterus* were observed in Grove Arm, inner Queen Charlotte Sound in 1989-90, and were colonised by a number of native seaweeds (particularly *Lenormandia chauvini*) and invertebrates (e.g. *Corbula, Pecten, Chirodota*) (C. Duffy pers. obs.). *C. variopedatus* builds and lives permanently in a tough, flexible, papery U-shaped tube buried in soft substrate with both ends protruding like little chimneys. The worm is segmented, pale coloured and up to twenty-five centimetres long. The anterior end is short and has bristle-bearing segments and a shovel-like mouth. The middle section bears parapodia. On the 12th segment these are modified into long wing-like structures which secrete mucus and form a bag. The parapodia on segments 13, 14 and 15 are fused into three paddle-shaped, piston-like structures, the purpose of which is to pump water through the tube. The water is drawn in through the anterior end and expelled through the posterior end, passing through the fine mesh of the mucus bag where food particles get trapped. The mucus bag is later rolled up and passed by a conveyor belt of whipping hairs in the ciliated dorsal groove to the mouth where it is swallowed whole. The posterior half of the worm is segmented and tapers towards the rear, bearing appendages on each segment.	Tennyson Inlet habitats and communities may be biologically different to bays with modified catchments. This can only be determined by thorough qualitative sampling. Until this is done the site is ranked as low rarity and distinctiveness.
Recommendations	Adopt new site boundaries.	Complete survey.

REFERENCES		
	Nelson, W.A.; Knight, G.A. 1995. *Asperococcus bullosus* - A new record for northern New Zealand of an adventive marine brown alga. Tane, Vol. 35, PP 121-125.	
	Francis, M.P. 1997. Spatial and temporal variation in the growth rate of elephantfish (*Callorhinchus milii*). New Zealand Journal of Marine and Freshwater Research, Vol. 31: 9—23.	
	Didier, D. A. 1995: Phylogenetic systematics of extant chimaeroid fishes (Holocephali, Chimaeroidei). American Museum novitates 3119. 86 p.	
	Didier, D.A. 1993. The chimaeroid fishes: a taxonomic review with notes on their general biology. Chrondros 4(5).	

Site 311 Tapapa coast (current swept)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	3.11	3.11
Site name	Tapapa coast	
Site description	This stretch of coast is located east of Maud Island at the eastern confluence of Waitata and Tawhitinui Reaches in the main Pelorus Sound Channel. The existing Tapapa Point coastline site is approximately 1.4 km long. The subtidal sea floor shelves steeply and is swept by moderate to strong tidal currents (Davidson *et al*., 2011).	
Ecological description of attributes	There is a wide variety of filter feeding organisms including biogenic habitat formers such as bryozoans, sponges, ascidians, horse mussels and hydroids present at this site. Fish, particularly blue cod, are common and these communities also provide habitat for juvenile blue cod. This is one of the best examples of tidally swept habitats within the Pelorus biogeographic area (Davidson *et al*., 2011).	
Biogeographic area	Pelorus Sound	
Level of original information	2. Qualitative internal report	
Date of original assessment	1/09/2011	
Report	Davidson R. J.; Duffy C.A.J.; Gaze P.; Baxter, A.; DuFresne S.; Courtney S.; Hamill P. 2011. Ecologically significant marine sites in Marlborough, New Zealand. Co-ordinated by Davidson Environmental limited for Marlborough District Council and Department of Conservation.	
Field work (present)		
Date	25 January 2018	
Lead organisation	Davidson Environmental	
Personnel	Rob Davidson, Laura Richards, Courtney Rayes, Tom Scott-Simmonds	
Site Characteristics		
Original area of significant site (ha)	24.11	
Suggested revision of significant site (ha)	13.03	
Marine zone	Sublittoral (low tide to continental shelf)	
Depth range (m)	0-40 m	
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)	
Methods		
Method of assessment	Drop camera (cable remote) HD photographs (remote underwater) HD video (remote underwater) Sonar Scan Photographs (handheld surface)	
Substratum (revised site)		
Substrata (widespread and dominant >50% cover)	Boulder	
Substrata (widespread and dominant >50% cover)	Cobble	
Substrata (widespread and dominant >50% cover)		
Substrata (common 30-50% cover)	Fine sand	
Substrata (common 30-50% cover)	Silt	
Substrata (common 30-50% cover)		
Substrata (minor <30%)	Dead whole shell	
Substrata (minor <30%)	Dead broken shell	
Substrata (localised patch or patches)	Bedrock	
Substrata (localised patch or patches)		
Substrata (localised patch or patches)		
Important species (revised site)		
Are important species present?	Yes	
Important species 1		
Species status	Biogenic habitat forming	
Biogenic type (if applicable)	High relief biogenic (variety of species)	
Important species 2	Blue cod juveniles	
Species status	Iconic	
Biogenic type (if applicable)		
Human Impacts		
Damage and or impacts noted	No impacts observed	
Proportion of significant site effected		
Level of impact	Recreational fishing occurs mostly over the summer months. Anchoring occurs occasionally.	
Type of damage or activity observed		
Type of damage or activity observed		
Type of damage or activity observed		
Type of damage or activity observed		

SIGNIFICANT SITE SUMMARY	Existing and present survey information	Expert panel assessment
Original area of significant site (ha)	24.11	24.11
Recommended area of significant site (ha)	13.03	13.03
Change to original site	Decrease	Decrease
Change (ha)	11.08	11.08
Percentage change from original area (%)	45.9%	45.9%
Anthropogenic disturbance	Low	
Species/habitat sensitivity	Sensitive	
Anthropogenic vulnerability	Low-moderate	
Assessment criteria scores	**Assessment criteria scores (original)**	**Assessment criteria scores (present review)**
1. Representativeness	M (medium)	H (high)
2. Rarity	L (low)	L (low)
3. Diversity	H (high)	H (high)
4. Distinctiveness	M (medium)	M (medium)
5. Size	L (low)	H (high)
6. Connectivity	L (low)	H (high)
7. Catchment	M (medium)	NA
Comments	Reduced area due to improved survey resolution. Biogenic communities present and abundant in some areas. Very high numbers of blue cod present. Juvenile blue cod also regularly observed. One adult john dory observed. Some damage to biogenic habitats from anchoring by recreational fishers likely.	Ranked as best in current swept habitat in biogeographic area at present but should be reassessed when Tawero Point or other sites in Pelorus are surveyed. This type of habitat on rocky substratum is likely to be present along Waitata Reach coastlines exposed to currents. Largest site of its type so far. High connectivity due to proximity and strong currents.
Recommendations	Adopt new site boundaries.	Adjust boundaries.

Site 3.12 Piripaua Reef

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	3.12	3.12
Site name	Piripaua reef	
Site description	Piripaua is located at the northern end of Beatrix Bay.	
Ecological description of attributes	Davidson *et al*. (2011) stated this reef was one of the better examples of a reef system in central Pelorus Sound. The present survey confirms the presence of the reef and identifies the existence of more deep reef habitat than previously known.	
Biogeographic area	Pelorus Sound	
Level of original information	2. Qualitative internal report	
Date of original assessment	1/09/2011	
Report	Davidson R. J.; Duffy C.A.J.; Gaze P.; Baxter, A.; DuFresne S.; Courtney S.; Hamill P. 2011. Ecologically significant marine sites in Marlborough, New Zealand. Co-ordinated by Davidson environmental limited for Marlborough District Council and Department of Conservation.	
Field work (present)		
Date	24 January 2018	
Lead organisation	Davidson Environmental	
Personnel	Rob Davidson, Laura Richards	
Site Characteristics		
Original area of significant site (ha)	0.685	
Suggested revision of significant site (ha)	1.86	
Marine zone	Sublittoral (low tide to continental shelf)	
Depth range (m)	1-33 m	
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)	
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)	Bedrock	
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%)		
Substrata (minor <30%)		
Substrata (localised patch or patches)	Boulder	
Substrata (localised patch or patches)	Cobble	
Substrata (localised patch or patches)	Shell hash	
Important species (revised site)		
Are important species present?	No	
Important species 1		
Species status		
Human Impacts		
Damage and or impacts noted	Mussel shell in proximity of reef	
Proportion of significant site effected	< 10%	
Level of impact	Mussel droppers are located east and west of the reef. Mussel shell was observed in the nearby areas but not on the reef itself.	
Type of damage or activity observed	Aquaculture	
Type of damage or activity observed		
Type of damage or activity observed		
Type of damage or activity observed		

SIGNIFICANT SITE SUMMARY	Existing and present survey information	Expert panel assessment
Original area of significant site (ha)	0.685	0.685
Recommended area of significant site (ha)	1.86	1.86
Change to original site	Increase	Increase
Change (ha)	1.17	1.17
Percentage change from original area (%)	160.0%	160.0%
Anthropogenic disturbance	Low	
Species/habitat sensitivity	Sensitive	
Anthropogenic vulnerability	Low	
Assessment criteria scores	**Assessment criteria scores (original)**	**Assessment criteria scores (present review)**
1. Representativeness	M (medium)	M (medium)
2. Rarity	L (low)	L (low)
3. Diversity	M (medium)	M (medium)
4. Distinctiveness	M (medium)	L (low)
5. Size	M (medium)	M (medium)
6. Connectivity	L (low)	M (medium)
7. Catchment	L (low)	L (low)
Comments	Increase in area due to improved survey resolution.	Two other significant reef sites located in Beatrix Bay area. Reef habitats and communities typical of central Pelorus rocky habitats.
Recommendations	Adopt new site boundaries. Ensure no marine farm growing structures are placed over the reef.	Adopt adjustments.

REFERENCES		
	Alcock, N; Handley, S. 2000. Proposed extension to marine farm licence 264 in Beatrix Bay, Pelorus Sound. NIWA client report MUS00423/4, Prepared for Sanford Limited.	
	Davidson, R. J; Brown, D. A. 1999: Biological report on a proposed marine farm extension in northern Beatrix Bay, Pelorus Sound. Prepared by Davidson Environmental Limited for Sanford (South Island) Ltd and Southern Mussel Farms Ltd Survey and Monitoring Report No. 219.	
	Davidson, R.J. 1996. Description of the subtidal macrobenthic substratum and associated communities from a proposed marine farm extension in north-western Beatrix Bay, Pelorus Sound. Survey and Monitoring Report No. 121. Prepared by Davidson Environmental Limited for Marlborough Mussel Co.	

Site 3.15 Grant Bay Reef

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	3.15	
Site name	Grant Bay reef	
Site description	Grant Bay is a small bay just east of Crail Bay approximately 39 km by sea from Havelock. A large reef approximately 200 m in length extends from the small headland in this bay.	
Ecological description of attributes	Blue maomao have been recorded on this reef (Davidson, 2000). This fish is near its southern New Zealand limit in the Marlborough Sounds and is therefore of scientific interest. This is one of the larger reef systems inside the sheltered waters of Pelorus Sound and a such is a representative example inside Pelorus Sound.	
Biogeographic area	Pelorus Sound	
Level of original information	2. Qualitative internal report	
Date of original assessment	22/06/1905	
Report	Davidson, R.J. and Richards, L.A. 2017. Biological report for the reconsenting of marine farm 8544, Grant Bay, Clova-Crail Bay complex. Prepared by Davidson Environmental Ltd. for Andrew King. Survey and monitoring report no. 866.	
Field work (present)		
Date	11 July 2017, 24 January 2018	
Lead organisation	Davidson Environmental	
Personnel	Rob Davidson, Laura Richards	
Site Characteristics		
Original area of significant site (ha)	0.987	
Suggested revision of significant site (ha)	2.92	
Marine zone	Sublittoral (low tide to continental shelf)	
Depth range (m)		
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)	
Methods		
Method of assessment	Sonar Scan Drop camera (cable remote)	
Substratum (revised site)		
Substrata (widespread and dominant >50% cover)	Bedrock	
Substrata (widespread and dominant >50% cover)		
Substrata (widespread and dominant >50% cover)		
Substrata (common 30-50% cover)	Boulder	
Substrata (common 30-50% cover)	Cobble	
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?	No	
Important species 1		
Species status		
Biogenic type (if applicable)		
Human Impacts		
Damage and or impacts noted	No	
Proportion of significant site effected		
Level of damage		
Type of damage or activity observed		
Type of damage or activity observed		
Type of damage or activity observed		
Type of damage or activity observed		

SIGNIFICANT SITE SUMMARY	Existing and present survey information	Expert panel assessment
Original area of significant site (ha)	0.987	0.987
Recommended area of significant site (ha)	2.92	2.92
Change to original site	Increase	Increase
Change (ha)	1.933	1.933
Percentage change from original area (%)	196.0%	196.0%
Anthropogenic disturbance	None	
Species/habitat sensitivity	Sensitive	
Vulnerability assessment	Low	
Assessment criteria scores	**Assessment criteria scores (original)**	**Assessment criteria scores (present review)**
1. Representativeness	M (medium)	M (medium)
2. Rarity	L (low)	L (low)
3. Diversity	M (medium)	M (medium)
4. Distinctiveness	M (medium)	L (low)
5. Size	M (medium)	M (medium)
6. Connectivity	L (low)	M (medium)
7. Catchment	L (low)	L (low)
Comments	One of the better examples of a sheltered reef inside Pelorus Sound. No impacts on the reef from adjacent marine farms were observed.	Other significant reef sites known from Beatrix Bay area.
Recommendations	Adjust boundaries to encompass reef structure.	Adopt adjusted boundaries.

REFERENCES		
	Davidson, R.J. 2000. Additional information on a proposed marine farm located west of Grant Bay, Pelorus Sound. Survey and Monitoring Report No. 344. Prepared by Davidson Environmental Limited for A. and S. King.	
	Davidson, R.J. and Richards, L.A. 2017. Biological report for the reconsenting of marine farm 8544, Grant Bay, Clova-Crail Bay complex. Prepared by Davidson Environmental Ltd. for Andrew King. Survey and monitoring report no. 866.	
	Davidson, R. J.; D. A. Brown 1999. Biological report on a proposed marine farm located west of Grant Bay, Pelorus Sound. Prepared by Davidson Environmental Limited for A. J. and S. A. King. Survey and Monitoring Report No. 226.	

Site 3.22 Tawhitinui Bay (king shag colony)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	3.22	3.22
Site name	Tawhitinui Bay king shag colony	
Site description	Tawhitinui Bay is a small bay at the eastern end of Tawhitinui Reach, Pelorus Sound. Tawhitinui Bay is approximately 36.5 km by sea from Havelock. Tawhitinui Bay has a coastline length of approximately 2970 m and covers an area of sea of approximately 79.5 ha. The mouth of Tawhitinui Bay is approximately 1900 m wide. This site was briefly visited on two occasions (4 September 2017; 13 February 2018) during the present study and photos were collected. A previous aerial survey counted 43 birds and 16 active nests (Schuckard *et al*., 2015).	
Ecological description of attributes	The New Zealand king shag is endemic to New Zealand, only occurring in the Marlborough Sounds. Subfossil bone deposits indicate two regional haplogroups, from the Cook Strait region and northern North Island. However, king shags have been confined to the outer Marlborough Sounds for at least 240 years (NZ birds online). King shags are restricted to the outer Marlborough Sounds, from the west coast of D'Urville Island east to where Queen Charlotte Sound and Cook Strait meet. About 85% of all existing birds are located at five colonies: Rahuinui Island, Duffers Reef, Trio Islands, Sentinel Rock and White Rocks. The shags feed up to 25 km in a predominantly southwest direction from the main colonies, mainly in waters up to 50 m deep (but diving in deeper waters has been recorded). The foraging area of king shag is estimated to be 1300 km2. Away from the Marlborough Sounds, there are records of single king shags from Wellington Harbour (July 2002), and Kaikoura (October 2011). In 2015 and 2016 seven individual king shags, mostly 1st and 2nd year birds, were recorded from Abel Tasman National Park. The International Union for Conservation of Nature threat classification is "Vulnerable to extinction" and under the New Zealand Threat Classification System the species has the status "Nationally Endangered". This means the species is considered threatened with extinction due to its low population numbers, the limited area of occupancy (usually considered to be the nesting habitat of seabirds) and limited extent of occurrence (foraging range at sea). The total population of King Shags is likely to be less than 1000 birds and more than 800. The most recent full population census in February 2015 identified 839 birds (Schuckard et al., 2015).	
Biogeographic area	Pelorus Sound	
Level of original information	5. Peer reviewed paper	
Date of original assessment	11/02/2015	
Report	Schuckard, R.; Melville, D.S.; Taylor, G. 2015. Population and breeding census of New Zealand King Shag (*Leucocarbo carunculatus*) in 2015. Notornis 62: 209-218.	
Field work (present)		
Date	4 September, 2017; 25 January 2018	
Lead organisation	Davidson Environmental	
Personnel	Rob Davidson, Laura Richards, Courtney Rayes, Tom Scott-Simmonds	
Site Characteristics		
Original area of significant site (ha)	0.16	
Suggested revision of significant site (ha)	0.16	
Marine zone	Terrestrial	
Depth range (m)		
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)	
Methods		
Method of assessment	Photographs (handheld surface) Observations	
Substratum (revised site)		
Substrata (widespread and dominant >50% cover)	Bedrock	
Important species (revised site)		
Are important species present?	Yes	
Important species 1	King shag	
Species status	Nationally endangered	
Biogenic type (if applicable)		
Human Impacts		
Damage and or impacts noted	Recreational fishing in proximity	
Proportion of significant site effected	75-100%	
Level of impact	Disturbance to birds, potential chick mortalities	
Type of damage or activity observed	Human presence disturbance	
Type of damage or activity observed		
Type of damage or activity observed		
Type of damage or activity observed		

SIGNIFICANT SITE SUMMARY	Existing and present survey information	Expert panel assessment
Original area of significant site (ha)	0.16	0.16
Recommended area of significant site (ha)	0.16	0.16
Change to original site	No change	No change
Change (ha)	0	0
Percentage change from original area (%)	0.0%	0.0%
Anthropogenic disturbance	Moderate	
Species/habitat sensitivity	Extremely sensitive	
Anthropogenic vulnerability	High	
Assessment criteria scores	**Assessment criteria scores (original)**	**Assessment criteria scores (present review)**
1. Representativeness	M (medium)	M (medium)
2. Rarity	H (high)	H (high)
3. Diversity	L (low)	L (low)
4. Distinctiveness	M (medium)	M (medium)
5. Size	L (low)	M (medium)
6. Connectivity	M (medium)	H (high)
7. Catchment	NA	NA
Comments		Largest mainland colony, fourth highest number of nests for all colonies (Schuckard et al., 2018). Within flying range of Duffer Reef, Sentinel and Trio Island colonies.
Recommendations	Protect from disturbance. Investigate options for protection from predators. Investigate options to encourage birds to establish site on Maud Island. Continue to monitor site.	

REFERENCES		
	Schuckard, R. 2006. Population status of the New Zealand king shag (*Leucocarbo carunculatus*). Notornis 53: 297-307.	Schuckard, R.; Bell, M.; Frost, P.; Taylor, G.; Greene, T. 2018. A census of nesting pairs of the endemic New Zealand king shag (Leucocarbo carunculatus) in 2016 and 2017. Notornis 65 (2): 59–66.

Site 3.22 Woodlands west (rhodolith bed)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	3.22	3.22
Site name	Woodlands (west) rhodolith bed	
Site description	The rhodolith bed is located in a small unnamed bay located west of Woodlands, along the northern coastline of Tawhitinui Reach. The bay is approximately 4.1 ha in size and the entrance to the bay is approximately 400 m in width.	
Ecological description of attributes	The rhodolith bed is small compared to other beds known from Marlborough measuring 0.2 ha or approximately 79 m in length and between 18 m to 38 m in width (Davidson and Richards, 2016; Davidson *et al*., 2018). Depths ranged from 12.8 m to 18.5 m. Davidson and Richards (2016) stated that comparable sea floor depths were located all around the bed, however, the rhodoliths were not recorded anywhere outside a defined zone.	
Biogeographic area	Pelorus Sound	
Level of original information	3. Quantitative internal report	
Date of original assessment	10/08/2016	
Report	Davidson, R.J.; Richards L.A.; Scott-Simmonds, T. 2018. Biological monitoring of a rhodolith bed located adjacent to mussel farm (8177) in Tawhitinui Reach, Pelorus Sound. Prepared by Davidson Environmental Ltd. for Talley's Group Limited. Survey and monitoring report no. 882.	
Field work (present)		
Date	NA (site based on other studies)	
Lead organisation	Davidson Environmental	
Personnel	Rob Davidson, Laura Richards, Tom Scott-Simmonds	
Site Characteristics		
Original area of significant site (ha)	Unknown	
Suggested revision of significant site (ha)	0.188	
Marine zone	Sublittoral (low tide to continental shelf)	
Depth range (m)	12.8 - 18.5	
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)	
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)		
Substrata (widespread and dominant >50% cover)		
Substrata (widespread and dominant >50% cover)		
Substrata (common 30-50% cover)	Fine sand	
Substrata (common 30-50% cover)	Silt	
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	Rhodolith bed	
Species status	Biogenic habitat forming	
Biogenic type (if applicable)	Rhodoliths	
Human Impacts		
Damage and or impacts noted	Anchor block drag marks. Probably occurred when old mussel farm was relocated further from shore.	
Proportion of significant site effected	< 10%	
Level of damage	High	
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		

SIGNIFICANT SITE SUMMARY	Existing and present survey information	Expert panel assessment
Original area of significant site (ha)	Unknown	Unknown
Recommended area of significant site (ha)	0.2	0.2
Change to original site	Increase	Increase
Change (ha)	0.2	0.2
Percentage change from original area (%)	NA	NA
Anthropogenic disturbance	Moderate	
Species/habitat sensitivity	Extremely sensitive	
Anthropogenic vulnerability	Moderate	
Assessment criteria scores	**Assessment criteria scores (original)**	**Assessment criteria scores (present review)**
1. Representativeness	M (medium)	M (medium)
2. Rarity	M (medium)	H (high)
3. Diversity	H (high)	M (medium)
4. Distinctiveness	M (medium)	M (medium)
5. Size	M (medium)	L (low)
6. Connectivity	H (high)	L (low)
7. Catchment	L (low)	L (low)
Comments	Smallest Marlborough Sounds site. Supports sufficient rhodoliths to represent a bed.	Rare biogenic habitat (31.4 ha known from Sounds). Sterile = low connectivity to nearby site.
Recommendations	Create new significant site	Site approved.

REFERENCES		
	Davidson, R.J.; Richards L.A. 2016. Biological monitoring of a rhodolith bed located adjacent to a mussel farm (8117) located in Tawhitinui Reach, Pelorus Sound: baseline report. Prepared by Davidson Environmental Ltd. for Talley's Group Limited. Survey and monitoring report no. 839.	Nelson, W.A. 2009. Calcified macroalgae – critical to coastal ecosystems and vulnerable to change: a review. Marine and Freshwater Research, 2009, 60, 787–801.
	Davidson, R.J.; Richards, L.A. 2005. Biological report on a proposed marine farm renewal (U941573, MF175) located in Tawhitinui Reach, Pelorus Sound. Prepared by Davidson Environmental Ltd for HG and EB Leov. Survey and Monitoring Report No. 474.	

Site 3.24 Tuhitarata Reef

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	3.24	3.24
Site name	Tuhitarata reef	
Site description	Tuhitarata Bay is small and located at the south end of Beatrix Bay approximately 40 km by sea from Havelock. Tuhitarata Bay has a coastline length of approximately 1.9 km and covers an area of sea of approximately 37 ha. The mouth of the Bay is approximately 950 m wide.	
Ecological description of attributes	A large reef is located on the eastern side of Tuhitarata Bay. This reef is approximately 3.4 ha is size and as such is one of the largest single reef structures within Pelorus Sound. Approximately 10 ha of inshore areas of the bay have been colonised by a Chaetopteridae tubeworm. It is probable this species is exotic and arrived in the Sounds in the mid to late 1990's. In high densities this species forms a low relief biogenic structure.	
Biogeographic area	Pelorus Sound	
Level of original information	2. Qualitative internal report	
Date of original assessment	06/09/2011	
Report	Davidson, R.J.; Richards, L.A. 2011. Ecological report for a proposed marine farm application located in Tuhitarata Bay, Beatrix Bay, Pelorus Sound. Prepared by Davidson Environmental Ltd. for Knight-Somerville Partnership. Survey and monitoring report no. 703.	
Field work (present)		
Date	24 January 2018	
Lead organisation	Davidson Environmental	
Personnel	Rob Davidson, Laura Richards, Courtney Rayes, Tom Scott-Simmonds	
Site Characteristics		
Original area of significant site (ha)		
Suggested revision of significant site (ha)	3.398 (reef)	
Marine zone	Sublittoral (low tide to continental shelf)	
Depth range (m)		
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)	
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)	Boulder	
Substrata (widespread and dominant >50% cover)		
Substrata (widespread and dominant >50% cover)		
Substrata (common 30-50% cover)	Cobble	
Substrata (common 30-50% cover)	Fine sand	
Substrata (common 30-50% cover)		
Substrata (minor <30%)	Dead whole shell	
Substrata (minor <30%)	Dead broken shell	
Substrata (localised patch or patches)	Bedrock	
Substrata (localised patch or patches)		
Substrata (localised patch or patches)		
Important species (revised site)		
Are important species present?	No	
Important species 1		
Species status		
Human Impacts		
Damage and or impacts noted	Localised shell debris near mussel farms	
Proportion of significant site effected		
Level of impact		
Type of damage or activity observed	Introduced or exotic species	
Type of damage or activity observed	Aquaculture	
Type of damage or activity observed		
Type of damage or activity observed		

SIGNIFICANT SITE SUMMARY	Existing and present survey information	Expert panel assessment
Original area of significant site (ha)		
Recommended area of significant site (ha)	3.4 ha	3.4ha
Change to original site		
Change (ha)		
Percentage change from original area (%)		
Anthropogenic disturbance	Low	
Species/habitat sensitivity	Sensitive	
Anthropogenic vulnerability	Low	
Assessment criteria scores	**Assessment criteria scores (original)**	**Assessment criteria scores (present review)**
1. Representativeness		M (medium)
2. Rarity		L (low)
3. Diversity		M (medium)
4. Distinctiveness		L (low)
5. Size		H (high)
6. Connectivity		M (medium)
7. Catchment		L (low)
Comments	Exotic tubeworm (Chaetopteridea) abundant at some locations around the coastal edges. In New Zealand there have been many recent reports of the parchment-like tubes of *Chaetopterus* littering beaches, especially after storms (Wikipedia, 2018). Since about 1995, large areas of shallow sea have been invaded by the worm, believed to be *C. variopedatus*. Since about 1995, divers reported seeing whole areas of the sea bed covered in parchment-like tubes (http://www.seafriends.org.nz/indepth/invasion.htm). Washed up by storms, these tubes break into millions of parchment shreds that litter our beaches, decaying very slowly. Large beds of *Chaetopteru*s were observed in Grove Arm, inner Queen Charlotte Sound in 1989-90, and were colonised by a number of native seaweeds (particularly *Lenormandia chauvini*) and invertebrates (e.g. *Corbula, Pecten, Chirodota*) (C. Duffy pers. obs.). *C. variopedatus* builds and lives permanently in a tough, flexible, papery U-shaped tube buried in soft substrate with both ends protruding like little chimneys. The worm itself is segmented, pale coloured and up to twenty-five centimetres long. The anterior end is short and has bristle-bearing segments and a shovel-like mouth. The middle section bears parapodia. On the 12th segment these are modified into long wing-like structures which secrete mucus and form a bag. The parapodia on segments 13, 14 and 15 are fused into three paddle-shaped, piston-like structures, the purpose of which is to pump water through the tube. The water is drawn in through the anterior end and expelled through the posterior end, passing through the fine mesh of the mucus bag where food particles get trapped. The mucus bag is later rolled up and passed by a conveyor belt of whipping hairs in the ciliated dorsal groove to the mouth where it is swallowed whole. The posterior half of the worm is segmented and tapers towards the rear, bearing appendages on each segment.	
Recommendations	Create a new significant site for the reef. Assess if tubeworm beds are a significant site due to it low relief biogenic structure.	Accept site.

REFERENCES		
	Davidson, R.J. 2015. Ecological report for the proposed renewal of a marine farm (8259) located in Tuhitarata Bay, Pelorus Sound. Prepared by Davidson Environmental Ltd. For Sanford. Survey and monitoring report no. 812.	
	Davidson, R.J.; Richards, L.A. 2012. Ecological report for a proposed marine farm extension located in Tuhitarata Bay, Beatrix Bay, Pelorus Sound. Prepared by Davidson Environmental Ltd. for Knight, Somerville Partnership. Survey and monitoring report no. 708.	

Site 3.25 Kauauroa coast (subtidal eelgrass beds)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	3.25	3.25
Site name	Kauauroa Bay coast	
Site description	This stretch of coast is located near the western entrance to Kauauroa Bay in eastern Tawhitinui Reach. The subtidal sea floor shelves steeply and is swept by moderate tidal currents (Davidson *et al*., 2011).	
Ecological description of attributes	There is a wide variety of filter feeding organisms including biogenic habitat formers such as sponges, ascidians, and hydroids present at this site. Fish, particularly spotty, are common, however, th ese biogenic communities also provide habitat for juvenile blue cod (Davidson et al., 2011). This is a good example of tidally swept habitat adjacent to a stable protected catchment within the Pelorus biogeographic area.	
Biogeographic area	Pelorus Sound	
Level of original information	2. Qualitative internal report	
Date of original assessment	1/09/2011	
Report	Davidson R. J.; Duffy C.A.J.; Gaze P.; Baxter, A.; DuFresne S.; Courtney S.; Hamill P. 2011. Ecologically significant marine sites in Marlborough, New Zealand. Co-ordinated by Davidson environmental limited for Marlborough District Council and Department of Conservation.	
Field work (present)		
Date	24 & 25 January 2018	
Lead organisation	Davidson Environmental	
Personnel	Rob Davidson, Laura Richards, Courtney Rayes, Tom Scott-Simmonds	
Site Characteristics		
Original area of significant site (ha)	14.9	
Suggested revision of significant site (ha)	6.3	
Marine zone	Sublittoral (low tide to continental shelf)	
Depth range (m)	4-35 m	
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)	
Methods		
Method of assessment	Drop camera (cable remote) Sonar Scan Photographs (handheld surface)	
Substratum (revised site)		
Substrata (widespread and dominant >50% cover)	Cobble	
Substrata (widespread and dominant >50% cover)	Boulder	
Substrata (widespread and dominant >50% cover)		
Substrata (common 30-50% cover)	Fine sand	
Substrata (common 30-50% cover)	Silt	
Substrata (common 30-50% cover)		
Substrata (minor <30%)	Dead whole shell	
Substrata (minor <30%)	Dead broken shell	
Substrata (localised patch or patches)	Bedrock	
Substrata (localised patch or patches)		
Substrata (localised patch or patches)		
Important species (revised site)		
Are important species present?	Yes	
Important species 1	Biogenic habitats	
Species status	Biogenic habitat forming	
Biogenic type (if applicable)	Low Relief biogenic (variety of species)	
Human Impacts		
Damage and or impacts noted	None	
Proportion of significant site effected		
Level of impact		
Type of damage or activity observed		
Type of damage or activity observed		
Type of damage or activity observed		
Type of damage or activity observed		

SIGNIFICANT SITE SUMMARY	Existing and present survey information	Expert panel assessment
Original area of significant site (ha)	14.9	14.9
Recommended area of significant site (ha)	6.3	6.3
Change to original site	Decrease	Decrease
Change (ha)	8.6	8.6
Percentage change from original area (%)	57.7%	57.7%
Anthropogenic disturbance	Low	
Species/habitat sensitivity	Sensitive	
Anthropogenic vulnerability	Low-moderate	
Assessment criteria scores	**Assessment criteria scores (original)**	**Assessment criteria scores (present review)**
1. Representativeness	M (medium)	M (medium)
2. Rarity	L (low)	L (low)
3. Diversity	H (high)	M (medium)
4. Distinctiveness	M (medium)	M (medium)
5. Size	L (low)	M (medium)
6. Connectivity	L (low)	H (high)
7. Catchment	M (medium)	NA
Comments	Reduced area due to improved survey resolution. Biogenic community present but not abundant. Biogenic species dominated by hydroids, ascidians and sponges.	Ranked as one of best in biogeographic area at present but should be reassessed when Tawero Point or other sites in Pelorus are surveyed. This type of habitat on rocky substratum is likely to be present along Waitata Reach coastlines exposed to currents. High connectivity due to proximity and strong currents.
Recommendations	Assess if site is appropriate as a significant site. If yes, adopt new site boundaries.	Adjust boundaries.

Site 3.26 Ouokaha Island

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	3.26	3.26
Site name	Ouokaha Island	
Site description	Ouokaha Island is an approximately 4.02 ha island located at the southern tip of Hopai Peninsula, Crail Bay. The significant site is located along the western side and the channel between the island and Hopai Peninsula.	
Ecological description of attributes	Hay (1990) stated " From the low water mark to about 3 metres depth there is a fairly thick band of seaweed comprising *Cystophora torulosa* , *C. retroflexa* , *Carpophyllum flexuosum* and *Sargassum sinclairii* . Occasionally there are small clumps of *Hormosira* - an unusual feature since the plant is usually confined to the intertidal zone. Sponges were recorded, especially the sulphur sponge *Aplysilla sulfurea* . At about 22 m depth, most of the bedrock is covered with shelly debris and muddy sand. This marks the upper limit of a zone of horse mussels, *Atrina zelandica* , which extends to 27 m depth. Below this depth there is a thick, gooey mud with a few burrows and dead shells. The horse mussels support a rich epibiota of sponges, chitons, window oysters, fan shells and brachiopods. The ribbed, red brachiopod, *Terebratella sanguinea* , is very abundant below 17 m depth, and is free living on shell fragments or pieces of polychaete worm tube and dead brachiopod valves. Near the southwestern end of the peninsula, especially, there are large, brittle mounds of colonies of the tubeworm *Galeolaria hystrix* . Scallops were found sporadically below about 15 m depth. The large starfish, *Coscinasterias,* is also common at this depth and was observed feeding on juvenile *Atrina* as well as a variety of bivalves. Fish seen included the spotty, triplefin, blue cod, kahawhai, stargazer and eagle rays. During the present study (2018) large tubeworm mounds (*Galeolaria hystrix*) were detected on the sonar and confirmed by drop camera images. Mounds were not sufficiently abundant to form a tubeworm zone, however, the site represents one of the best examples of and area supporting *Galeolaria* tubeworm mounds in Pelorus Sound. The presence of horse mussels as described by Hay (1990) was not detected."	
Biogeographic area	Pelorus Sound	
Level of original information	2. Qualitative internal report	
Date of original assessment	01/09/2011	
Report	Hay, C.H. 1990. The hydrography and benthic marine biota of Crail Bay, Pelorus Sound: A general account. Unpublished report prepared for NZ Resort & Condominium Development Ltd. Held by Marlborough District Council technical library number: L001241	
Field work (present)		
Date	24 January 2018	
Lead organisation	Davidson Environmental	
Personnel	Rob Davidson, Laura Richards, Courtney Rayes, Tom Scott-Simmonds	
Site Characteristics		
Original area of significant site (ha)		
Suggested revision of significant site (ha)	6.5	
Marine zone	Sublittoral (low tide to continental shelf)	
Depth range (m)	0-30 m	
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)	
Methods		
Method of assessment	Drop camera (cable remote) HD video (handheld surface) Sonar Scan Observations	
Substratum (revised site)		
Substrata (widespread and dominant >50% cover)	Cobble	
Substrata (widespread and dominant >50% cover)		
Substrata (widespread and dominant >50% cover)		
Substrata (common 30-50% cover)	Boulder	
Substrata (common 30-50% cover)	Silt	
Substrata (common 30-50% cover)	Fine sand	
Substrata (minor <30%)	Dead whole shell	
Substrata (minor <30%)	Dead broken shell	
Substrata (localised patch or patches)	Bedrock	
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)	
Human Impacts		
Damage and or impacts noted	Yes, damaged tubeworm mounds	
Proportion of significant site effected	< 10%	
Level of impact	One damaged mound was observed from drop camera imagery. This was probably damaged by a recreational fishers anchor. Two vessels were observed fishing around the island during the present survey. Divers observed several damaged mounds.	
Type of damage or activity observed	Anchor damage or marks on benthos	

SIGNIFICANT SITE SUMMARY	Existing and present survey information	Expert panel assessment
Original area of significant site (ha)		
Recommended area of significant site (ha)	6.5	6.5
Change to original site	Increase	Increase
Change (ha)	6.5	6.5
Percentage change from original area (%)	100.0%	100.0%
Anthropogenic disturbance	Moderate	
Species/habitat sensitivity	Extremely sensitive	
Anthropgenic vulnerability	High	
Assessment criteria scores	**Assessment criteria scores (original)**	**Assessment criteria scores (present review)**
1. Representativeness		H (high)
2. Rarity		M (medium)
3. Diversity		M (medium)
4. Distinctiveness		M (medium)
5. Size		H (high)
6. Connectivity		L (low)
7. Catchment		L (low)
Comments	New site. Presence of large *Galeolaria* mounds. Mounds are large and although not abundant are common along the inshore areas of this coast. Large mounds are not common or widespread in Pelorus Sound, therefore this site is one of the better examples of a site that supports mounds.	The panel noted that Hay (1990) reported horse mussels from c. 17-27 m depth but considered that despite the loss of horse mussels from the site the presence of large tube worm mounds and other significant epifauna such as sponges and brachiopods means it retains significant values. The reason for the loss of horse mussels from the site is unknown.
Recommendations	Create new site. Restrict anchoring within the site. Kill wilding pines. Collect quantitative data on tubeworm mounds.	Accept site.

Site 3.27 Matai Bay tubeworms

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	3.27	3.27
Site name	Matai Bay tubeworms	
Site description	Matai Bay (Godsiff Bay) is located within Tennyson Inlet (western end of Tawhitinui Reach), 22 km north of Havelock. The Inlet is well separated from the rest of the Sounds due to its geographic location, as a result water residency time are likely to be some of the longest in the Sounds. There is a relatively low variety of subtidal habitats and species compared to other areas in the Marlborough Sounds (Davidson *et al*., 2011).	
Ecological description of attributes	The tubeworm bed discovered during the present survey of Tennyson Inlet supports high numbers of *Bispira bispira* SpA. This species has only been recorded from Blow Hole Point, Pelorus Sound, the northern shore of Waikawa Bay, Wellington Harbour, Whangarei Harbour, Mount Manganui, Houhora Harbour in Northland (Geoff Read, NIWA, pers. comm.). More recently, dense beds of this tubeworm have been described from a small site in Bobs Bay (0.363 ha) in Picton Harbour (Davidson *et al*., 2011), and a very small site in Port Underwood (author pers. obs.). The site in Matai Bay is the third known and largest site (2.23 ha) in the Sounds and the only known site in Pelorus Sound that supports sufficient numbers of this species to form a bed.	
Biogeographic area	Pelorus Sound	
Level of original information	2. Qualitative internal report	
Date of original assessment	1/09/2011	
Report	Davidson R. J.; Duffy C.A.J.; Gaze P.; Baxter, A.; DuFresne S.; Courtney S.; Hamill P. 2011. Ecologically significant marine sites in Marlborough, New Zealand. Co-ordinated by Davidson environmental limited for Marlborough District Council and Department of Conservation.	
Field work (present)		
Date	17-18 March 2018	
Lead organisation	Davidson Environmental	
Personnel	Rob Davidson, Courtney Rayes, Tom Scott-Simmonds	
Site Characteristics		
Original area of significant site (ha)		
Suggested revision of significant site (ha)	2.232	
Marine zone	Sublittoral (low tide to continental shelf)	
Depth range (m)	3-12 m	
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)	
Methods		
Method of assessment	Drop camera (cable remote) HD photographs (remote underwater) HD video (remote underwater) 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)	Fine sand	
Substrata (common 30-50% cover)	Silt	
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	Bispira bispira Sp.A	
Species status	Data deficient	
Biogenic type (if applicable)	Tubeworm non-mounds (e.g. Owenia)	
Human Impacts		
Damage and or impacts noted	Exotic species. Introduced tubeworms (*Chaetopterus*) common an some locations around coastal edges.	
Proportion of significant site effected	< 10%	
Level of impact	Patchy	
Type of damage or activity observed	Introduced or exotic species	
Type of damage or activity observed	Sedimentation	
Type of damage or activity observed		
Type of damage or activity observed		

SIGNIFICANT SITE SUMMARY	Existing and present survey information	Expert panel assessment
Original area of significant site (ha)		
Recommended area of significant site (ha)	2.232	2.232
Change to original site		
Change (ha)		
Percentage change from original area (%)		
Anthropogenic disturbance	Low	
Species/habitat sensitivity	Extremely sensitive	
Anthropogenic vulnerability	High	
Assessment criteria scores	**Assessment criteria scores (original)**	**Assessment criteria scores (present review)**
1. Representativeness		H (high)
2. Rarity		H (high)
3. Diversity		M (medium)
4. Distinctiveness		H (high)
5. Size		H (high)
6. Connectivity		L (low)
7. Catchment		H (high)
Comments	Exotic tubeworm (Chaetopteridea) is present in Tennyson Inlet. It is unknown if this species will have an impact on *Bisprira* beds. In New Zealand there have been many recent reports of the parchment-like tubes of *Chaetopterus* littering beaches, especially after storms (Wikipedia, 2018). Since about 1995, large areas of shallow sea have been invaded by the worm, believed to be C. variopedatus. Since about 1995, divers reported seeing whole areas of the sea bed covered in parchment-like tubes (http://www.seafriends.org.nz/indepth/invasion.htm). Washed up by storms, these tubes break into millions of parchment shreds that litter our beaches, decaying very slowly. *C. variopedatus* builds and lives permanently in a tough, flexible, papery U-shaped tube buried in soft substrate with both ends protruding like little chimneys. The worm itself is segmented, pale coloured and up to twenty-five centimetres long. The anterior end is short and has bristle-bearing segments and a shovel-like mouth. The middle section bears parapodia. On the 12th segment these are modified into long wing-like structures which secrete mucus and form a bag. The parapodia on segments 13, 14 and 15 are fused into three paddle-shaped, piston-like structures, the purpose of which is to pump water through the tube. The water is drawn in through the anterior end and expelled through the posterior end, passing through the fine mesh of the mucus bag where food particles get trapped. The mucus bag is later rolled up and passed by a conveyor belt of whipping hairs in the ciliated dorsal groove to the mouth where it is swallowed whole. The posterior half of the worm is segmented and tapers towards the rear, bearing appendages on each segment.	One of a small number of beds in the Sounds. Matai Bay bed is the largest known bed in the Sounds.
Recommendations	Create new site. It is recommended that this site remain as a significant marine site, but should be reassessed if the status for this species changes to introduced or invasive. Species status at present = cryptogenic.	Accept site. Reaccess if shown to be exotic species.

REFERENCES		
	Nelson, W.A.; Knight, G.A. 1995. *Asperococcus bullosus* - A new record for northern New Zealand of an adventive marine brown alga. Tane, Vol. 35, PP 121-125.	
	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.	

Ste 3.28 Penzance Bay (elephantfish spawning)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number	3.28	3.28
Site name	Penzance Bay (elephantfish spawning)	
Site description	Penzance Bay is located along the northern shores of Tennyson Inlet. The Bay supports a small settlement of mostly holiday homes, a jetty and launching ramp. The site is located inside the larger Tennyson Inlet significant site (Davidson et al., 2011).	
Ecological description of attributes	Tennyson Inlet is recognised as the largest bay complex in the Marlborough Sounds surrounded by stable and protected native forest catchments (Davidson *et al*., 2011).	
Biogeographic area	Pelorus Sound	
Level of original information	2. Qualitative internal report	
Date of original assessment	1/09/2011	
Report	Davidson R. J.; Duffy C.A.J.; Gaze P.; Baxter, A.; DuFresne S.; Courtney S.; Hamill P. 2011. Ecologically significant marine sites in Marlborough, New Zealand. Co-ordinated by Davidson environmental limited for Marlborough District Council and Department of Conservation.	
Field work (present)		
Date	17-18 March 2018	
Lead organisation	Davidson Environmental	
Personnel	Rob Davidson, Courtney Rayes, Tom Scott-Simmonds	
Site Characteristics		
Original area of significant site (ha)		
Suggested revision of significant site (ha)	6.68	
Marine zone	Sublittoral (low tide to continental shelf)	
Depth range (m)	7-11 m	
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)	
Methods		
Method of assessment	Drop camera (cable remote) HD photographs (remote underwater) HD video (remote underwater) 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)	Fine sand	
Substrata (common 30-50% cover)	Silt	
Substrata (common 30-50% cover)		
Substrata (minor <30%)	Dead whole shell	
Substrata (minor <30%)	Dead broken shell	
Substrata (localised patch or patches)	Bedrock	
Substrata (localised patch or patches)	Boulder	
Substrata (localised patch or patches)	Cobble	
Important species (revised site)		
Are important species present?	Yes	
Important species 1	Elephantfish spawning	
Species status	Conservation/scientific importance	
Biogenic type (if applicable)		
Human Impacts		
Damage and or impacts noted	Fine sediment present, moorings may disturb egg cases, moorings restrict recreational dredging.	
Proportion of significant site effected	75-100%	
Level of impact	Unknown	
Type of damage or activity observed	Sedimentation	
Type of damage or activity observed	Moorings	
Type of damage or activity observed		
Type of damage or activity observed		

SIGNIFICANT SITE SUMMARY	Existing and present survey information	Expert panel assessment
Original area of significant site (ha)		
Recommended area of significant site (ha)	6.68	6.68
Change to original site		
Change (ha)		
Percentage change from original area (%)		
Anthropogenic disturbance	Moderate	
Species/habitat sensitivity	Unknown	
Anthropogenic vulnerability	Low-moderate	
Assessment criteria scores	**Assessment criteria scores (original)**	**Assessment criteria scores (present review)**
1. Representativeness		M (medium)
2. Rarity		M (medium)
3. Diversity		L (low)
4. Distinctiveness		M (medium)
5. Size		L (low)
6. Connectivity		M (medium)
7. Catchment		M (medium)
Comments	Highest numbes of egg cases observed during 2008 survey year.	
Recommendations	Create new site. Monitor elephantfish egg case densities.Implement low impact moorings where they overlap with spawning habitat.	

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Ste 3.29 Treble Tree coast (current swept)

Site Registration Detail (original)	Existing and present survey information	Expert panel assessment
Site number		
Site name	Treble Tree coastline	
Site description	The Treble Tree coastline is located along the western shores of Waitata Reach immediately south of Waitata Bay.	
Ecological description of attributes	The Treble Tree coast had three 3 ha research marine farms installed in 1997. The research farms are in a moderate to strong tidal flow environment and have been only used for sponge research and juvenile mussel spat experiments. These experiments have not impacted the seabed (Battershill, 1999), however their presence over a period of 20 years has excluded the sites from scallop dredging. In contrast, adjacent soft bottom shores in Waitata Reach have been intensively dredged during the scallop season. The Treble Tree coast therefore represents a shore in a state of advanced recovery and heading towards the pre-dredge state. DuFresne and Richards (2006) recommended that the three research marine farm sites be relocated further from shore to avoid benthic habitats. These habitats were mostly soft bottom biogenic communities. Since that time another 12 years have passed allowing further recovery of the benthos.	
Biogeographic area	Pelorus Sound	
Level of original information	2. Qualitative internal report	
Date of original assessment		
Report	DuFresne, S; Richards, L 2006. Benthic survey of three proposed marine farm renewals located north of Treble Tree Point, Pelorus Sound. Prepared for Treble Tree Holdings Ltd by DuFresne Ecology Ltd.	
Field work (present)		
Date		
Lead organisation		
Personnel		
Site Characteristics		
Original area of significant site (ha)		
Suggested revision of significant site (ha)	32.57	
Marine zone	Sublittoral (low tide to continental shelf)	
Depth range (m)	0-38 m	
Wave Climate	Sheltered coast (enclosed or semi-enclosed water body)	
Methods		
Method of assessment	Drop camera (cable remote) HD photographs (remote underwater) HD video (remote underwater) 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)	Fine sand	
Substrata (common 30-50% cover)	Silt	
Substrata (common 30-50% cover)	Shell hash	
Substrata (minor <30%)	Dead whole shell	
Substrata (minor <30%)	Dead broken shell	
Substrata (localised patch or patches)	Bedrock	
Substrata (localised patch or patches)	Boulder	
Substrata (localised patch or patches)	Cobble	
Important species (revised site)		
Are important species present?	Yes	
Important species 1	Biogenic communities	
Species status	Biogenic habitat forming	
Biogenic type (if applicable)		
Important species 2	Blue cod adults and juveniles	
Species status	Iconic	
Biogenic type (if applicable)		
Human Impacts		
Damage and or impacts noted	Has been retired from dredging and trawling since 1997	
Proportion of significant site effected	75-100%	
Level of impact	Variable but most pronounced in shallow areas	
Type of damage or activity observed		
Type of damage or activity observed		
Type of damage or activity observed		
Type of damage or activity observed		

SIGNIFICANT SITE SUMMARY	Existing and present survey information	Expert panel assessment
Original area of significant site (ha)		
Recommended area of significant site (ha)	32.57	
Change to original site		
Change (ha)		
Percentage change from original area (%)		
Anthropogenic disturbance	Low	
Species/habitat sensitivity	Extremely sensitive	
Anthropogenic vulnerability	High	
Assessment criteria scores	Assessment criteria scores (original)	Assessment criteria scores (present review)
1. Representativeness		
2. Rarity		
3. Diversity		
4. Distinctiveness		
5. Size		
6. Connectivity		
7. Catchment		
Comments		May be the largest shallow soft bottom habitat not dredged in recent years in Waitata Reach. Insufficient information at present.
Recommendations	Create new site to encompass area where dredging has not occurred since 1997.	Reject. Reassess when more information available.

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6.0 Significant site sensitivity and anthropogenic disturbance

6.1 Anthropogenic impacts

Ranking of significant sites in Davidson *et al*. (2011) revealed the biological assemblages they supported were often uncommon with many representing one of few or the last of their kind in each biogeographic area. Site persistence was often attributed to environmental factors such as topography or substratum providing some level of natural protection from anthropogenic impacts.

Many of Marlborough's significant marine sites are thought to be remnants of habitats and communities historically more widespread (Davidson *et al*., 2011; Davidson and Richards 2015; 2016; Handley 2015, 2016; Davidson *et al*., 2017). This situation reflects a global trend of declining biogenic habitat area and quality with consequential effects on wider ecological values (Thrush *et al.,* 2006a, 2006b; Gray *et al.,* 2006; Lotz *et al*., 2006; Airoldi *et al.,* 2008; McCauley *et al.,* 2015).

For example, a decline in biogenic habitats in New Zealand has been linked to declining juvenile fish habitat and identified as a contributor to declines in fish abundance and biomass (see Morrison *et al*. 2014 for review). Hurst *et al*. (2000) stated "The Environmental Principles of the 1996 Fisheries Act require that habitat of particular significance for fisheries management should be protected". Significant sites that support biogenic habitats have often been described as important to juvenile fish (Diaz, *et al*., 2003; Dahlgren *et al.*, 2006; McCain *et al*., 2016). Wilson *et al*. (2010) for example reported habitat degradation compounded effects of fishing on coral reefs as increased fishing reduces large-bodied target species, while habitat loss resulted in fewer small-bodied juveniles and prey that replenish stocks and provide dietary resources for predatory target species.

Loss and degradation of marine biological values around New Zealand and internationally has usually 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; Paul 2012; Morrison *et al.,* 2014, 2014a; Handley 2015, 2016). Direct physical disturbance by trawling and dredging for example, has been assessed as one of the main causes of damage to marine benthic biological values (MacDiarmid *et al.*, 2012; MfE, 2016). It is likely that without protection or strong management, Marlborough's less resilient significant marine sites will continue to be lost or degraded with consequential impacts on fish abundance.

Davidson and Richards (2015) highlighted the decline of biological attributes at several significant sites originally identified by Davidson *et al.* (2011), including sites becoming smaller and some being functionally lost. In contrast, Davidson and Richards (2016) did not document loss that could be directly attributed to human activities; rather site boundaries were adjusted based on improved information and data. Davidson *et al*. (2017a) reported that some sites were adversely affected by anthropogenic activities. In the most recent study, Davidson *et al*. (2018) reported many sites were reduced in size due to improvements in survey detail, while others were affected by physical disturbance, exotic species and increased sedimentation.

6.2 Threat assessment process

The Expert Panel assessed anthropogenic threats for each significant site (Table 3) based on:

- The perceived level of anthropogenic disturbance (e.g. dredging recorded).
- Species, community or habitat vulnerability to anthropogenic impact (e.g. fragile species).
- Significant site vulnerability to anthropogenic impact (e.g. site located on an offshore soft bottom or site located next to rocky reef).

This assessment was 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).

Similar approaches have been adopted by Halpern *et al.* (2007) and further adapted for the assessment of New Zealand's marine environment by MacDiarmid *et al.* (2012). Robertson and Stevens (2012) described an ecological vulnerability assessment (originally developed by 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 respond to potential "stressors".

Definitions for the threat categories used in the assessment were:

> **Anthropogenic disturbance:** Known or expected (based on experts' experience) level of impact associated with human-related activities. Disturbance levels range from little or no disturbance (low score) to sites regularly subjected to disturbance (high score). Impacts range from direct physical disturbance to indirect effects, including those from the adjacent catchments.
>
> **Sensitivity:** Assessment of the sensitivity of habitats, species and/or communities present at a site. Scores ranged from extremely sensitive biological features such as lace corals and brittle tubeworm mounds (high vulnerability score) to relatively robust species or habitats such as coarse substrate/mobile shores and high energy kelp forests (low vulnerability score).
>
> **Anthropogenic vulnerability** is an assessment of the vulnerability of a habitat, species and/or community to human-derived damage because of its location or the level of physical or legal protection. For example, a very shallow community is regarded as having a low vulnerability to damage from dredging and trawling, while a marine reserve has a high level of legal protection from marine-based anthropogenic impacts.

Table 3. Selected environmental categories used to assess threat.

Categories	Descriptions, definitions and examples
Anthropogenic disturbance	
Low	Little or no known human associated physical disturbance. Catchment effects low (vegetated).
Moderate	Light equipment and/or anchoring disturbance. Well managed catchment.
High	Subjected to regular or heavy equipment seabed disturbance, and/or catchments modified and poorly managed.
Sensitivity (species, habitat)	
Resilient (low or unlikely)	Algae forest, coarse mobile substrata, reef, boulder bank, high energy shore, short-lived species.
Sensitive (moderate)	Horse mussels, soft tubeworms, shellfish beds, red algae bed.
Very sensitive (high)	Massive bryozoans, sponges, hydroids, burrowing anemone.
Extremely sensitive (very high)	Lace or fragile bryozoan colonies, tubeworm mounds, rhodoliths.
Anthropogenic vulnerability	
Low	Legally or physically protected e.g. in a reserve, on rocky substrata, on a steep slope.
Moderate	Limited or difficult access e.g. close to rocks, shallow, close to shore. Limited or no legal protection.
High	Location easily accessed, no legal protection e.g. offshore soft bottom substratum.

6.3 Threat assessment summary

Of the three categories, anthropogenic disturbance is likely to be the most important consideration for the continued viability of a significant site. Any score above "low" indicates human activities are having an impact and management action is required to ensure continuation of natural values at the site. Four sites were scored "moderate" and one site scored a "high" for anthropogenic disturbance. When this score is combined with a species community or habitat in the "extremely sensitive" category and a "high" score for anthropogenic vulnerability, the issue becomes critical (e.g. disturbance occurring at a vulnerable site that supports a sensitive habitat, community or species).

Site 3.22 Tawhitinui Bay king shag colony:

King shags are most vulnerable at their breeding colonies. Their nervous nature makes them particularly vulnerable to disturbance potentially leading to chick and egg mortalities. At present there is no restriction on how close boats can approach a colony. It is strongly recommended that the colonies have a minimum 50 m no-approach zone. This recommendation could be implemented through the adoption of a voluntary code of conduct by commercial vessel operators and other sectors in the Sounds. A public awareness campaign is also suggested.

Site 3.26 Ouokaha Island (tubeworm mounds)

The western side of Ouokaha Island supports the best example of *Galeolaria* tubeworm mounds in Pelorus Sound. *Galeolaria* tubeworm beds are known from only 18.2 ha or 0.003% of the Sounds marine area. Ouokaha Island is 6.5 ha in size and supports low density mounds. Davidson *et al*. (2018) documented damage from recreation fisher anchors and chains. This site will likely continue to be reduced in quality unless anchoring is excluded.

Site 3.28 Penzance Bay elephantfish spawning

High numbers of elephantfish egg cases were observed in a new significant site located in Penzance Bay. Moorings are numerous in the bay and act to exclude recreational dredging; however, traditional block and chain moorings likely disturb egg cases. It is therefore recommended that moorings be converted to low impact systems.

Site 3.8 Fitzroy Bay elephantfish spawning

A variety of human activities occur in the Fitzroy Bay elephantfish spawning site. A small number of mussel farms overlap with this site and have altered the benthic habitat. It is recommended that these marine farms be surveyed, and growing structures removed where they overlap with spawning habitat. Marine farm anchors and warps have been shown to have little impact on the benthos (Davidson and Richards, 2014) and need not be removed. Moorings also exist in one area of this site. Again, low impact moorings are suggested.

Site 3.23 Woodlands (west) rhodoliths

This new significant site supports the smallest known rhodolith bed in the Sounds. It is physically protected from commercial dredging by the adjacent headland and marine farm. Although anchor blocks have dragged through the bed in the past, this is unlikely to occur in the future.

The Expert Panel recommends that all sites regarded as sensitive or vulnerable to anthropogenic disturbance (Table 4) be given a level of protection that ensures their biological values are not further degraded. In some cases, this would mean the highest level of protection e.g. no anchoring.

7.0 Erratum

The following are errors in Davidson *et al*. (2011).

Page 62 Map 7
Site names and numbers located in wrong positions on Map 7.
Fix: Swap Site 2.29 Witt Rock with Site 2.28 MacManaway Rocks on Map 7

Page 91 Map 15
Site names and numbers located in wrong positions on Map 15.
Fix: Swap labels 4.22 with 4.23 on Map 15

Page 19 Table 2
Fix: Willawa Point (spelling error)

Page 73 Line 3
Fix: Replace reference numbers 337, 338, 339 with 251, 373, 374, 375

Page 73 Para 2 Line 4
Fix: Replace reference numbers 94 with 102

Acknowledgements

The project was funded and supported by the Marlborough District Council and the Department of Conservation. Constructive and detailed comments on this report were gratefully received from Steve Urlich (MDC).

Table 4. Summary of anthropogenic disturbance and vulnerability assessment.

Sites	Anthropogenic disturbance	Sensitivity (species, habitat)	Anthropogenic vulnerability	Major issues	Comments
Site 3.7 Picnic Bay rhodoliths	Low	Extremely sensitive	Moderate	Adjacent forest logging	No impact observed, fragile species, physical protection from marine farm & headland, open to dredging
Site 3.8 Fitzroy Bay elephantfish spawning	Moderate to high	Unknown	Moderate to high	Decline in abundance	Habitat impacted by marine farms, sediment and exotic species, egg case sensitivity not known, no commercial dredging & trawling
Site 3.9 Tennyson Inlet	Low	Sensitive	Low-moderate	Forestry, exotic marine species	Low levels of human impact, stable catchments, habitats vulnerable to increased sedimentation, no commercial dredging & trawling
Site 3.11 Tapapa coastline	Low	Sensitive	Low-moderate		Some damage to biogenic habitats from anchoring by recreational fishers likely. Dredging and trawling unlikely.
Site 3.12 Piripaua Reef	Low	Sensitive	Low		Reef habitat, small risk of anchor damage, tubeworm mounds may be present
Site 3.15 Grant Bay Reef	Low	Sensitive	Low		Reef habitat, small risk of anchor damage, tubeworm mounds may be present
Site 3.22 Tawhitinui Bay king shag colony	Moderate	Extremely sensitive	High	Mortalities from disturbance	Colony vulnerable to disturbance, recreational fisher disturbance occurs
Site 3.23 Woodlands (west) rhodoliths	Moderate	Extremely sensitive	Moderate	Adjacent forest logging	Impact from anchor drag, fragile species, physical protection from marine farm & headland, open to dredging
Site 3.24 Tuhitarata Bay Reef	Low	Sensitive	Low		Reef habitat, small risk of anchor damage, tubeworm mounds may be present
Site 3.25 Kauauroa coast	Low	Sensitive	Low-moderate		Some damage to biogenic habitats from anchoring by recreational fishers likely. Dredging and trawling unlikely.
Site 3.26 Ouokaha Island (west coast)	Moderate	Extremely sensitive	High	Recreational anchoring	Recreational fishers regularly anchor and damage tubeworm mounds
Site 3.27 Matai Bay tubeworms	Low	Extremely sensitive	Moderate		No impact observed, fragile species, closed to commercial dredging
Site 3.28 Penzance Bay elephantfish spawning	Moderate	Unknown	Low-moderate		Moorings present (impact on egg cases unkonwn)
Site 3.29 Treble Tree coastline	Low	Extremely sensitive	High	Physical damage	Soft bottom current swept community where commercial has been dredging excluded

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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 a sites significance. Site that do not achieve "H" or "M" are 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).