CAWTHRON INSTITUTE
98 Halifax Street East, Nelson 7010
Private Bag 2, Nelson 7042
NEW ZEALAND
Tel: +64 3 548 2319 ·Fax: + 64 3 546 9464
www.cawthron.org.nz

Date 2010-04-12

Mitchell Partnerships
PO Box 489
DUNEDIN
Attention: Megan Justice

ADDENDUM TO CAWTHRON REPORT NO. 1615:
INTERPRETAITION OF SURVEY DATA CONCERNING THE SPATIAL EXTENT AND DISTRIBUTION OF HARD SUBSTRATE BENTHIC HABITATS IN WAIKAWA BAY.

This addendum is provided in response to a request by Marlborough District Council (MDC), dated 21 March 2010, for further information concerning a proposed plan change for zoning of coastal waters in Waikawa Bay.

The Council has requested an overall plan showing the spatial extent of the hard inshore substrates grading to the softer central substrates, with an emphasis on defining the extent of the reef structure within the proposed north-western extension to the marina zone.

Although the compiled survey data on benthic habitats within Waikawa Bay is relatively comprehensive, it does not exist in a form which would facilitate the production of an accurate spatial plan of substrate boundaries. This is partially because this was not a principal objective of the surveys; but also because clear delineation of such boundaries does not generally occur except in a few instances within meters of the low tide mark. The existence of broad transitional zones would make such a mapping exercise, using the available survey data, subjective and possibly misleading.

Due to the largely gradual changes in subtidal substrates at distances greater than approximately 10 m from the low-tide shoreline, the relative extent and proportions of different habitat types was reported descriptively in the relevant sections of Cawthron Report 1615.

Within the areas of Waikawa Bay which were surveyed by divers, side-scan sonar and automatically operated drop-camera (Figure 2, Cawthron Report 1615), hard substrates were limited to fringing reefs associated with shoreline intertidal reef areas and these did not generally extend more than 20 m from low tide. Transitional habitats represented by patches of cobble, shell and gravel in shallow subtidal areas were not observed to be associated with significant reef structures. As stated in section 4.2.1 of the report, apart from the breakwater structures, the only fixed hard substrates of any significance identified within water depths greater than 4 m were mooring blocks. No isolated subtidal reef areas were identified within the surveyed areas of Waikawa Bay.

Figure 1 shows the extent of side-scan sonar coverage for all surveys considered in the report, with locations associated with the side-scan “screen shots” where representative seabed features were identified (Figure 2). Reef areas identified by side-scan sonar were limited to the artificial substrate associated with the existing armour-rock of marina breakwaters (Figure 2 F) and a few instances where steep profiles allowed the survey vessel to pass within 30 m of the shoreline (Figure 2 A,I,L).

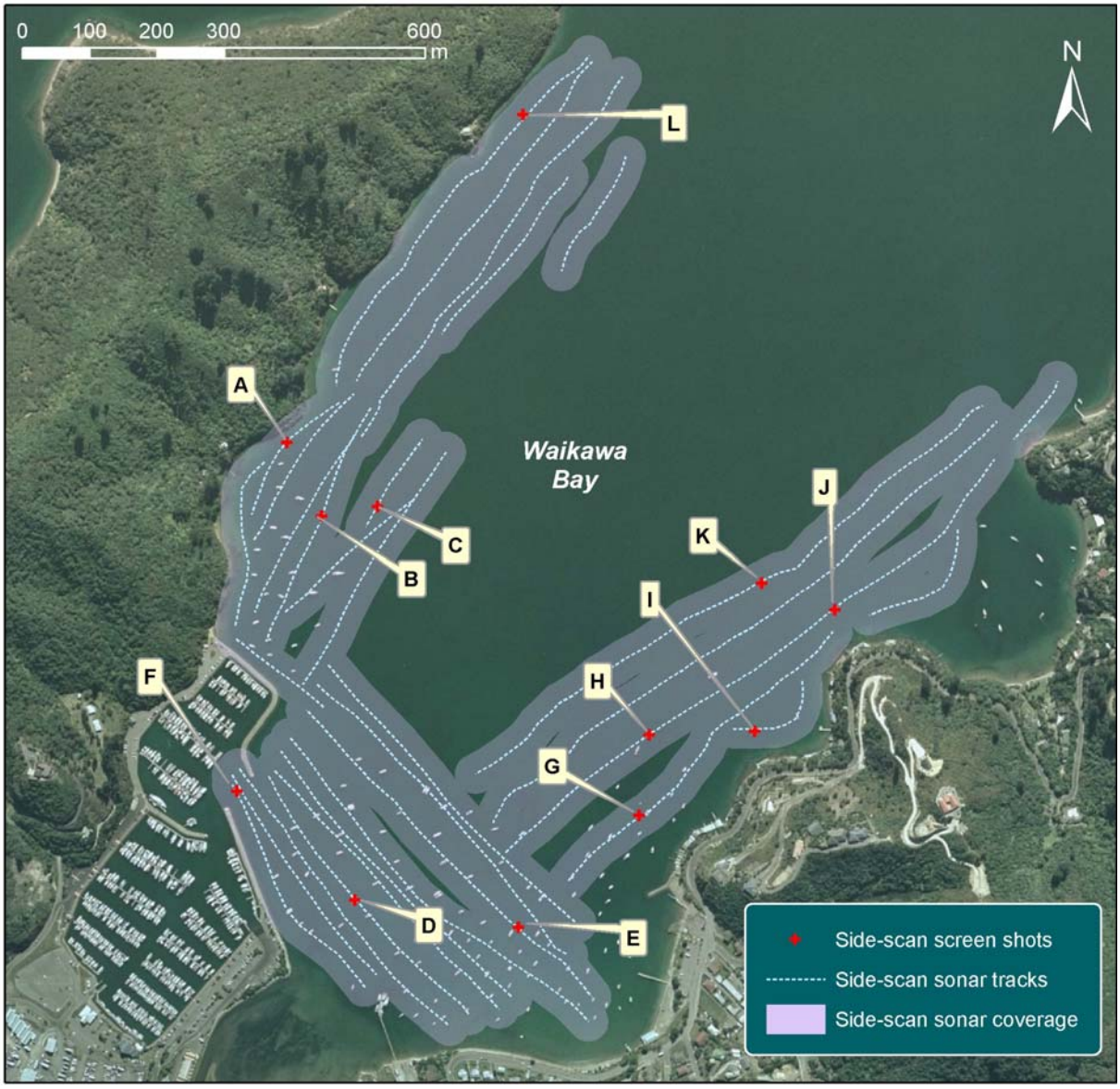

Figure 1 Side-scan sonar coverage of areas of Waikawa Bay. Red crosses designate the locations of the representative sonar "screen shots" presented in Figure 2.

Side-scan coverage of near-shore areas was limited by the survey vessel's draft and manoeuvrability and also the presence of moored vessels. Also in places where the shoreline reef edge should have been within the side-scan swathe width of 30 m, this was not always visible due to the steep profile of the sub-littoral slope (resulting from such features being above the depth at which the sonar "fish" was being towed). This was the case with much of the north-western shoreline.

Most of the surveyed subtidal area was indicated by side-scan as being composed of relatively featureless and flat soft sediments (*e.g.* Figure 2 C). However, drop-camera still images showed that this encompassed a range of such surfaces, from soft mud, through low-relief fine weed, to coarse shell hash. The resolution of the sonar images was not sufficient to delineate these areas, although the density of drop-camera images was sometimes high enough to indicate their approximate extent.

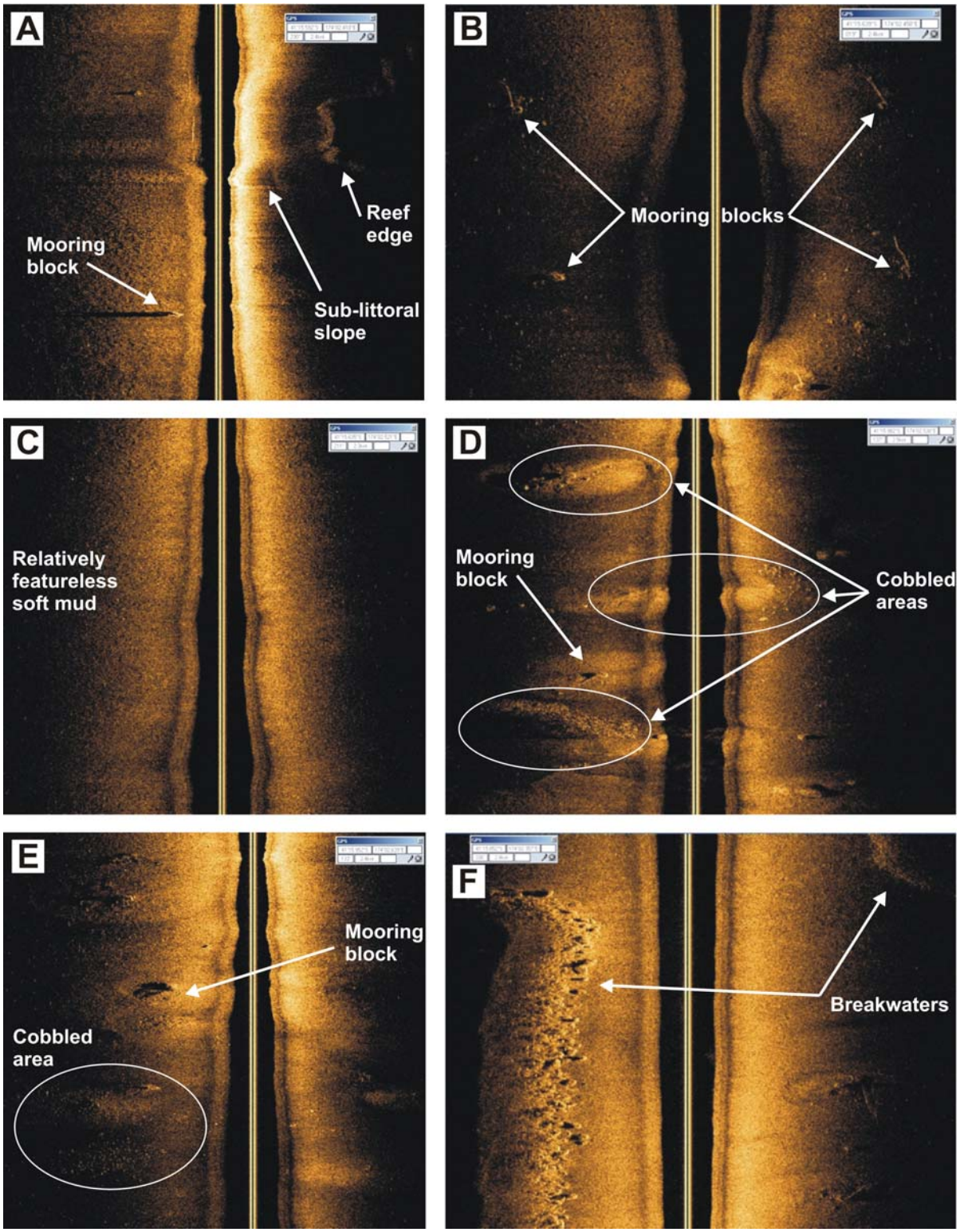

Figure 2 Representative side-scan sonar images of the seabed within surveyed areas of Waikawa Bay. Salient features are labelled. Locations for each image are presented in Figure 1.

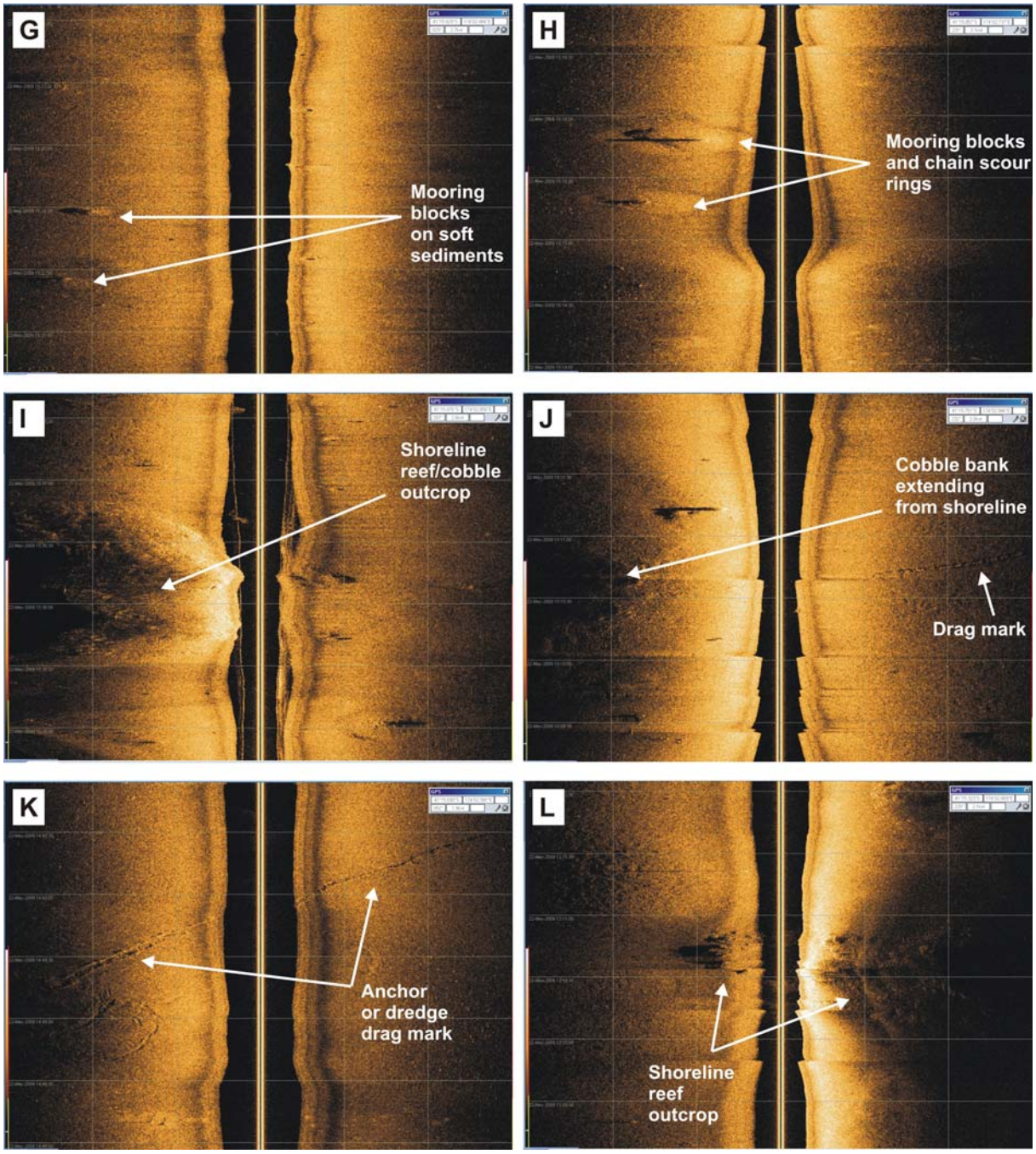

Figure 2 (contd.) Representative side-scan sonar images of the seabed within surveyed areas of Waikawa Bay. Salient features are labelled. Locations for each image are presented in Figure 1

Drop-camera images of the seabed were used to "ground-truth" the side-scan sonar images with respect to substrate type. The drop-camera was employed within water depths from 2 m to 24 m and used extensively within the current and proposed marina zone, with less coverage in the proposed mooring zones further out in the Bay (Figure 2 Cawthron Report 1615). Figure 3 shows the coverage of the Waikawa Bay seabed by drop-camera images and shows locations for the series of representative images in Figure 4.

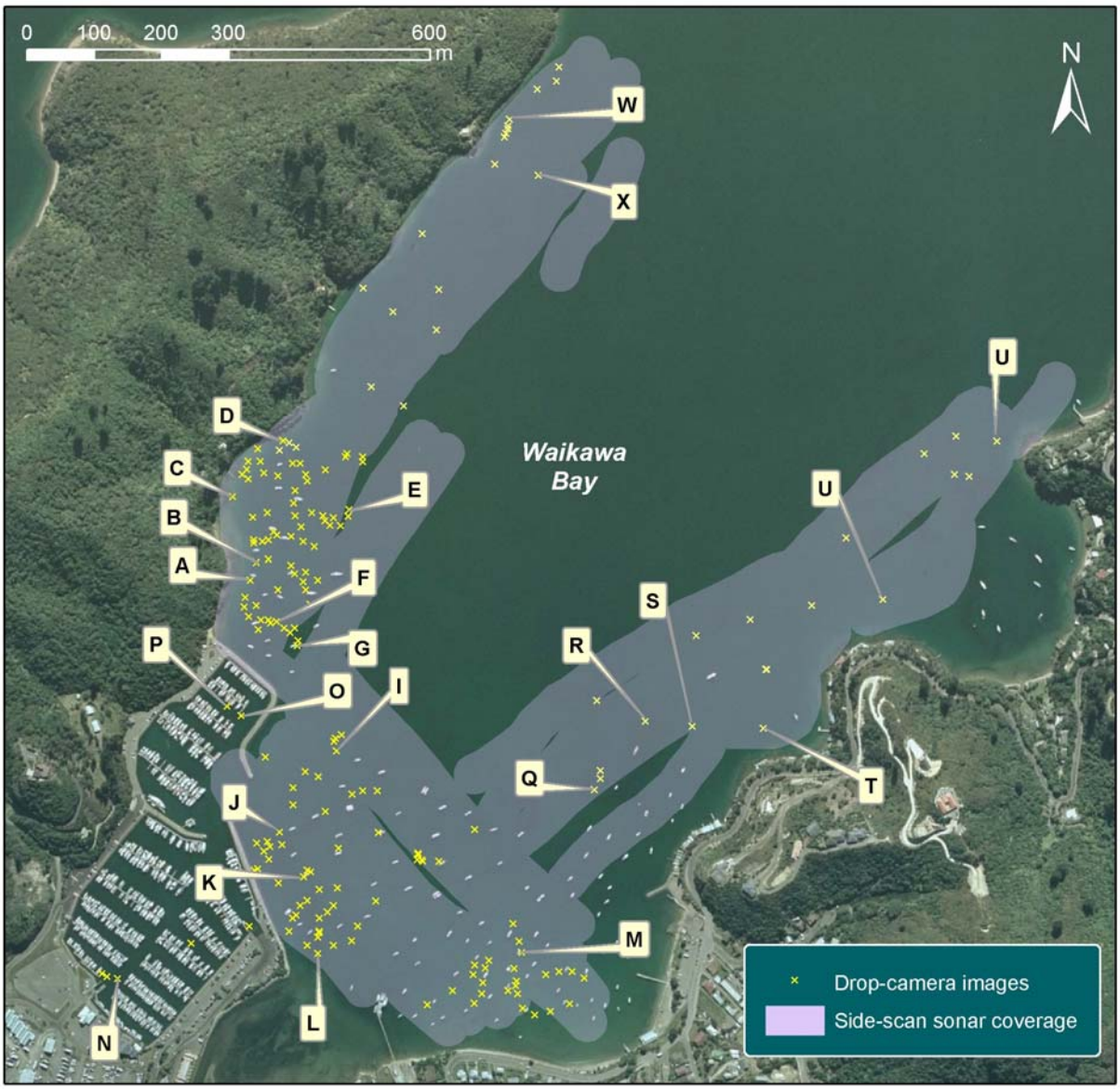

Figure 3 Drop-camera coverage of benthic areas of Waikawa Bay with side-scan coverage for reference. Letters indicate the locations of the representative benthic images presented in Figure 4.

Although drop camera images showed a variety of sediment substrates, including some areas exhibiting surface cobbles (*e.g.* Figure 4C,M,V) and shell/pebble material (*e.g.* Figure 4G,H,S,T), no fixed natural reef substrates were identified except very close to the shoreline. Transitions between course and fine sediment substrates were almost universally gradual and generally followed bathymetry. Textural differences between these substrates were mostly too subtle to show up clearly on side-scan images, which require a certain amount of relief to register in a way that can be clearly interpreted. The combination of side-scan sonar and still photograph imagery of the seabed in Waikawa Bay identified very little in the form of clear discontinuities between substrates which could be mapped in a meaningful way.

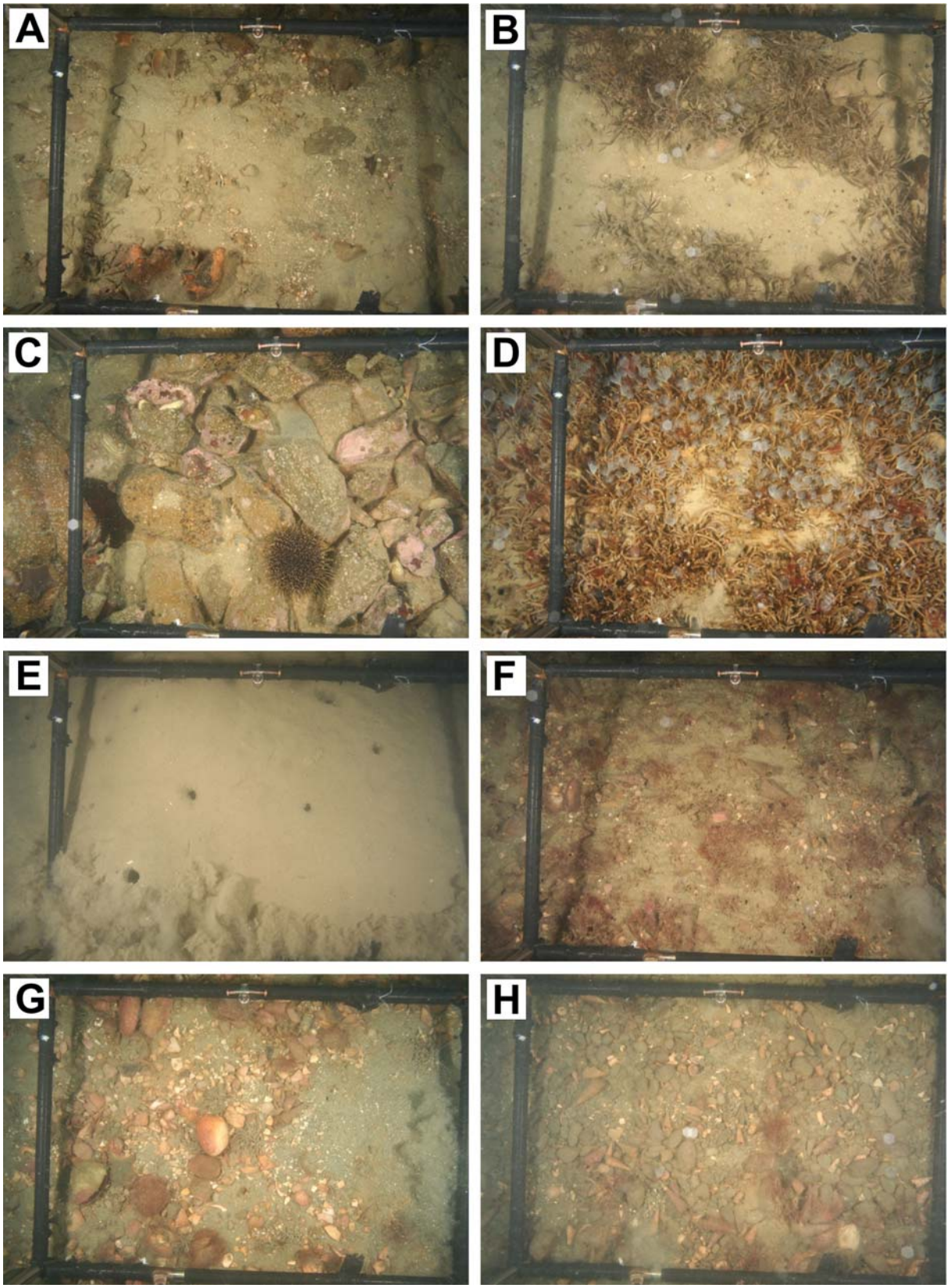

Figure 4 Automatic drop-camera images of the Waikawa Bay seabed, representing the range of different habitat types and epibiotic communities present. Locations shown in Figure 1.

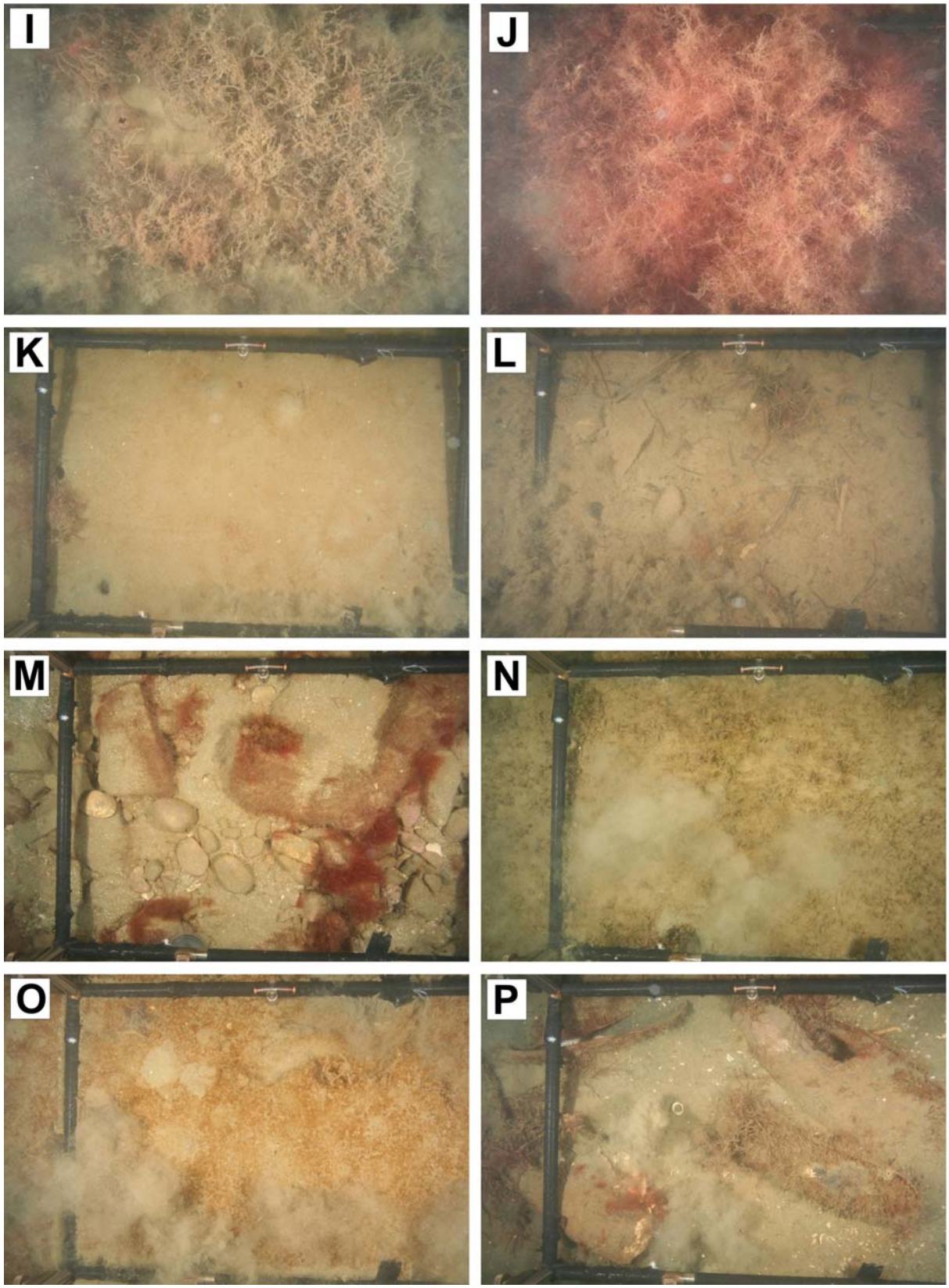

Figure 4 (contd.) Automatic drop-camera images of the Waikawa Bay seabed, representing the range of different habitat types and epibiotic communities present.

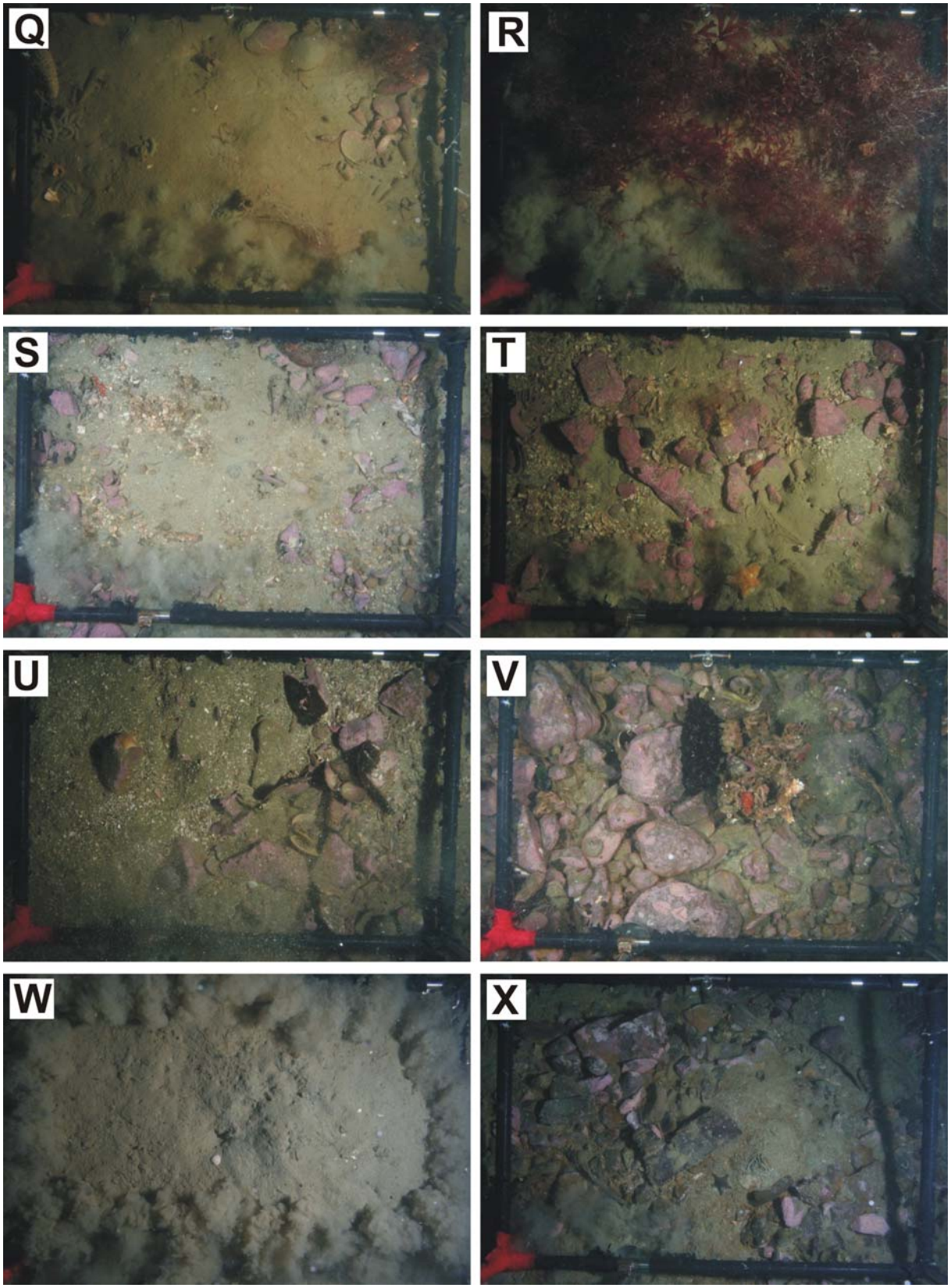

Figure 4 (contd.) Automatic drop-camera images of the Waikawa Bay seabed, representing the range of different habitat types and epibiotic communities present.

Since the field surveys have shown that the reef area in the proposed north-west extension to the marina zone occurs only in intertidal and shallow subtidal areas, its extent is well-indicated by aerial photographs and its approximate boundaries may be mapped. The hard substrate area shown in (Figure 5) is approximately 0.4 ha and it is estimated that around two thirds of this area is intertidal. The fringing reef within the proposed marina zone extension is similar, both in nature and extent, to that existing further north along this shoreline towards The Snout.

Figure 5 Approximate extent of the intertidal and shallow subtidal fringing reef within the proposed extension to the Waikawa Marina Zone. Based on aerial photographs and survey data.

I trust that this addendum addresses sufficiently the request by Marlborough District Council for further information regarding the distribution of substrate types in Waikawa Bay.

Ross Sneddon
Environmental Scientist: Coastal & Freshwater Group
Cawthron Institute