Biomass Estimates for Sea Cucumbers (*Parastichopus californicus, Cucumaria miniata, C. pallida*) as Determined Through Surveys Conducted June 2011 to May 2012

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by

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Stock assessment surveys of the Giant Red Sea Cucumber, *Parastichopus californicus*, population in British Columbia have been ongoing since 1998. Between June 2011 and May 2012, eight surveys were conducted to provide managers with population density and biomass estimates. The relative abundance of Red Sea Urchin (*Strongylocentrotus franciscanus*), Green Sea Urchin (*Strongylocentrotus droebachiensis*), and Geoduck (*Panopea generosa*) were also measured and are presented here. The Howe Sound, Louise Island and Cowichan Bay survey results showed low sea cucumber densities with many Subareas having densities below the established commercial fishery threshold. The Texada – Lasqueti, Desolation Sound, Seymour Inlet and Belize Inlet surveys had higher sea cucumber densities, with most Subareas having densities above the commercial fishery threshold. Locations for no-take reserve areas are suggested.

RÉSUMÉ

Duprey, N.M.T. 2014. Biomass estimates for sea cucumbers (*Parastichopus californicus, Cucumaria miniata, C. pallida*) as determined through surveys conducted June 2011 to May 2012. Can. Manuscr. Rep. Fish. Aquat. Sci. 3017: xi + 155p.

Des relevés des stocks de concombres de mer du Pacifique (*Parastichopus californicus*) ont été complétés en Colombie-Britannique depuis 1998. De juin 2011 à mai 2012, huit relevés ont fourni des estimés de densitées et de biomasses aux gestionnaires. Les abondances qualitatives d'oursin rouge (*Strongylocentrotus franciscanus*), d'oursin vert (*S. droebachiensis*) et de panope du Pacifique (*Panopea generosa*), sont présentées. Les densitées dans le Détroit Howe, l'Ile Louise et Baie de Cowichan étaient trop basses dans plusieurs sous-secteurs pour supporter la pêche commerciale. Les densités dans Texada – Lasqueti, le Détroit Désolation ainsi que les bras de mer Seymour et Belize étaient assez élevées pour supporter la pêche commerciale dans la plupart des sous-secteurs. Des localités pour des réserves sans pêche commerciale sont suggérées.

INTRODUCTION

The fishery for Giant Red Sea Cucumber, *Parastichopus californicus* (Stimpson, 1857), in British Columbia (BC) had an annual value of approximately 7.5 million Canadian dollars in 2010 (P. Ridings, Fisheries and Oceans Canada (DFO), pers. comm.). Landings were first recorded in Canada in 1971, and the fishery underwent several management changes through the 1980's and 1990's. Since 1995, the fishery has undergone a rigorous period of data collection, analysis and information review. The objective was to develop a biologically-based stock assessment program and risk-averse fishery management. The first stock assessment and quota options paper was completed in 1995, utilizing a surplus production model (Phillips and Boutillier 1998). In the course of conducting this assessment, gaps in knowledge of the species' biology were identified and shortcomings of the fishery-dependent data became clear. Phillips and Boutillier (1998) identified the need for a change in approach for the BC sea cucumber fishery and laid the groundwork for a more comprehensive review in 1996 (Boutillier et al. 1998), called Phase 0 (*fide* Perry et al. 1999). The Phase 0 review paper concluded that the fishery was not providing the information necessary for stock assessments and evaluations of the impact of commercial fishing on sea cucumber populations. Accordingly, it was recommended that the fishery henceforth be conducted in a manner that would provide the necessary data. Phase 1 of the sea cucumber fishery began in 1997 (Hand and Rogers 1999), wherein the area open to commercial harvest was restricted to a static 25% of the coast, 50% of the coast was closed to harvest, and the remaining 25% of the coast was set aside for experimental fishery research. Only a small fraction of the area set aside for experimental fishery research was used; therefore the closed area encompassed almost 75% of the coast. A fishery-independent survey program was initiated in areas open to commercial harvest (termed 'Open' surveys) in BC. These Open surveys are used to determine the density and biomass of sea cucumbers in a given area.

After 10-years of fisheries-dependent and -independent research conducted in the Phase 1 regime, the data collected from Open surveys, experimental fisheries and biological sampling were analyzed and the results and recommendations were presented to and accepted by the Pacific Invertebrate Subcommittee of the Canadian Science Advisory Secretariat (CSAS) in 2007 (Hand et al. 2009). The recommendation to allow re-opening of the commercial fishery beyond the geographically-restricted area of 25% of the shoreline, using BC-based exploitation rates, was endorsed. It was also recommended and approved that any re-opened areas should be surveyed prior to the occurrence of commercial harvesting (Hand et al. 2009; Duprey et al. 2011). The sea cucumber fishery then entered Phase 2, 'fishing for commerce' (Perry et al. 1999).

As recommended in Hand et al. (2009) prior to re-opening areas in BC to commercial harvesting, surveys are conducted to estimate the density and biomass of sea cucumbers within them. A total of 120 new Pacific Fishery Management (PFM) Subareas have been surveyed from July 2007 through May 2011, and survey results have provided site-specific estimates of sea cucumber density and biomass (Duprey 2011, Duprey 2012).

The Integrated Fishery Management Plan (DFO 2011) lists all PFM Subareas currently open for commercial harvest of sea cucumber.

This manuscript report presents the results of eight Open surveys conducted between June 2011 and May 2012: two Open surveys in the Haida Gwaii region (Louise Island and part of Gwaii Haanas); two Open Surveys in the Central Coast region (Belize Inlet and Seymour Inlet); and four Open surveys in the East Coast of Vancouver Island region (Desolation Sound, Texada – Lesqueti, Cowichan Bay, and Howe Sound).

Seven of the Open surveys were not open to fishing at the time of the survey (Louise Island, Belize Inlet, Seymour inlet, Desolation Sound, Texada – Lesqueti, Cowichan Bay and Howe Sound), but were being considered for opening in upcoming harvest seasons; the Gwaii Haanas survey, located in the Gwaii Haanas National Marine Park, was not open for fishing.

This report summarizes the survey protocols, describes the survey methodology and presents the results of data analysis for density, mean weight and biomass of the *P. californicus* populations, density estimates for the *Cucumaria miniata* and *C. pallida* sea cucumber populations and relative abundance estimates of Geoducks (*Panopea generosa*), Red Sea Urchins (*Strongylocentrotus franciscanus*) and Green Sea Urchins (*S. droebachiensis*).

METHODS

Open surveys are the standard survey method used in BC to assess the *P. californicus* population (Duprey et al. 2011). They are used to assess density and biomass in areas currently open to commercial harvesting or to assess areas currently not open, but where there is a desire to re-open the area in upcoming years.

OPEN SURVEY METHODS

Surveying

While each Open Survey was prepared separately, the methods used to prepare and conduct each survey were the same. First, the entire shoreline of the each PFM Subarea was measured using ArcGIS 9.3 (Table 1). The basemap used to measure the shoreline was the cucland.shp dataset, projected in BC Albers. Using ArcGIS 9.3 measurements, transect locations were determined by placing transects systematically every two kilometers along the shoreline using Xtools (see Table 1 for total number of surveyed transects by PFM Subarea). One transect was allocated for every 2 kilometers of shoreline located in the PFM Subarea.

Each transect was surveyed by two SCUBA divers. A marked leadline was placed in a perpendicular line to shore, from zero gauge depth to 15.2 m gauge depth (except in the two Haida Gwaii surveys where 18.2 m gauge depth was used). The leadline was marked with zapstraps and coloured electrical tape at 5 m intervals. A buoy was anchored to the deep end of the line at approximately 15.2 m (50 ft; or 18.2 m [60 ft] in Haida Gwaii). Two divers descended the buoy line at the deep end and began the survey. Each diver

had a 2 m pole with an attached datasheet which they used to survey 10 m^2 quadrats (5 m in length, zapstrap to zapstrap, and 2 m wide, length of survey pole). One diver was designated as the left diver and the other, the right; each diver was responsible for counting and recording the number of sea cucumbers within each quadrat on their side of the transect line. The left diver was responsible for counting the sea cucumbers straddling the transect line. For each quadrat, the following were recorded: the number of adult and the juvenile *P. californicus* (juveniles were animals less than 15 cm, the size of the pencil used by divers), no more than three dominant substrate types and no more than two dominant algae types. A sea cucumber was considered inside the quadrat if more than half of the animal was within the quadrat. The depth of each quadrat was also recorded. Only one diver recorded the number of *C. miniata* and *C. pallida* observed on their side of the transect. Because the white tentacles of *C. pallida* can be confused with those of *Eupentacta* spp., some *Eupentacta* may be included in the *C. pallida* numbers presented in this report. As only one diver was recording this information, the swath covered was limited to their pole length of 2 m as compared to the 4 m wide swath covered for *P. californicus*, where both divers count animals. Relative abundance estimates of Red Sea Urchins, Green Sea Urchins and Geoducks were also recorded on the dive regardless of how far they were seen from the transect line; each transect was designated as having either None, Few (1–10), Many (11–100) or Abundant (100+) animals.

Biosampling

The average weight and weight-frequency distribution of the populations was determined from biosamples, which were small collections of *P. californicus* that were individually weighed. Biosamples were collected from predetermined transects that were randomly selected from all transect locations. Approximately one biosample was collected for every 10 transects in an Analysis Area. After these selected transects were surveyed, the divers handpicked 25 sea cucumbers from the transect line and surrounding area up to maximum depth of 15.2 m. Juveniles were not collected during biosampling and therefore their weights were excluded from biomass calculations. The animals were then brought on board the boat, where they were longitudinally split, left to drain and, at the end of the day, individually weighed. A total of 90 biosamples were collected from seven of the Open surveys presented in this report (no biosamples were collected in Gwaii Haanas).

SURVEY AREA DESCRIPTIONS

The eight Open surveys were conducted June 2011 through May 2012 and stretched from Haida Gwaii in the North to Cowichan Bay in the South.

Louise Island

The Louise Island Open Survey was located entirely within Pacific Fisheries Management Area (PFMA) 2, the PFMA surrounding Haida Gwaii (Figures 1–9). The last commercial harvest landings occurred in Haida Gwaii in 1995. This area was surveyed for potential re-opening, and included four previously unsurveyed PFM Subareas (2–3 to 2–6). The survey was conducted from April 28 – May 4, 2012 onboard a commercial fishing vessels. The survey was conducted in partnership with the Pacific

Sea Cucumber Harvesters Association (PSCHA) and the Haida Fishery Program (HFP); a DFO biologist was present for the 7 days of surveying.

PFM Subareas 2–3 and 2–4 are located in Cumshewa Inlet on the northeast coast of Louise Island. PFM Subarea 2–5 is comprised of Carmichael Passage and Louise Narrows. PFM Subarea 2–6 is a large Subarea made up of the southern shoreline of Louise Island, Lagoon Inlet, Sewell Inlet, Talunkwan Island and Dana Inlet. The total shoreline length of all 4 PFM Subareas was measured as 262.7 km using ArcGIS 9.3 (see Table 1 for individual shoreline lengths for each PFM Subarea).

Gwaii Haanas

The Gwaii Haanas Open survey was located in PFMA 2, located in the North Coast region (Figure 1). The last commercial harvest landings occurred in Haida Gwaii in 1995. The Gwaii Haanas survey area covers most of the area of the new Gwaii Haanas National Marine Conservation Area, however only one PFM Subarea was completely surveyed between June 2011 and May 2012. The surveyed PFM Subarea, 2–15 (Figures 10–11), was completed onboard a commercial fishing vessel between May 5–9, 2012. The survey was conducted in partnership with the Pacific Sea Cucumber Harvesters Association (PSCHA) and the Haida Fishery Program (HFP); a DFO biologist was present for the entire 4 days of surveying.

PFM Subarea 2–15 is made up Skincuttle Inlet, this includes Harriet Harbour and Huston Inlet. The total shoreline length of the PFM Subarea was measured as 77.8 km using ArcGIS 9.3.

Belize Inlet

The Belize Inlet Open survey was located in PFMA 11, which is located in the East Coast of Vancouver Island region (Figure 1). This area had not been commercially harvested for sea cucumber since 1998 and was surveyed for potential re-opening. The survey included 4 PFM Subareas, 11–4 to 11–7 (Figures 14–21) and was conducted from March 22–29, 2012 onboard a commercial fishing vessel. The survey was conducted in partnership with the Pacific Sea Cucumber Harvesters Association (PSCHA) and a contract, third-party, biologist was present, on behalf of DFO, for the 8 days of surveying.

PFM Subarea 11–4 is a large Subarea covering most of Belize Inlet from Alison Sound to Lassiter and Rowley Bay to the west. PFM Subarea 11–5 comprises the entire Mereworth Sound were it branches off Belize Inlet. PFM Subarea 11–6 comprises all of Alison Sound from where it branches off Belize Inlet. PFM Subarea 11–7 is made up of the end of Belize Inlet, the Subarea begins at the western most point to the entrance of Alison Sound. The total shoreline length of all four PFM Subareas was measured as 263.2 km using ArcGIS 9.3 (see Table 1 for individual shoreline lengths for each PFM Subarea).

Seymour Inlet

The Seymour Inlet Open survey was located in PFMA 11, which is located in the East Coast of Vancouver Island region (Figure 1). This area had not been commercially harvested for sea cucumber since 1998 and was surveyed for potential re-opening. The survey included 3 PFM Subareas, 11–3, 11–8, and 11–10 (Figures 12–13; 22–25) and was conducted from April 11–17, 2012 onboard a commercial fishing vessel. The survey was conducted in partnership with the Pacific Sea Cucumber Harvesters Association (PSCHA); a DFO biologist was present for the 7 days of surveying.

PFM Subarea 11–3 comprises Seymour Inlet from Nugent Sound to a line connecting Martin and Miles Points; this includes Maunsell Bay. PFM Subarea 11–8 covers the whole of Nugent Sound; although transects were plotted in Schwartzenberg Lagoon it was not accessible and was therefore not surveyed. PFM Subarea 11–10 is made up Frederick Sound and Salmon Arm as well as the northern branch of Seymour inlet. The total shoreline length of all three PFM Subareas was measured as 313.7 km using ArcGIS 9.3 (see Table 1 for individual shoreline lengths for each PFM Subarea).

Desolation Sound

The Desolation Sound Open survey was located in PFMA 15, which is located in the East Coast of Vancouver Island region (Figure 1). This area had not been commercially harvested for sea cucumber since 1998 and was surveyed for potential re-opening. The survey included 3 PFM Subareas, 15–4 to 15–6 (Figures 30–35) and was conducted from July 14–20, 2011 onboard two commercial fishing vessels. The survey was conducted in partnership with the Pacific Sea Cucumber Harvesters Association (PSCHA); two DFO biologists were present for the 7 days of surveying.

PFM Subarea 15–4 is made up of Okeover and Lancelot Inlets. PFM Subarea 15–5 is a large Subarea that includes the Redonda Islands, Teakerne Arm, Lewis Channel, Waddington Channel, Homfray Channel, Pryce Channel, Pendrell Sound and Deer Passage. The boundary lines for the northwest part of the Subarea are Georg Head to Tibbs Point and the southern tip of Raza Island and the northern tip of Cortes Island. The southern boundaries are Tiber Bay to Sarah Pt and the entrance to Okeover Inlet (which is a separate Subarea). The northeast boundary of the Subarea is the entrance to Toba Inlet; a line drawn north-northwest from Brettell Point divides Subarea 15–5 and 15–6. PFM Subarea 15–6 is made up of Toba Inlet. The total shoreline length of all three PFM Subareas in the Desolation Sound survey was measured as 493.9 km using ArcGIS 9.3 (see Table 1 for individual shoreline lengths for each PFM Subarea).

Texada – Lasqueti

The Texada – Lesqueti Open survey was located in PFMAs 14–16, located in the East Coast of Vancouver Island region (Figure 1). This area had not been commercially harvested for sea cucumber since 1998 and was surveyed for potential re-opening. The survey included 13 PFM Subareas, 14–3, 15–1, 16–1 to 16–4, 16–16 to 16–22 (Figures 26–29; 36–51) and was conducted from September 13–19, 2011 onboard two commercial fishing vessels. The survey was conducted in partnership with the Pacific Sea Cucumber

Harvesters Association (PSCHA); a DFO biologist and a contract biologist were present for the 7 days of surveying.

PFM Subarea 14–3 covers the south side of Lasqueti Island, from Young Point in the east to the western edge of False Bay. PFM Subarea 15–1 covers the northern part of Malaspina Straight, from Powell River to Scotch Fir Point on the northern shoreline and Kiddie Point to Northeast Point on Texada Island. PFM Subarea 16–1 includes all of North and South Thormanby Islands and the mainland section between Reception Point and the northern tip of Turnagain Island. PFM Subarea 16–2 covers the mainland section between the northern tip of Turnagain Island and Francis Point on Francis Peninsula, but does not include Bargain Bay nor the northern section of Edgecombe Island. PFM Subarea 16–3 is made up of Bargain Bay and the northern section of Edgecombe Island. PFM Subarea 16–4 covers Pender Harbour up to a vertical line through Henry Point and Charles Island. PFM Subarea 16–16 includes Blind Bay and the shoreline of Nelson Island south to Cape Cockburn, however the shoreline south of Kelly Island was not surveyed due the existence of an Experimental Fishing Area. PFM Subarea 16–17 covers the western side of the Francis Peninsula, a small section of mainland from Henry Point to the entrance of Agamemnon Channel and the southern section of Nelson Island from Cape Cockburn to Fearney Point; the shoreline along Nelson Island was not surveyed due to the presence of an Experimental Fishing Area. PFM Subarea 16–18 covers the southeast section of Texada Island, from Northeast Point in the north to Upwood Point in the south. PFM Subarea 16–19 covers the north side of Lasqueti Island, from Squitty Bay to Spanish Cave. The Subarea also includes the small island between Lasqueti and Texada Islands except the northern section of Jervis Island. PFM Subarea 16–20 covers the small northwest end of Lasqueti Island, from Spanish Cave to Olsen Island and includes the small islands off Lasqueti Island's west coast. PFM Subarea 16–21 covers the southern coast of Texada Island from Favada Point to the most southern point of Texada Island. PFM Subarea 16–22 covers the northwest shoreline of Texada Island from Kiddie Point to Favada Point. The total length of the shoreline in the surveyed area was measured as 554.3 km using ArcGIS 9.3 (see Table 1 for individual shoreline lengths for each PFM Subarea).

Cowichan Bay

The Cowichan Bay Open survey was located in PFMA 17 and 18, located in the East Coast of Vancouver Island region (Figure 1). This area had not been commercially harvested for sea cucumber since 1998 and was surveyed for potential re-opening. The survey included 2 PFM Subareas, 17–9 and 18–7 (Figures 52–55) and was conducted from November 26–29, 2011 using the Canadian Coast Guard Vessel Neocaligus. Three DFO biologists conducted the 4 days of surveying.

PFM Subarea 17–9 includes a segment of Saltspring Island from Parminter Point to Erskine Point and a segment of shoreline on Vancouver Island from Grave Point to Bare Point. PFM Subarea 18–7 contains a large segment of the western side of Saltspring Island from Cape Keppel to Erskine Point and two segments of shoreline on Vancouver Island, from Hatch Point to Cherry Point and from Separation Point to Grave Point. The

total length of the shoreline in the surveyed area was measured as 75.1 km using ArcGIS 9.3 (see Table 1 for individual shoreline lengths for each PFM Subarea).

Howe Sound

The Howe Sound Open survey was located in PFMA 28 and 29, located in the East Coast of Vancouver Island region (Figure 1). This area had not been commercially harvested for sea cucumber since 1998 and was surveyed for potential re-opening. The survey included 7 PFM Subareas, 28–1 to 28–6 and 29–3 (Figures 56–65) and was conducted from January 26 – February 4, 2012 onboard a commercial fishing vessel. The survey was conducted in partnership with the Pacific Sea Cucumber Harvesters Association (PSCHA); a DFO biologist was present for the 10 days of surveying.

PFM Subarea 28–1 includes Keats Island, Collingwood Channel, Shoal Channel, Barfleur Passage, the western side of Bowen Island from Hood Point to Cape Roger Curtis and the southern part of Gambier Island from Halkett Point to Avalon Bay. PFM Subarea 28–2 includes Queen Charlotte Channel, Bowyer Island, the mainland shoreline from Point Atkinson to Brunswick Point, the eastern side of Bowen Island from Cowen Point to Hood Point, the eastern side of Gambier Island from Halkett Point to Ekins Point and the western side of Anvil Island from Irby Point to Domett Point. PFM Subarea 28–3 includes the mainland shoreline from Hopkins landing to the point parallel to the northern tip of Anvil Island (see Figure 60), Thornbrough Channel, Woolridge Island, the western side of Gambier Island from Avalon Bay to Ekins Point. PFM Subarea 28–4 includes Montagu Channel, the east side of Anvil Island, the mainland shoreline from Furry Creek to Brunswick Point, and the northern mainland stretch from Subarea 28–3 to slightly south of Ellesmere Creek. PFM Subarea 28–5 includes the area north of Furry Creek and the point slightly south of Ellesmere Creek. PFM Subarea 28–6 is comprised of the mainland shoreline stretching from Navvy Jack Point to Point Atkinson. PFM Subarea 29–3 is made up of the southern shoreline of Bowen Island from Cape Roger Curtis to Point Cowen. The total length of the shoreline in the surveyed area was measured as 288.1 km using ArcGIS 9.3 (see Table 1 for individual shoreline lengths for each PFM Subarea).

DATA ANALYSIS

Density estimations

For statistical analysis, the linear density of *P. californicus, C. miniata and C. pallida* was calculated for each transect by dividing the total number of sea cucumbers by the width of the transect (4 m for *P. californicus* and 2 m for *C. miniata* and *C. pallida*). On a PFM Subarea basis, the transect data were analyzed using the CukeAnalysis Program (version 2008 11 19), which calculated the mean density and confidence bounds using the bootstrapping technique (see Hand et al. [2009] for more details). Transect data were re-sampled with 1000 iterations using a random seed of 756. Some PFM Subareas were small and therefore had sample sizes too low to obtain good results from bootstrapping (a sample size of 10 transects is preferred). Analysis Areas were developed to avoid this complication: PFM Subareas in the same survey were pooled with other PFM Subareas that had similar bathymetry and geographical shape, and

analyzed as one (see Table 1 for a list of Analysis Areas). The mean *P. californicus, C. miniata and C. pallida* density, and 75%, 90%, 95%, 99% confidence bounds from the bootstrap were calculated for each Subarea or Analysis Area.

Mean weight estimations

Biosamples were used to estimate mean animal weight within each PFM Subarea. Each sea cucumber collected in a biosample was weighed individually. The individual weights within a biosample (approximately 25 sea cucumbers) were averaged to produce a mean biosample weight from the sampled transect. The PFM Subarea's (or Analysis Area's) mean weight was the mean of all the biosample averages collected from transects within that Subarea (or Analysis Area; Duprey et al. 2011). If no biosamples were collected within a PFM Subarea then the lowest mean weight estimate of all Subareas in the same survey was used (Duprey et al. 2011).

Biomass estimations

The biomass of P. californicus in a PFM Subarea was estimated at various confidence bounds (CB) using the following formula

$$Biomass_{CB} = [(Shoreline_{Protected} * Density_{CB}) * Wt_{mean}] + [(Shoreline_{Exposed} * 2.5) * Wt_{mean}]$$

where $Density_{CB}$ is the density from the bootstrap output and Wt_{mean} is the mean individual sea cucumber weight attributed to the Subarea from biosampling (Duprey et al. 2011). The shoreline length used to calculate biomass was measured using the GIS software Compugrid and is currently housed in the managers database. $Shoreline_{exposed}$ is the cumulative shoreline in a Subarea that has been designated exposed in the BC Shorezone dataset (Hand et al. 2009; Duprey et al. 2011). $Shoreline_{protected}$ is the cumulative shoreline in a Subarea that has been designated Semi-Exposed to Very Protected (Duprey et al. 2011). If the $Density_{CB}$ value is lower than 2.5, then ($Shoreline_{Exposed} * 2.5$) is replaced with the [($Shoreline_{Exposed} * Density_{CB}$). See Duprey et al. (2011) for a detailed description of methods used to calculate biomass estimates.

RESULTS

DENSITY SURVEYS

The following sections describe the results of analyses of the transect densities, biosample weights and biomass estimations for each PFM Subarea. Exact density estimates for transects are listed in Tables 5 to 12, while the figures indicate the position of a transect and have scaled symbols for density ranges. The density ranges developed for the figures were chosen for their relevance to stock assessment benchmarks and differ by Analysis Areas. A figure was developed for each PFM Subarea, however for large PFM Subareas it was sometimes necessary to split the Subarea into pieces to properly display all the transects locations (the figures for these PFM Subareas have letters (a, b, c, etc) after the figure number to indicate the different parts of the PFM Subarea). There are as many as five categories of density ranges in each figure. Absence of sea cucumbers (0.0 sea cucumbers/metre of shoreline (c/m-sh)) and up to 2.49 c/m-sh are used in every figure. Zero was chosen as a category to aid in determining areas where no sea

cucumbers were seen. The next category range of 0.01 to 2.49 c/m-sh was chosen because a 90% lower confidence bound (LCB) of 2.50 c/m-sh, for an Analysis Area, is the commercial fishery threshold recommended in Duprey et al. (2011). The remaining three category ranges differ depending on the survey location and the results of the analysis. The third density range is between 2.50 c/m-sh and either the regional baseline density or the 90% LCB of the bootstrapped transect densities, whichever is lower. Baseline densities are densities attributed to un-surveyed open areas within a region, as follows: North Coast = 6.0 c/m-sh; Central Coast = 6.0 c/m-sh; East Coast Vancouver Island = 4.1 c/m-sh; and West Coast Vancouver Island = 1.9 c/m-sh (Duprey et al. 2011). The forth density range is from the regional baseline density to the 90% LCB, or vice versa depending on which is lower. If the maximum observed density is low, the upper end if the forth range is the maximum observed density in the Analysis Area. The final range in the figures is from the 90% LCB (or regional baseline density) to the maximum density observed in the Analysis Area. If the maximum observed density is less than the baseline density then this category is not present.

PFMA 2–3 (Louise Island)

Parastichopus californicus

PFM Subarea 2–3 had low *P. californicus* densities observed throughout (Figure 2); only 12 of the 29 plotted transects in the PFM Subarea could be surveyed. A total of 9 of the 12 transects surveyed had a density of 0.25 c/m-sh or less (Table 5). The highest transect density observed was 41.25 c/m-sh and the lowest 0.0 c/m-sh.

The DFO management database had a total shoreline length for Subarea 2–3 of 56,162 m, of which 3,063 m was classified as Exposed and 53,099 m classified as Protected by the BC Shorezone classification system. Inclement weather prevented 17 of the 29 plotted transects from being surveyed. Most of the missed transects were located along the western edges of the PFM Subarea (transects 1-14, 27-29). As a result 34,000 m of shoreline was subtracted from the total shoreline length for this analysis (analysis could be re-run a later date should these transects be surveyed in later years). Therefore, the total shoreline length used for biomass calculations was 3,063 m of Exposed and 19,099 m of Protected shoreline.

Mean sea cucumber density was estimated to be 3.9 c/m-sh and the 90% LCB of the bootstrap was 0.4 c/m-sh (Table 2). An average weight, of 340 g, was calculated from the 1 biosample collected (transect 26; Table 3). Using the corrected shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 3,014 kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* numbers were recorded for all 12 transects surveyed in the Subarea. Ten of the 12 transects surveyed had no observed *C. miniata* and the highest density observed was 19.5 c/m-sh (Table 5). The mean density was estimated to be 1.7 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the corrected shoreline length and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers.

Ten of the 12 transects surveyed had no *C. pallida* observed and the highest density observed was 0.5 c/m-sh (Table 5). The mean density was estimated to be 0.1 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the corrected shoreline length and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected from 11 of the 12 transects surveyed in PFM Subarea 2–3. 'Few' Geoducks were seen on 1 (9%) transect, 'Many' were seen on 5 (45%) transects, 'Abundant' Geoducks were seen on 1 (9%) transect and the remaining 4 (36%) transects had no Geoducks observed (Figure 3).

'Few' Green Sea Urchins were seen on 2 (18%) transects and 9 (82%) transects had no Green Sea Urchin observed. 'Few' Red Sea Urchins were seen on 1 (9%) transect, 'Many' were seen on 1 (9%) transect, 'Abundant' Red Sea Urchins were seen on 1 (9%) transect and the remaining 8 (73%) transects had no Red Sea Urchins observed (Figure 3).

PFMA 2–4 (Louise Island)

Parastichopus californicus

PFM Subarea 2–4 had low densities of *P. californicus* throughout the Subarea (Figure 4). A total of 14 of the 19 transects surveyed had a density of 0.50 c/m-sh or less (Table 5). The highest density observed was 26.00 c/m-sh and 12 transects had 0 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total shoreline length for Subarea 2–4 of 34,121 m, all of which was classified as Protected by the BC Shorezone classification system.

Mean sea cucumber density was estimated to be 2.0 c/m-sh and the 90% LCB of the bootstrap was 0.6 c/m-sh (Table 2). An average weight, of 481 g, was calculated from the 1 biosample collected (transect 44; Table 3). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate for PFMA 2–4 was 9,847 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all of the 19 transects surveyed in the Subarea. Nine of the 19 transects surveyed had no *C. miniata* observed and the highest density observed was 55.0 c/m-sh (Table 5). The mean density was estimated to be 7.8 c/m-sh and the 90% LCB of the bootstrap was 3.7 c/m-sh. Using the entire shoreline length of the Subarea and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 126,247 sea cucumbers.

Ten of the 19 transects surveyed had no *C. pallida* observed and the highest density observed was 96.0 c/m-sh (Table 5). The mean density was estimated to be 7.9 c/m-sh and the 90% LCB of the bootstrap was 2.3 c/m-sh. Using the entire shoreline length of

the Subarea and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 78,478 individuals in Subarea 2–4.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data for Geoduck were collected from all of the 19 transects surveyed in PFM Subarea 2–4. 'Few' Geoducks were seen on 6 (32%) transects, 'Many' were seen on 2 (10%) transects while the remaining 11 (58%) transects had no Geoducks observed (Figure 5).

Relative abundance data for sea urchins were collected from 18 of the 19 transects surveyed in Subarea 2–4. 'Many' Green Sea Urchins were seen on 1 (6%) transect and zero on the remaining 17 (94%) transects (Figure 5). 'Few' Red Sea Urchins were seen on 2 (11%) transects and 16 (89%) transects had none observed.

PFMA 2–5 (Louise Island)

Parastichopus californicus

PFM Subarea 2–5, mostly comprised of Carmichael Passage, had low *P. californicus* densities. The few transects with observed *P. californicus* were grouped in the northern section of the Subarea (Figure 6). A total of 7 of the 10 transects surveyed had a density of 1.0 c/m-sh or less (Table 5). The highest density observed was 8.75 c/m-sh and the lowest 0.00 c/m-sh.

The DFO management database had a total length for Subarea 2–5 of 23,520 m, all of which was classified as Protected by the BC Shorezone classification system. Two transects were not surveyed due to their location in the Louise Narrows, therefore 4,000 m of shoreline was removed from the total shoreline length to represent this non-navigable area. The total shoreline length used for biomass calculations was 19,520 m of Protected shoreline.

Mean sea cucumber density was estimated to be 2.0 c/m-sh and the 90% LCB of the bootstrap was 0.8 c/m-sh (Table 2). No biosamples were taken in this Subarea, so the lowest mean weight estimate from the entire Louise Island survey, 319 g, was used as the mean weight (Table 3). Using the corrected shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 4,982 kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* numbers were recorded on all 10 transects surveyed in the Subarea. Three of the 10 transects surveyed had no *C. miniata* observed and the highest density observed was 16.0 c/m-sh (Table 5). The mean density was estimated to be 3.5 c/m-sh and the 90% LCB of the bootstrap was 1.3 c/m-sh. Using the corrected shoreline length and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 25,376 sea cucumbers.

Three of the 10 transects surveyed had no *C. pallida* observed and the highest density observed was 28.5 c/m-sh (Table 5). The mean density was estimated to be 6.6 c/m-sh and the 90% LCB of the bootstrap was 3.2 c/m-sh. Using the corrected shoreline length

and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 62,464 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected from all 10 transects surveyed in PFM Subarea 2–5. 'Few' Geoduck were seen on 4 (40%) transects, 'Many' were seen on 4 (40%) transects and zero were seen on the remaining 2 (20%) transects (Figure 7).

No Green Sea Urchins were seen on the 10 (100%) transects surveyed. 'Few' Red Sea Urchins were seen on 2 (20%) transects and zero were seen on the remaining 8 (80%) transects (Figure 7).

PFMA 2–6 (Louise Island)

Parastichopus californicus

PFM Subarea 2–6 had the highest densities of *P. californicus* of all the Louise Island Subareas (Figure 8). A total of 37 of the 72 transects had a density less than 6.0 c/m-sh, 17 of which had a density of 1.0 c/m-sh or less (Table 5). The highest density observed was 41.75 c/m-sh and the lowest was 0 c/m-sh.

The DFO management database had a total shoreline length for Subarea 2–6 of 134,702 m, of which 1,579 m was classified as Exposed and 133,124 m classified as Protected by the BC Shorezone classification system. Two transects were not surveyed, one due its location in the Louise Narrows another due to its location in a non-navigable area at the head of Lagoon Inlet, 4,000 m of shoreline was removed from the total shoreline length to represent these non-navigable areas. Therefore, the total shoreline length used for biomass calculations was 1,579 m of Exposed and 129,124 m of Protected shoreline.

Mean sea cucumber density was estimated to be 6.7 c/m-sh and the 90% LCB of the bootstrap was 5.6 c/m-sh (Table 2). An average weight was calculated from each of the seven biosamples (transects 66, 79, 86, 100, 108, 117 and 131; Table 3); the average of these seven values was 319 g (Table 3). Using the corrected shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 231,926 kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* numbers were recorded on 46 of the 72 transects surveyed in the Subarea. Eighteen of the 46 transects surveyed had no *C. miniata* observed and the highest density observed was 153.5 c/m-sh (Table 5). The mean density was estimated to be 12.4 c/m-sh and the 90% LCB of the bootstrap was of 7.6 c/m-sh. Using the corrected shoreline length of 78,703 m and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 598,143 sea cucumbers.

Twenty-five of the 46 transects surveyed had no *C. pallida* observed and the highest density observed was 401.5 c/m-sh (Table 5). The mean density was estimated to be 16.0 c/m-sh and the 90% LCB of the bootstrap was of 6.3 c/m-sh. Using a corrected shoreline

length of 78,703 m and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 495,829 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected for 70 of the 72 transects surveyed in PFM Subarea 2–6. 'Few' Geoduck were seen on 6 (8%) transects, 'Many' were seen on 8 (11%) transects, 'Abundant' were seen on 4 (6%) and zero were seen on the remaining 52 (74%) transects (Figure 9).

'Few' Green Sea Urchins were seen on 11 (16%) transects, 'Many' were seen on 3 (4%) transects and 56 (80%) transects had no Green Sea Urchins observed. 'Few' Red Sea Urchins were seen on 7 (10%) transects, 'Many' were seen on 4 (6%) transects, 'Abundant' animals were seen on 20 (28%) transects and 39 (56%) transects had no Red Sea Urchins observed (Figure 9).

PFMA 2–15 (Gwaii Haanas)

Parastichopus californicus

PFM Subarea 2–15, Skincuttle Inlet, had mostly higher density transects of *P. californicus* scattered throughout the Subarea (Figure 10). Twenty of the 39 transects surveyed had a density of less than 6.0 c/m-sh (Table 6). The highest density observed was 15.5 c/m-sh and the lowest was 0 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 2–15 of 72,676 m, of which 1,635 m was classified as Exposed and 71,041 m classified as Protected by the BC Shorezone classification system.

Mean sea cucumber density was estimated to be 6.5 c/m-sh and the 90% LCB of the bootstrap was 5.2 c/m-sh (Table 2). No biosamples were taken in this Subarea and as no other Subareas have been surveyed in Gwaii Haanas the lowest Subarea mean weight from the Louise Island survey, 319 g, was used as the mean weight (Table 3). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 120,555 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* numbers were recorded on 28 of the 35 transects surveyed in the Subarea. Ten of the 28 transects surveyed had no *C. miniata* observed and the highest density observed was 57.5 c/m-sh (Table 6). The mean density was estimated to be 7.1 c/m-sh and the 90% LCB of the bootstrap was 4.1 c/m-sh. Using the entire shoreline length of Subarea 2–15 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 297,972 sea cucumbers.

Twenty of the 28 transects surveyed had no *C. pallida* observed and the highest density observed was 6.0 c/m-sh (Table 6). The mean density was estimated to be 0.7 c/m-sh and the 90% LCB of the bootstrap was 0.4 c/m-sh. Using the entire shoreline length of

Subarea 2–15 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 29,071 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance of Geoducks were collected on 38 of the 39 transects surveyed in PFM Subarea 2–15. Geoducks were seen regularly in the Subarea. 'Few' were seen on 10 (26%) transects, 'Many' on 3 (8%) transects, 'Abundant' on 4 (10%) transects and none were observed on the remaining 21 (55%) transects (Figure 11).

Relative abundance of Green Sea Urchins were collected on 33 of the 39 transects surveyed in Subarea 2–15. No Green Sea Urchins were observed on the surveyed transects in the Subarea (Figure 11). Relative abundance of Red Sea Urchin were collected on 36 of the 39 transects surveyed in Subarea 2–15. 'Abundant' Red Sea Urchins were seen on 10 (28%) transects, 'Many' were seen on 6 (17%) transects, 'Few' were seen on 2 (6%) transects and 18 (50%) transects had none observed.

PFMA 11–3 (Seymour Inlet)

Parastichopus californicus

PFM Subarea 11–3 had higher densities of *P. californicus* in the southern section of the inlet (Figure 12a, b). A total of 9 of the 60 transects had a density of 4.1 c/m-sh or less (Table 7). The highest density observed was 75.25 c/m-sh and only one transect had 0 c/m-sh.

The DFO management database had a total length for Subarea 11–3 of 143,254 m all of which was classified as Protected by the BC Shorezone classification system. Eighteen of the 78 plotted transects were not surveyed due to non-navigable waters or extremely poor water visibility (transect 12 at the back of Warner Bay was in non-navigable water; transects 29-33, 48, 50-53, 72-78 were not surveyed due to poor visibility). As a result 36,000 m of shoreline was removed from the total shoreline length to represent these areas. Therefore, the total shoreline length used for biomass calculations was 107,254 m of Protected shoreline.

Mean sea cucumber density was estimated to be 14.6 c/m-sh and the 90% LCB of the bootstrap was 12.0 c/m-sh (Table 2). An average weight was calculated from each of the six biosamples (transects 10, 18, 27, 37, 45, and 60; Table 3); the average of these six values was 103 g (Table 3). Using the corrected shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 132,566 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data was recorded on 45 of the 60 transects surveyed in the Subarea. Twenty-five of the 45 transects surveyed had no *C. miniata* observed and the highest density observed was 47.5 c/m-sh (Table 7). The mean density was estimated to be 4.5 c/m-sh and the 90% LCB of the bootstrap was 2.5 c/m-sh. Using a corrected shoreline length of 77,254 m for Subarea 11–3 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 193,135 sea cucumbers.

Seventeen of the 45 transects surveyed had no *C. pallida* observed and the highest density observed was 61.0 c/m-sh (Table 7). The mean density was estimated to be 6.3 c/m-sh and the 90% LCB of the bootstrap was 3.8 c/m-sh. Using a corrected shoreline length of 77,254 m for Subarea 11–3 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 293,565 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data for Geoduck were collected from 59 of the 60 transects surveyed in PFM Subarea 11–3. Geoducks were not observed in the Subarea (Figure 13a, b).

Relative abundance data for Green Sea Urchin were collected from all of the 60 transects surveyed in Subarea 11–3. 'Few' Green Sea Urchins were seen on 18 (30%) transects, 'Many' were seen on 21 (35%) transects, 'Abundant' Green Sea Urchins were seen on 15 (25%) transects and 6 (10%) transects had none observed. Relative abundance data for Red Sea Urchin were collected from 59 of the 60 transects surveyed in Subarea 11–3. 'Few' Red Sea Urchins were seen on 4 (7%) transects, 'Many' were seen on 1 (2%) transect and 54 (91%) transects had none observed (Figure 13a, b).

PFMA 11–4 (Belize Inlet)

Parastichopus californicus

PFM Subarea 11–4 had high *P. californicus* densities observed on the west side of the Subarea (Figure 14). A total of 13 of the 47 transects surveyed had a density of less than 4.1 c/m-sh. The highest density observed was 41.25 c/m-sh and the lowest was 0 c/m-sh (Table 8).

The DFO management database had a total length for Subarea 11–4 of 92,215 m, of which 113 m was classified as Exposed and 92,102 m classified as Protected by the BC Shorezone classification system. Two transects were not surveyed, one due its location near the Nakwakto Rapids another due logistical constraints in the field, 4,000 m of shoreline was removed from the total shoreline length to represent these areas. Therefore, the total shoreline length used for biomass calculations was 113 m of Exposed and 88,102 m of Protected shoreline.

Mean sea cucumber density was estimated to be 10.9 c/m-sh and the 90% LCB of the bootstrap was 8.8 c/m-sh (Table 2). An average weight was calculated from each of the six biosamples (transects 87, 98, 104, 116, 123 and 136; Table 3); the average of these six values was 109 g (Table 3). Using the corrected shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 84,538 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* numbers were recorded on 40 of the 47 transects surveyed in the Subarea. Fifteen of the 40 transects surveyed had no *C. miniata* observed, the highest density observed was 131.5 c/m-sh (Table 8). The mean density was estimated to be 10.5 c/m-sh and the 90% LCB of the bootstrap was 5.6 c/m-sh. Using

the corrected shoreline length of 74,215 m and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 415,604 sea cucumbers.

Fourteen of the transects surveyed had no *C. pallida* observed (Table 8). The mean density was estimated to be 6.8 c/m-sh and the 90% LCB of the bootstrap was 4.1 c/m-sh. Using the corrected shoreline length of 74,215 m and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 304,281 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected from all 47 transects surveyed in PFM Subarea 11–4. Geoducks were not seen on any of the 47 transects (Figure 15).

'Few' Green Sea Urchins were seen on 13 (28%) transects, 'Many' were seen on 9 (19%) transects, 'Abundant' were seen on 7 (15%) transects and 18 (38%) transects had none observed. 'Few' Red Sea Urchins were seen on 2 (4%) transects, 'Many' were seen on 2 (4%) transects, 'Abundant' were seen on 1 (2%) transects and 42 (90%) transects had none observed (Figure 15).

PFMA 11–5 (Belize Inlet)

Parastichopus californicus

The density of *P. californicus* in PFM Subarea 11–5 was lower in the northeast reaches of Mereworth Sound (Figure 16). A total of 18 of the 36 transects surveyed had a density of less than 4.1 c/m-sh (Table 8). The highest density observed was 16.25 c/m-sh and the lowest was 0.00 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 11–5 of 63,773 m all classified as Protected by the BC Shorezone classification system.

Mean sea cucumber density was estimated to be 5.2 c/m-sh and the 90% LCB of the bootstrap was 4.2 c/m-sh (Table 2). An average weight was calculated for each of the three biosamples (transects 144, 156, and 163; Table 3); the average of these three values was 137 g (Table 3). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 36,695 Kg for Subarea 11–5 (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* numbers were recorded on all 36 transects surveyed in the Subarea. Twenty-two of the 36 transects surveyed had no *C. miniata* observed and the highest density observed was 38.5 c/m-sh (Table 8). The mean density was estimated to be 2.7 c/m-sh and the 90% LCB of the bootstrap was 1.3 c/m-sh. Using the entire shoreline length of the Subarea and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 82,905 sea cucumbers in Subarea 11–5.

Fourteen of the 36 transects surveyed had no *C. pallida* observed and the highest density observed was 53.5 c/m-sh (Table 8). The mean density was estimated to be 5.6 c/m-sh with a 90% LCB of the bootstrap was 3.5 c/m-sh. Using the entire shoreline length of the

Subarea and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 223,205 sea cucumbers in Subarea 11–5.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected from all 36 transects surveyed in PFM Subarea 11–5. No Geoducks were seen in PFM Subarea 11–5 (Figure 17).

'Few' Green Sea Urchins were seen on 8 (22%) transects, 'Many' on 2 (6%) transects, and zero on the remaining 26 (72%) transects (Figure 17). 'Few' Red Sea Urchins were seen on 1 (3%) transect and the remaining 35 (97%) transects had no Red Sea Urchin observed.

PFMA 11–6 (Belize Inlet)

Parastichopus californicus

PFM Subarea 11–6 had low *P. californicus* densities in the upper reaches of Alison Sound (Figure 18). A total of 17 of the 28 transects surveyed had a density of less than 4.1 c/m-sh (Table 8). The highest density observed was 20.50 c/m-sh and the lowest was 0.00 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 11–6 of 46,217 m all classified as Protected by the BC Shorezone classification system.

Mean sea cucumber density was estimated to be 4.4 c/m-sh and the 90% LCB of the bootstrap was 3.1 c/m-sh (Table 2). An average weight was calculated for each of the three biosamples (transects 201, 211 and 222; Table 3); the average of these three values was 130 g (Table 3). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 18,625 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* presence was recorded on only 4 of the 28 transects surveyed in the Subarea (Table 8). Therefore no analysis on population size was conducted.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected from all of the 28 transects surveyed in PFM Subarea 11–6. No Geoducks were observed in the Subarea (Figure 19).

'Few' Green Sea Urchins were seen on 1 (4%) transect, 'Many' were seen on 4 (14%) transects, 'Abundant' were seen on 1 (4%) transect and zero on the remaining 22 (78%) transects (Figure 19). No Red Sea Urchins were observed in the Subarea.

PFMA 11–7 (Belize Inlet)

Parastichopus californicus

PFM Subarea 11–7 had low densities of *P. californicus* approaching the head of Belize Inlet (Figure 20). A total of 16 of the 20 transects surveyed had a density of less

than 4.1 c/m-sh (Table 8). The highest density observed was 5.50 c/m-sh and the lowest was 0.00 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 11–7 of 34,910 m all of which is classified as Protected by the BC Shorezone classification system.

Mean sea cucumber density was estimated to be 1.9 c/m-sh and the 90% LCB of the bootstrap was 1.3 c/m-sh (Table 2). An average weight was calculated for each of the two biosamples (transects 262 and 270; Table 3); the average of these two values was 130 g (Table 3). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 5,900 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* numbers were not recorded on any of the 20 transects surveyed in the Subarea. Therefore no analysis on population size was conducted.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected all of the 20 transects surveyed in PFM Subarea 11–7. Geoducks were not observed in the Subarea (Figure 21).

'Many' Green Sea Urchins were seen on 2 (10%) transects, 'Abundant' on 1 (5%) transect and zero on the remaining 17 (85%) transects (Figure 21). Red Sea Urchins were not observed in the PFM Subarea (Figure 21).

PFMA 11–8 (Seymour Inlet)

Parastichopus californicus

PFMA 11–8 had low *P. californicus* densities at the very back of Nugent Sound (Figure 22). A total of 11 of the 27 transects surveyed had a density of less than 4.1 c/m-sh (Table 7). The highest density observed was 19.00 c/m-sh and the lowest was 0 c/m-sh.

The DFO management database had a total length for Subarea 11–8 of 57,204 m, all of which was classified as Protected by the BC Shorezone classification system. Five transects were not surveyed (transects 243-247), all due to Schwartzenberg Lagoon being inaccessible by boat. Therefore 10,000 m of shoreline was removed from the total shoreline length to represent the inaccessible lagoon. The total shoreline length used for biomass calculations was 47,204 m of Protected shoreline.

Mean sea cucumber density was estimated to be 7.4 c/m-sh and the 90% LCB of the bootstrap was 5.4 c/m-sh (Table 2). An average weight was calculated for each of the two biosamples (transects 233 and 253; Table 3); the average of these two values was 155 g (Table 3). Using the corrected shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 39,510 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on 19 of the 27 transects surveyed in the Subarea. Thirteen of the 19 transects surveyed had no *C. miniata* observed and the highest density observed was 36.5 c/m-sh (Table 7). The mean density was estimated to be 2.7 c/m-sh and the 90% LCB of the bootstrap was 0.7 c/m-sh. Using a corrected shoreline length of 31,204 m and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 21,842 sea cucumbers.

Nine of the 19 transects surveyed had no *C. pallida* observed and the highest density observed was 22.5 c/m-sh (Table 7). The mean density was estimated to be 2.8 c/m-sh and the 90% LCB of the bootstrap was 1.4 c/m-sh. Using a corrected shoreline length of 31,204 m and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 43,685 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on 26 of the 27 transects surveyed in PFM Subarea 11–8. 'Few' Geoduck were seen on 1 (4%) transect and none were observed on the remaining 25 (96%) transects (Figure 23).

'Few' Green Sea Urchins were seen on 4 (15%) transects, 'Many' were seen on 11 (42%) transects, 'Abundant' were seen on 1 (4%) transect and zero on the remaining 10 (39%) transects (Figure 23). No Red Sea Urchins were observed in the PFM Subarea (Figure 23).

PFMA 11–10 (Seymour Inlet)

Parastichopus californicus

Only the southern part of the Subarea (Frederick Sound) was fully surveyed in PFM Subarea 11–10; the surveyed area had a mix of sea cucumber densities (Figure 24). A total of 8 of the 23 transects surveyed had a density of less than 6.0 c/m-sh (Table 7). The highest density observed was 16.50 c/m-sh and the lowest was 0 c/m-sh.

The DFO management database had a total length for Subarea 11–10 of 81,631 m all of which was classified as Protected by the BC Shorezone classification system. Twenty-four of the 47 plotted transects were not surveyed due to extremely poor water visibility (transects 282–303, 321, 323). As a result 48,000 m of shoreline was removed from the total shoreline length to represent these areas. Therefore, the total shoreline length used for biomass calculations was 33,631 m of Protected shoreline.

Mean sea cucumber density was estimated to be 5.7 c/m-sh and the 90% LCB of the bootstrap was 4.5 c/m-sh (Table 2). An average weight was calculated for each of the three biosamples (transects 309, 315 and 326; Table 3); the average of these three values was 111 g (Table 3). Using the corrected shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 16,799 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all 23 transects surveyed in the Subarea. Twenty-two of the 23 transects surveyed had no *C. miniata* observed and the highest density observed was 0.5 c/m-sh (Table 7). The mean density was estimated to be 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the corrected shoreline length of Subarea 11–10 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers.

Twenty-one of the 23 transects surveyed had no *C. pallida* observed and the highest density observed was 6.5 c/m-sh (Table 7). The mean density was estimated to be 0.3 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the corrected shoreline length of Subarea 11–10 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on all of the 23 transects surveyed in PFM Subarea 11–10. Geoducks were not observed in the Subarea (Figure 25).

'Few' Green Sea Urchins were seen on 3 (13%) transects, 'Many' on 2 (9%) transects, 'Abundant' on 2 (9%) transects and zero on the remaining 16 (70%) transects (Figure 25). No Red Sea Urchins were observed in the PFM Subarea (Figure 25).

PFMA 14–3 (Texada – Lasqueti)

Parastichopus californicus

In PFMA 14–3 high densities of *P. californicus* were distributed throughout the Subarea (Figure 26). A total of 5 of the 26 transects surveyed had a density of less than 4.1 c/m-sh (Table 9). The highest density observed was 35.75 c/m-sh and the lowest was 0.25 c/m-sh.

No shoreline segments were removed from Subareas 14–3 due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 14–3 of 55,289 m all of which was classified as Protected by the BC Shorezone classification system.

Mean sea cucumber density was estimated to be 12.8 c/m-sh and the 90% LCB of the bootstrap was 9.8 c/m-sh (Table 2). An average weight was calculated for each of the three biosamples (transects 20, 30 and 40; Table 3); the average of these three values was 182 g (Table 3). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 98,613 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all 26 transects surveyed in the Subarea. Twenty-five of the 26 transects surveyed had no *C. miniata* observed (Table 9). The mean density was 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 14–3 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers.

All of the 26 transects surveyed had no *C. pallida* observed (Table 9). The mean density was therefore 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on all of the 26 transects surveyed in PFM Subarea 14–3. Geoducks were not seen on any of the transects in the Subarea (Figure 27).

'Few' Green Sea Urchins were seen on 5 (19%) transects, 'Many' on 4 (15%) of the transects, 'Abundant' on 3 (12%) transects and zero on the remaining 14 (54%) transects (Figure 27). 'Few' Red Sea Urchins were seen on 4 (15%) transects, 'Many' on 5 (19%) transects, 'Abundant' on 6 (23%) transects and zero on the remaining 11 (43%) transects.

PFMA 15–1 (Texada – Lasqueti)

Parastichopus californicus

PFMA 15–1 had low densities of *P. californicus* on the north side of Malaspina Strait, between Powell River and Frolander Bay, but had high densities on the south side of the Subarea along Texada Island (Figure 28). A total of 16 of the 37 transects surveyed had a density of less than 4.1 c/m-sh (Table 9). The highest density observed was 49.00 c/m-sh and the lowest was 0 c/m-sh.

The DFO management database had a total length for Subarea 15–1 of 73,853 m all of which was classified as Protected by the BC Shorezone classification system. One of the 38 plotted transects was not surveyed as it was located in the large Powell River Marina area (transect 164). As a result 2,000 m of shoreline was removed from the total shoreline length to represent this area. Therefore, the total shoreline length used for biomass calculations was 71,853 m of Protected shoreline.

Mean sea cucumber density was estimated to be 8.3 c/m-sh and the 90% LCB of the bootstrap was 6.0 c/m-sh (Table 2). An average weight was calculated from each of the three biosamples (transects 131, 141 and 148; Table 3); the average of these three values was 175 g (Table 3). Using the corrected shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 75,446 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all of the 37 transects surveyed in the Subarea. Thirty-two of the 37 transects surveyed had no *C. miniata* observed and the highest density observed was 1.5 c/m-sh (Table 9). The mean density was estimated to be 0.1 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the corrected shoreline length of Subarea 15–1 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers.

None of the 37 transects surveyed had *C. pallida* observed (Table 9). The mean density was therefore 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the corrected shoreline length of Subarea 15–1 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data for Geoduck were collected on 35 of the 37 transects surveyed in PFM Subarea 15–1. No Geoducks were seen in the Subarea (Figure 29).

Relative abundance data for sea urchins were collected on 36 of the 37 transects surveyed in PFM Subarea 15–1. 'Few' Green Sea Urchins were seen on 6 (17%) transects, 'Many' were seen on 1 (3%) transect, 'Abundant' on 2 (5%) transects and zero on the remaining 27 (75%) transects (Figure 29). 'Few' Red Sea Urchins were seen on 8 (22%) transects, 'Many' on 3 (8%) transects and 25 (70%) transects had no Red Sea Urchins observed (Figure 29).

PFMA 15–4 (Desolation Sound)

Parastichopus californicus

PFMA 15–4 had low *P. californicus* densities south of the Coode Peninsula and in Lancelot Inlet (Figure 30a, b). A total of 24 of the 41 transects surveyed had a density of less than 4.1 c/m-sh (Table 10). The highest density observed was 26.00 c/m-sh and the lowest 0 c/m-sh.

The DFO management database had a total length for Subarea 15–4 of 81,026 m, of which 2,318 m was classified as Exposed and 78,708 m was classified as Protected by the BC Shorezone classification system. Two of the 43 plotted transects were not surveyed as they were located in inaccessible areas (transect 219 and 222). As a result 4,000 m of shoreline were removed from the total shoreline length to represent this area. Therefore, the total shoreline length used for biomass calculations was 2,318 m of Exposed shoreline and 74,708 m of Protected shoreline.

Mean sea cucumber density was estimated to be 5.9 c/m-sh and the 90% LCB of the bootstrap was 4.3 c/m-sh (Table 2). An average weight was calculated from each of the four biosamples (transects 194, 200, 211 and 218; Table 3); the average of these four values was 244 g (Table 3). Using the corrected shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 79,798 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all of the 41 transects surveyed in the Subarea. Thirty-eight of the 41 transects surveyed had no *C. miniata* observed and the highest density observed was 0.5 c/m-sh (Table 10). The mean density was estimated to be 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the corrected shoreline length of Subarea 15–4 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers.

Thirty-nine of the 41 transects surveyed had no *C. pallida* observed and the highest density observed was 1.5 c/m-sh (Table 10). The mean density was estimated to be 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 15–4 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on 39 of the 41 transects surveyed in Subarea 15–4. 'Few' Geoducks were seen on 6 (15%) transects, 'Many' were observed on 1 (3%) transect, and zero on the remaining 32 (82%) transects (Figure 31a, b).

'Few' Green Sea Urchin were seen on 2 (5%) transects, 'Abundant' were observed on 4 (10%) transects, and zero Green Sea Urchins on the remaining 33 (85%) transects (Figure 31a, b). 'Few' Red Sea Urchins were seen on 3 (8%) transects, 'Many' on 4 (10%) transects, 'Abundant' on 1 (3%) transect and 31 (79%) transects had no Red Sea Urchin observed (Figure 31a, b).

PFMA 15–5 (Desolation Sound)

Parastichopus californicus

PFM Subarea 15–5 had consistently high *P. californicus* densities throughout (Figure 32a, b, c, d). A total of 24 of the 180 transects surveyed had a density of less than 4.1 c/m-sh (Table 10). The highest density observed was 58.50 c/m-sh and the lowest 0.0 c/m-sh.

The DFO management database had a total length for Subarea 15–5 of 326,122 m; 643 m of which was classified as Exposed and 325,479 m of which was classified as Protected by the BC Shorezone classification system. One of the 181 plotted transects was not surveyed as it was located in the far back of Squirrel Cove's recreational boating anchorage and was inaccessible (transect 16). As a result 2,000 m of shoreline were removed from the total shoreline length to represent this area. Therefore, the total shoreline length used for biomass calculations was 643 m of Exposed shoreline and 323,479 m of Protected shoreline.

Mean sea cucumber density was estimated to be 17.8 c/m-sh and the 90% LCB of the bootstrap was 16.3 c/m-sh (Table 2). An average weight was calculated from each of the twelve biosamples (transects 10, 35, 78, 92, 99, 108, 120, 132, 152, 158, 176 and 180; Table 3); the average of these twelve values was 188 g (Table 3). Using the corrected shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 991,571 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on 178 of the 180 transects surveyed in the Subarea. One hundred and seventy-four transects surveyed had no *C. miniata* observed (Table 10). The mean density was estimated to be 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the corrected shoreline length of 320,122 m and

the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers.

One hundred and seventy-one of the transects surveyed had no *C. pallida* observed (Table 10). The mean density was estimated to be 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the corrected shoreline length of 320,122 m and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data for Geoduck were collected on 151 of the 180 transects surveyed in PFM Subarea 15–5. 'Few' Geoduck were seen on 4 (3%) transects, 'Many' on 2 (1%) transects, and zero on the remaining 145 (96%) transects (Figure 33a, b, c, d).

Relative abundance data for Green Sea Urchins were collected on 152 of the 180 transects surveyed in PFM Subarea 15–5. 'Few' Green Sea Urchins were seen on 42 (28%) transects, 'Many' on 16 (10%) transects, 'Abundant' on 24 (16%) transects and zero on the remaining 70 (46%) transects (Figure 33a, b, c, d). Relative abundance data for Red Sea Urchins were collected on 153 of the 180 transects surveyed in PFM Subarea 15–5. 'Few' Red Sea Urchins were seen on 26 (17%) transects, 'Many' on 12 (8%) transects, 'Abundant' on 1 (1%) transect and 114 (74%) transects had no Red Sea Urchins observed (Figure 33a, b, c, d).

PFMA 15–6 (Desolation Sound)

Parastichopus californicus

PFM Subarea 15–6 had low *P. californicus* densities at the head of the inlet and along the northeastern shoreline (Figure 34a, b). A total of 27 of the 42 transects surveyed had a density less than 4.1 c/m-sh (Table 10). The highest density observed was 61.75 c/m-sh and the lowest 0.0 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 15–6 of 85,882 m of which 3,344 m was classified as Exposed and 82,537 m was classified as Protected by the BC Shorezone classification system.

Mean sea cucumber density was estimated to be 5.2 c/m-sh and the 90% LCB of the bootstrap was 3.6 c/m-sh (Table 2). An average weight was calculated from each of the four biosamples (transects 231, 241, 253, and 264; Table 3); the average of these four values was 160 g (Table 3). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 48,879 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all 42 transects surveyed in the Subarea. All transects surveyed had no *C. miniata* and no *C. pallida* observed (Table 10). The mean density was therefore 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 15–5 and the 90% LCB of the

bootstrapped density, the estimated population was 0 sea cucumbers for both *C. miniata* and *C. pallida*.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on all 42 transects surveyed in PFM Subarea 15–6. No Geoducks were observed on any of the transects surveyed in the Subarea (Figure 35a, b).

'Few' Green Sea Urchins were observed on 8 (19%) transects, 'Many' Green Sea Urchins were seen on 4 (10%) transects, 'Abundant' numbers were observed on 5 (12%) transects and 25 (59%) transects had no Green Sea Urchin observed (Figure 35a, b). 'Few' Red Sea Urchin were observed on 1 (2%) transect, 'Many' were seen on 1 (2%) transect and 40 (96%) transects had no Red Sea Urchin observed (Figure 35a, b).

PFMA 16–1 (Texada – Lasqueti)

Parastichopus californicus

PFMA 16–1 had low *P. californicus* densities throughout Halfmoon Bay (Figure 36). Twenty-two of the 31 transects surveyed had a density less than 4.1 c/m-sh (Table 9). The highest density observed in the two Subareas was 17.25 c/m-sh and the lowest 0 c/m-sh.

Subarea 16–1 had no shoreline segments removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 16–1 of 59,825 m, of which 415 m was classified as Exposed and 59,410 m was classified as Protected by the BC Shorezone classification system.

Mean sea cucumber density was estimated to be 3.1 c/m-sh and the 90% LCB of the bootstrap was 2.0 c/m-sh (Table 2). An average weight was calculated for Subarea 16–1 from three biosamples (transects 223, 233, 243; Table 3); the average was 223 g (Table 3). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 26,682 Kg for Subarea 16–1 (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all 31 transects surveyed in the Subareas. Twenty-six of the 31 transects surveyed had no *C. miniata* observed and the highest density observed was 2.5 c/m-sh (Table 9). The mean density was estimated to be 0.2 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 16–1 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers.

Thirty of the 31 transects surveyed had no *C. pallida* observed and the highest density observed was 1.0 c/m-sh (Table 9). The mean density was estimated to be 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 16–1 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data for Geoduck were collected on all of the 31 transects surveyed in Subarea 16–1. 'Few' Geoducks were seen on 1 (3%) transect, and in the remaining 30 (97%) transects no Geoducks were observed (Figure 37).

Relative abundance data for Green Sea Urchins were collected on all of the 31 transects surveyed in Subarea 16–1. 'Few' Green Sea Urchins were seen on 2 (6%) transects, 'Many' were seen on 1 (3%) transect, 'Abundant' were seen on 2 (6%) transects and 26 (84%) transects had no Green Sea Urchin observed (Figure 37). Relative abundance data for Red Sea Urchins were collected on 30 of the 31 transects surveyed in Subarea 16–1. No Red Sea Urchins were observed on any of the transects surveyed in the Subarea (Figure 37).

PFMA 16–2 and 17 (Texada – Lasqueti)

Parastichopus californicus

PFMA 16–2 had consistently high *P. californicus* densities from Secret Cove to McNaughton Point (Figure 38). PFMA 16–2 and 16–17 were combined for the bootstrap analysis; 13 and 6 transects were surveyed in each Subarea, respectively. Seven of the 19 transects surveyed had a density less than 4.1 c/m-sh (Table 9). The highest density observed in the two Subareas was 15.25 c/m-sh and the lowest 0.0 c/m-sh.

Subarea 16–2 had no shoreline segments removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 16–2 of 25,099 m, all of which was classified as Protected by the BC Shorezone classification system. The DFO management database had a total length for Subarea 16–17 of 27,098 m, all of which was classified as Protected by the BC Shorezone classification system. A large portion of Subarea 16–17 consists of an old Experimental Fishing Area which is still closed to all commercial activity; 17,828 m was removed from the total shoreline length to represent this area. Therefore a total remaining length of 9,270 m was used for biomass calculations for Subarea 16–17.

Mean sea cucumber density was estimated to be 6.8 c/m-sh and the 90% LCB of the bootstrap was 5.1 c/m-sh (Table 2). An average weight was calculated for Subarea 16–2 from one biosample (transect 208; Table 3); the average was 248 g (Table 3). An average weight was also calculated for Subarea 16–17 from one biosample (transect 182; Table 3); the average was 215 g (Table 3). Using the corrected shoreline lengths, average weights and the 90% LCB of the bootstrapped density the mean biomass estimate was 31,745 Kg for Subarea 16–2 and 10,165 Kg for Subarea 16–17 (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all 19 transects surveyed in the Subareas. Sixteen of the 19 transects surveyed had no *C. miniata* observed and the highest density observed was 1.5 c/m-sh (Table 9). The mean density was estimated to be 0.1 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 16–2 and the 90% LCB of the boostrapped density, the estimated population of *C. miniata* was 0 sea cucumbers. Using the corrected shoreline

length of Subarea 16–17 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers.

Eighteen of the 19 transects surveyed had no *C. pallida* observed and the highest density observed was 0.5 c/m-sh (Table 9). The mean density was estimated to be 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 16–2 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers. Using the corrected shoreline length of Subarea 16–17 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on 18 of the 19 transects surveyed in Subareas 16–2 and 16–17. No Geoducks were observed on any of the transects surveyed in the Subareas (Figure 39).

'Few' Green Sea Urchins were seen on 3 (17%) transects, 'Abundant' numbers were seen on 2 (11%) transects, and 13 (72%) transects had no Green Sea Urchins observed (Figure 39). 'Few' Red Sea Urchins were seen on 1 (6%) transect and 17 (94%) transects had no Red Sea Urchins observed (Figure 39).

PFMA 16–3 and 4 (Texada – Lasqueti)

Parastichopus californicus

PFM Subareas 16–3 and 16–4, making up Pender Harbour, had low *P. californicus* densities throughout (Figure 40). PFMA 16–3 and 16–4 were combined for the bootstrap analysis; 1 and 10 transects were surveyed in each Subarea, respectively. A total of 10 of the 11 transects surveyed had a density of less than 4.1 c/m-sh (Table 9). The highest density observed was 7.50 c/m-sh and the lowest 0.0 c/m-sh.

The DFO management database had a total length for PFM Subarea 16–3 of 3,965 m, all of which was classified as Protected by the BC Shorezone classification system. In Subarea 16–3 one of the 2 plotted transects was not surveyed (transect 215), as a result 2,000 m of shoreline were removed from the total shoreline length to represent this area. Therefore, the total shoreline length used for Subarea 16–3 biomass calculations was 1,965 m of Protected shoreline. The DFO management database had a total length for PFM Subarea 16–4 of 22,226 m, all of which was classified as Protected by the BC Shorezone classification system. In Subarea 16–4 three of the 13 plotted transects were not surveyed (transects 193, 194, 195) as they were in the very back of Gunboat Bay and were in non-navigable waters. As a result 6,000 m of shoreline were removed from the total shoreline length to represent this area. Therefore, the total shoreline length used for Subarea 16–4 biomass calculations was 16,226 m of Protected shoreline.

Mean sea cucumber density was estimated to be 0.9 c/m-sh and the 90% LCB of the bootstrap was 0.2 c/m-sh (Table 2). No biosamples were collected in Subareas 16–3 or 16–4; therefore the lowest Subarea mean weight from the Texada – Lasqueti survey, 182 g, was used for biomass calculations (Duprey et al. 2011). Using the corrected shoreline

lengths, average weights and the 90% LCB of the bootstrapped density the biomass estimate was 69 Kg for Subarea 16–3 and 568 Kg for Subarea 16–4 (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all of the 11 transects surveyed in the Subarea. Ten of the 11 transects surveyed had no *C. miniata* observed and the highest density observed was 0.5 c/m-sh (Table 9). The mean density was estimated to be 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the corrected shoreline length of Subareas 16–3 and 16–4 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers.

All of the 11 transects surveyed had no *C. pallida* observed (Table 9). The mean density was therefore 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subareas 16–3 and 16–4 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on all of the 11 transects surveyed in Subarea 16–3 and 16–4. No Geoducks, Green Sea Urchins or Red Sea Urchins were observed on any of the transects surveyed in the two Subareas (Figure 41).

PFMA 16–16 (Texada – Lasqueti)

Parastichopus californicus

PFMA 16–16 had consistently low *P. californicus* densities throughout the Subarea (Figure 42). A total of 13 of the 16 transects surveyed had a density of less than 4.1 c/m-sh (Table 9). The highest density observed was 5.25 c/m-sh and the lowest 0.0 c/m-sh.

The DFO management database had a total length for Subarea 16–16 of 40,958 m all classified as Protected by the BC Shorezone classification system. A southern section of the PFM Subarea was not surveyed as it is part of a long term Experimental Fishing Area (EFA). A total of 14,614 m was removed from the Subarea due to this EFA. Therefore, the total shoreline length used for Subarea 16–16 biomass calculations was 26,344 m of Protected shoreline.

Mean sea cucumber density was estimated to be 1.8 c/m-sh and the 90% LCB of the bootstrap was 1.2 c/m-sh (Table 2). An average weight was calculated for each of the two biosamples (transects 173 and 180; Table 3); the average of these two values was 269 g (Table 3). Using the corrected shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 13,221 Kg for Subarea 16–16 (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all 16 transects surveyed in the Subarea. None of the 16 transects surveyed had *C. miniata* observed (Table 9).

Therefore, the mean density was estimated to be 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 16–16 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers.

Fourteen of the 16 transects surveyed had no *C. pallida* observed (Table 9). The mean density was 0.1 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 16–16 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data for Geoduck were collected on all of the 16 transects surveyed in PFM Subarea 16–16. No Geoducks were observed on any of the transects surveyed in the Subarea (Figure 43).

Relative abundance data for sea urchins were collected on 15 of the 16 transects surveyed in PFM Subarea 16–16. 'Few' Green Sea Urchins were seen on 1 (7%) transect, 'many' were observed on 1 (7%) transect, 'Abundant' animals were observed on 1 (7%) transect and 12 (80%) transects had no Green Sea Urchins observed (Figure 43). No Red Sea Urchins were observed on any of the transects surveyed in the Subarea (Figure 43).

PFMA 16–18 (Texada – Lasqueti)

Parastichopus californicus

PFM Subarea 16–18, southeast side of Texada Island, had high *P. californicus* densities throughout the Subarea (Figure 44). A total of 2 of the 17 transects surveyed had a density of less than 4.1 c/m-sh (Table 9). The highest density observed was 40.25 c/m-sh and the lowest 0.0 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 16–18 of 39,228 m all classified as Protected by the BC Shorezone classification system.

Mean sea cucumber density was estimated to be 14.8 c/m-sh and the 90% LCB of the bootstrap was 10.9 c/m-sh (Table 2). An average weight was calculated for each of the two biosamples (transects 7 and 12; Table 3); the average of these two values was 182 g (Table 3). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 77,821 Kg for Subarea 16–18 (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all 17 transects surveyed in the Subarea. Thirteen of the 17 transects surveyed had no *C. miniata* observed (Table 9). The mean density was estimated to be 0.3 c/m-sh and the 90% LCB of the bootstrap was 0.1 c/m-sh. Using the entire shoreline length of Subarea 16–18 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 3,923 sea cucumbers.

None of the 17 transects surveyed had *C. pallida* observed (Table 9). Therefore, the mean density was 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 16–18 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on all of the 17 transects surveyed in PFM Subarea 16–18. 'Few' Geoducks were observed on 2 (12%) transects and 15 (88%) transects had no Geoduck observed (Figure 45).

'Few' Green Sea Urchins were seen on 10 (59%) transects, 'Many' on 1 (6%) transect, 'Abundant' on 2 (12%) transects and zero on the remaining 4 (24%) transects (Figure 45). 'Few' Red Sea Urchins were seen on 7 (41%) transects, 'Many' on 4 (24%) transects, 'Abundant' numbers were observed on 3 (18%) transects and 3 (18%) transects had no Red Sea Urchins observed (Figure 45).

PFMA 16–19 (Texada – Lasqueti)

Parastichopus californicus

PFMA 16–19 had a variety of low and high *P. californicus* densities throughout the Subarea (Figure 46). A total of 19 of the 33 transects surveyed had a density of less than 4.1 c/m-sh (Table 9). The highest density observed was 25.00 c/m-sh and the lowest was 0.0 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 16–19 of 66,158 m, 414 m of which was classified as Exposed and 65,744 m of which was classified as Protected by the BC Shorezone classification system (Table 4).

Mean sea cucumber density was estimated to be 7.0 c/m-sh and the 90% LCB of the bootstrap was 4.8 c/m-sh (Table 2). An average weight was calculated from each of the three biosamples (transects 90, 101 and 119; Table 3); the average of these three values was 236 g (Table 3). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 74,719 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all of the 33 transects surveyed in the Subarea. None of the transects surveyed in Subarea 16–19 had *C. miniata* or *C. pallida* observed (Table 9). The mean density was therefore 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 16–19 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* and *C. pallida* was 0 individuals.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on all of the 33 transects surveyed in PFM Subarea 16–19. 'Few' Geoducks were observed on 1 (3%) transect and 32 (97%) transects had no Geoduck observed (Figure 47).

'Few' Green Sea Urchins were seen on 5 (15%) transects, 'Many' were seen on 4 (12%) transects, 'Abundant' were seen on 5 (15%) transects and zero on the remaining 19 (58%) transects (Figure 47). 'Few' Red Sea Urchins were seen on 5 (15%) transects, 'Many' were seen on 8 (24%) transects, 'Abundant' were seen on 2 (6%) transects and 18 (55%) transects had no Red Sea Urchins observed (Figure 47).

PFMA 16–20 (Texada – Lasqueti)

Parastichopus californicus

PFMA 16–20 had high *P. californicus* densities on the southern side of the Finnerty Islands (Figure 48). A total of 4 of the 10 transects surveyed had a density of less than 4.1 c/m-sh (Table 9). The highest density observed was 35.25 c/m-sh and the lowest was 1.75 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 16–20 of 11,441 m, all of which was classified as Protected by the BC Shorezone classification system (Table 4).

Mean sea cucumber density was estimated to be 12.5 c/m-sh and the 90% LCB of the bootstrap was 6.9 c/m-sh (Table 2). An average weight was calculated from the one biosample (transects 81; Table 3); the average of this value was 244 g (Table 3). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 19,262 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all of the 10 transects surveyed in the Subarea. None of the transects surveyed in Subarea 16–20 had *C. miniata* or *C. pallida* observed (Table 9). The mean density was therefore 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 16–20 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* and *C. pallida* was 0 individuals.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on 9 of the 10 transects surveyed in PFM Subarea 16–20. No Geoducks were observed in the PFM Subarea (Figure 49).

'Few' Green Sea Urchins were seen on 4 (44%) transects, 'Abundant' animals were seen on 2 (22%) transects, and 3 (33%) transects had no Green Sea Urchins observed (Figure 49). 'Few' Red Sea Urchins were seen on 1 (11%) transect, 'Many' were seen on 4 (44%) transects, 'Abundant' animals were seen on 2 (22%) transects, and 2 (22%) transects had no Red Sea Urchins observed (Figure 49).

PFMA 16–21 and 22 (Texada – Lasqueti)

Parastichopus californicus

PFMA 16–21 and 16–22 had highly variable *P. californicus* densities along the western side of Texada Island (Figure 50a, b). A total of 18 of the 41 transects surveyed

had a density of less than 4.1 c/m-sh (Table 9). The highest density observed was 84.50 c/m-sh and the lowest 0.0 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 16–21 of 69,266 m all classified as Protected by the BC Shorezone classification system (Table 4). The DFO management database had a total length for Subarea 16–22 of 11,323 m all classified as Protected by the BC Shorezone classification system (Table 4).

Mean sea cucumber density was estimated to be 10.6 c/m-sh and the 90% LCB of the bootstrap was 7.4 c/m-sh (Table 2). An average weight was calculated from each of the four biosamples collected in 16–21 (transects 54, 57, 62 and 77; Table 3); the average of these four values was 210 g (Table 3). An average weight was calculated from the single biosample collected in 16–22 (transect 126; Table 3); the average of this value was 202 g (Table 3). Using the shoreline lengths, average weights and the 90% LCB of the bootstrapped density the biomass estimates for Subareas 16–21 and 16–22 were 107,639 Kg and 17,596 Kg, respectively (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all of the 41 transects surveyed in the Subareas. Thirty-seven of the 41 transects surveyed had no *C. miniata* observed and the highest density observed was 1.0 c/m-sh (Table 9). The mean density was estimated to be 0.1 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 16–21 and 16–22 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers for both Subareas.

None of the 41 transects surveyed had *C. pallida* observed (Table 9). Therefore, the mean density was estimated to be 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 16–21 and 16–22 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers for both Subareas.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on 40 of the 41 transects surveyed in Subarea 16–21 and 16–22. 'Few' Geoduck were seen on 4 (11%) transects, 'Many' were seen on 1 (2%) transect and in the remaining 35 (87%) transects no Geoducks were observed (Figure 51a, b).

'Few' Green Sea Urchins were seen on 3 (8%) transects, 'Many' were seen on 5 (12%) transects, 'Abundant' were seen on 2 (5%) transects and the remaining 30 (75%) transects had no Green Sea Urchins observed (Figure 51a, b). 'Few' Red Sea Urchins were seen on 4 (10%) transects, 'Many' were seen on 5 (12%) transects and the remaining 31 (78%) transects had no Red Sea Urchins observed (Figure 51a, b).

PFMA 17–9 (Cowichan Bay)

Parastichopus californicus

PFMA 17–9 had low *P. californicus* densities throughout the Subarea (Figure 52). A total of 10 of the 12 transects surveyed had a density of 0.0 c/m-sh (Table 11). The highest density observed was 3.50 c/m-sh.

The DFO management database had a total length for Subarea 17–9 of 27,350 m, 6,329 m of which was Exposed and 21,021 m was classified as Protected by the BC Shorezone classification system (Table 4). Two transects were not surveyed due to their location near an active logging mill, therefore 4,000 m of shoreline was removed from the total shoreline length to represent this non-navigable/hazardous area. The total shoreline length used for biomass calculations was 6,329 m of Exposed and 17,021 m of Protected shoreline.

Mean sea cucumber density was estimated to be 0.3 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh (Table 2). No biosamples were collected in Subareas 17–9 so the lowest Subarea mean weight from the Cowichan Bay survey, 212 g, was used for biomass calculations (Duprey et al. 2011). Using the corrected shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 0 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all 12 transects surveyed in the Subarea. No *C. miniata* or *C. pallida* were observed on any of the 12 transects (Table 11). Therefore, the mean density estimate was 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh for both species. Using the entire shoreline length of Subarea 17–9 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* and *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on all of the 12 transects surveyed in PFMA Subarea 17–9. 'Few' Geoducks were seen on 1 (8%) transect and no Geoducks were seen on the remaining 11 transects (92%) in the Subarea (Figure 53).

No Green Sea Urchins were observed on any of the transects surveyed in the PFM Subarea (Figure 53). No Red Sea Urchins were seen on any of the transects surveyed in the PFM Subarea (Figure 53).

PFMA 18–7 (Cowichan Bay)

Parastichopus californicus

PFMA 18–7 had low *P. californicus* densities throughout the Subarea (Figure 54). A total of 23 of the 26 transects surveyed had a density of less than 4.1 c/m-sh (Table 11). The highest density observed was 15.50 c/m-sh and the lowest 0.0 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 18–7 of 48,653 m all classified as Protected by the BC Shorezone classification system (Table 4).

Mean sea cucumber density was estimated to be 1.8 c/m-sh and the 90% LCB of the bootstrap was 1.1 c/m-sh (Table 2). An average weight was calculated from each of the two biosamples (transects 5 and 16; Table 3); the average of these two values was 212 g (Table 3). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 11,346 Kg (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* data were recorded on all 26 transects surveyed in Subarea 18–7 (Table 11). No *C. miniata* or *C. pallida* were recorded on any of the surveyed transects. Therefore, the mean density for both species was estimated to be 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 18–7 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* and *C. pallida* was 0 sea cucumbers..

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on all of the 26 transects surveyed in Subarea 18–7. 'Many' Geoducks were seen on 2 (8%) transects and in the remaining 24 (92%) transects no Geoducks were observed (Figure 55).

'Few' Green Sea Urchins were observed on 7 (27%) transects, 'Many' on 1 (4%) transect and 18 (69%) transects had no Green Sea Urchins observed (Figure 55). 'Many' Red Sea Urchins were seen on 4 (15%) transects, 'Abundant' on 1 (4%) transect and 21 (81%) transects had no Red Sea Urchin observed (Figure 55).

PFMA 28–1 and 29–3 (Howe Sound)

Parastichopus californicus

PFMA 28–1 and 29–3 had consistently low *P. californicus* densities throughout the Subarea (Figure 56). A total of 47 of the 51 transects surveyed had a density of less than 4.1 c/m-sh (Table 8). The highest density observed was 9.25 c/m-sh and the lowest 0.0 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 28–1 of 81,564 m, all of which was classified as Protected by the BC Shorezone classification system (Table 4). The DFO management database had a total length for Subarea 29–3 of 8,333 m, of which 358 m was classified as Exposed and 7,975 m was classified as Protected by the BC Shorezone classification system (Table 4).

Mean sea cucumber density was estimated to be 1.2 c/m-sh and the 90% LCB of the bootstrap was 0.8 c/m-sh (Table 2). An average weight was calculated from each of the four biosamples collected in 28–1 (transects 1, 37, 45 and 48; Table 3); the average of these four values was 276 g (Table 3). No biosamples were collected in Subarea 29–3;

therefore the lowest Subarea mean weight from the Howe Sound survey, 159 g, was used for biomass calculations (Duprey et al. 2011). Using the shoreline lengths, average weights and the 90% LCB of the bootstrapped density the biomass estimate was 18,009 Kg for Subarea 28–1 and 1,060 Kg for Subarea 29–3 (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* numbers were recorded on all of the 51 transects surveyed in the Subarea. Forty-eight of the 51 transects surveyed had no *C. miniata* observed and the highest density observed was 1.5 c/m-sh (Table 8). The mean density was 0.0 c/m-sh and 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 28–1 and 29–3 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers.

None of the 51 transects surveyed had *C. pallida* observed (Table 8). The mean density estimate was therefore 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 28–1 and 29–3 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on 50 of the 51 transects surveyed in PFM Subareas 28–1 and 29–3. No Geoducks were observed in the Subarea (Figure 57).

'Few' Green Sea Urchins were seen on 10 (20%) transects, 'Many' were seen on 4 (8%) transects and zero on the remaining 36 (72%) transects (Figure 57). 'Few' Red Sea Urchins were seen on 2 (4%) transects, and the remaining 48 (96%) transects had no Red Sea Urchin observed (Figure 57).

PFMA 28–2 and 6 (Howe Sound)

Parastichopus californicus

PFM Subarea 28–2 and 28–6 had low *P. californicus* densities in the southeast corner of the surveyed areas (Figure 58). A total of 32 of the 41 transects surveyed had a density of less than 4.1 c/m-sh (Table 9). The highest density observed was 17.25 c/m-sh and the lowest 0.0 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 28–2 of 68,342 m, of which 518 m was classified as Exposed and 67,824 m was classified as Protected by the BC Shorezone classification system (Table 4). The DFO management database had a total length for Subarea 28–6 of 8,719 m, all of which was classified as Protected by the BC Shorezone classification system (Table 4).

Mean sea cucumber density was estimated to be 2.6 c/m-sh and the 90% LCB of the bootstrap was 1.8 c/m-sh (Table 2). An average weight was calculated from each of the two biosamples collected in 28–2 (transects 95 and 101; Table 3); the average of these two values was 205 g (Table 3). An average weight was calculated from the one biosamples collected in 28–6 (transects 77; Table 3); the average of this value was 159 g

(Table 3). Using the shoreline lengths, average weights and the 90% LCB of the bootstrapped density the biomass estimate was 25,218 Kg for Subarea 28–2 and 2,495 Kg for Subarea 28–6 (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* numbers were recorded on all of the transects surveyed in the Subareas. Eleven of the 41 transects surveyed had no *C. miniata* observed and the highest density observed was 4.0 c/m-sh (Table 9). The mean density was estimated to be 0.3 c/m-sh and the 90% LCB of the bootstrap was 0.2 c/m-sh. Using the entire shoreline length of Subarea 28–2 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 13,669 sea cucumbers. Using the entire shoreline length of Subarea 28–6 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 1,744 sea cucumbers.

Thirty-nine of the 41 transects surveyed had no *C. pallida* observed (Table 9). The mean density was 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline lengths of Subarea 28–2 and 28–6 and the 90% LCB of the density, the estimated population of *C. pallida* was 0 sea cucumbers for both Subareas.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on 39 of the 41 transects surveyed in PFM Subarea 28–2 and 6. 'Few' Geoducks were seen on 2 (5%) transects, and on the remaining 37 (95%) transects no Geoducks were observed (Figure 59).

'Few' Green Sea Urchins were seen on 6 (15%) transects, 'Many' on 5 (13%) transects, and zero on the remaining 28 (72%) transects (Figure 59). 'Few' Red Sea Urchins were seen on 2 (5%) transects, 1 (3%) transect had 'Many', and no Red Sea Urchins were observed on the remaining 36 (92%) transects (Figure 59).

PFMA 28–3 (Howe Sound)

Parastichopus californicus

PFM Subarea 28–3, Thornbrough Channel, *P. californicus* densities were mixed throughout the Subarea (Figure 60). A total of 16 of the 24 transects surveyed had a density of less than 4.1 c/m-sh (Table 9). The highest density observed was 12.00 c/m-sh and the lowest 0.0 c/m-sh.

The DFO management database had a total length of 41,462 m for Subarea 28–3, all of which was classified as Protected by the BC Shorezone classification system (Table 4). One transect was not surveyed due to its location near an active logging mill, therefore 2,000 m of shoreline was removed from the total shoreline length to represent this non-navigable/hazardous area. The total shoreline length used for biomass calculations was 39,462 m of Protected shoreline.

Mean sea cucumber density in the Analysis Area was estimated to be 3.4 c/m-sh and the 90% LCB of the bootstrap was 2.4 c/m-sh (Table 2). An average weight was calculated from each of the two biosamples collected in 28–3 (transects 56 and 66; Table 3); the

average of these two values was 243 g (Table 3). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 23,014 Kg for Subarea 28–3 (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* numbers were recorded on all of the 24 transects surveyed in the Subarea. Twenty-two of the 24 transects surveyed had no *C. miniata* observed and the highest density observed was 2.0 c/m-sh (Table 9). The mean density was estimated to be 0.1 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 28–3 with the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers.

All of the 24 transects surveyed had no *C. pallida* observed (Table 9). The mean density was therefore estimated to be 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 28–3 with the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on all of the 24 transects surveyed in PFM Subarea 28–3. No Geoducks were observed on any of the transects in the Subarea (Figure 61).

'Few' Green Sea Urchins were seen on 3 (12%) transects, 'Many' on 5 (21%) transects and zero on the remaining 16 (67%) transects (Figure 61). No Red Sea Urchins were observed on any transects in the PFM Subarea (Figure 61).

PFMA 28–4 (Howe Sound)

Parastichopus californicus

PFMA 28–4 had low *P. californicus* densities on the western side of the survey area (Figure 62). A total of 10 of the 14 transects surveyed had a density of less than 4.1 c/m-sh (Table 9). The highest density observed was 19.75 c/m-sh and the lowest 0.0 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 28–4 of 21,605 m, all of which was classified as Protected by the BC Shorezone classification system (Table 4).

Mean sea cucumber density was estimated to be 3.9 c/m-sh and the 90% LCB of the bootstrap was 2.4 c/m-sh (Table 2). In Subarea 28–4 an average weight was calculated from the one biosamples (transect 122; Table 3); the average was 171 g (Table 3). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 6,650 Kg for Subarea 28–4 (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* numbers were recorded on all of the 14 transects surveyed in the Subarea. Thirteen of the 14 transects surveyed had no *C. miniata*

observed and the only density observed was 3.0 c/m-sh (Table 9). The mean density was estimated to be 0.2 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 28–4 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers.

All of the 14 transects surveyed had no *C. pallida* observed (Table 9). The mean density was therefore 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 28–4 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on all of the 14 transects surveyed in PFM Subarea 28–4. No Geoducks were observed in the Subarea (Figure 63).

'Few' Green Sea Urchins were seen on 3 (21%) transects, 'Many' were seen on 4 (29%) transects and zero on the remaining 7 (50%) transects (Figure 63). No Red Sea Urchins were observed on any of the transects in the PFM Subarea (Figure 63).

PFMA 28–5 (Howe Sound)

Parastichopus californicus

PFMA 28–5 had low *P. californicus* densities, especially at the head of the sound (Figure 64). A total of 15 of the 16 transects surveyed had a density of less than 4.1 c/m-sh; nine of which had a density of 0.0 c/m-sh (Table 9). The highest density observed was 6.00 c/m-sh and the lowest 0.0 c/m-sh.

No shoreline segments were removed due to logistical obstacles or other closures. The DFO management database had a total length for Subarea 28–5 of 40,236 m, of which 4,393 m was classified as Exposed and 35,843 m was classified as Protected by the BC Shorezone classification system (Table 4).

Mean sea cucumber density was estimated to be 0.7 c/m-sh and the 90% LCB of the bootstrap was 0.3 c/m-sh (Table 2). No biosamples were collected in Subarea 28–5; therefore the lowest Subarea mean weight from the Howe Sound survey, 159 g, was used for biomass calculations (Duprey et al. 2011). Using the shoreline length, average weight and the 90% LCB of the bootstrapped density the biomass estimate was 1,919 Kg for Subarea 28–5 (Table 4).

Cucumaria miniata and *C. pallida*

C. miniata and *C. pallida* numbers were recorded on all of the 16 transects surveyed in the Subarea. All of the 18 transects surveyed had no *C. miniata* observed (Table 9). The mean density was therefore 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the entire shoreline length of Subarea 28–5 and the 90% LCB of the bootstrapped density, the estimated population of *C. miniata* was 0 sea cucumbers.

All of the 16 transects surveyed had no *C. pallida* observed (Table 9). The mean density was therefore 0.0 c/m-sh and the 90% LCB of the bootstrap was 0.0 c/m-sh. Using the

entire shoreline length of Subarea 28–5 and the 90% LCB of the bootstrapped density, the estimated population of *C. pallida* was 0 sea cucumbers.

Geoduck, Red Sea Urchin and Green Sea Urchin abundance

Relative abundance data were collected on all of the 16 transects surveyed in Subarea 28–5. No Geoducks were seen in the Subarea (Figure 65).

'Few' Green Sea Urchins were seen on 1 (6%) transect, 'Many' on 7 (44%) transects, 'Abundant' on 2 (12%) transects and zero on the remaining 6 (38%) transects (Figure 65). No Red Sea Urchins were observed on any of the transects in PFM Subarea 28–5 (Figure 65).

DISCUSSION

Results of the surveys presented in this report are discussed in relation to recommendations made in the sea cucumber assessment framework (Duprey et al. 2011). The recommendations that are specific to biomass estimation include a minimum density threshold for opening to commercial harvest of 2.5 c/m-sh, and use of the bootstrapped 90% LCB of the estimated mean density and the mean weight estimates for biomass estimation (Duprey et al. 2011).

Louise Island

The estimated densities of *P. californicus* in the Louise Island survey were low and all but one PFM Subarea had bootstrapped 90% LCBs lower than 2.5 c/m-sh. The only PFM Subarea in the Louise Island survey that exceeded 2.5 c/m-sh was PFM Subarea 2–6; it is therefore the only PFM Subarea in the survey that met the commercial fishery threshold as set out in Duprey et al. (2011).

The Gwaii Haanas National Marine Conservation Area (NMCA) is located just south of Louise Island; several areas in the NMCA are closed permanently to commercial fishing. At this time no new no-take reserve locations have been identified as a result of the Louise Island survey.

Gwaii Haanas

The estimated density of *P. californicus* for PFM Subarea 2–15 had a bootstrapped 90% LCB above 2.5 c/m-sh; it therefore met the commercial fishery threshold as set out in Duprey et al. (2011).

Subarea 2–15, Skincuttle Inlet, is part of the Gwaii Haanas National Marine Conservation Area; at the time of surveying Gwaii Haanas was not open for commercial sea cucumber fishing.

Seymour Inlet

The estimated density of *P. californicus* in each of the 3 surveyed PFM Subareas of the Seymour Inlet survey had bootstrapped 90% LCBs higher than 2.50 c/m-sh. Therefore all three PFM Subareas met the commercial fishery threshold as set out in Duprey et al. (2011). Caution should be taken when using the presented results to calculate population size as large segments of shoreline were removed and unsurveyed in the PFM Subareas due to very poor visibility in the water column.

PFM Subarea 11–8, Nugent Sound, was identified as a candidate for a no-take reserve. The PFM Subarea had regionally representative *P. californicus* densities and can easily be distinguished geographically. Also this PFM Subarea is between Seymour Inlet and Belize Inlet and seemed suitable as a no-take reserve for both of the inlets. The estimated populations of *C. miniata* and *C. pallida* in Nugent Sound were 0 animals. The other PFM Subareas in the two surveys had a mixed range of *Cucumaria* densities, and several PFM Subareas had incomplete survey data for the two *Cucumaria* species. Nugent Sound was recommended more for its *P. californicus* densities than its *Cucumaria* representiveness. The abundances of Geoducks and Red Sea Urchins were similar in Nugent Sound compared to the other PFM Subareas in both Seymour and Belize Inlet. The abundances of Green Sea Urchins in Nugent Sound were slightly higher than the other PFM Subareas.

Belize Inlet

The estimated density of *P. californicus* in 3 out of the 4 surveyed PFM Subareas of the Belize Inlet survey had bootstrapped 90% LCBs higher than 2.50 c/m-sh. PFM Subarea 11–7 had a bootstrapped 90% LCB of the density less than 2.50 c/m-sh. Therefore three PFM Subareas, 11–4, 11–5, 11–6, met the commercial fishery threshold as set out in Duprey et al. (2011).

No no-take reserve areas were recommended from the Belize Inlet survey area as the no-take reserve recommended from the Seymour Inlet survey, Nugent Sound PFM Subarea 11–8, was recommended to cover both the Seymour Inlet and Belize Inlet surveys.

Texada – Lasqueti

The results for Texada – Lasqueti indicated the survey area had a mix of low and high density areas. All of the PFM Subareas around Texada and Lasqueti Islands (Subareas 14–3, 15–1, 16–18, 16–19, 16–20, 16–21, 16–22) had densities with bootstrapped 90% LCBs above 2.50 c/m-sh and therefore met the commercial fishery threshold set out in Duprey et al. (2011). Also PFM Subareas 16–2 and 16–17, outside Pender Harbour, meet the commercial fishery threshold as set out in Duprey et al. (2011) with bootstrapped 90% LCBs above 2.50 c/m-sh. PFM Subareas 16–1, 16–3, 16–4 and 16–16 did not have densities with bootstrapped 90% LCBs higher than 2.50 c/m-sh and therefore did not meet the commercial fishery threshold as set out in Duprey et al. (2011).

PFM Subareas 16–2 and 16–17, were identified as candidates for no-take reserves. The PFM Subareas had slightly lower regionally representative *P. californicus* densities, but could easily be distinguished geographically. The estimated size of the *C. miniata* and *C.*

pallida populations were zero for these PFM Subareas. This is representative of the other PFM Subareas in the survey, most of which did not have any *Cucumaria* species observed. The abundances of Geoduck in PFM Subareas 16–2 and 16–17 were representative of the entire surveyed area, where most areas had no animals observed. The abundances of Green Sea Urchins in Subarea 16–2 and 16–17 were also representative of the entire survey area. However, the abundances of Red Sea Urchins in the two PFM Subareas were only representative for approximately half of the PFM Subareas in the survey.

Desolation Sound

The estimated densities of *P. californicus* for the Desolation Sound survey were high, with all 3 of the surveyed Subareas having bootstrapped 90% LCBs higher than 2.50 c/m-sh. Therefore all three PFM Subareas met the commercial fishery threshold set out in Duprey et al. (2011).

PFM Subarea 15–6, Toba Inlet, was identified as a candidate for a no-take reserve. The PFM Subarea had regionally representative *P. californicus* densities and could easily be distinguished geographically. The population estimates of *C. miniata* and *C. pallida* in Toba Inlet were 0 animals; however, this was representative of the other two PFM Subareas in the Desolation Sound survey which also had 0 estimates for population sizes of *C. miniata* and *C. pallida*. While the abundances of Geoducks and Red Sea Urchins were lower in Toba Inlet than they were in the other two PFM Subareas the abundances of Green Sea Urchins was similar.

Cowichan Bay

The estimated densities of *P. californicus* for the Cowichan Bay survey indicated low densities, overall. Neither of the two PFM Subareas met the commercial fishery threshold of a bootstrapped 90% LCB above 2.50 c/m-sh (Duprey et al. 2011).

As neither of the PFM Subareas met the commercial fishery threshold, no no-take reserves areas were recommended in the Cowichan Bay survey area.

Howe Sound

The estimated densities of *P. californicus* for the Howe Sound survey indicated low densities, overall. None of the six PFM Subareas met the commercial fishery threshold of a bootstrapped 90% LCB above 2.50 c/m-sh (Duprey et al. 2011).

As none of the PFM Subareas in Howe Sound met the commercial fishery threshold for *P. californicus*, no no-take reserves areas were recommended in the Howe Sound survey area.

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Table 1. Total number and ID of transects surveyed, and number of *Parastichopus californicus* biosamples collected in Open surveys conducted June 2011 – May 2012, by PFM Subarea. The total shoreline length is measured from the cucland.shp dataset using ArcGIS 9.3. (Note this is different from the shoreline length used for biomass calculations, which was measured using Compugrid.)

Analysis Areas	Survey	PFMA Subareas	Shoreline Length (Km)	Number (and ID) of Transects	Biosamples
1	Louise Island	2–3	55.8	12 (TR 1–29)	1
2	Louise Island	2–4	38.7	19 (TR 30–48)	1
3	Louise Island	2–5	21.6	10 (TR 49–60)	0
4	Louise Island	2–6	146.6	72 (TR 61–134)	7
5	Gwaii Haanas	2–15	77.8	39 (TR 354–392)	0
6	Seymour Inlet	11–3	156.7	60 (TR 1–78)	6
7	Belize Inlet	11–4	98.2	47 (TR 79–127)	5
8	Belize Inlet	11–5	72.2	36 (TR 128–163)	4
9	Belize Inlet	11–6	54.4	28 (TR 201–228)	3
10	Belize Inlet	11–7	38.4	20 (TR 261–280)	2
11	Seymour Inlet	11–8	63.2	27 (TR 229–260)	2
12	Seymour Inlet	11–10	93.8	23 (TR 281–327)	3
13	Texada – Lasqueti	14–3	51.4	26 (TR 18–43)	3
14	Texada – Lasqueti	15–1	75.4	37 (TR 128–165)	3
15	Desolation Sound	15–4	84.8	41 (TR 182–224)	4
16	Desolation Sound	15–5	363.7	180 (TR 1–181)	12
17	Desolation Sound	15–6	105.8	42 (TR 225–266)	4
18	Texada – Lasqueti	16–1	67.0	31 (TR 216–246)	3
	Texada – Lasqueti	16–2	25.4	13 (TR 201–213)	1
19	Texada – Lasqueti	16–17	12.4	6 (TR 182–187)	1
	Texada – Lasqueti	16–3	4.0	1 (TR 214)	0
20	Texada – Lasqueti	16–4	25.4	10 (TR 188–200)	0
21	Texada – Lasqueti	16–16	30.5	16 (TR 166–181)	2
22	Texada – Lasqueti	16–18	34.9	17 (TR 1–17)	2
23	Texada – Lasqueti	16–19	65.1	33 (TR 89–121)	3
24	Texada – Lasqueti	16–20	20.2	10 (TR 79–88)	1
	Texada – Lasqueti	16–21	70.0	35 (TR 44–78)	4
25	Texada – Lasqueti	16–22	12.2	6 (TR 122–127)	1
26	Cowichan Bay	17–9	25.5	12 (TR 27–40)	0
27	Cowichan Bay	18–7	49.6	26 (TR 1–26)	2
	Howe Sound	28–1	96.3	48 (TR 1–48)	4
28	Howe Sound	29–3	5.8	3 (TR 49–51)	0
	Howe Sound	28–2	73.9	37 (TR 81–117)	2
29	Howe Sound	28–6	9.2	4 (TR 77–80)	1
30	Howe Sound	28–3	47.6	24 (TR 52–76)	2
31	Howe Sound	28–4	26.3	14 (TR 118–131)	1
32	Howe Sound	28–5	29.0	16 (TR 132–147)	0
	Total	**37**	**2328.8**	**1081**	**90**

Table 2. Mean linear *Parastichopus californicus* density estimates by PFM Subarea, with bootstrapped lower (LCB) and upper (UCB) confidence bounds (sea cucumbers per metre of shoreline: c/m-sh) from Open surveys completed June 2011 – May 2012. Each PFM Subarea was analyzed separately except those shown with * or ** which indicates that the transects were pooled into Analysis Areas.

PFMA Subarea	Survey	No. Transects	Mean	Confidence Level	LCB	UCB
2–3	Louise Island	12	3.9	99	0.2	20.1
				95	0.3	17.3
				90	0.4	14.1
				75	0.6	10.8
2–4	Louise Island	19	2.0	99	0.4	7.4
				95	0.5	7.3
				90	0.6	6.2
				75	0.7	4.7
2–5	Louise Island	10	2.0	99	0.4	5.6
				95	0.5	4.5
				90	0.8	4.3
				75	1.1	3.5
2–6	Louise Island	72	6.7	99	5.1	9.5
				95	5.5	8.4
				90	5.6	8.1
				75	5.9	7.7
2–15	Gwaii Haanas	39	6.5	99	4.6	8.7
				95	5.0	8.1
				90	5.2	7.8
				75	5.6	7.4
11–3	Seymour Inlet	60	14.6	99	10.6	20.6
				95	11.5	19.8
				90	12.0	18.9
				75	12.8	17.5
11–4	Belize Inlet	47	10.9	99	7.9	16.6
				95	8.5	14.5
				90	8.8	13.9
				75	9.4	13.0
11–5	Belize Inlet	36	5.2	99	3.5	7.1
				95	3.9	6.8
				90	4.2	6.5
				75	4.5	6.0
11–6	Belize Inlet	28	4.4	99	2.5	8.0
				95	2.8	6.9
				90	3.1	6.3
				75	3.5	5.7
11–7	Belize Inlet	20	1.9	99	0.9	3.1
				95	1.2	2.8
				90	1.3	2.6
				75	1.4	2.3

Table 2, cont'd.

PFMA Subarea	Survey	No. Transects	Mean	Confidence Level	LCB	UCB
11–8	Seymour Inlet	27	7.4	99	4.5	10.6
				95	5.1	9.6
				90	5.4	9.2
				75	6.0	8.6
11–10	Seymour Inlet	23	5.7	99	3.7	9.2
				95	4.2	8.1
				90	4.5	7.5
				75	4.8	7.0
14–3	Texada Lasqueti	26	12.8	99	8.1	19.4
				95	9.1	17.1
				90	9.8	16.6
				75	10.7	15.3
15–1	Texada Lasqueti	37	8.3	99	5.0	14.3
				95	5.6	12.5
				90	6.0	11.7
				75	6.5	10.4
15–4	Desolation Sound	41	5.9	99	3.5	9.6
				95	4.1	8.5
				90	4.3	8.0
				75	4.8	7.3
15–5	Desolation Sound	180	17.8	99	15.4	20.3
				95	16.0	19.8
				90	16.3	19.4
				75	16.8	18.9
15–6	Desolation Sound	42	5.2	99	3.1	11.1
				95	3.4	10.9
				90	3.6	9.6
				75	4.0	7.9
16–1	Texada – Lasqueti	31	3.1	99	1.5	6.4
				95	1.8	5.3
				90	2.0	5.0
				75	2.3	4.3
16–2*	Texada – Lasqueti	19	6.8	99	4.1	9.5
				95	4.9	8.8
				90	5.1	8.5
				75	5.6	8.0
16–3**	Texada – Lasqueti	11	0.9	99	0.0	4.3
				95	0.0	3.6
				90	0.2	2.8
				75	0.2	2.1

Table 2, cont'd.

PFMA Subarea	Survey	No. Transects	Mean	Confidence Level	LCB	UCB
16–4**	Texada – Lasqueti	11	0.9	99	0.0	4.3
				95	0.0	3.6
				90	0.2	2.8
				75	0.2	2.1
16–16	Texada – Lasqueti	16	1.8	99	0.8	3.3
				95	1.1	2.9
				90	1.2	2.6
				75	1.4	2.4
16–17*	Texada – Lasqueti	19	6.8	99	4.1	9.5
				95	4.9	8.8
				90	5.1	8.5
				75	5.6	8.0
16–18	Texada – Lasqueti	17	14.8	99	8.9	23.4
				95	10.2	21.2
				90	10.9	20.1
				75	12.1	18.4
16–19	Texada – Lasqueti	33	7.0	99	4.1	10.5
				95	4.5	9.6
				90	4.8	9.2
				75	5.4	8.5
16–20	Texada – Lasqueti	10	12.5	99	4.4	25.9
				95	5.7	22.0
				90	6.9	20.5
				75	8.5	17.8
16–21†	Texada – Lasqueti	41	10.6	99	6.6	20.0
				95	6.9	17.3
				90	7.4	15.8
				75	8.2	14.0
16–22†	Texada – Lasqueti	41	10.6	99	6.6	20.0
				95	6.9	17.3
				90	7.4	15.8
				75	8.2	14.0
17–9	Cowichan Bay	12	0.3	99	0.0	1.5
				95	0.0	1.5
				90	0.0	1.0
				75	0.0	0.6
18–7	Cowichan Bay	26	1.8	99	0.8	5.3
				95	1.0	3.8
				90	1.1	3.3
				75	1.3	2.7

Table 2, cont'd.

PFMA Subarea	Survey	No. Transects	Mean	Confidence Level	LCB	UCB
28–1‡	Howe Sound	51	1.2	99	0.7	2.3
				95	0.8	1.9
				90	0.8	1.8
				75	0.9	1.6
28–2+	Howe Sound	41	2.6	99	1.5	4.5
				95	1.7	4.2
				90	1.8	4.0
				75	2.0	3.6
28–3	Howe Sound	24	3.4	99	1.9	5.7
				95	2.2	4.9
				90	2.4	4.7
				75	2.7	4.2
28–4	Howe Sound	14	3.9	99	0.9	9.2
				95	1.4	8.4
				90	1.8	7.5
				75	2.3	6.3
28–5	Howe Sound	16	0.7	99	0.1	2.4
				95	0.2	2.1
				90	0.3	1.8
				75	0.4	1.4
28–6+	Howe Sound	41	2.6	99	1.5	4.5
				95	1.7	4.2
				90	1.8	4.0
				75	2.0	3.6
29–3‡	Howe Sound	51	1.2	99	0.7	2.3
				95	0.8	1.9
				90	0.8	1.8
				75	0.9	1.6

Table 3. Estimated mean weight of *Parastichopus californicus* from biosamples collected during June 2011 – May 2012. The Subarea mean weight estimate is the mean of the transect averages, and is used for biomass calculations (Duprey et al. 2011).

PFMA Subarea	Survey	Transect no.	Average (g)	SD	Subarea mean (g)
2–3	Louise Island	26	339.7	78.77	340
2–4	Louise Island	44	480.6	81.09	481
2–6	Louise Island	66	336.9	69.43	319
2–6	Louise Island	79	272.4	85.43	
2–6	Louise Island	86	345.7	52.50	
2–6	Louise Island	100	245.7	69.78	
2–6	Louise Island	108	245.6	77.89	
2–6	Louise Island	117	387.9	111.81	
2–6	Louise Island	131	400.5	104.58	
11–3	Seymour Inlet	10	99.1	27.17	103
11–3	Seymour Inlet	18	70.1	26.64	
11–3	Seymour Inlet	27	145.6	44.27	
11–3	Seymour Inlet	37	61.7	21.15	
11–3	Seymour Inlet	45	146.2	48.59	
11–3	Seymour Inlet	60	92.8	22.96	
11–4	Belize Inlet	87	118.0	31.06	106
11–4	Belize Inlet	98	80.4	17.14	
11–4	Belize Inlet	104	105.1	24.61	
11–4	Belize Inlet	116	110.0	28.43	
11–4	Belize Inlet	123	115.3	29.61	
11–5	Belize Inlet	136	127.2	45.41	135
11–5	Belize Inlet	144	113.6	37.18	
11–5	Belize Inlet	156	132.0	48.15	
11–5	Belize Inlet	163	166.0	41.73	
11–6	Belize Inlet	201	99.0	24.08	130
11–6	Belize Inlet	211	130.8	40.05	
11–6	Belize Inlet	222	159.5	33.56	
11–7	Belize Inlet	262	111.6	25.68	130
11–7	Belize Inlet	270	148.0	66.45	
11–8	Seymour Inlet	233	157.1	67.71	155
11–8	Seymour Inlet	253	152.2	278.80	
11–10	Seymour Inlet	309	117.0	35.80	111
11–10	Seymour Inlet	315	142.2	35.83	
11–10	Seymour Inlet	326	75.2	29.79	
14–3	Texada – Lasqueti	20	116.8	30.43	182
14–3	Texada – Lasqueti	30	183.0	38.06	
14–3	Texada – Lasqueti	40	247.3	74.65	
15–1	Texada – Lasqueti	131	189.0	52.85	175
15–1	Texada – Lasqueti	141	131.6	50.62	
15–1	Texada – Lasqueti	148	205.1	70.81	

Table 3, cont'd.

PFMA Subarea	Survey	Transect no.	Average (g)	SD	Subarea mean (g)
15–4	Desolation Sound	194	172.2	79.87	244
15–4	Desolation Sound	200	260.8	134.52	
15–4	Desolation Sound	211	260.5	137.41	
15–4	Desolation Sound	218	283.5	73.13	
15–5	Desolation Sound	10	131.1	37.95	188
15–5	Desolation Sound	35	379.4	87.77	
15–5	Desolation Sound	78	355.0	76.58	
15–5	Desolation Sound	92	107.7	46.05	
15–5	Desolation Sound	99	150.2	50.46	
15–5	Desolation Sound	108	105.3	31.36	
15–5	Desolation Sound	120	189.7	87.71	
15–5	Desolation Sound	132	125.8	34.06	
15–5	Desolation Sound	152	168.7	55.57	
15–5	Desolation Sound	158	258.4	73.65	
15–5	Desolation Sound	176	152.0	47.03	
15–5	Desolation Sound	180	128.9	34.25	
15–6	Desolation Sound	231	123.6	29.25	160
15–6	Desolation Sound	241	129.7	80.32	
15–6	Desolation Sound	253	231.2	64.54	
15–6	Desolation Sound	264	155.8	45.76	
16–1	Texada – Lasqueti	223	143.4	46.95	223
16–1	Texada – Lasqueti	233	194.5	45.13	
16–1	Texada – Lasqueti	243	331.3	70.24	
16–2	Texada – Lasqueti	208	247.5	68.62	248
16–16	Texada – Lasqueti	173	221.1	124.40	269
16–16	Texada – Lasqueti	180	316.5	104.29	
16–17	Texada – Lasqueti	182	215.1	64.59	215
16–18	Texada – Lasqueti	7	232.2	60.47	182
16–18	Texada – Lasqueti	12	132.2	39.60	
16–19	Texada – Lasqueti	90	214.9	43.95	236
16–19	Texada – Lasqueti	101	268.3	92.94	
16–19	Texada – Lasqueti	119	224.2	53.54	
16–20	Texada – Lasqueti	81	244.5	43.02	244
16–21	Texada – Lasqueti	54	233.4	40.54	210
16–21	Texada – Lasqueti	57	213.9	42.53	
16–21	Texada – Lasqueti	62	214.2	66.70	
16–21	Texada – Lasqueti	77	177.5	49.10	
16–22	Texada – Lasqueti	126	201.6	42.51	202
18–7	Cowichan Bay	5	196.7	77.23	212
18–7	Cowichan Bay	16	227.9	92.12	

Table 3, cont'd.

PFMA Subarea	Survey	Transect no.	Average (g)	SD	Subarea mean (g)
28–1	Howe Sound	1	232.5	52.65	276
28–1	Howe Sound	37	251.8	123.10	
28–1	Howe Sound	45	365.8	95.55	
28–1	Howe Sound	48	262.8	72.27	
28–2	Howe Sound	95	183.2	56.31	205
28–2	Howe Sound	101	226.2	88.19	
28–3	Howe Sound	56	211.1	69.79	243
28–3	Howe Sound	66	274.8	80.65	
28–4	Howe Sound	122	170.8	46.50	171
28–6	Howe Sound	77	159.3	66.63	159

Table 4. Biomass estimated from Open surveys conducted June 2011 – May 2012. Biosamples were not collected from all Subareas; the lowest mean weight, Wt_{mean}, in the same survey was used as the mean weight for Subareas marked with a * (Duprey et al. 2011); except for PFM Subarea 2–15 where the lowest mean weight from the Louise Island survey was used.

PFMA	Survey	Shoreline Length - exposed	Shoreline Length - protected	Confidence Level	Biomass (kg) LCB	Biomass (kg) UCB
2–3	Louise Island	3,063	19,099	99	1,507	133,126
				95	2,261	114,944
				90	3,014	94,164
				75	4,521	72,735
2–4	Louise Island	0	34,121	99	6,565	121,450
				95	8,206	119,809
				90	9,847	101,756
				75	11,489	77,137
2–5	Louise Island	0	19,520	99	2,491	34,871
				95	3,113	28,021
				90	4,982	26,776
				75	6,850	21,794
2–6	Louise Island	1,579	129,124	99	211,331	392,570
				95	227,807	347,260
				90	231,926	334,903
				75	244,284	318,427
2–15*	Gwaii Haanas	1,635	71,041	99	106,645	201,698
				95	115,918	187,788
				90	120,555	180,832
				75	129,828	171,559
11–3	Seymour Inlet	0	107,254	99	117,100	227,572
				95	127,042	218,734
				90	132,566	208,791
				75	141,404	193,325
11–4	Belize Inlet	113	88,102	99	73,807	155,054
				95	79,410	135,443
				90	82,211	129,839
				75	87,815	121,435
11–5	Belize Inlet	0	63,773	99	30,133	61,126
				95	33,576	58,544
				90	36,159	55,961
				75	38,742	51,656
11–6	Belize Inlet	0	46,217	99	15,021	48,066
				95	16,823	41,457
				90	18,625	37,852
				75	21,029	34,247
11–7	Belize Inlet	0	34,910	99	4,084	14,069
				95	5,446	12,707
				90	5,900	11,800
				75	6,354	10,438
11–8	Seymour Inlet	0	47,204	99	32,925	77,556
				95	37,315	70,240
				90	39,510	67,313
				75	43,900	62,923

Table 4, cont'd.

PFMA	Survey	Shoreline Length - exposed	Shoreline Length - protected	Confidence Level	Biomass (kg) LCB	Biomass (kg) UCB
11–10	Seymour Inlet	0	33,631	99	13,812	34,344
				95	15,679	30,238
				90	16,799	27,998
				75	17,919	26,131
14–3	Texada – Lasqueti	0	55,289	99	81,507	195,214
				95	91,570	172,070
				90	98,613	167,039
				75	107,670	153,958
15–1	Texada – Lasqueti	0	71,853	99	62,871	179,812
				95	70,416	157,178
				90	75,446	147,119
				75	81,733	130,772
15–4	Desolation Sound	2,318	74,708	99	65,215	176,410
				95	76,152	156,358
				90	79,798	147,244
				75	88,912	134,484
15–5	Desolation Sound	643	323,479	99	936,839	1,234,827
				95	973,327	1,204,420
				90	991,571	1,180,095
				75	1,021,978	1,149,688
15–6	Desolation Sound	3,344	82,537	99	42,276	147,923
				95	46,238	145,282
				90	48,879	128,114
				75	54,161	105,664
16–1	Texada – Lasqueti	415	59,410	99	20,011	85,021
				95	24,014	70,448
				90	26,682	66,474
				75	30,684	57,200
16–2	Texada – Lasqueti	0	25,099	99	25,521	59,133
				95	30,500	54,776
				90	31,745	52,909
				75	34,857	49,796
16–3*	Texada – Lasqueti	0	1,965	99	0	1,479
				95	0	1,238
				90	69	963
				75	69	722
16–4*	Texada – Lasqueti	0	16,226	99	0	12,210
				95	0	10,222
				90	568	7,951
				75	568	5,963
16–16	Texada – Lasqueti	0	26,344	99	5,669	23,386
				95	7,795	20,551
				90	8,504	18,425
				75	9,921	17,008

Table 4, cont'd.

PFMA	Survey	Shoreline Length - exposed	Shoreline Length - protected	Confidence Level	Biomass (kg) LCB	Biomass (kg) UCB
16–17	Texada – Lasqueti	0	9,270	99	8,172	18,934
				95	9,766	17,539
				90	10,165	16,941
				75	11,161	15,944
16–18	Texada – Lasqueti	0	39,228	99	63,542	167,064
				95	72,823	151,357
				90	77,821	143,504
				75	86,388	131,367
16–19	Texada – Lasqueti	414	65,744	99	63,858	163,158
				95	70,064	149,194
				90	74,719	142,988
				75	84,028	132,127
16–20	Texada – Lasqueti	0	11,441	99	12,283	72,303
				95	15,912	61,415
				90	19,262	57,228
				75	23,729	49,691
16–21	Texada – Lasqueti	0	69,266	99	96,003	290,917
				95	100,366	251,643
				90	107,639	229,825
				75	119,276	203,642
16–22	Texada – Lasqueti	0	11,323	99	15,096	45,745
				95	15,782	39,569
				90	16,926	36,138
				75	18,755	32,021
17–9*	Cowichan Bay	6,329	17,021	99	0	7,425
				95	0	7,425
				90	0	4,950
				75	0	2,970
18–7	Cowichan Bay	0	48,653	99	8,252	54,667
				95	10,314	39,195
				90	11,346	34,038
				75	13,409	27,849
28–1	Howe Sound	0	81,564	99	15,758	51,777
				95	18,009	42,772
				90	18,009	40,521
				75	20,260	36,019
28–2	Howe Sound	518	67,824	99	21,015	62,833
				95	23,817	58,662
				90	25,218	55,881
				75	28,020	50,320
28–3	Howe Sound	0	39,462	99	18,220	54,659
				95	21,096	46,987
				90	23,014	45,070
				75	25,891	40,275

Table 4, cont'd.

PFMA	Survey	Shoreline Length - exposed	Shoreline Length - protected	Confidence Level	Biomass (kg) LCB	Biomass (kg) UCB
28–4	Howe Sound	0	21,605	99	3,325	33,989
				95	5,172	31,033
				90	6,650	27,708
				75	8,497	23,275
28–5*	Howe Sound	4,393	35,843	99	640	15,354
				95	1,280	13,435
				90	1,919	11,516
				75	2,559	8,957
28–6	Howe Sound	0	8,719	99	2,079	6,238
				95	2,357	5,823
				90	2,495	5,545
				75	2,773	4,991
29–3*	Howe Sound	358	7,975	99	927	3,047
				95	1,060	2,517
				90	1,060	2,385
				75	1,192	2,120

Table 5. Linear density (sea cucumbers per meter shoreline; c/m-sh) for *Parastichopus californicus*, *Cucumaria miniata* and *C. pallida*, by transect, in the Louise Island survey.

				Linear Density (c/m-sh)		
Survey	PFMA	SubArea	Transect No.	*P. californicus*	*C. miniata*	*C. pallida*
Louise Island	2	3	15	2.00	0.0	0.5
Louise Island	2	3	16	3.25	0.5	0.0
Louise Island	2	3	17	0.00	0.0	0.0
Louise Island	2	3	18	0.25	0.0	0.0
Louise Island	2	3	19	0.25	0.0	0.5
Louise Island	2	3	20	0.25	0.0	0.0
Louise Island	2	3	21	0.00	0.0	0.0
Louise Island	2	3	22	0.00	0.0	0.0
Louise Island	2	3	23	0.00	0.0	0.0
Louise Island	2	3	24	0.00	0.0	0.0
Louise Island	2	3	25	0.00	0.0	0.0
Louise Island	2	3	26	41.25	19.5	0.0
Louise Island	2	4	30	0.00	0.0	0.0
Louise Island	2	4	31	0.00	3.5	0.5
Louise Island	2	4	32	1.25	20.0	33.5
Louise Island	2	4	33	2.00	2.0	1.5
Louise Island	2	4	34	4.50	35.0	14.0
Louise Island	2	4	35	0.00	0.0	0.0
Louise Island	2	4	36	0.00	3.0	0.5
Louise Island	2	4	37	0.00	0.0	0.0
Louise Island	2	4	38	0.00	0.0	0.0
Louise Island	2	4	39	0.00	0.0	0.0
Louise Island	2	4	40	0.00	0.0	0.0
Louise Island	2	4	41	26.00	55.0	96.0
Louise Island	2	4	42	0.25	3.5	2.0
Louise Island	2	4	43	0.00	0.0	0.0
Louise Island	2	4	44	3.50	16.5	2.0
Louise Island	2	4	45	0.00	0.0	0.0
Louise Island	2	4	46	0.00	3.5	0.0
Louise Island	2	4	47	0.00	0.0	0.0
Louise Island	2	4	48	0.50	6.0	0.5
Louise Island	2	5	49	1.00	4.0	13.0
Louise Island	2	5	50	7.25	12.0	8.5
Louise Island	2	5	51	1.75	0.5	8.5
Louise Island	2	5	52	0.00	0.0	0.0
Louise Island	2	5	53	0.00	0.0	0.0
Louise Island	2	5	56	0.25	0.0	0.0
Louise Island	2	5	57	0.25	0.5	2.0
Louise Island	2	5	58	0.75	1.0	2.5
Louise Island	2	5	59	0.25	1.0	3.0
Louise Island	2	5	60	8.75	16.0	28.5
Louise Island	2	6	61	0.00	--	--
Louise Island	2	6	62	16.00	--	--
Louise Island	2	6	63	12.00	--	--
Louise Island	2	6	64	8.25	--	--
Louise Island	2	6	65	8.00	--	--
Louise Island	2	6	66	8.00	--	--
Louise Island	2	6	67	5.50	24.0	10.0
Louise Island	2	6	68	4.75	0.0	0.0
Louise Island	2	6	69	3.50	25.0	6.0
Louise Island	2	6	70	7.25	1.5	10.5
Louise Island	2	6	71	0.00	0.0	0.0
Louise Island	2	6	72	12.00	8.5	5.5
Louise Island	2	6	73	1.00	0.0	0.0
Louise Island	2	6	74	8.50	0.0	0.0
Louise Island	2	6	75	8.50	95.5	32.0
Louise Island	2	6	76	0.00	0.5	0.0
Louise Island	2	6	77	0.50	0.0	0.0
Louise Island	2	6	78	2.25	27.5	0.0
Louise Island	2	6	79	6.25	17.0	28.0

Table 5, Louise Island, cont'd.

Survey	PFMA	SubArea	Transect No.	Linear Density (c/m-sh)		
				P. californicus	*C. miniata*	*C. pallida*
Louise Island	2	6	80	6.75	1.0	0.5
Louise Island	2	6	81	17.00	0.0	0.0
Louise Island	2	6	82	14.00	0.0	0.0
Louise Island	2	6	83	41.75	7.5	401.5
Louise Island	2	6	84	5.25	0.5	0.0
Louise Island	2	6	85	3.50	0.0	0.0
Louise Island	2	6	86	12.25	2.5	0.0
Louise Island	2	6	87	7.00	37.0	4.0
Louise Island	2	6	88	6.25	153.5	47.0
Louise Island	2	6	89	5.25	7.0	0.0
Louise Island	2	6	90	13.50	18.0	0.0
Louise Island	2	6	91	0.25	0.0	0.0
Louise Island	2	6	92	4.25	0.0	0.0
Louise Island	2	6	93	4.75	0.0	0.0
Louise Island	2	6	94	1.00	10.0	1.0
Louise Island	2	6	95	0.00	1.0	0.5
Louise Island	2	6	96	0.00	--	--
Louise Island	2	6	97	0.25	--	--
Louise Island	2	6	98	0.00	--	--
Louise Island	2	6	99	8.25	--	--
Louise Island	2	6	100	4.50	--	--
Louise Island	2	6	101	7.25	--	--
Louise Island	2	6	102	2.00	--	--
Louise Island	2	6	103	1.00	--	--
Louise Island	2	6	104	0.00	--	--
Louise Island	2	6	105	3.50	--	--
Louise Island	2	6	106	1.75	--	--
Louise Island	2	6	107	5.00	--	--
Louise Island	2	6	108	10.50	--	--
Louise Island	2	6	109	9.50	--	--
Louise Island	2	6	110	6.00	--	--
Louise Island	2	6	111	9.00	--	--
Louise Island	2	6	112	5.25	--	--
Louise Island	2	6	113	4.00	--	--
Louise Island	2	6	114	5.50	--	--
Louise Island	2	6	116	6.00	--	--
Louise Island	2	6	117	15.00	0.0	0.5
Louise Island	2	6	119	7.25	9.0	4.5
Louise Island	2	6	120	4.75	0.0	0.0
Louise Island	2	6	121	10.25	1.0	0.0
Louise Island	2	6	122	11.75	11.5	1.5
Louise Island	2	6	123	9.00	0.0	0.0
Louise Island	2	6	124	16.50	5.0	2.0
Louise Island	2	6	125	22.25	47.0	78.0
Louise Island	2	6	126	0.00	0.0	0.0
Louise Island	2	6	127	0.00	0.0	0.0
Louise Island	2	6	128	0.00	0.0	0.0
Louise Island	2	6	129	0.00	0.0	0.0
Louise Island	2	6	130	7.25	0.5	0.0
Louise Island	2	6	131	6.50	1.0	7.0
Louise Island	2	6	132	4.75	14.0	51.5
Louise Island	2	6	133	4.50	16.5	14.0
Louise Island	2	6	134	17.00	28.0	29.0

Table 6. Linear density (sea cucumbers per meter shoreline; c/m-sh) for *Parastichopus californicus*, *Cucumaria miniata* and *C. pallida*, by transect, in the Gwaii Haanas survey.

				Linear Density (c/m-sh)		
Survey	PFMA	SubArea	Transect No.	*P. californicus*	*C. miniata*	*C. pallida*
Gwaii Haanas	2	15	354	0.00	22.0	1.0
Gwaii Haanas	2	15	355	2.50	38.5	0.0
Gwaii Haanas	2	15	356	5.25	0.5	0.0
Gwaii Haanas	2	15	357	14.00	5.5	6.0
Gwaii Haanas	2	15	358	2.25	--	--
Gwaii Haanas	2	15	359	2.75	--	--
Gwaii Haanas	2	15	360	14.50	--	--
Gwaii Haanas	2	15	361	13.00	--	--
Gwaii Haanas	2	15	362	4.00	--	--
Gwaii Haanas	2	15	363	0.75	0.0	0.0
Gwaii Haanas	2	15	364	0.00	17.5	0.0
Gwaii Haanas	2	15	365	2.75	7.0	3.0
Gwaii Haanas	2	15	366	1.00	0.0	0.0
Gwaii Haanas	2	15	367	15.50	0.0	0.0
Gwaii Haanas	2	15	368	3.50	7.0	2.0
Gwaii Haanas	2	15	369	7.00	1.0	0.0
Gwaii Haanas	2	15	370	7.25	0.0	0.0
Gwaii Haanas	2	15	371	8.25	0.0	0.0
Gwaii Haanas	2	15	372	4.75	0.0	0.0
Gwaii Haanas	2	15	373	4.75	1.5	1.5
Gwaii Haanas	2	15	374	7.00	0.5	0.0
Gwaii Haanas	2	15	375	0.25	0.0	0.0
Gwaii Haanas	2	15	376	14.00	2.0	4.5
Gwaii Haanas	2	15	377	12.00	--	--
Gwaii Haanas	2	15	378	8.00	5.5	0.0
Gwaii Haanas	2	15	379	1.00	0.0	0.0
Gwaii Haanas	2	15	380	0.00	--	--
Gwaii Haanas	2	15	381	14.00	0.0	0.0
Gwaii Haanas	2	15	382	12.25	57.5	0.0
Gwaii Haanas	2	15	383	6.50	--	--
Gwaii Haanas	2	15	384	6.75	--	--
Gwaii Haanas	2	15	385	1.25	--	--
Gwaii Haanas	2	15	386	9.25	0.0	0.0
Gwaii Haanas	2	15	387	12.00	--	--
Gwaii Haanas	2	15	388	12.75	12.5	0.0
Gwaii Haanas	2	15	389	12.25	16.0	0.5
Gwaii Haanas	2	15	390	1.75	0.5	2.0
Gwaii Haanas	2	15	391	4.00	1.0	0.0
Gwaii Haanas	2	15	392	3.00	2.5	0.0

Table 7. Linear density (sea cucumbers per meter shoreline; c/m-sh) for *Parastichopus californicus*, *Cucumaria miniata* and *C. pallida*, by transect, in the Seymour Inlet survey.

				Linear Density (c/m-sh)		
Survey	PFMA	SubArea	Transect No.	*P. californicus*	*C. miniata*	*C. pallida*
Seymour Inlet	11	3	1	10.00	0.0	0.0
Seymour Inlet	11	3	2	20.75	0.0	4.0
Seymour Inlet	11	3	3	6.00	0.0	0.5
Seymour Inlet	11	3	4	5.50	0.0	0.5
Seymour Inlet	11	3	5	15.50	0.0	0.0
Seymour Inlet	11	3	6	1.00	0.0	0.0
Seymour Inlet	11	3	7	7.75	0.0	3.5
Seymour Inlet	11	3	8	5.25	0.5	0.5
Seymour Inlet	11	3	9	5.75	0.0	0.0
Seymour Inlet	11	3	10	20.75	0.0	1.0
Seymour Inlet	11	3	11	13.25	2.5	5.5
Seymour Inlet	11	3	13	14.25	0.5	0.0
Seymour Inlet	11	3	14	11.00	0.0	0.5
Seymour Inlet	11	3	15	4.00	0.0	0.5
Seymour Inlet	11	3	16	7.00	0.0	0.0
Seymour Inlet	11	3	17	19.00	0.0	0.5
Seymour Inlet	11	3	18	14.50	--	--
Seymour Inlet	11	3	19	15.00	0.0	0.0
Seymour Inlet	11	3	20	6.00	0.0	0.0
Seymour Inlet	11	3	21	19.00	0.0	0.0
Seymour Inlet	11	3	22	1.50	0.5	0.5
Seymour Inlet	11	3	23	17.00	10.0	40.0
Seymour Inlet	11	3	24	15.25	15.5	28.5
Seymour Inlet	11	3	25	17.50	3.5	20.5
Seymour Inlet	11	3	26	19.50	22.5	28.0
Seymour Inlet	11	3	27	51.50	0.5	2.0
Seymour Inlet	11	3	28	48.50	0.0	2.5
Seymour Inlet	11	3	34	12.75	1.0	10.0
Seymour Inlet	11	3	35	40.50	5.5	13.0
Seymour Inlet	11	3	36	14.25	0.5	4.0
Seymour Inlet	11	3	37	75.25	--	--
Seymour Inlet	11	3	38	52.75	--	--
Seymour Inlet	11	3	39	57.50	--	--
Seymour Inlet	11	3	40	9.50	22.0	9.0
Seymour Inlet	11	3	41	17.75	39.0	5.5
Seymour Inlet	11	3	42	14.00	12.0	61.0
Seymour Inlet	11	3	43	11.75	16.5	6.5
Seymour Inlet	11	3	44	15.00	1.0	4.0
Seymour Inlet	11	3	45	31.00	3.0	3.0
Seymour Inlet	11	3	46	0.00	0.0	0.0
Seymour Inlet	11	3	47	29.50	47.5	27.0
Seymour Inlet	11	3	49	5.75	--	--
Seymour Inlet	11	3	54	4.50	--	--
Seymour Inlet	11	3	55	3.75	--	--
Seymour Inlet	11	3	56	5.75	--	--
Seymour Inlet	11	3	57	1.75	--	--
Seymour Inlet	11	3	58	4.00	--	--
Seymour Inlet	11	3	59	5.50	--	--
Seymour Inlet	11	3	60	6.00	--	--
Seymour Inlet	11	3	61	5.50	--	--
Seymour Inlet	11	3	62	6.50	--	--
Seymour Inlet	11	3	63	5.75	--	--
Seymour Inlet	11	3	64	6.25	0.0	0.0
Seymour Inlet	11	3	65	2.25	0.0	0.5
Seymour Inlet	11	3	66	7.00	0.0	0.0
Seymour Inlet	11	3	67	7.75	0.0	0.0
Seymour Inlet	11	3	68	8.00	0.5	0.0
Seymour Inlet	11	3	69	10.00	0.0	0.0
Seymour Inlet	11	3	70	2.25	0.0	0.0
Seymour Inlet	11	3	71	6.00	0.0	0.0

Table 7, Seymour Inlet survey cont'd.

Survey	PFMA	SubArea	Transect No.	Linear Density (c/m-sh)		
				P. californicus	*C. miniata*	*C. pallida*
Seymour Inlet	11	8	229	19.00	36.5	1.5
Seymour Inlet	11	8	230	14.25	--	--
Seymour Inlet	11	8	231	12.50	--	--
Seymour Inlet	11	8	232	8.75	--	--
Seymour Inlet	11	8	233	12.75	--	--
Seymour Inlet	11	8	234	8.00	6.5	7.5
Seymour Inlet	11	8	235	17.50	0.0	2.5
Seymour Inlet	11	8	236	0.25	0.0	1.0
Seymour Inlet	11	8	237	11.00	0.0	0.0
Seymour Inlet	11	8	238	13.50	0.5	2.5
Seymour Inlet	11	8	239	3.00	1.0	0.0
Seymour Inlet	11	8	240	0.00	0.0	0.0
Seymour Inlet	11	8	241	0.00	0.0	0.0
Seymour Inlet	11	8	242	0.00	0.0	0.0
Seymour Inlet	11	8	248	1.75	0.0	0.0
Seymour Inlet	11	8	249	3.25	0.0	0.0
Seymour Inlet	11	8	250	3.00	0.0	0.0
Seymour Inlet	11	8	251	4.50	0.0	5.5
Seymour Inlet	11	8	252	11.25	0.0	6.0
Seymour Inlet	11	8	253	4.00	2.0	2.0
Seymour Inlet	11	8	254	13.00	5.5	22.5
Seymour Inlet	11	8	255	2.00	0.0	0.0
Seymour Inlet	11	8	256	4.75	0.0	2.0
Seymour Inlet	11	8	257	18.50	--	--
Seymour Inlet	11	8	258	5.50	--	--
Seymour Inlet	11	8	259	4.25	--	--
Seymour Inlet	11	8	260	3.00	--	--
Seymour Inlet	11	10	281	7.75	0.0	0.0
Seymour Inlet	11	10	304	8.00	0.0	0.0
Seymour Inlet	11	10	305	4.50	0.0	0.0
Seymour Inlet	11	10	306	7.50	0.0	0.0
Seymour Inlet	11	10	307	4.75	0.0	0.0
Seymour Inlet	11	10	308	15.50	0.0	0.0
Seymour Inlet	11	10	309	6.75	0.0	0.0
Seymour Inlet	11	10	310	0.00	0.0	0.0
Seymour Inlet	11	10	311	0.00	0.0	0.0
Seymour Inlet	11	10	312	1.25	0.0	0.0
Seymour Inlet	11	10	313	7.25	0.0	0.0
Seymour Inlet	11	10	314	0.00	0.0	0.0
Seymour Inlet	11	10	315	5.50	0.0	0.0
Seymour Inlet	11	10	316	1.25	0.0	0.0
Seymour Inlet	11	10	317	12.00	0.0	0.0
Seymour Inlet	11	10	318	4.25	0.0	0.0
Seymour Inlet	11	10	319	7.50	0.0	0.0
Seymour Inlet	11	10	320	3.25	0.0	0.0
Seymour Inlet	11	10	322	6.25	0.0	0.0
Seymour Inlet	11	10	324	16.50	0.0	0.0
Seymour Inlet	11	10	325	3.00	0.5	6.5
Seymour Inlet	11	10	326	6.75	0.0	0.0
Seymour Inlet	11	10	327	1.00	0.0	0.5

Table 8. Linear density (sea cucumbers per meter shoreline; c/m-sh) for *Parastichopus californicus*, *Cucumaria miniata* and *C. pallida*, by transect, in the Belize Inlet survey.

				Linear Density (c/m-sh)		
Survey	PFMA	SubArea	Transect No.	*P. californicus*	*C. miniata*	*C. pallida*
Belize Inlet	11	4	79	8.00	0.0	0.0
Belize Inlet	11	4	80	5.25	0.5	5.0
Belize Inlet	11	4	81	9.75	0.0	0.0
Belize Inlet	11	4	82	4.00	0.0	0.0
Belize Inlet	11	4	83	5.75	3.5	0.5
Belize Inlet	11	4	84	5.25	0.0	0.0
Belize Inlet	11	4	85	5.25	1.5	4.5
Belize Inlet	11	4	86	2.75	1.0	4.5
Belize Inlet	11	4	87	2.00	2.5	3.5
Belize Inlet	11	4	88	8.75	5.0	6.0
Belize Inlet	11	4	89	15.00	5.5	2.0
Belize Inlet	11	4	90	5.25	9.5	3.0
Belize Inlet	11	4	91	8.50	0.5	2.0
Belize Inlet	11	4	92	15.00	30.5	9.5
Belize Inlet	11	4	93	10.25	0.5	1.5
Belize Inlet	11	4	94	17.75	3.0	9.5
Belize Inlet	11	4	95	31.50	11.0	3.5
Belize Inlet	11	4	96	12.50	5.0	29.5
Belize Inlet	11	4	97	24.50	10.0	2.0
Belize Inlet	11	4	98	30.25	20.5	21.0
Belize Inlet	11	4	99	0.00	0.0	0.0
Belize Inlet	11	4	100	13.00	1.0	0.5
Belize Inlet	11	4	101	0.75	0.0	0.0
Belize Inlet	11	4	102	37.75	33.5	39.5
Belize Inlet	11	4	103	20.00	0.0	0.0
Belize Inlet	11	4	104	41.25	101.0	3.0
Belize Inlet	11	4	105	34.25	131.5	70.5
Belize Inlet	11	4	107	29.00	22.0	19.5
Belize Inlet	11	4	108	0.00	--	--
Belize Inlet	11	4	110	14.75	--	--
Belize Inlet	11	4	111	9.50	--	--
Belize Inlet	11	4	112	2.00	--	--
Belize Inlet	11	4	113	7.00	--	--
Belize Inlet	11	4	114	3.75	0.0	1.5
Belize Inlet	11	4	115	12.50	12.5	2.0
Belize Inlet	11	4	116	5.25	0.0	0.0
Belize Inlet	11	4	117	6.25	0.0	0.0
Belize Inlet	11	4	118	1.00	0.0	0.0
Belize Inlet	11	4	119	4.00	7.5	16.5
Belize Inlet	11	4	120	4.75	0.0	0.0
Belize Inlet	11	4	121	4.25	1.0	6.0
Belize Inlet	11	4	122	17.50	0.0	0.0
Belize Inlet	11	4	123	6.50	0.0	0.0
Belize Inlet	11	4	124	4.25	0.0	0.0
Belize Inlet	11	4	125	2.50	1.5	5.5
Belize Inlet	11	4	126	0.75	--	--
Belize Inlet	11	4	127	3.25	--	--
Belize Inlet	11	5	128	11.00	4.0	11.0
Belize Inlet	11	5	129	1.00	0.0	0.0
Belize Inlet	11	5	130	8.25	4.5	16.0
Belize Inlet	11	5	131	4.75	9.5	5.0
Belize Inlet	11	5	132	4.75	0.0	14.5
Belize Inlet	11	5	133	16.25	0.0	1.0
Belize Inlet	11	5	134	9.75	0.0	0.0
Belize Inlet	11	5	135	5.25	8.0	8.5
Belize Inlet	11	5	136	10.00	1.0	13.0
Belize Inlet	11	5	137	10.75	2.5	13.0
Belize Inlet	11	5	138	13.25	3.0	4.0
Belize Inlet	11	5	139	7.75	2.5	6.5
Belize Inlet	11	5	140	9.25	0.0	1.5

Table 8, Seymour Inlet survey cont'd.

Survey	PFMA	SubArea	Transect No.	Linear Density (c/m-sh) *P. californicus*	*C. miniata*	*C. pallida*
Belize Inlet	11	5	141	1.25	0.0	1.0
Belize Inlet	11	5	142	3.25	0.0	0.0
Belize Inlet	11	5	143	2.75	0.0	0.0
Belize Inlet	11	5	144	4.00	0.0	0.0
Belize Inlet	11	5	145	3.00	0.0	0.5
Belize Inlet	11	5	146	3.25	0.0	0.0
Belize Inlet	11	5	147	0.00	0.0	0.5
Belize Inlet	11	5	148	0.00	0.0	0.0
Belize Inlet	11	5	149	1.25	0.0	0.0
Belize Inlet	11	5	150	0.00	0.0	0.0
Belize Inlet	11	5	151	3.50	0.0	0.0
Belize Inlet	11	5	152	1.25	0.0	5.0
Belize Inlet	11	5	153	2.00	0.0	0.0
Belize Inlet	11	5	154	0.00	0.0	0.0
Belize Inlet	11	5	155	0.75	1.0	3.5
Belize Inlet	11	5	156	2.50	0.0	0.0
Belize Inlet	11	5	157	1.50	0.0	0.5
Belize Inlet	11	5	158	5.25	4.5	15.5
Belize Inlet	11	5	159	8.50	1.5	6.0
Belize Inlet	11	5	160	9.00	14.0	13.0
Belize Inlet	11	5	161	5.50	0.0	0.0
Belize Inlet	11	5	162	11.75	38.5	53.5
Belize Inlet	11	5	163	5.50	1.5	8.5
Belize Inlet	11	6	201	7.25	0.5	12.0
Belize Inlet	11	6	202	3.25	0.0	3.0
Belize Inlet	11	6	203	3.75	--	--
Belize Inlet	11	6	204	20.50	--	--
Belize Inlet	11	6	205	3.75	--	--
Belize Inlet	11	6	206	0.00	--	--
Belize Inlet	11	6	207	9.75	--	--
Belize Inlet	11	6	208	2.50	--	--
Belize Inlet	11	6	209	0.25	--	--
Belize Inlet	11	6	210	2.25	--	--
Belize Inlet	11	6	211	7.00	--	--
Belize Inlet	11	6	212	0.00	--	--
Belize Inlet	11	6	213	0.25	--	--
Belize Inlet	11	6	214	0.75	--	--
Belize Inlet	11	6	215	0.00	--	--
Belize Inlet	11	6	216	0.00	--	--
Belize Inlet	11	6	217	0.00	--	--
Belize Inlet	11	6	218	5.25	--	--
Belize Inlet	11	6	219	4.50	--	--
Belize Inlet	11	6	220	4.50	--	--
Belize Inlet	11	6	221	0.75	--	--
Belize Inlet	11	6	222	7.25	--	--
Belize Inlet	11	6	223	15.50	--	--
Belize Inlet	11	6	224	13.50	--	--
Belize Inlet	11	6	225	0.00	--	--
Belize Inlet	11	6	226	4.00	--	--
Belize Inlet	11	6	227	1.50	0.5	0.5
Belize Inlet	11	6	228	4.25	0.0	0.5
Belize Inlet	11	7	261	1.50	--	--
Belize Inlet	11	7	262	5.50	--	--
Belize Inlet	11	7	263	4.25	--	--
Belize Inlet	11	7	264	4.75	--	--
Belize Inlet	11	7	265	5.25	--	--
Belize Inlet	11	7	266	2.75	--	--
Belize Inlet	11	7	267	1.50	--	--
Belize Inlet	11	7	268	0.00	--	--
Belize Inlet	11	7	269	0.00	--	--

Table 8, Belize Inlet survey cont'd.

Survey	PFMA	SubArea	Transect No.	Linear Density (c/m-sh)		
				P. californicus	*C. miniata*	*C. pallida*
Belize Inlet	11	7	270	1.75	--	--
Belize Inlet	11	7	271	0.00	--	--
Belize Inlet	11	7	272	0.00	--	--
Belize Inlet	11	7	273	0.00	--	--
Belize Inlet	11	7	274	0.50	--	--
Belize Inlet	11	7	275	0.00	--	--
Belize Inlet	11	7	276	1.50	--	--
Belize Inlet	11	7	277	3.25	--	--
Belize Inlet	11	7	278	1.25	--	--
Belize Inlet	11	7	279	1.25	--	--
Belize Inlet	11	7	280	2.25	--	--

Table 9. Linear density (sea cucumbers per meter shoreline; c/m-sh) for *Parastichopus californicus*, *Cucumaria miniata* and *C. pallida*, by transect, in the Texada – Lasqueti survey.

				Linear Density (c/m-sh)		
Survey	PFMA	SubArea	Transect No.	*P. californicus*	*C. miniata*	*C. pallida*
Texada Lasqueti	14	3	18	9.25	0.0	0.0
Texada Lasqueti	14	3	19	1.75	0.0	0.0
Texada Lasqueti	14	3	20	23.75	0.0	0.0
Texada Lasqueti	14	3	21	5.75	0.0	0.0
Texada Lasqueti	14	3	22	4.00	0.0	0.0
Texada Lasqueti	14	3	23	3.75	0.0	0.0
Texada Lasqueti	14	3	24	12.00	0.0	0.0
Texada Lasqueti	14	3	25	6.25	0.0	0.0
Texada Lasqueti	14	3	26	5.50	0.0	0.0
Texada Lasqueti	14	3	27	5.50	0.0	0.0
Texada Lasqueti	14	3	28	20.75	0.0	0.0
Texada Lasqueti	14	3	29	15.75	0.0	0.0
Texada Lasqueti	14	3	30	35.75	0.0	0.0
Texada Lasqueti	14	3	31	4.50	0.0	0.0
Texada Lasqueti	14	3	32	33.50	0.0	0.0
Texada Lasqueti	14	3	33	26.00	0.0	0.0
Texada Lasqueti	14	3	34	11.00	0.0	0.0
Texada Lasqueti	14	3	35	9.25	0.5	0.0
Texada Lasqueti	14	3	36	10.25	0.0	0.0
Texada Lasqueti	14	3	37	32.50	0.0	0.0
Texada Lasqueti	14	3	38	17.50	0.0	0.0
Texada Lasqueti	14	3	39	23.75	0.0	0.0
Texada Lasqueti	14	3	40	5.00	0.0	0.0
Texada Lasqueti	14	3	41	0.25	0.0	0.0
Texada Lasqueti	14	3	42	4.00	0.0	0.0
Texada Lasqueti	14	3	43	4.50	0.0	0.0
Texada Lasqueti	15	1	128	16.75	0.0	0.0
Texada Lasqueti	15	1	129	6.00	0.0	0.0
Texada Lasqueti	15	1	130	8.00	0.0	0.0
Texada Lasqueti	15	1	131	29.75	0.0	0.0
Texada Lasqueti	15	1	132	8.50	0.0	0.0
Texada Lasqueti	15	1	133	8.50	0.0	0.0
Texada Lasqueti	15	1	134	3.75	0.0	0.0
Texada Lasqueti	15	1	135	6.75	0.0	0.0
Texada Lasqueti	15	1	136	16.00	0.0	0.0
Texada Lasqueti	15	1	137	11.00	0.0	0.0
Texada Lasqueti	15	1	138	9.25	0.5	0.0
Texada Lasqueti	15	1	139	14.25	0.5	0.0
Texada Lasqueti	15	1	140	5.00	0.0	0.0
Texada Lasqueti	15	1	141	11.75	0.0	0.0
Texada Lasqueti	15	1	142	19.50	0.0	0.0
Texada Lasqueti	15	1	143	27.50	0.0	0.0
Texada Lasqueti	15	1	144	49.00	1.5	0.0
Texada Lasqueti	15	1	145	11.50	0.0	0.0
Texada Lasqueti	15	1	146	4.00	0.0	0.0
Texada Lasqueti	15	1	147	18.00	0.5	0.0
Texada Lasqueti	15	1	148	1.25	0.0	0.0
Texada Lasqueti	15	1	149	10.00	0.0	0.0
Texada Lasqueti	15	1	150	5.00	0.0	0.0
Texada Lasqueti	15	1	151	0.00	0.0	0.0
Texada Lasqueti	15	1	152	0.25	0.0	0.0
Texada Lasqueti	15	1	153	0.00	0.0	0.0
Texada Lasqueti	15	1	154	5.50	1.5	0.0
Texada Lasqueti	15	1	155	1.25	0.0	0.0
Texada Lasqueti	15	1	156	0.00	0.0	0.0
Texada Lasqueti	15	1	157	0.25	0.0	0.0
Texada Lasqueti	15	1	158	0.00	0.0	0.0
Texada Lasqueti	15	1	159	0.00	0.0	0.0
Texada Lasqueti	15	1	160	0.50	0.0	0.0
Texada Lasqueti	15	1	161	0.00	0.0	0.0

Table 9, Texada – Lasqueti survey cont'd.

Survey	PFMA	SubArea	Transect No.	Linear Density (c/m-sh) *P. californicus*	*C. miniata*	*C. pallida*
Texada Lasqueti	15	1	162	0.00	0.0	0.0
Texada Lasqueti	15	1	163	0.00	0.0	0.0
Texada Lasqueti	15	1	165	0.00	0.0	0.0
Texada Lasqueti	16	1	216	0.00	0.0	0.0
Texada Lasqueti	16	1	217	0.00	0.0	0.0
Texada Lasqueti	16	1	218	0.00	0.0	0.0
Texada Lasqueti	16	1	219	0.00	0.0	0.0
Texada Lasqueti	16	1	220	0.50	0.0	0.0
Texada Lasqueti	16	1	221	0.00	0.0	0.0
Texada Lasqueti	16	1	222	1.00	0.0	0.0
Texada Lasqueti	16	1	223	17.25	0.5	0.0
Texada Lasqueti	16	1	224	0.25	0.0	0.0
Texada Lasqueti	16	1	225	6.25	0.0	0.0
Texada Lasqueti	16	1	226	9.25	0.0	0.0
Texada Lasqueti	16	1	227	13.50	0.0	0.0
Texada Lasqueti	16	1	228	0.75	0.0	0.0
Texada Lasqueti	16	1	229	0.50	0.0	0.0
Texada Lasqueti	16	1	230	1.25	0.0	0.0
Texada Lasqueti	16	1	231	9.75	0.0	0.0
Texada Lasqueti	16	1	232	5.25	0.0	0.0
Texada Lasqueti	16	1	233	3.75	0.5	0.0
Texada Lasqueti	16	1	234	0.00	0.0	0.0
Texada Lasqueti	16	1	235	0.00	0.0	0.0
Texada Lasqueti	16	1	236	0.75	1.0	0.0
Texada Lasqueti	16	1	237	0.00	0.0	0.0
Texada Lasqueti	16	1	238	0.00	0.0	0.0
Texada Lasqueti	16	1	239	5.00	0.5	0.0
Texada Lasqueti	16	1	240	0.25	0.0	0.0
Texada Lasqueti	16	1	241	12.75	0.0	0.0
Texada Lasqueti	16	1	242	0.00	0.0	0.0
Texada Lasqueti	16	1	243	5.75	2.5	1.0
Texada Lasqueti	16	1	244	0.00	0.0	0.0
Texada Lasqueti	16	1	245	0.00	0.0	0.0
Texada Lasqueti	16	1	246	1.50	0.0	0.0
Texada Lasqueti	16	2	201	15.25	0.0	0.0
Texada Lasqueti	16	2	202	10.75	0.5	0.0
Texada Lasqueti	16	2	203	11.75	0.0	0.0
Texada Lasqueti	16	2	204	13.75	1.5	0.5
Texada Lasqueti	16	2	205	4.75	0.0	0.0
Texada Lasqueti	16	2	206	4.00	0.0	0.0
Texada Lasqueti	16	2	207	10.25	0.0	0.0
Texada Lasqueti	16	2	208	10.00	0.0	0.0
Texada Lasqueti	16	2	209	5.25	0.5	0.0
Texada Lasqueti	16	2	210	9.50	0.0	0.0
Texada Lasqueti	16	2	211	0.25	0.0	0.0
Texada Lasqueti	16	2	212	1.75	0.0	0.0
Texada Lasqueti	16	2	213	6.25	0.0	0.0
Texada Lasqueti	16	3	214	0.00	0.0	0.0
Texada Lasqueti	16	4	188	7.50	0.0	0.0
Texada Lasqueti	16	4	189	0.00	0.0	0.0
Texada Lasqueti	16	4	190	0.00	0.0	0.0
Texada Lasqueti	16	4	191	0.00	0.0	0.0
Texada Lasqueti	16	4	192	0.00	0.0	0.0
Texada Lasqueti	16	4	196	1.75	0.0	0.0
Texada Lasqueti	16	4	197	0.00	0.5	0.0
Texada Lasqueti	16	4	198	0.00	0.0	0.0
Texada Lasqueti	16	4	199	0.00	0.0	0.0
Texada Lasqueti	16	4	200	0.25	0.0	0.0
Texada Lasqueti	16	16	166	3.50	0.0	0.0
Texada Lasqueti	16	16	167	4.25	0.0	0.0

Table 9, Texada – Lasqueti survey cont'd.

Survey	PFMA	SubArea	Transect No.	Linear Density (c/m-sh) *P. californicus*	*C. miniata*	*C. pallida*
Texada Lasqueti	16	16	168	0.75	0.0	0.0
Texada Lasqueti	16	16	169	1.00	0.0	0.0
Texada Lasqueti	16	16	170	0.00	0.0	0.0
Texada Lasqueti	16	16	171	0.25	0.0	0.0
Texada Lasqueti	16	16	172	0.75	0.0	0.0
Texada Lasqueti	16	16	173	4.25	0.0	0.5
Texada Lasqueti	16	16	174	5.25	0.0	1.5
Texada Lasqueti	16	16	175	0.25	0.0	0.0
Texada Lasqueti	16	16	176	0.00	0.0	0.0
Texada Lasqueti	16	16	177	0.25	0.0	0.0
Texada Lasqueti	16	16	178	0.25	0.0	0.0
Texada Lasqueti	16	16	179	2.25	0.0	0.0
Texada Lasqueti	16	16	180	2.25	0.0	0.0
Texada Lasqueti	16	16	181	3.50	0.0	0.0
Texada Lasqueti	16	17	182	2.50	0.0	0.0
Texada Lasqueti	16	17	183	0.00	0.0	0.0
Texada Lasqueti	16	17	184	9.75	0.0	0.0
Texada Lasqueti	16	17	185	1.00	0.0	0.0
Texada Lasqueti	16	17	186	3.50	0.0	0.0
Texada Lasqueti	16	17	187	8.00	0.0	0.0
Texada Lasqueti	16	18	1	4.50	0.0	0.0
Texada Lasqueti	16	18	2	18.75	0.0	0.0
Texada Lasqueti	16	18	3	15.00	0.0	0.0
Texada Lasqueti	16	18	4	4.25	0.5	0.0
Texada Lasqueti	16	18	5	8.75	0.0	0.0
Texada Lasqueti	16	18	6	0.00	0.0	0.0
Texada Lasqueti	16	18	7	11.25	0.0	0.0
Texada Lasqueti	16	18	8	10.25	0.0	0.0
Texada Lasqueti	16	18	9	28.50	1.5	0.0
Texada Lasqueti	16	18	10	10.25	2.5	0.0
Texada Lasqueti	16	18	11	4.25	0.0	0.0
Texada Lasqueti	16	18	12	28.25	0.0	0.0
Texada Lasqueti	16	18	13	29.00	0.0	0.0
Texada Lasqueti	16	18	14	40.25	1.0	0.0
Texada Lasqueti	16	18	15	25.00	0.0	0.0
Texada Lasqueti	16	18	16	8.75	0.0	0.0
Texada Lasqueti	16	18	17	4.00	0.0	0.0
Texada Lasqueti	16	19	89	3.25	0.0	0.0
Texada Lasqueti	16	19	90	25.00	0.0	0.0
Texada Lasqueti	16	19	91	3.25	0.0	0.0
Texada Lasqueti	16	19	92	6.75	0.0	0.0
Texada Lasqueti	16	19	93	2.00	0.0	0.0
Texada Lasqueti	16	19	94	15.25	0.0	0.0
Texada Lasqueti	16	19	95	13.00	0.0	0.0
Texada Lasqueti	16	19	96	3.50	0.0	0.0
Texada Lasqueti	16	19	97	2.00	0.0	0.0
Texada Lasqueti	16	19	98	24.00	0.0	0.0
Texada Lasqueti	16	19	99	3.25	0.0	0.0
Texada Lasqueti	16	19	100	2.75	0.0	0.0
Texada Lasqueti	16	19	101	2.00	0.0	0.0
Texada Lasqueti	16	19	102	0.00	0.0	0.0
Texada Lasqueti	16	19	103	15.50	0.0	0.0
Texada Lasqueti	16	19	104	14.50	0.0	0.0
Texada Lasqueti	16	19	105	13.25	0.0	0.0
Texada Lasqueti	16	19	107	6.75	0.0	0.0
Texada Lasqueti	16	19	108	1.00	0.0	0.0
Texada Lasqueti	16	19	109	9.25	0.0	0.0
Texada Lasqueti	16	19	110	14.25	0.0	0.0
Texada Lasqueti	16	19	111	1.50	0.0	0.0
Texada Lasqueti	16	19	112	1.75	0.0	0.0

Table 9, Texada – Lasqueti survey cont'd.

Survey	PFMA	SubArea	Transect No.	Linear Density (c/m-sh) *P. californicus*	*C. miniata*	*C. pallida*
Texada Lasqueti	16	19	113	1.00	0.0	0.0
Texada Lasqueti	16	19	114	0.00	0.0	0.0
Texada Lasqueti	16	19	115	0.00	0.0	0.0
Texada Lasqueti	16	19	116	0.75	0.0	0.0
Texada Lasqueti	16	19	117	0.00	0.0	0.0
Texada Lasqueti	16	19	118	0.50	0.0	0.0
Texada Lasqueti	16	19	119	5.75	0.0	0.0
Texada Lasqueti	16	19	120	0.75	0.0	0.0
Texada Lasqueti	16	19	121	19.50	0.0	0.0
Texada Lasqueti	16	20	79	34.00	0.0	0.0
Texada Lasqueti	16	20	80	12.75	0.0	0.0
Texada Lasqueti	16	20	81	4.50	0.0	0.0
Texada Lasqueti	16	20	82	1.75	0.0	0.0
Texada Lasqueti	16	20	83	5.25	0.0	0.0
Texada Lasqueti	16	20	84	3.00	0.0	0.0
Texada Lasqueti	16	20	85	2.75	0.0	0.0
Texada Lasqueti	16	20	86	3.50	0.0	0.0
Texada Lasqueti	16	20	87	22.25	0.0	0.0
Texada Lasqueti	16	20	88	35.25	0.0	0.0
Texada Lasqueti	16	21	44	20.00	0.0	0.0
Texada Lasqueti	16	21	45	0.00	0.0	0.0
Texada Lasqueti	16	21	46	19.75	1.0	0.0
Texada Lasqueti	16	21	47	17.25	0.0	0.0
Texada Lasqueti	16	21	48	6.50	0.0	0.0
Texada Lasqueti	16	21	49	6.75	0.0	0.0
Texada Lasqueti	16	21	50	8.00	0.0	0.0
Texada Lasqueti	16	21	51	0.00	0.0	0.0
Texada Lasqueti	16	21	52	2.75	0.0	0.0
Texada Lasqueti	16	21	53	6.00	0.5	0.0
Texada Lasqueti	16	21	54	17.25	0.0	0.0
Texada Lasqueti	16	21	55	1.00	0.0	0.0
Texada Lasqueti	16	21	56	0.25	0.0	0.0
Texada Lasqueti	16	21	57	25.25	0.0	0.0
Texada Lasqueti	16	21	58	1.25	0.0	0.0
Texada Lasqueti	16	21	59	17.50	0.5	0.0
Texada Lasqueti	16	21	60	36.75	0.0	0.0
Texada Lasqueti	16	21	61	17.00	0.5	0.0
Texada Lasqueti	16	21	62	10.00	0.0	0.0
Texada Lasqueti	16	21	63	14.50	0.0	0.0
Texada Lasqueti	16	21	64	11.25	0.0	0.0
Texada Lasqueti	16	21	65	0.00	0.0	0.0
Texada Lasqueti	16	21	66	27.50	0.0	0.0
Texada Lasqueti	16	21	67	1.50	0.0	0.0
Texada Lasqueti	16	21	68	0.00	0.0	0.0
Texada Lasqueti	16	21	69	0.00	0.0	0.0
Texada Lasqueti	16	21	70	0.00	0.0	0.0
Texada Lasqueti	16	21	71	0.50	0.0	0.0
Texada Lasqueti	16	21	72	7.75	0.0	0.0
Texada Lasqueti	16	21	73	0.00	0.0	0.0
Texada Lasqueti	16	21	74	0.00	0.0	0.0
Texada Lasqueti	16	21	75	20.75	0.0	0.0
Texada Lasqueti	16	21	76	84.50	0.0	0.0
Texada Lasqueti	16	21	77	5.00	0.0	0.0
Texada Lasqueti	16	21	78	14.50	0.0	0.0
Texada Lasqueti	16	21	106	18.00	0.0	0.0
Texada Lasqueti	16	22	122	0.00	0.0	0.0
Texada Lasqueti	16	22	123	11.00	0.0	0.0
Texada Lasqueti	16	22	124	0.00	0.0	0.0
Texada Lasqueti	16	22	125	0.75	0.0	0.0
Texada Lasqueti	16	22	126	20.50	0.0	0.0
Texada Lasqueti	16	22	127	0.00	0.0	0.0

Table 10. Linear density (sea cucumbers per meter shoreline; c/m-sh) for *Parastichopus californicus*, *Cucumaria miniata* and *C. pallida*, by transect, in the Desolation Sound survey.

				Linear Density (c/m-sh)		
Survey	PFMA	SubArea	Transect No.	*P. californicus*	*C. miniata*	*C. pallida*
Desolation Sound	15	4	183	13.00	0.0	0.0
Desolation Sound	15	4	184	6.00	0.5	0.0
Desolation Sound	15	4	185	2.75	0.0	0.0
Desolation Sound	15	4	186	13.75	0.0	0.0
Desolation Sound	15	4	187	6.25	0.0	0.5
Desolation Sound	15	4	188	1.75	0.0	0.0
Desolation Sound	15	4	189	2.25	0.0	0.0
Desolation Sound	15	4	190	8.25	0.5	0.0
Desolation Sound	15	4	191	6.00	0.0	0.0
Desolation Sound	15	4	192	1.75	0.0	0.0
Desolation Sound	15	4	193	1.00	0.0	0.0
Desolation Sound	15	4	194	7.50	0.0	0.0
Desolation Sound	15	4	195	11.50	0.0	0.0
Desolation Sound	15	4	196	0.00	0.0	0.0
Desolation Sound	15	4	197	0.25	0.0	0.0
Desolation Sound	15	4	198	0.00	0.0	0.0
Desolation Sound	15	4	199	1.00	0.0	0.0
Desolation Sound	15	4	200	1.00	0.0	0.0
Desolation Sound	15	4	201	0.50	0.0	0.0
Desolation Sound	15	4	202	0.00	0.0	0.0
Desolation Sound	15	4	203	0.00	0.0	0.0
Desolation Sound	15	4	204	1.25	0.0	0.0
Desolation Sound	15	4	205	1.75	0.0	0.0
Desolation Sound	15	4	206	2.50	0.0	0.0
Desolation Sound	15	4	207	0.50	0.0	0.0
Desolation Sound	15	4	208	0.50	0.0	0.0
Desolation Sound	15	4	209	1.50	0.0	0.0
Desolation Sound	15	4	210	1.25	0.0	0.0
Desolation Sound	15	4	211	2.25	0.0	0.0
Desolation Sound	15	4	212	10.00	0.5	0.0
Desolation Sound	15	4	213	8.50	0.0	0.0
Desolation Sound	15	4	214	8.75	0.0	0.0
Desolation Sound	15	4	215	1.00	0.0	0.0
Desolation Sound	15	4	216	0.00	0.0	0.0
Desolation Sound	15	4	217	2.50	0.0	0.0
Desolation Sound	15	4	218	15.50	0.0	0.0
Desolation Sound	15	4	220	23.50	0.0	0.0
Desolation Sound	15	4	221	10.75	0.0	1.5
Desolation Sound	15	4	223	19.50	0.0	0.0
Desolation Sound	15	4	224	26.00	0.0	0.0
Desolation Sound	15	5	1	20.50	0.0	0.0
Desolation Sound	15	5	2	23.00	0.0	0.0
Desolation Sound	15	5	3	26.00	0.0	0.0
Desolation Sound	15	5	4	8.00	0.0	0.0
Desolation Sound	15	5	5	26.00	0.0	0.0
Desolation Sound	15	5	6	20.25	0.0	0.0
Desolation Sound	15	5	7	15.75	0.0	0.0
Desolation Sound	15	5	8	23.50	0.0	0.0
Desolation Sound	15	5	9	24.00	0.0	0.0
Desolation Sound	15	5	10	17.75	0.0	0.0
Desolation Sound	15	5	11	22.50	0.0	0.0
Desolation Sound	15	5	12	9.75	0.0	0.0
Desolation Sound	15	5	13	22.75	0.0	0.0
Desolation Sound	15	5	14	23.75	0.0	0.0
Desolation Sound	15	5	15	2.25	0.0	0.0
Desolation Sound	15	5	17	0.00	0.0	0.0
Desolation Sound	15	5	18	0.00	0.0	0.0
Desolation Sound	15	5	19	7.75	0.0	0.0
Desolation Sound	15	5	20	27.50	0.0	0.0
Desolation Sound	15	5	21	32.75	0.0	0.0

Table 10, Desolation Sound cont'd.

Survey	PFMA	SubArea	Transect No.	Linear Density (c/m-sh) *P. californicus*	*C. miniata*	*C. pallida*
Desolation Sound	15	5	22	9.00	0.0	0.0
Desolation Sound	15	5	23	19.25	0.0	0.0
Desolation Sound	15	5	24	22.00	0.0	0.0
Desolation Sound	15	5	25	2.75	0.0	0.0
Desolation Sound	15	5	26	1.25	0.0	0.0
Desolation Sound	15	5	27	22.75	0.0	0.0
Desolation Sound	15	5	28	33.00	0.0	0.0
Desolation Sound	15	5	29	13.75	0.0	0.0
Desolation Sound	15	5	30	15.25	0.0	0.0
Desolation Sound	15	5	31	29.50	0.0	0.0
Desolation Sound	15	5	32	3.75	0.0	0.0
Desolation Sound	15	5	33	3.50	0.0	0.0
Desolation Sound	15	5	34	1.25	0.0	0.0
Desolation Sound	15	5	35	5.50	0.0	0.0
Desolation Sound	15	5	36	12.00	0.0	0.0
Desolation Sound	15	5	37	26.50	0.0	0.0
Desolation Sound	15	5	38	40.00	0.5	0.5
Desolation Sound	15	5	39	5.25	1.5	0.0
Desolation Sound	15	5	40	27.75	0.0	0.0
Desolation Sound	15	5	41	23.50	0.0	0.0
Desolation Sound	15	5	42	8.00	0.0	0.0
Desolation Sound	15	5	43	0.00	0.0	0.0
Desolation Sound	15	5	44	15.00	0.0	0.0
Desolation Sound	15	5	45	0.00	0.0	0.0
Desolation Sound	15	5	46	0.50	0.0	0.0
Desolation Sound	15	5	47	4.75	0.0	0.0
Desolation Sound	15	5	48	16.75	0.0	0.0
Desolation Sound	15	5	49	21.50	0.0	0.0
Desolation Sound	15	5	50	18.75	0.0	0.0
Desolation Sound	15	5	51	20.75	0.0	0.0
Desolation Sound	15	5	52	2.50	0.0	0.0
Desolation Sound	15	5	53	0.00	0.0	0.0
Desolation Sound	15	5	54	5.75	0.0	0.0
Desolation Sound	15	5	55	0.00	0.0	0.0
Desolation Sound	15	5	56	8.50	0.0	0.0
Desolation Sound	15	5	57	7.25	0.0	0.0
Desolation Sound	15	5	58	21.25	0.0	0.0
Desolation Sound	15	5	59	14.25	0.0	0.0
Desolation Sound	15	5	60	4.75	0.0	0.0
Desolation Sound	15	5	61	21.25	0.0	0.0
Desolation Sound	15	5	62	11.50	0.0	0.0
Desolation Sound	15	5	63	11.00	0.0	0.0
Desolation Sound	15	5	64	6.00	0.0	0.0
Desolation Sound	15	5	65	19.50	0.0	0.0
Desolation Sound	15	5	66	15.25	0.0	0.0
Desolation Sound	15	5	67	10.50	0.0	0.0
Desolation Sound	15	5	68	38.25	0.0	0.0
Desolation Sound	15	5	69	27.50	0.0	0.0
Desolation Sound	15	5	70	12.50	0.0	0.0
Desolation Sound	15	5	71	49.75	0.0	0.0
Desolation Sound	15	5	72	4.00	0.0	0.0
Desolation Sound	15	5	73	10.00	0.0	0.0
Desolation Sound	15	5	74	24.50	0.0	0.0
Desolation Sound	15	5	75	58.50	0.0	0.0
Desolation Sound	15	5	76	14.00	0.0	0.0
Desolation Sound	15	5	77	12.75	0.0	0.0
Desolation Sound	15	5	78	4.75	0.0	0.0
Desolation Sound	15	5	79	29.75	0.0	0.0
Desolation Sound	15	5	80	41.50	0.0	0.0
Desolation Sound	15	5	81	46.00	0.0	0.0

Table 10, Desolation Sound survey cont'd.

Survey	PFMA	SubArea	Transect No.	Linear Density (c/m-sh) *P. californicus*	*C. miniata*	*C. pallida*
Desolation Sound	15	5	82	28.25	0.0	0.0
Desolation Sound	15	5	83	27.75	0.0	0.0
Desolation Sound	15	5	84	50.75	--	--
Desolation Sound	15	5	85	56.25	0.0	0.0
Desolation Sound	15	5	86	32.00	0.0	0.0
Desolation Sound	15	5	87	39.50	0.0	0.0
Desolation Sound	15	5	88	17.75	0.0	0.0
Desolation Sound	15	5	89	13.50	--	--
Desolation Sound	15	5	90	26.75	0.0	0.0
Desolation Sound	15	5	91	21.75	0.0	0.0
Desolation Sound	15	5	92	12.75	0.0	1.0
Desolation Sound	15	5	93	24.75	0.0	0.0
Desolation Sound	15	5	94	13.50	0.0	0.0
Desolation Sound	15	5	95	5.00	0.0	0.0
Desolation Sound	15	5	96	6.25	0.0	0.0
Desolation Sound	15	5	97	15.75	0.0	0.0
Desolation Sound	15	5	98	10.25	0.0	0.0
Desolation Sound	15	5	99	20.00	0.0	0.0
Desolation Sound	15	5	100	6.75	0.0	0.0
Desolation Sound	15	5	101	5.25	0.0	0.0
Desolation Sound	15	5	102	28.00	0.0	0.5
Desolation Sound	15	5	103	25.50	0.0	3.0
Desolation Sound	15	5	104	13.25	2.0	1.5
Desolation Sound	15	5	105	21.50	0.0	0.0
Desolation Sound	15	5	106	25.25	0.0	0.0
Desolation Sound	15	5	107	33.75	0.0	0.0
Desolation Sound	15	5	108	26.50	0.0	0.0
Desolation Sound	15	5	109	34.50	0.0	0.0
Desolation Sound	15	5	110	35.50	0.0	0.0
Desolation Sound	15	5	111	0.00	0.0	0.0
Desolation Sound	15	5	112	13.25	0.0	0.5
Desolation Sound	15	5	113	14.75	0.0	0.0
Desolation Sound	15	5	114	42.25	0.0	0.0
Desolation Sound	15	5	115	29.75	0.0	0.0
Desolation Sound	15	5	116	19.50	0.0	0.0
Desolation Sound	15	5	117	15.00	0.0	0.0
Desolation Sound	15	5	118	0.00	0.0	0.0
Desolation Sound	15	5	119	16.50	0.0	0.0
Desolation Sound	15	5	120	5.00	0.0	0.0
Desolation Sound	15	5	121	2.25	0.0	0.0
Desolation Sound	15	5	122	34.50	0.0	0.0
Desolation Sound	15	5	123	0.25	0.0	0.0
Desolation Sound	15	5	124	10.25	0.0	0.0
Desolation Sound	15	5	125	14.00	0.0	0.0
Desolation Sound	15	5	126	21.00	0.0	0.0
Desolation Sound	15	5	127	53.50	0.0	0.0
Desolation Sound	15	5	128	45.25	0.0	0.0
Desolation Sound	15	5	129	14.50	0.0	0.0
Desolation Sound	15	5	130	17.00	0.0	0.0
Desolation Sound	15	5	131	6.75	0.0	0.0
Desolation Sound	15	5	132	17.00	0.0	0.0
Desolation Sound	15	5	133	15.00	0.0	0.0
Desolation Sound	15	5	134	49.50	0.0	0.0
Desolation Sound	15	5	135	23.25	0.0	0.0
Desolation Sound	15	5	136	28.00	0.0	0.0
Desolation Sound	15	5	137	33.25	0.0	0.0
Desolation Sound	15	5	138	39.50	0.0	0.0
Desolation Sound	15	5	139	26.25	0.0	0.0
Desolation Sound	15	5	140	24.00	0.0	0.0
Desolation Sound	15	5	141	11.50	0.0	0.0

Table 10, Desolation Sound survey cont'd.

Survey	PFMA	SubArea	Transect No.	Linear Density (c/m-sh) *P. californicus*	*C. miniata*	*C. pallida*
Desolation Sound	15	5	142	13.00	0.0	0.0
Desolation Sound	15	5	143	17.75	0.0	0.0
Desolation Sound	15	5	144	11.25	0.0	0.0
Desolation Sound	15	5	145	16.75	0.0	0.0
Desolation Sound	15	5	146	2.00	0.0	0.0
Desolation Sound	15	5	147	11.25	0.0	0.0
Desolation Sound	15	5	148	10.75	0.0	0.0
Desolation Sound	15	5	149	20.75	0.0	0.0
Desolation Sound	15	5	150	19.25	0.0	0.0
Desolation Sound	15	5	151	6.25	0.0	0.0
Desolation Sound	15	5	152	37.00	0.0	0.0
Desolation Sound	15	5	153	21.50	0.0	0.0
Desolation Sound	15	5	154	14.75	0.0	0.0
Desolation Sound	15	5	155	12.25	0.0	0.0
Desolation Sound	15	5	156	11.75	2.0	0.0
Desolation Sound	15	5	157	5.50	0.0	0.0
Desolation Sound	15	5	158	3.25	0.0	0.0
Desolation Sound	15	5	159	14.75	0.0	0.0
Desolation Sound	15	5	160	5.75	0.0	0.0
Desolation Sound	15	5	161	3.00	0.0	0.0
Desolation Sound	15	5	162	5.00	0.0	0.0
Desolation Sound	15	5	163	4.25	0.0	0.0
Desolation Sound	15	5	164	0.50	0.0	0.0
Desolation Sound	15	5	165	1.25	0.0	0.0
Desolation Sound	15	5	166	4.75	0.0	0.0
Desolation Sound	15	5	167	7.25	0.0	0.0
Desolation Sound	15	5	168	6.50	0.0	0.0
Desolation Sound	15	5	169	8.50	0.0	0.0
Desolation Sound	15	5	170	14.75	0.0	0.0
Desolation Sound	15	5	171	26.25	0.0	0.0
Desolation Sound	15	5	172	27.00	0.0	0.0
Desolation Sound	15	5	173	8.00	0.0	0.5
Desolation Sound	15	5	174	12.00	0.0	0.0
Desolation Sound	15	5	175	14.25	0.0	0.0
Desolation Sound	15	5	176	45.00	0.0	0.0
Desolation Sound	15	5	177	23.00	0.0	0.0
Desolation Sound	15	5	178	13.50	0.0	0.0
Desolation Sound	15	5	179	12.50	0.0	0.0
Desolation Sound	15	5	180	31.50	0.0	0.0
Desolation Sound	15	5	181	27.25	0.0	0.0
Desolation Sound	15	5	182	21.25	0.0	0.0
Desolation Sound	15	6	225	61.75	0.0	0.0
Desolation Sound	15	6	226	11.50	0.0	0.0
Desolation Sound	15	6	227	9.50	0.0	0.0
Desolation Sound	15	6	228	16.00	0.0	0.0
Desolation Sound	15	6	229	10.00	0.0	0.0
Desolation Sound	15	6	230	11.25	0.0	0.0
Desolation Sound	15	6	231	7.25	0.0	0.0
Desolation Sound	15	6	232	3.25	0.0	0.0
Desolation Sound	15	6	233	0.00	0.0	0.0
Desolation Sound	15	6	234	1.50	0.0	0.0
Desolation Sound	15	6	235	4.00	0.0	0.0
Desolation Sound	15	6	236	2.00	0.0	0.0
Desolation Sound	15	6	237	5.75	0.0	0.0
Desolation Sound	15	6	238	2.50	0.0	0.0
Desolation Sound	15	6	239	4.50	0.0	0.0
Desolation Sound	15	6	240	0.00	0.0	0.0
Desolation Sound	15	6	241	7.25	0.0	0.0
Desolation Sound	15	6	242	0.00	0.0	0.0
Desolation Sound	15	6	243	0.00	0.0	0.0

Table 10, Desolation Sound survey cont'd.

Survey	PFMA	SubArea	Transect No.	Linear Density (c/m-sh) *P. californicus*	*C. miniata*	*C. pallida*
Desolation Sound	15	6	244	0.00	0.0	0.0
Desolation Sound	15	6	245	0.00	0.0	0.0
Desolation Sound	15	6	246	0.25	0.0	0.0
Desolation Sound	15	6	247	6.25	0.0	0.0
Desolation Sound	15	6	248	0.75	0.0	0.0
Desolation Sound	15	6	249	1.75	0.0	0.0
Desolation Sound	15	6	250	0.00	0.0	0.0
Desolation Sound	15	6	251	1.00	0.0	0.0
Desolation Sound	15	6	252	0.75	0.0	0.0
Desolation Sound	15	6	253	3.75	0.0	0.0
Desolation Sound	15	6	254	1.00	0.0	0.0
Desolation Sound	15	6	255	1.00	0.0	0.0
Desolation Sound	15	6	256	7.50	0.0	0.0
Desolation Sound	15	6	257	3.50	0.0	0.0
Desolation Sound	15	6	258	1.50	0.0	0.0
Desolation Sound	15	6	259	0.00	0.0	0.0
Desolation Sound	15	6	260	1.25	0.0	0.0
Desolation Sound	15	6	261	10.75	0.0	0.0
Desolation Sound	15	6	262	0.50	0.0	0.0
Desolation Sound	15	6	263	0.25	0.0	0.0
Desolation Sound	15	6	264	1.25	0.0	0.0
Desolation Sound	15	6	265	11.50	0.0	0.0
Desolation Sound	15	6	266	7.50	0.0	0.0

Table 11. Linear density (sea cucumbers per meter shoreline; c/m-sh) for *Parastichopus californicus*, *Cucumaria miniata* and *C. pallida*, by transect, in the Cowichan Bay survey.

				Linear Density (c/m-sh)		
Survey	PFMA	SubArea	Transect No.	*P. californicus*	*C. miniata*	*C. pallida*
Cowichan Bay	17	9	27	0.00	0.0	0.0
Cowichan Bay	17	9	28	0.00	0.0	0.0
Cowichan Bay	17	9	29	0.00	0.0	0.0
Cowichan Bay	17	9	30	0.25	0.0	0.0
Cowichan Bay	17	9	31	0.00	0.0	0.0
Cowichan Bay	17	9	32	3.50	0.0	0.0
Cowichan Bay	17	9	33	0.00	0.0	0.0
Cowichan Bay	17	9	34	0.00	0.0	0.0
Cowichan Bay	17	9	37	0.00	0.0	0.0
Cowichan Bay	17	9	38	0.00	0.0	0.0
Cowichan Bay	17	9	39	0.00	0.0	0.0
Cowichan Bay	17	9	40	0.00	0.0	0.0
Cowichan Bay	18	7	1	2.00	0.0	0.0
Cowichan Bay	18	7	2	0.00	0.0	0.0
Cowichan Bay	18	7	3	0.00	0.0	0.0
Cowichan Bay	18	7	4	15.50	0.0	0.0
Cowichan Bay	18	7	5	3.00	0.0	0.0
Cowichan Bay	18	7	6	2.50	0.0	0.0
Cowichan Bay	18	7	7	0.75	0.0	0.0
Cowichan Bay	18	7	8	0.50	0.0	0.0
Cowichan Bay	18	7	9	1.50	0.0	0.0
Cowichan Bay	18	7	10	1.00	0.0	0.0
Cowichan Bay	18	7	11	0.50	0.0	0.0
Cowichan Bay	18	7	12	4.75	0.0	0.0
Cowichan Bay	18	7	13	0.25	0.0	0.0
Cowichan Bay	18	7	14	3.25	0.0	0.0
Cowichan Bay	18	7	15	1.25	0.0	0.0
Cowichan Bay	18	7	16	5.00	0.0	0.0
Cowichan Bay	18	7	17	1.50	0.0	0.0
Cowichan Bay	18	7	18	0.00	0.0	0.0
Cowichan Bay	18	7	19	0.25	0.0	0.0
Cowichan Bay	18	7	20	0.25	0.0	0.0
Cowichan Bay	18	7	21	2.50	0.0	0.0
Cowichan Bay	18	7	22	0.00	0.0	0.0
Cowichan Bay	18	7	23	0.00	0.0	0.0
Cowichan Bay	18	7	24	0.00	0.0	0.0
Cowichan Bay	18	7	25	0.00	0.0	0.0
Cowichan Bay	18	7	26	0.50	0.0	0.0

Table 12. Linear density (sea cucumbers per meter shoreline; c/m-sh) for *Parastichopus californicus*, *Cucumaria miniata* and *C. pallida*, by transect, in the Howe Sound survey.

				Linear Density (c/m-sh)		
Survey	PFMA	SubArea	Transect No.	*P. californicus*	*C. miniata*	*C. pallida*
Howe Sound	28	1	1	9.25	0.0	0.0
Howe Sound	28	1	2	0.00	0.0	0.0
Howe Sound	28	1	3	0.00	0.0	0.0
Howe Sound	28	1	4	0.00	0.0	0.0
Howe Sound	28	1	5	1.00	0.0	0.0
Howe Sound	28	1	6	0.50	0.0	0.0
Howe Sound	28	1	7	0.00	0.0	0.0
Howe Sound	28	1	8	1.75	0.5	0.0
Howe Sound	28	1	9	8.25	0.0	0.0
Howe Sound	28	1	10	3.00	0.0	0.0
Howe Sound	28	1	11	2.75	0.0	0.0
Howe Sound	28	1	12	3.75	0.0	0.0
Howe Sound	28	1	13	5.25	0.0	0.0
Howe Sound	28	1	14	0.25	0.0	0.0
Howe Sound	28	1	15	1.25	0.0	0.0
Howe Sound	28	1	16	0.00	0.0	0.0
Howe Sound	28	1	17	1.00	0.0	0.0
Howe Sound	28	1	18	1.25	0.0	0.0
Howe Sound	28	1	19	3.50	0.0	0.0
Howe Sound	28	1	20	0.25	0.0	0.0
Howe Sound	28	1	21	0.00	0.0	0.0
Howe Sound	28	1	22	4.75	0.0	0.0
Howe Sound	28	1	23	0.50	0.0	0.0
Howe Sound	28	1	24	0.50	0.0	0.0
Howe Sound	28	1	25	0.00	0.0	0.0
Howe Sound	28	1	26	0.25	0.0	0.0
Howe Sound	28	1	27	0.00	1.5	0.0
Howe Sound	28	1	28	0.00	0.0	0.0
Howe Sound	28	1	29	0.00	0.0	0.0
Howe Sound	28	1	30	0.00	0.0	0.0
Howe Sound	28	1	31	0.25	0.0	0.0
Howe Sound	28	1	32	0.00	0.0	0.0
Howe Sound	28	1	33	0.00	0.0	0.0
Howe Sound	28	1	34	0.25	0.0	0.0
Howe Sound	28	1	35	0.00	0.0	0.0
Howe Sound	28	1	36	0.00	0.0	0.0
Howe Sound	28	1	37	1.25	0.0	0.0
Howe Sound	28	1	38	0.00	0.0	0.0
Howe Sound	28	1	39	0.00	0.0	0.0
Howe Sound	28	1	40	0.00	0.0	0.0
Howe Sound	28	1	41	0.00	0.0	0.0
Howe Sound	28	1	42	0.00	0.0	0.0
Howe Sound	28	1	43	0.75	0.0	0.0
Howe Sound	28	1	44	4.00	0.0	0.0
Howe Sound	28	1	45	0.50	0.0	0.0
Howe Sound	28	1	46	3.75	0.0	0.0
Howe Sound	28	1	47	0.50	0.0	0.0
Howe Sound	28	1	48	1.00	0.0	0.0
Howe Sound	28	2	81	0.00	0.0	0.0
Howe Sound	28	2	82	0.00	0.0	0.0
Howe Sound	28	2	83	0.00	0.0	0.0
Howe Sound	28	2	84	0.00	0.0	0.0
Howe Sound	28	2	85	0.00	0.0	0.0
Howe Sound	28	2	86	2.75	0.0	0.0
Howe Sound	28	2	87	0.75	0.0	0.0
Howe Sound	28	2	88	0.50	4.0	0.0
Howe Sound	28	2	89	4.25	0.5	0.5
Howe Sound	28	2	90	2.25	0.0	0.0
Howe Sound	28	2	91	0.25	0.0	0.0
Howe Sound	28	2	92	10.25	1.5	0.5

Table 12, Howe Sound cont'd.

Survey	PFMA	SubArea	Transect No.	Linear Density (c/m-sh) *P. californicus*	*C. miniata*	*C. pallida*
Howe Sound	28	2	93	3.25	1.5	0.0
Howe Sound	28	2	94	1.25	0.0	0.0
Howe Sound	28	2	95	8.25	2.5	0.0
Howe Sound	28	2	96	14.75	0.0	0.0
Howe Sound	28	2	97	6.25	0.0	0.0
Howe Sound	28	2	98	0.00	0.0	0.0
Howe Sound	28	2	99	17.25	1.0	0.0
Howe Sound	28	2	100	4.00	0.5	0.0
Howe Sound	28	2	101	1.50	0.0	0.0
Howe Sound	28	2	102	0.75	0.0	0.0
Howe Sound	28	2	103	4.25	0.0	0.0
Howe Sound	28	2	104	2.75	0.0	0.0
Howe Sound	28	2	105	0.50	0.0	0.0
Howe Sound	28	2	106	0.00	0.0	0.0
Howe Sound	28	2	107	3.00	0.0	0.0
Howe Sound	28	2	108	3.00	0.0	0.0
Howe Sound	28	2	109	0.75	0.0	0.0
Howe Sound	28	2	110	0.00	0.5	0.0
Howe Sound	28	2	111	1.50	0.0	0.0
Howe Sound	28	2	112	1.75	1.0	0.0
Howe Sound	28	2	113	1.25	0.0	0.0
Howe Sound	28	2	114	5.25	0.0	0.0
Howe Sound	28	2	115	4.25	0.5	0.0
Howe Sound	28	2	116	0.00	0.0	0.0
Howe Sound	28	2	117	1.00	0.0	0.0
Howe Sound	28	3	52	6.25	0.0	0.0
Howe Sound	28	3	53	4.00	0.0	0.0
Howe Sound	28	3	54	1.00	0.0	0.0
Howe Sound	28	3	55	2.00	0.0	0.0
Howe Sound	28	3	56	2.25	0.0	0.0
Howe Sound	28	3	58	0.25	0.0	0.0
Howe Sound	28	3	59	1.75	0.0	0.0
Howe Sound	28	3	60	3.75	0.0	0.0
Howe Sound	28	3	61	4.50	0.0	0.0
Howe Sound	28	3	62	5.75	0.0	0.0
Howe Sound	28	3	63	0.00	0.0	0.0
Howe Sound	28	3	64	2.00	0.0	0.0
Howe Sound	28	3	65	0.50	0.0	0.0
Howe Sound	28	3	66	8.75	0.0	0.0
Howe Sound	28	3	67	4.50	0.0	0.0
Howe Sound	28	3	68	2.50	0.0	0.0
Howe Sound	28	3	69	3.25	0.0	0.0
Howe Sound	28	3	70	0.25	0.0	0.0
Howe Sound	28	3	71	9.50	0.0	0.0
Howe Sound	28	3	72	0.00	0.0	0.0
Howe Sound	28	3	73	0.75	0.0	0.0
Howe Sound	28	3	74	0.25	0.0	0.0
Howe Sound	28	3	75	6.25	1.0	0.0
Howe Sound	28	3	76	12.00	2.0	0.0
Howe Sound	28	4	118	5.00	0.0	0.0
Howe Sound	28	4	119	7.50	0.0	0.0
Howe Sound	28	4	120	19.75	0.0	0.0
Howe Sound	28	4	121	0.00	0.0	0.0
Howe Sound	28	4	122	2.00	0.0	0.0
Howe Sound	28	4	123	0.00	0.0	0.0
Howe Sound	28	4	124	0.25	0.0	0.0
Howe Sound	28	4	125	0.50	0.0	0.0
Howe Sound	28	4	126	0.00	0.0	0.0
Howe Sound	28	4	127	4.00	3.0	0.0
Howe Sound	28	4	128	1.00	0.0	0.0

Table 12, Howe Sound cont'd.

Survey	PFMA	SubArea	Transect No.	Linear Density (c/m-sh) *P. californicus*	*C. miniata*	*C. pallida*
Howe Sound	28	4	129	0.25	0.0	0.0
Howe Sound	28	4	130	15.00	0.0	0.0
Howe Sound	28	4	131	0.00	0.0	0.0
Howe Sound	28	5	132	0.25	0.0	0.0
Howe Sound	28	5	133	0.50	0.0	0.0
Howe Sound	28	5	134	1.00	0.0	0.0
Howe Sound	28	5	135	0.00	0.0	0.0
Howe Sound	28	5	136	3.25	0.0	0.0
Howe Sound	28	5	137	0.00	0.0	0.0
Howe Sound	28	5	138	0.00	0.0	0.0
Howe Sound	28	5	139	0.00	0.0	0.0
Howe Sound	28	5	140	0.00	0.0	0.0
Howe Sound	28	5	141	0.00	0.0	0.0
Howe Sound	28	5	142	0.00	0.0	0.0
Howe Sound	28	5	143	0.25	0.0	0.0
Howe Sound	28	5	144	0.00	0.0	0.0
Howe Sound	28	5	145	0.00	0.0	0.0
Howe Sound	28	5	146	0.25	0.0	0.0
Howe Sound	28	5	147	6.00	0.0	0.0
Howe Sound	28	6	77	0.00	0.0	0.0
Howe Sound	28	6	78	0.25	1.0	0.0
Howe Sound	28	6	79	0.00	0.0	0.0
Howe Sound	28	6	80	0.00	0.0	0.0
Howe Sound	29	3	49	0.00	0.0	0.0
Howe Sound	29	3	50	0.25	1.0	0.0
Howe Sound	29	3	51	0.00	0.0	0.0

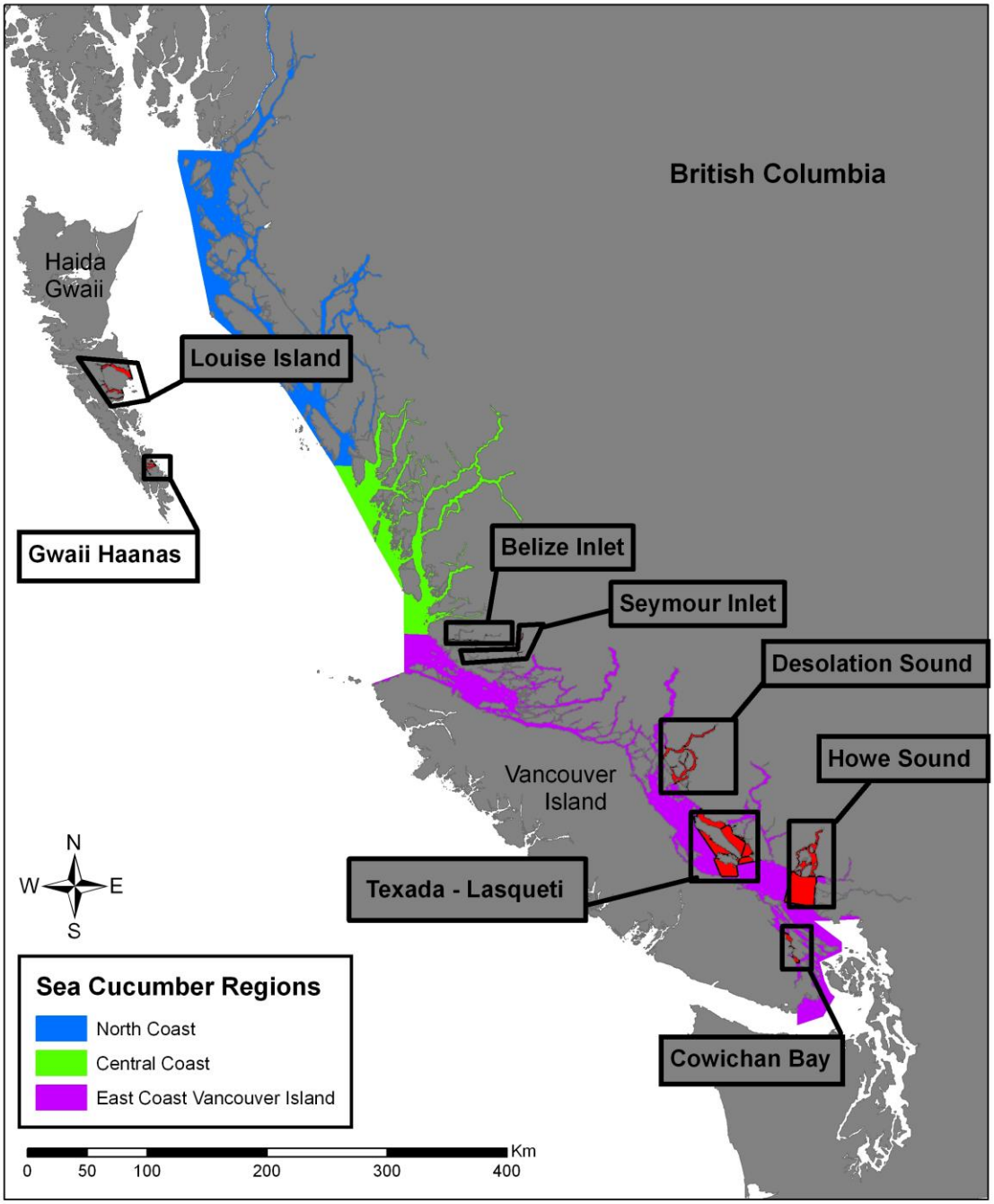

Figure 1. Sea cucumber surveys conducted June 2011 to May 2012. Open surveys conducted were Louise Island, Gwaii Haanas, Belize Inlet, Seymour Inlet, Desolation Sound, Texada – Lasqueti, Cowichan Bay and Howe Sound.

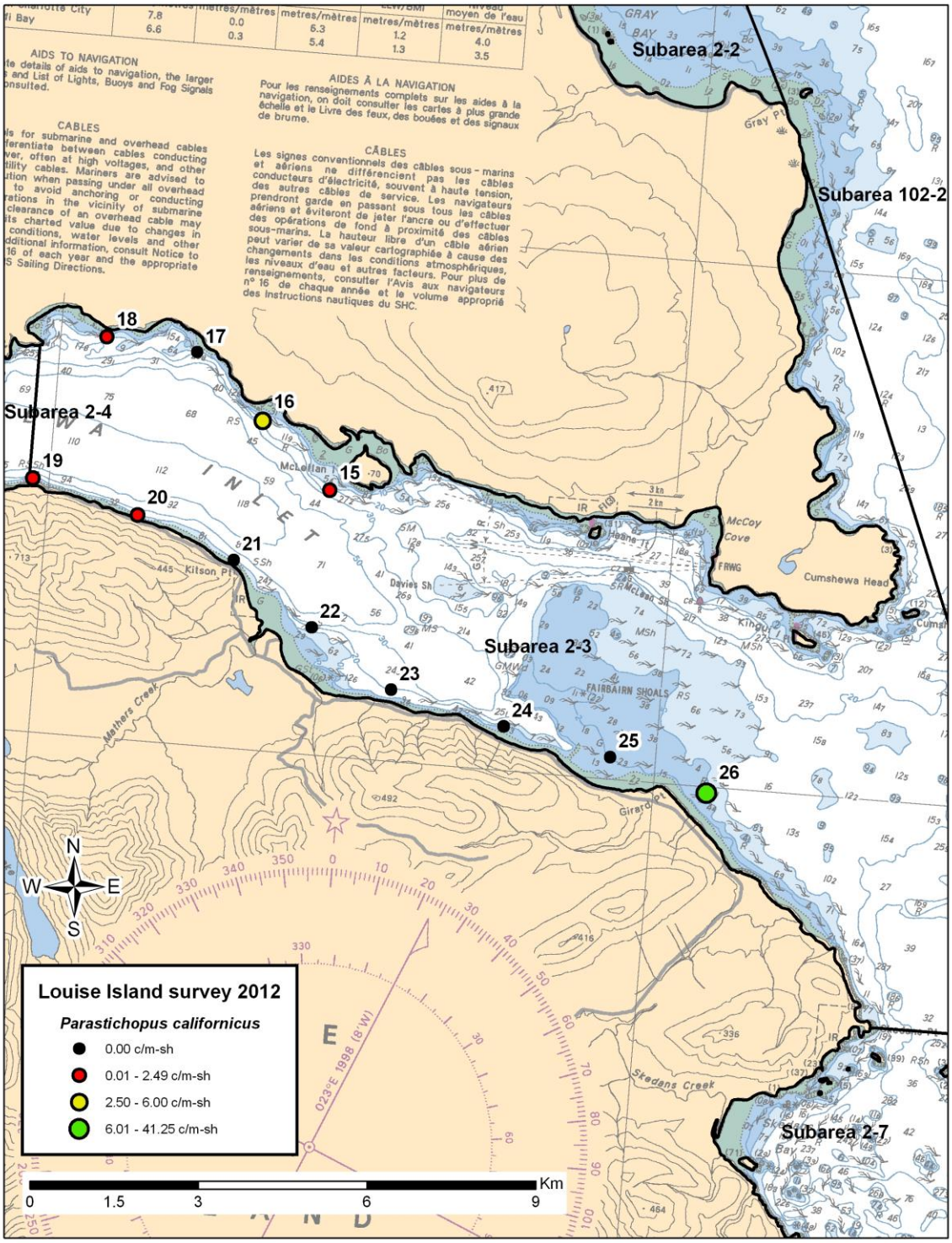

Figure 2. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 2–3, surveyed as part of the Louise Island survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and Regional Baseline Density); green = productive locations (between 6.00 c/m-sh and the maximum observed in the Subarea).

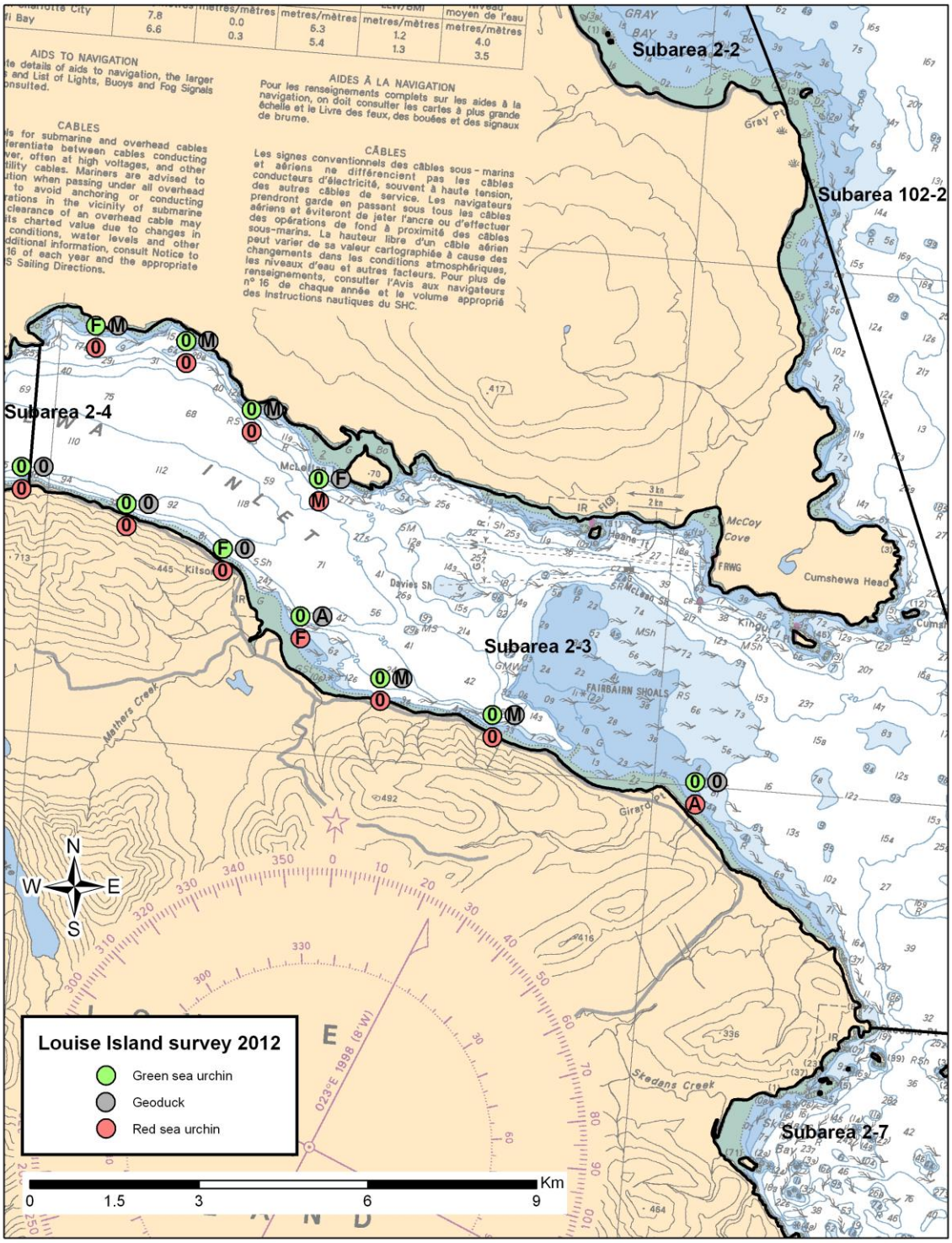

Figure 3. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 2–3. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

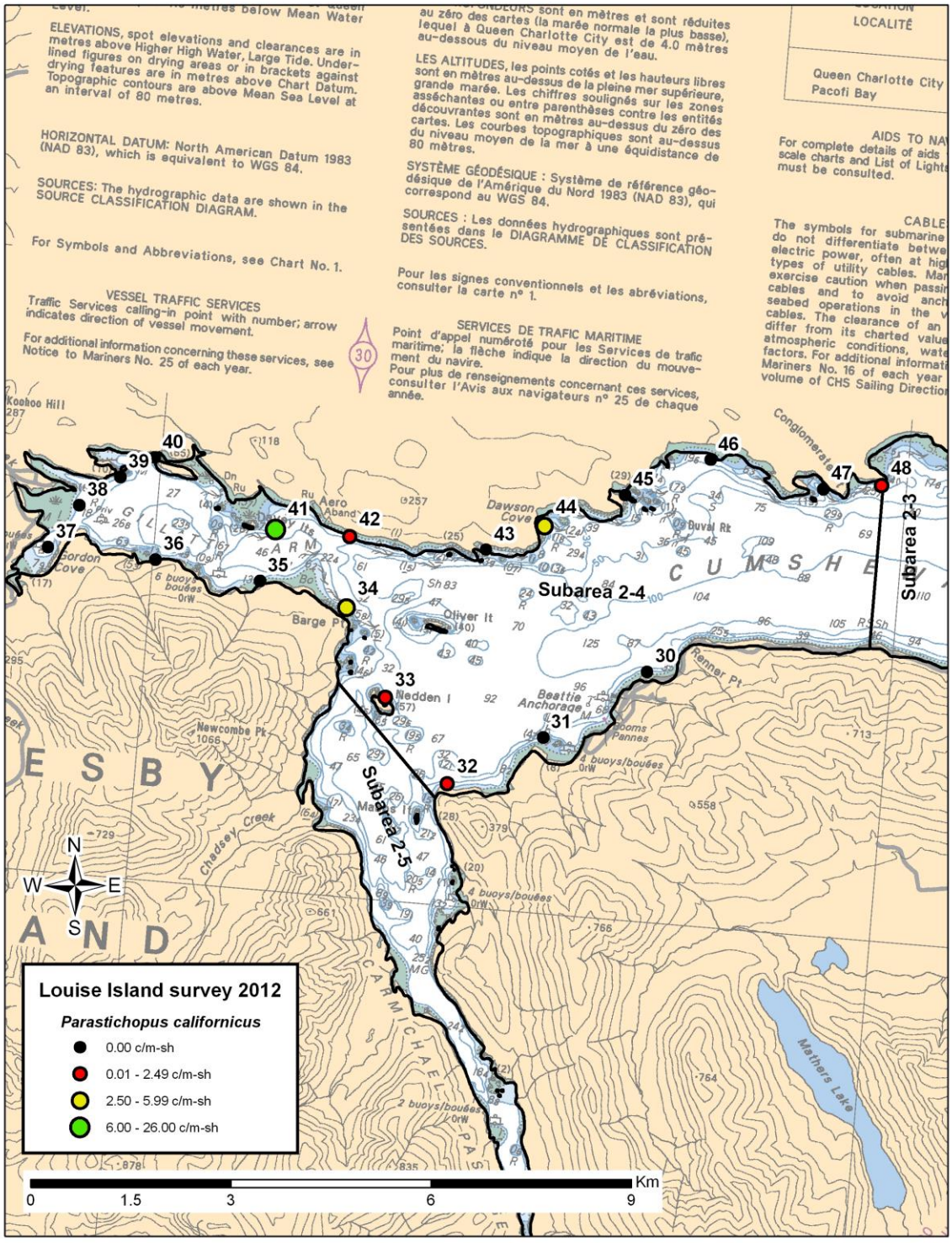

Figure 4. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 2–4, surveyed as part of the Louise Island survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and Regional Baseline Density); green = productive locations (between 6.00 c/m-sh and the maximum observed density in the Subarea).

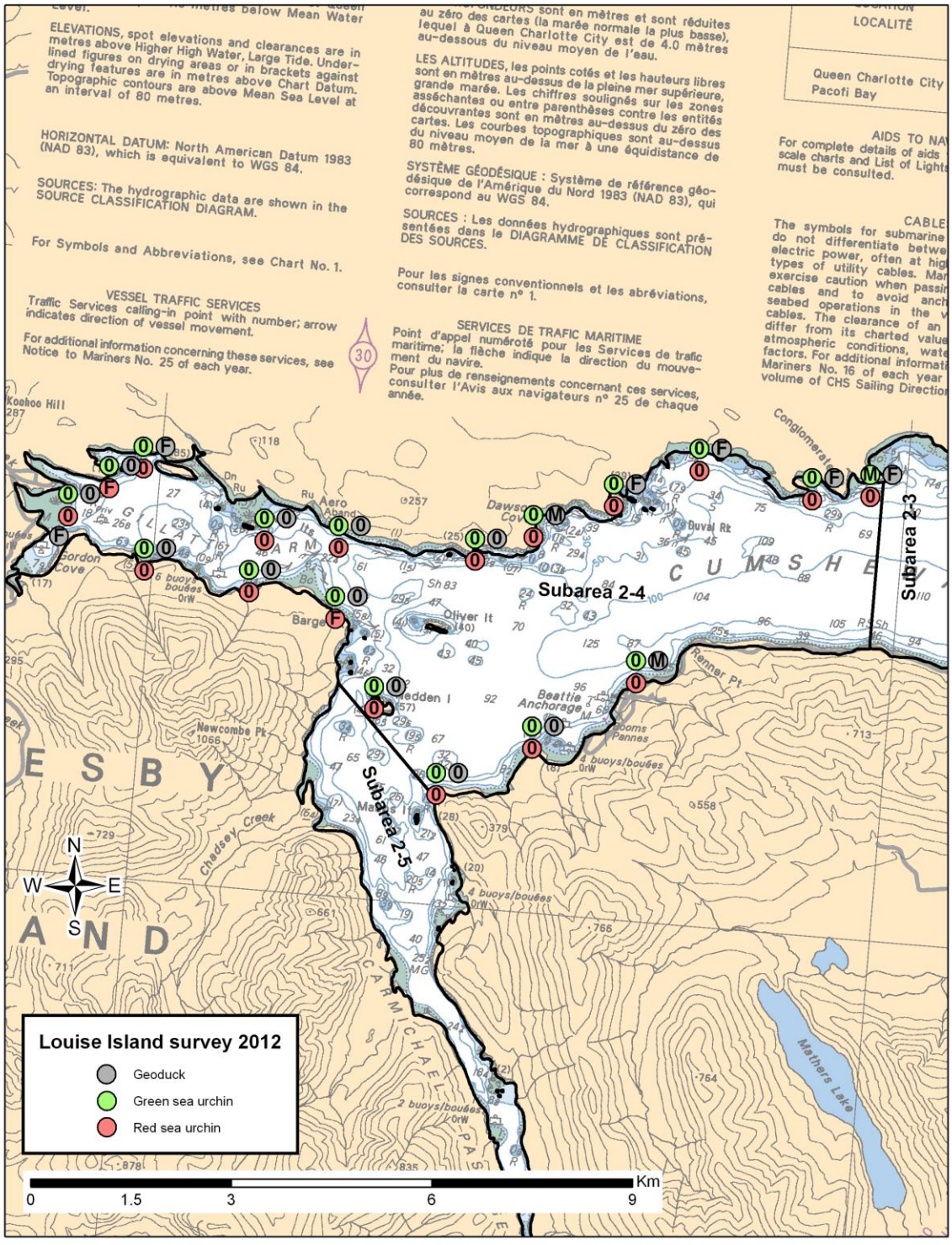

Figure 5. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 2–4. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

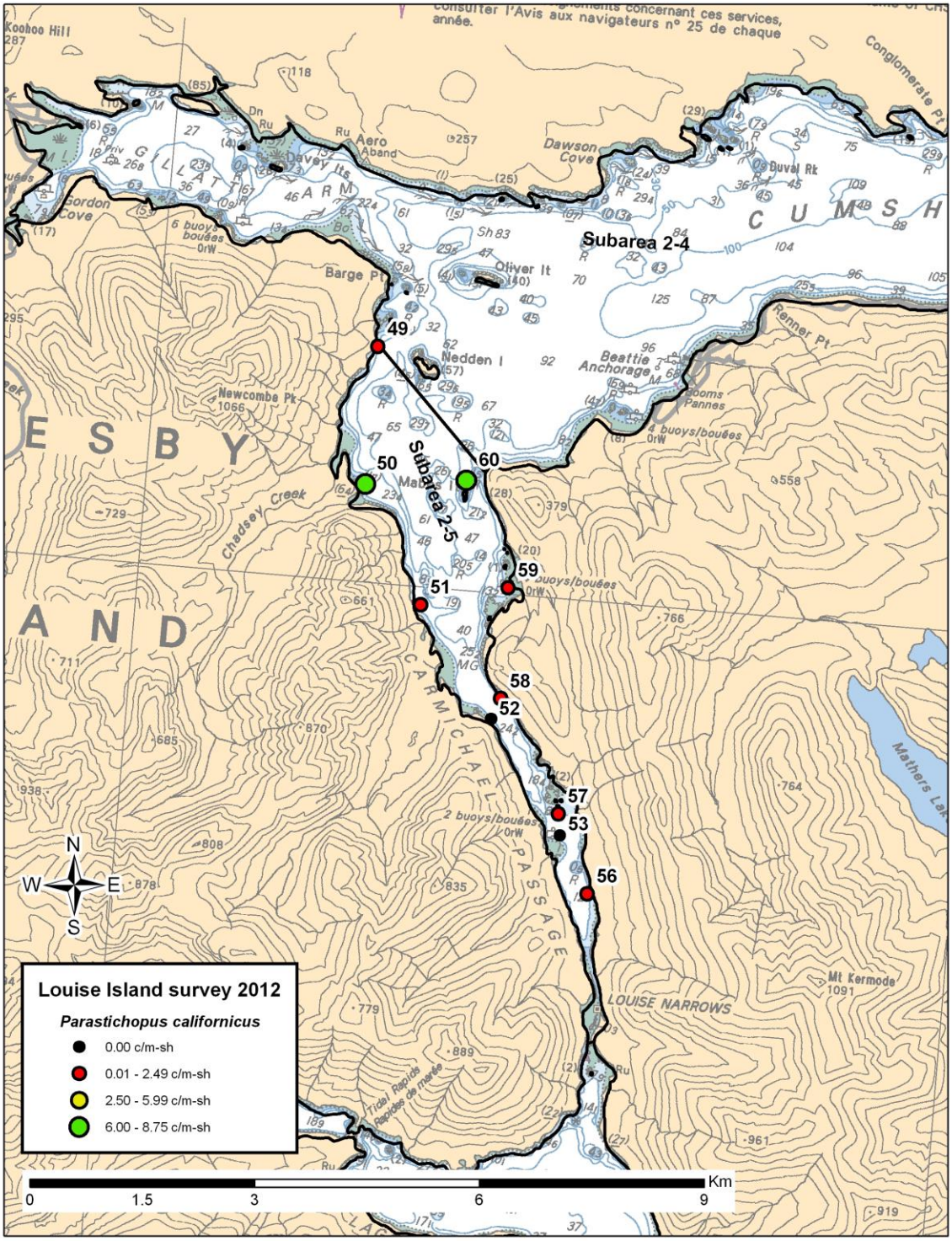

Figure 6. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 2–5, surveyed as part of the Louise Island survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (between 6.00 c/m-sh and the maximum observed density in the Subarea).

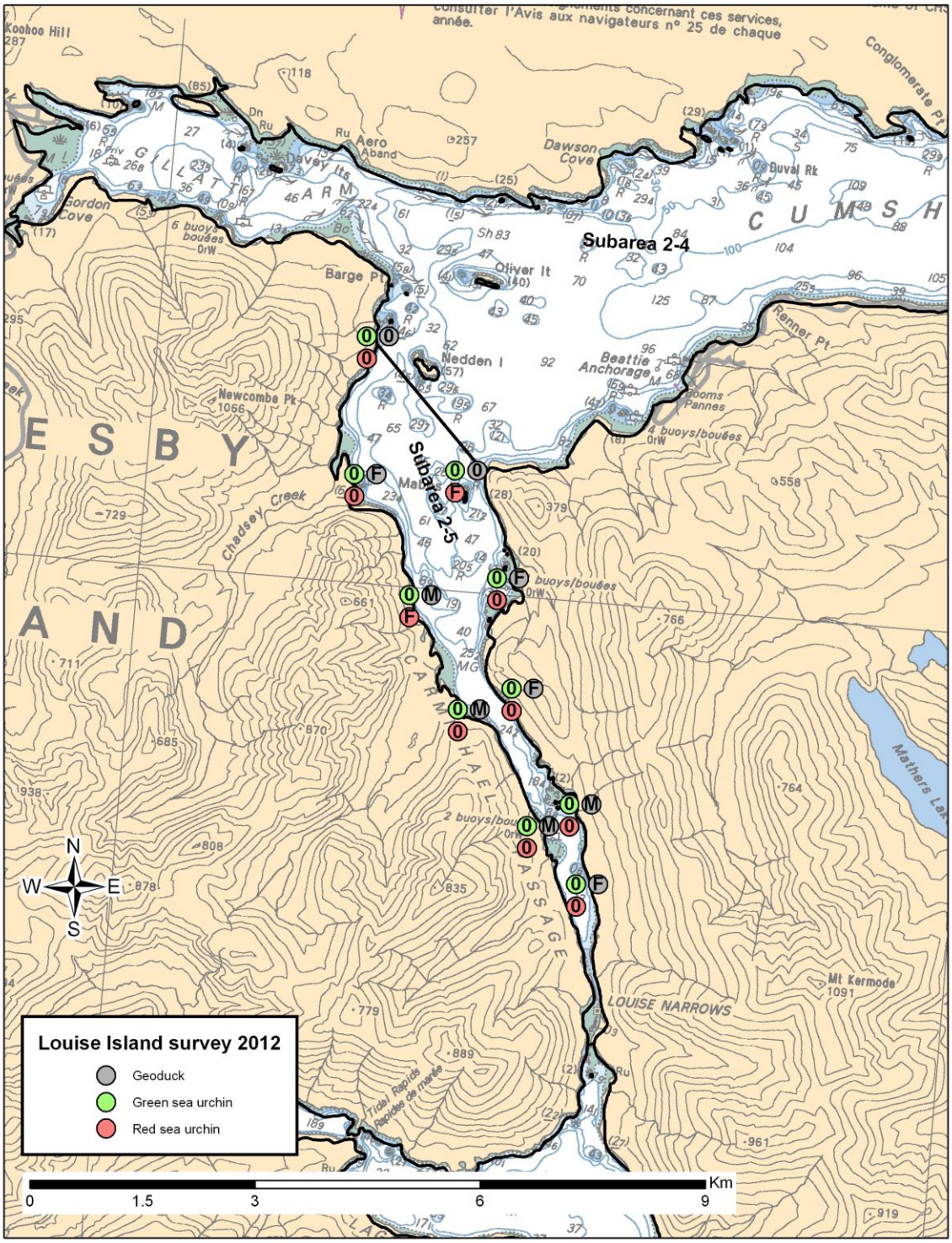

Figure 7. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in a portion of PFMA 2–5. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

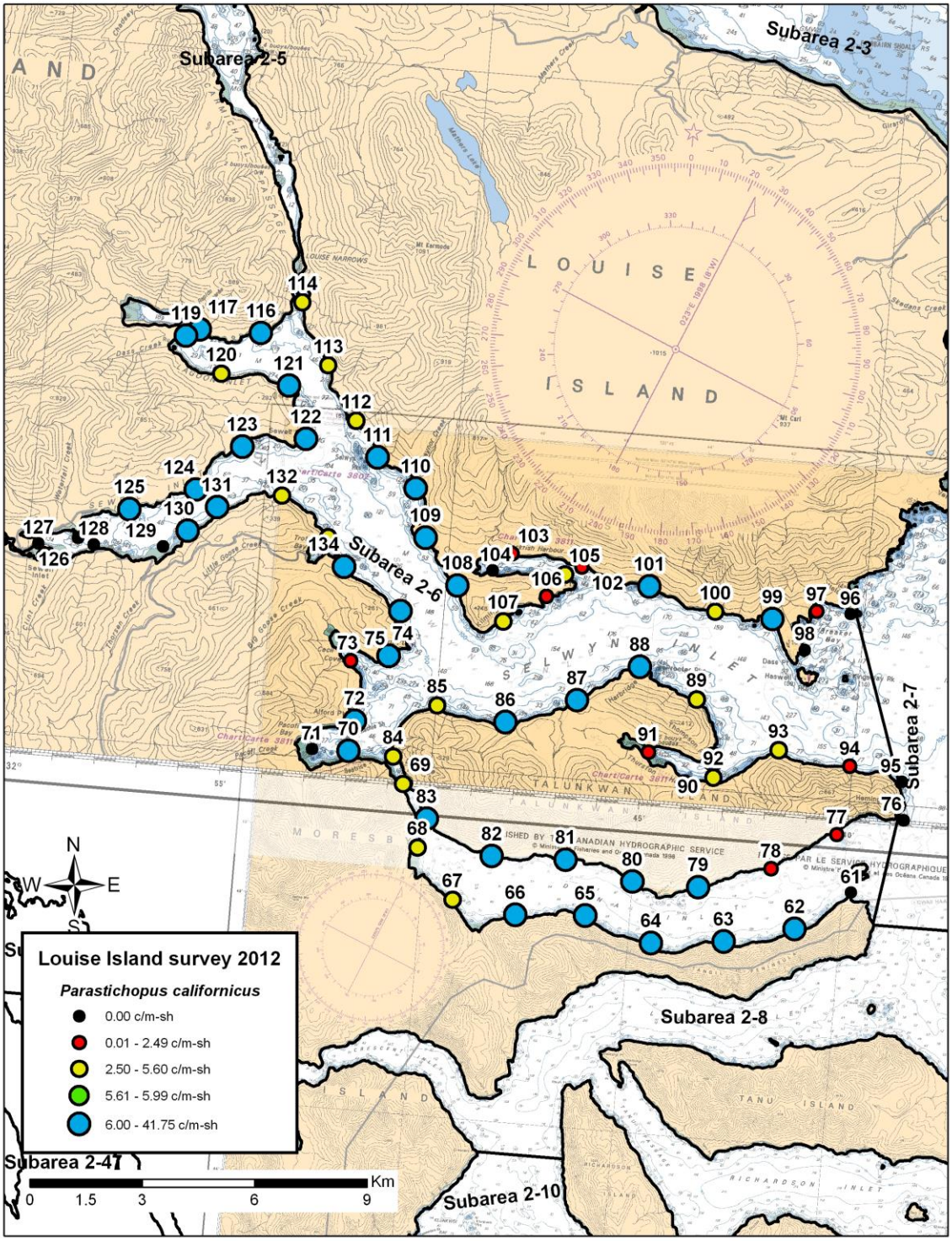

Figure 8. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 2–6, surveyed as part of the Louise Island survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and 90% lower confidence bound calculated for the Subarea); green = productive locations (between 5.61 and the Regional Baseline Density); blue = very productive locations (densities above the Regional Baseline Density).

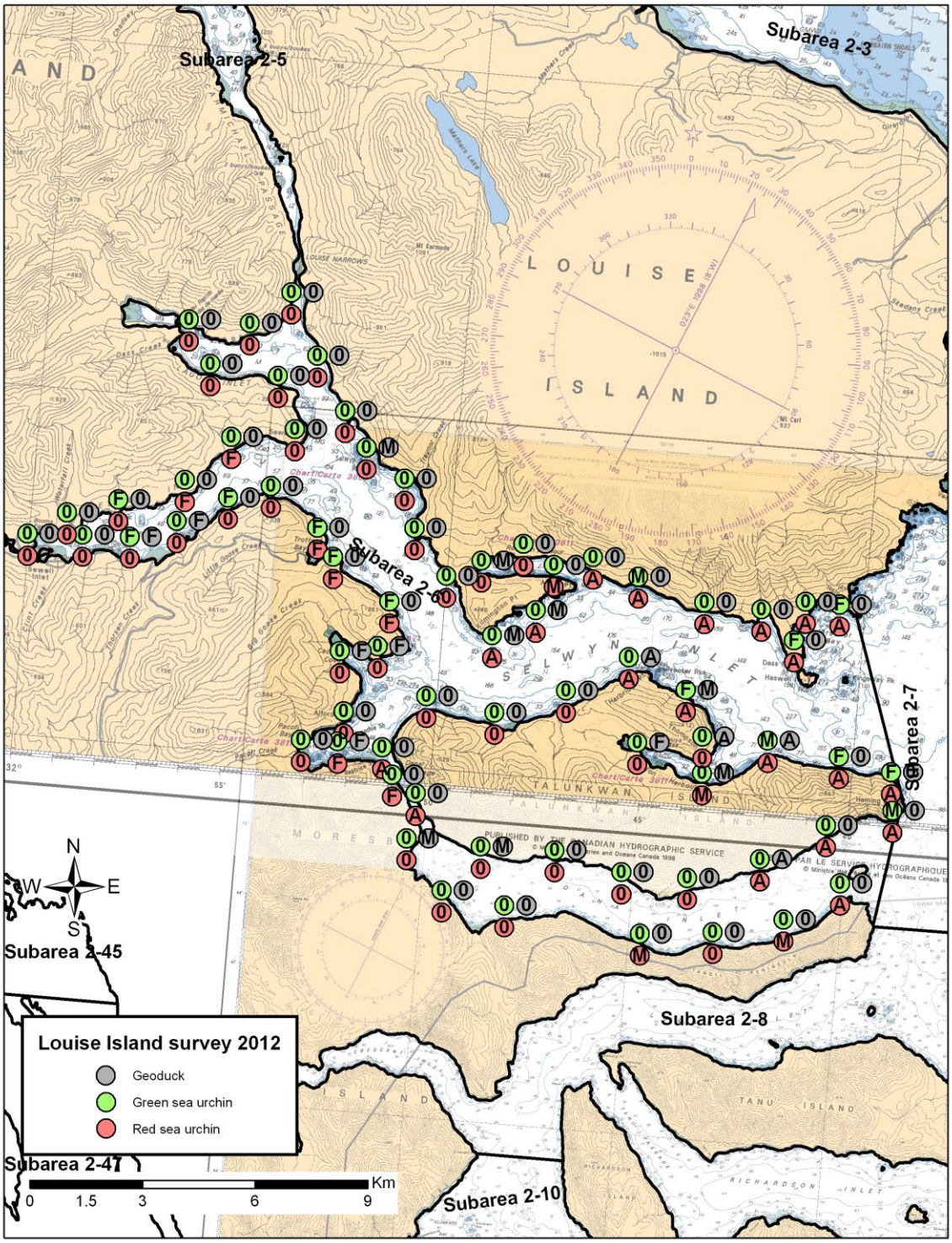

Figure 9. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 2–6. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

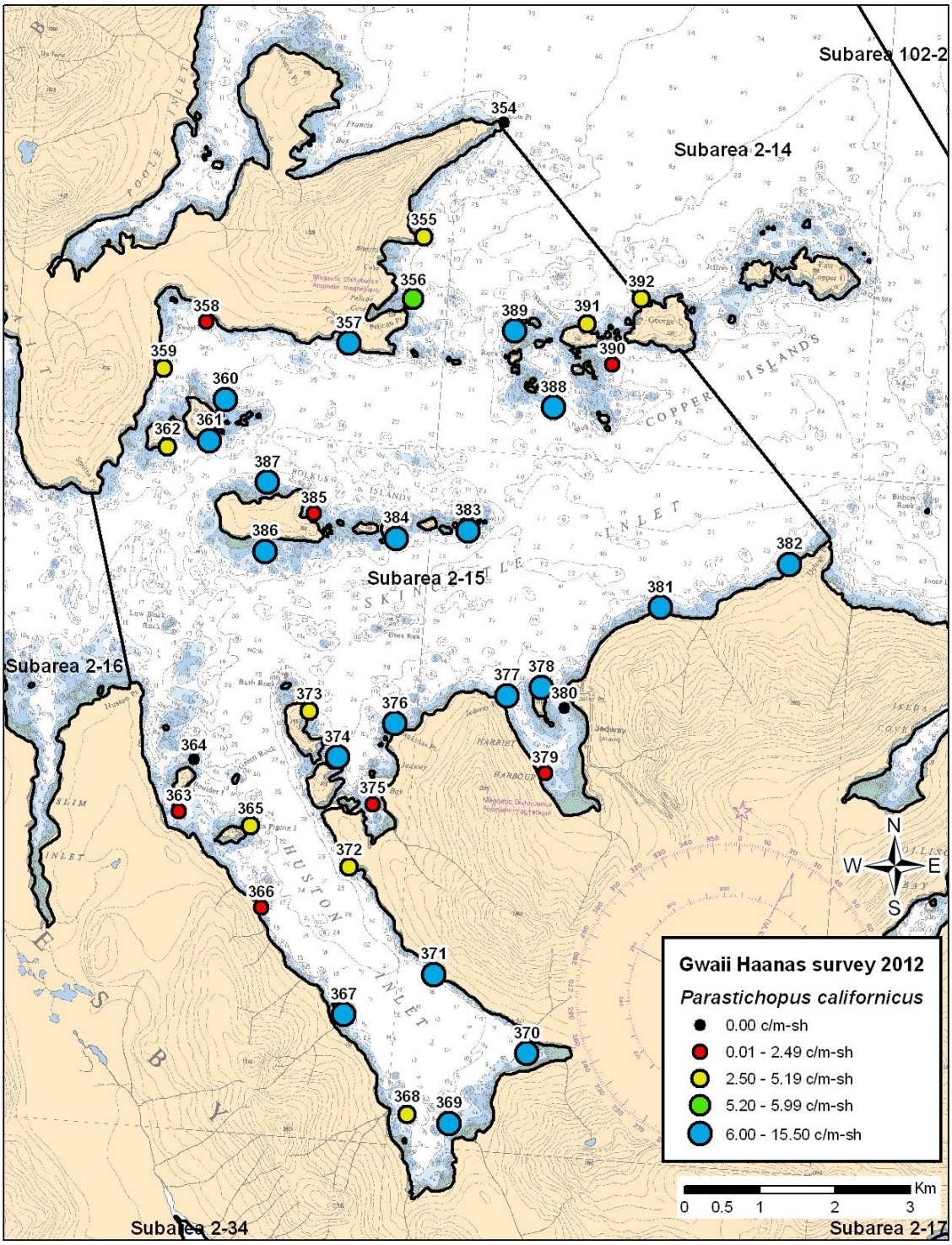

Figure 10. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 2–15, surveyed as part of the Gwaii Haanas survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and lower 90% confidence bound calculated for the Subarea); green = productive locations (between lower 90% confidence bound calculated for the Subarea and the Regional Baseline Density); blue = very productive locations (densities above the Regional Baseline Density).

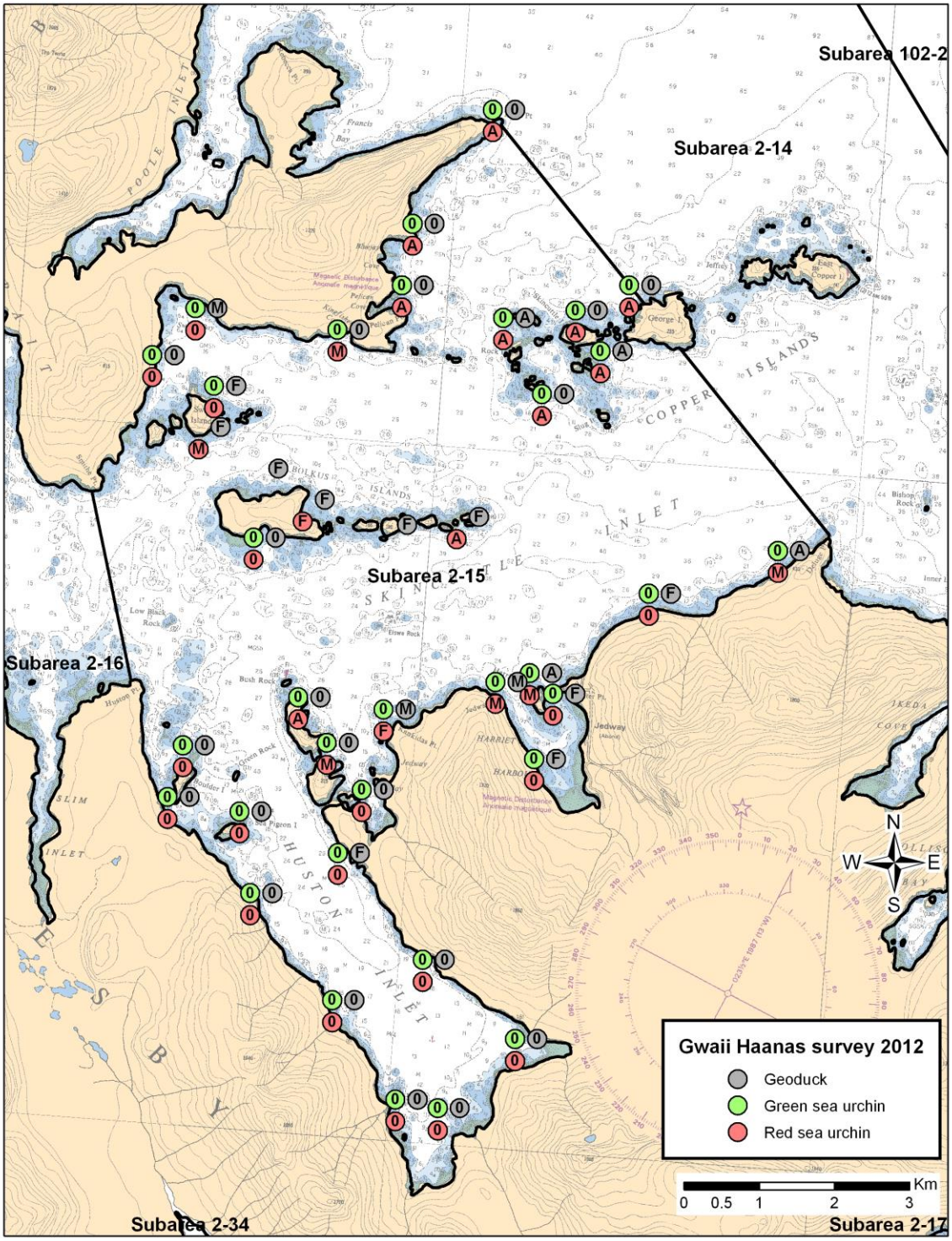

Figure 11. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 2–15. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

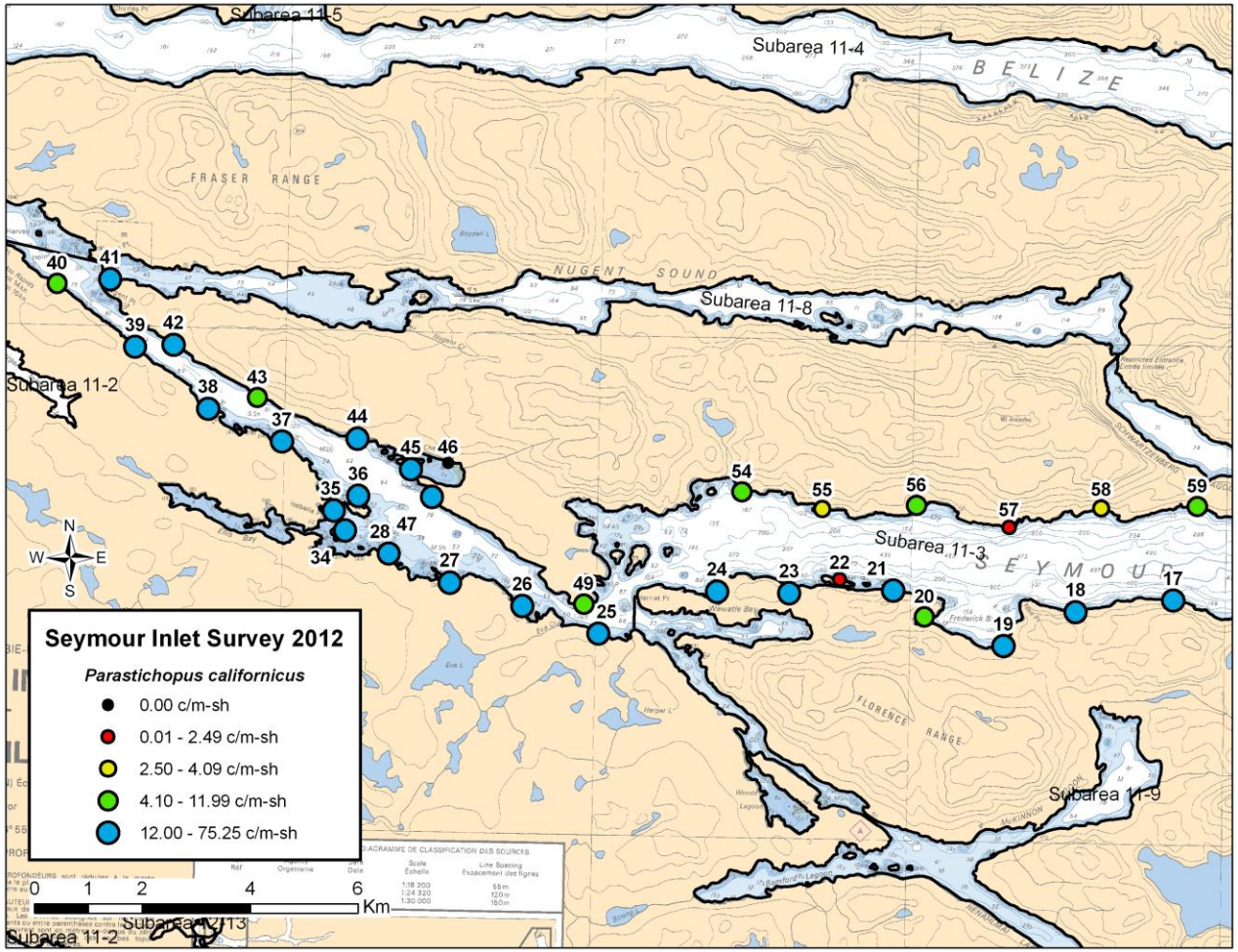

Figure 12a. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in part of PFMA 11–3, surveyed as part of the Seymour Inlet survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (between Regional Baseline Density and the lower 90% confidence bound calculated for the Subarea); blue = very productive locations (densities above the lower 90% confidence bound calculated for the Subarea).

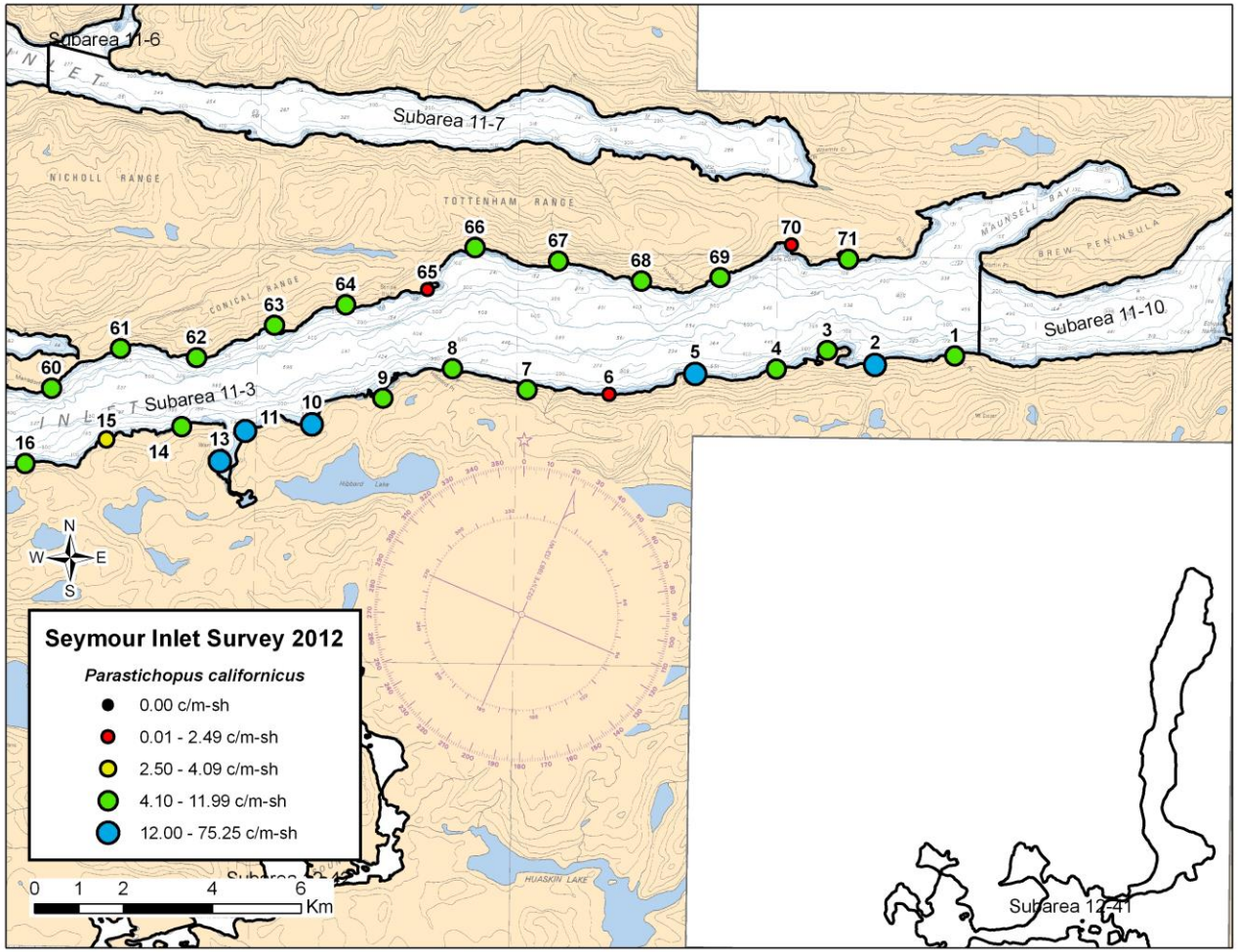

Figure 12b. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in part of PFMA 11–3, surveyed as part of the Seymour Inlet survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (between Regional Baseline Density and the lower 90% confidence bound calculated for the Subarea); blue = very productive locations (densities above the lower 90% confidence bound calculated for the Subarea).

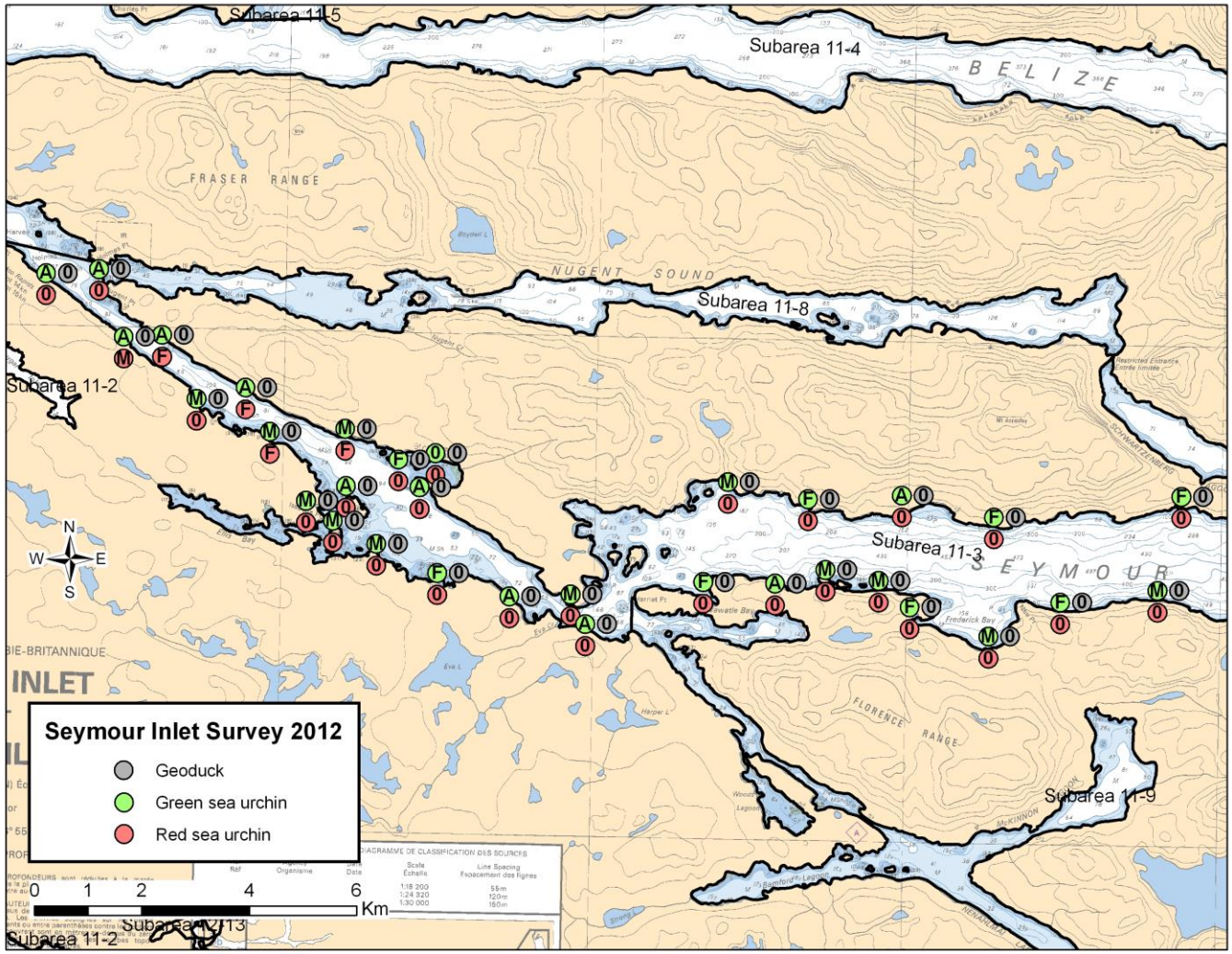

Figure 13a. Abundances of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 11–3. The total number of animals observed while swimming the transect is noted and given an abundance scale of A, M, F, or 0. A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

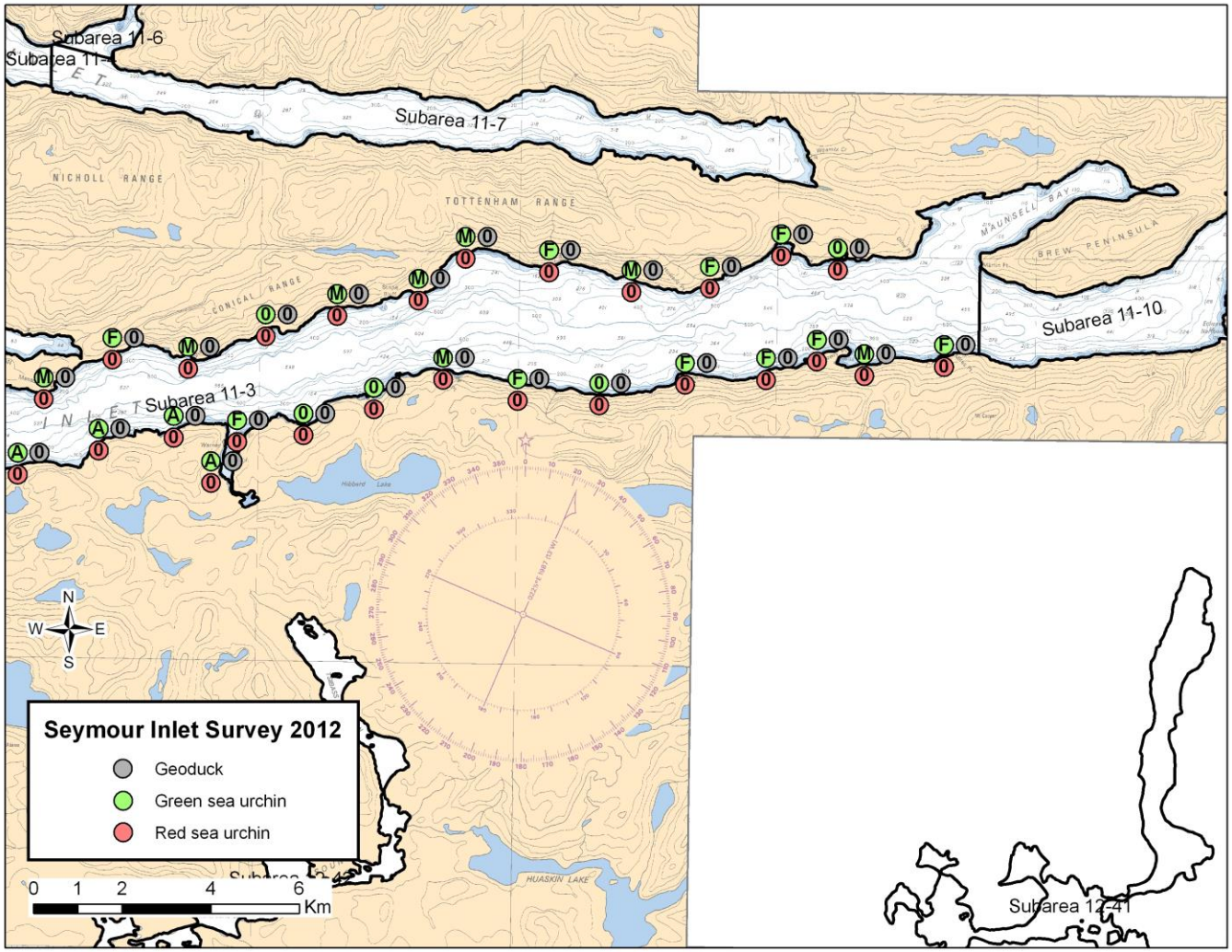

Figure 13b. Abundances of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 11–3. The total number of animals observed while swimming the transect is noted and given an abundance scale of A, M, F, or 0. A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

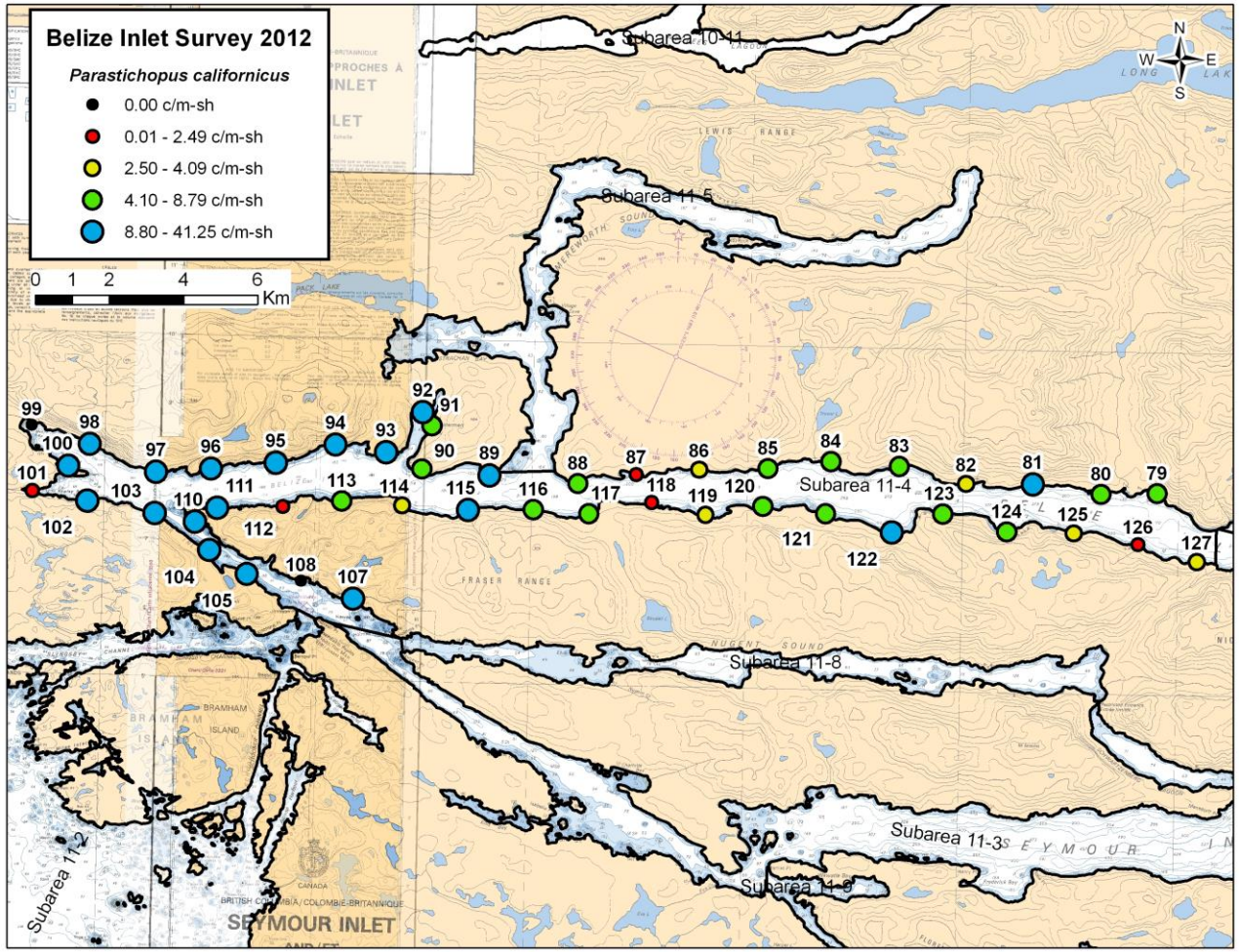

Figure 14. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 11–4, surveyed as part of the Belize Inlet survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and Regional Baseline Density); green = productive locations (between the Regional Baseline Density and the bootstrapped lower 90% confidence bound calculated for the Subarea); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound).

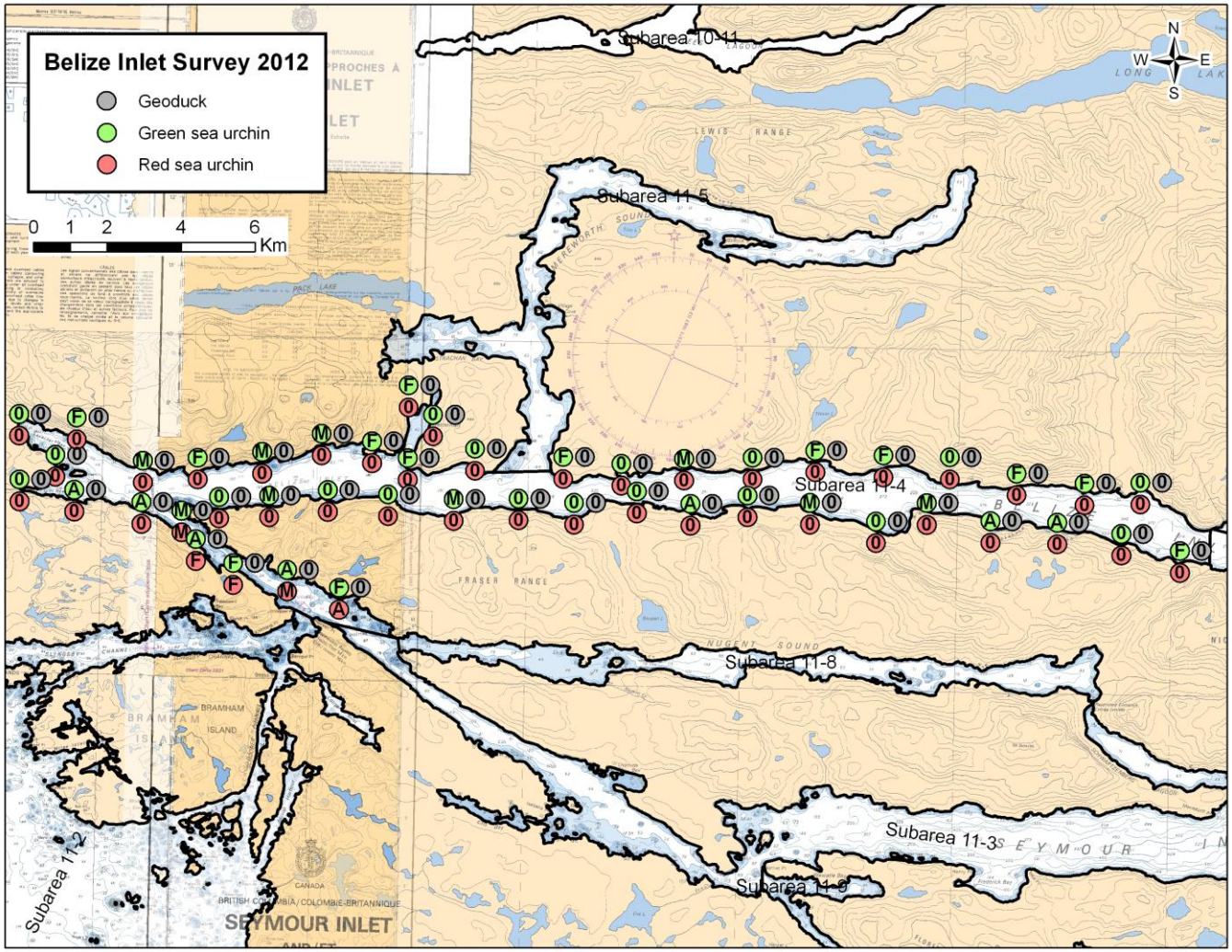

Figure 15. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 11–4. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

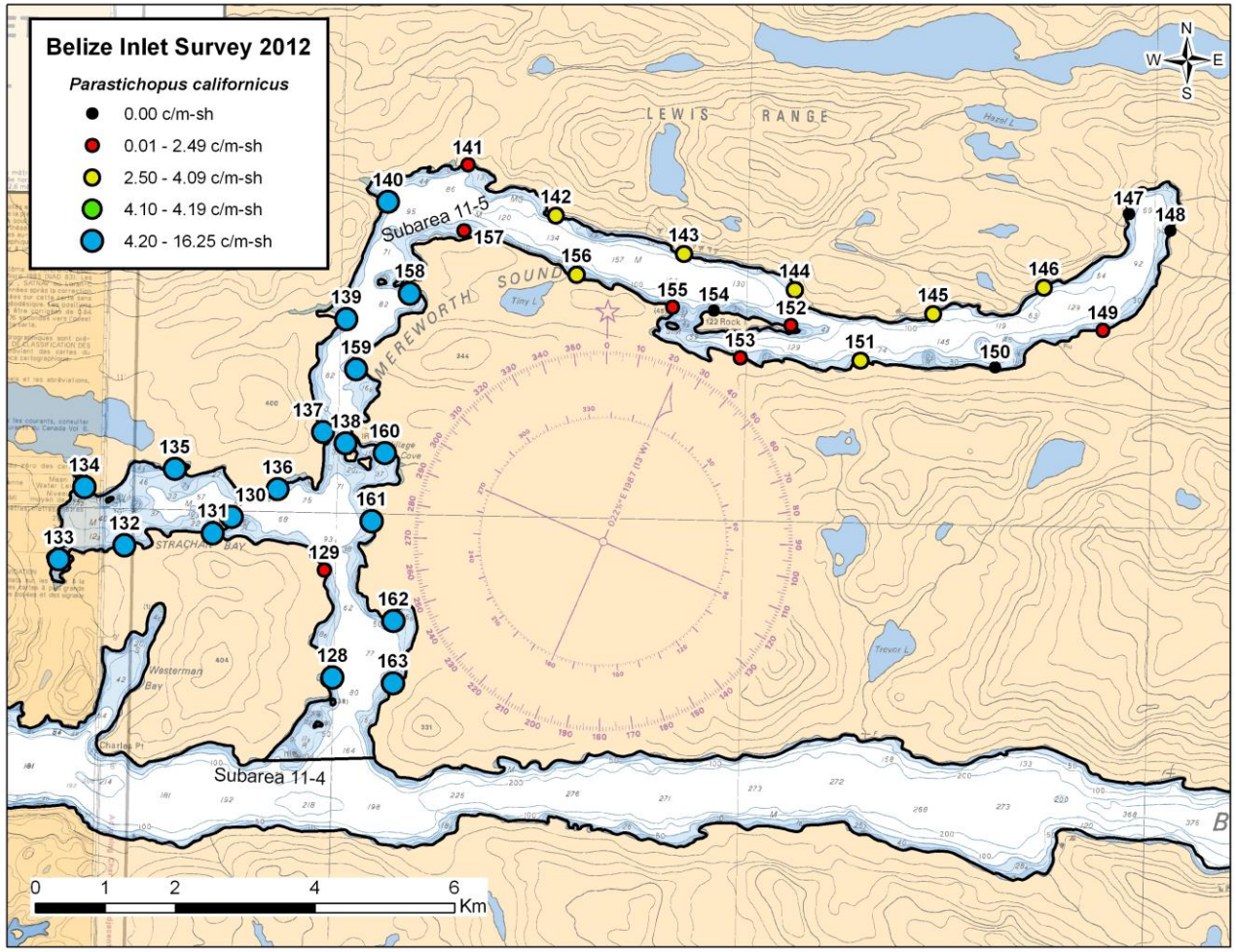

Figure 16. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* PFMA 11–5, surveyed as part of the Belize Inlet survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and Regional Baseline Density); green = productive locations (between Regional Baseline Density and the bootstrapped lower 90% confidence bound calculated for the Subarea); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound for the Subarea).

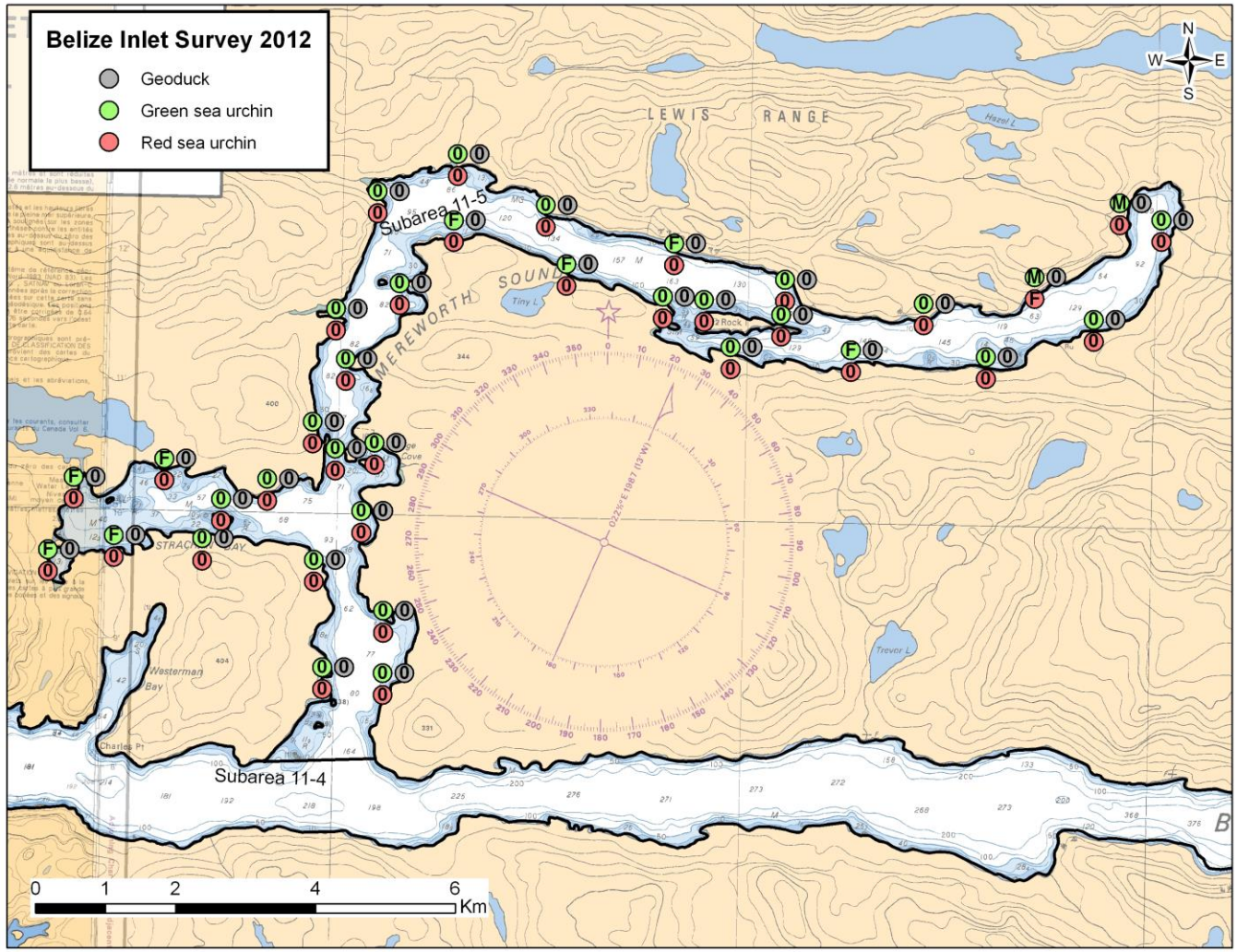

Figure 17. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 11–5. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

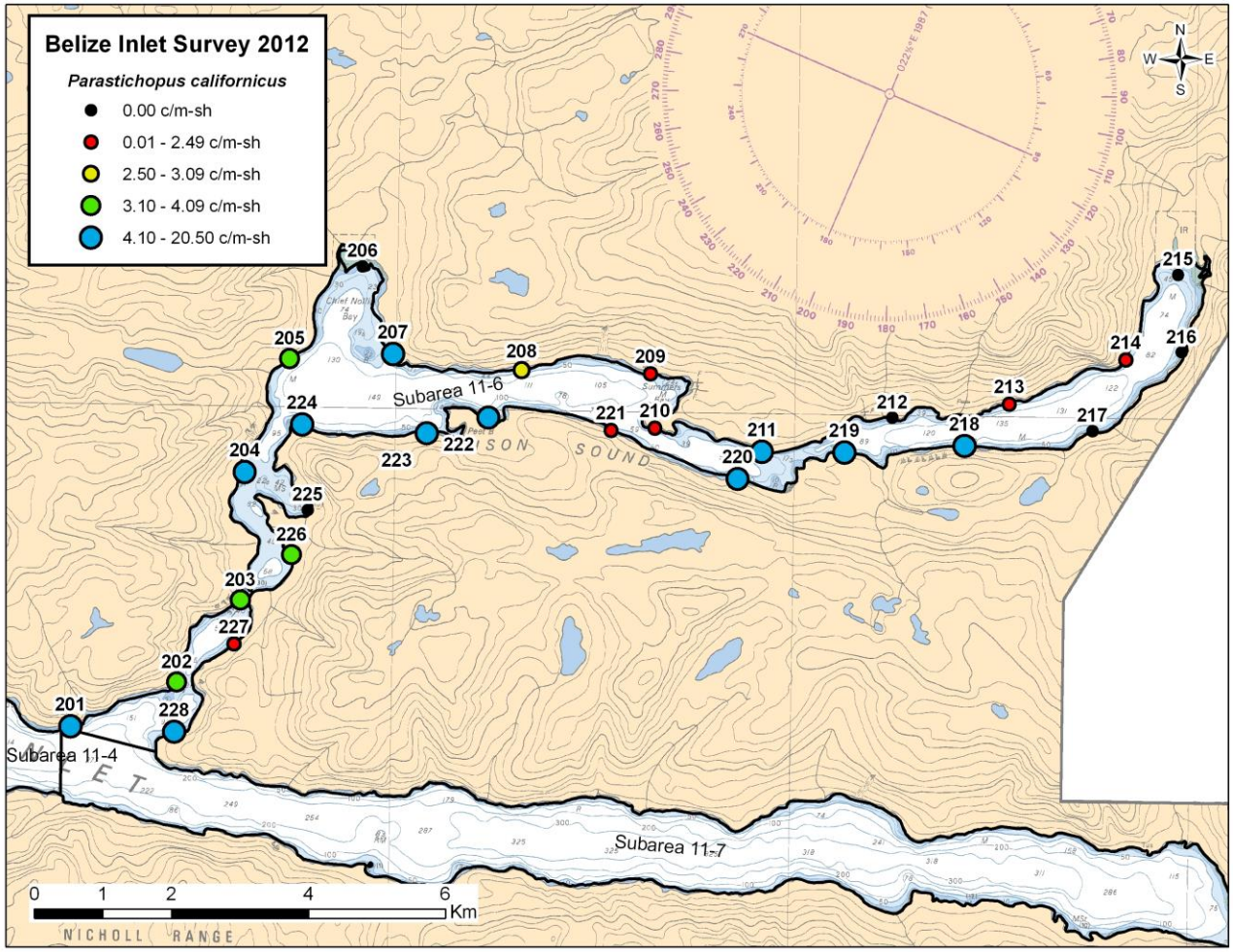

Figure 18. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 11–6, surveyed as part of the Belize Inlet survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the bootstrapped lower 90% confidence bound calculated for the Subarea); green = productive locations (between the bootstrapped lower 90% confidence bound calculated for the Subarea and the Regional Baseline Density); blue = very productive locations (densities above the Regional Baseline Density).

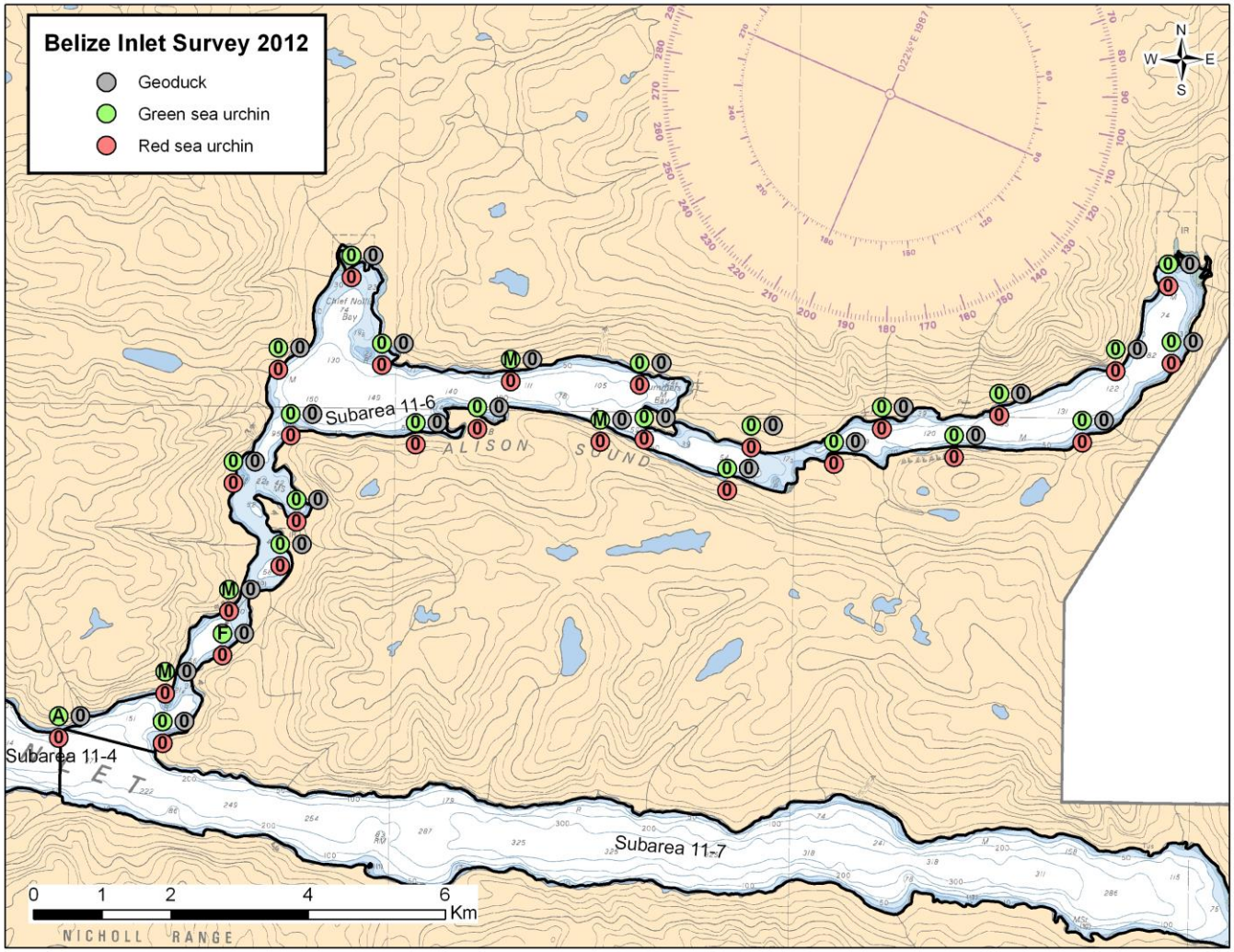

Figure 19. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 11–6. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

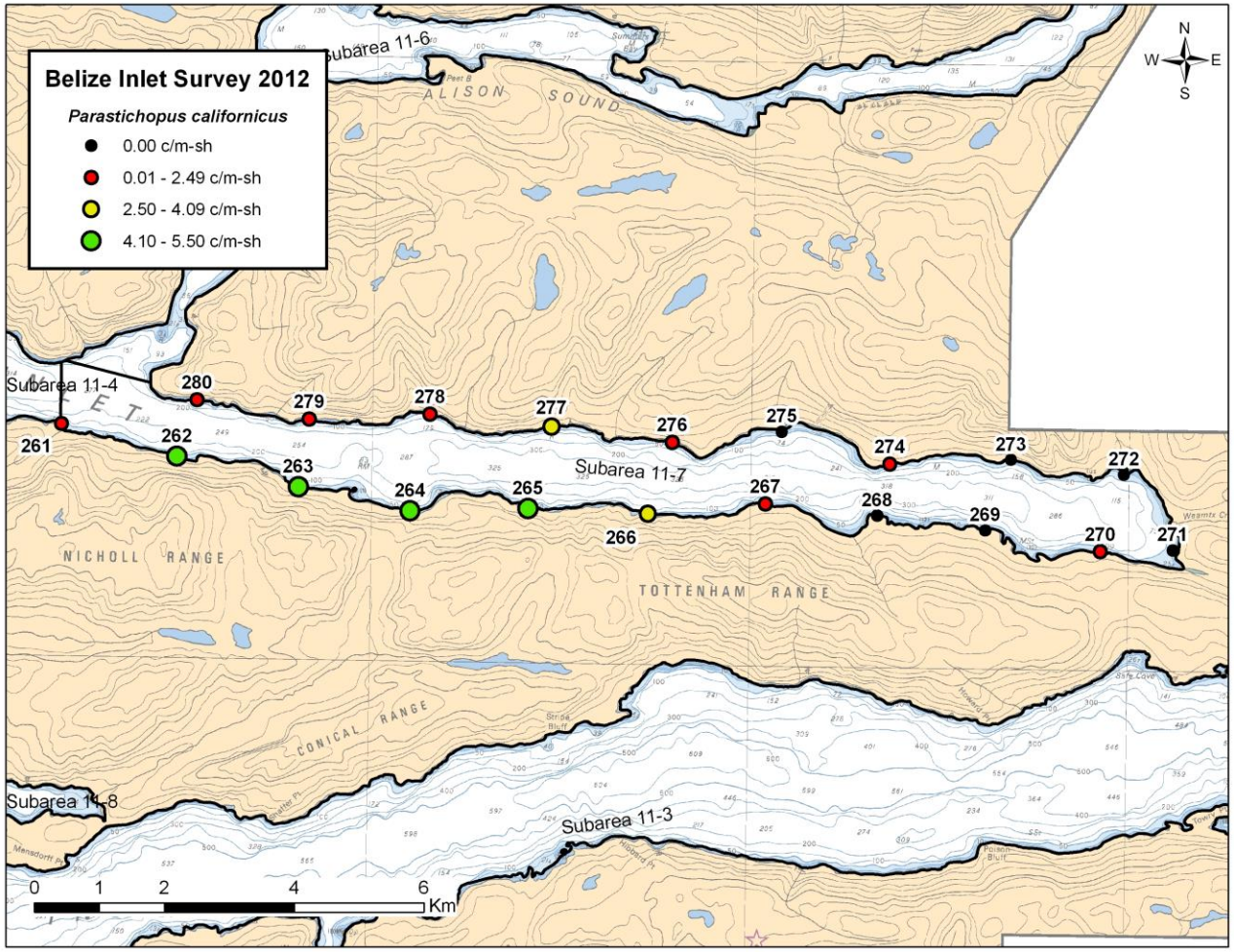

Figure 20. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 11–7, surveyed as part of the Belize Inlet survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (between the Regional Baseline Density and the maximum observed density in the Subarea).

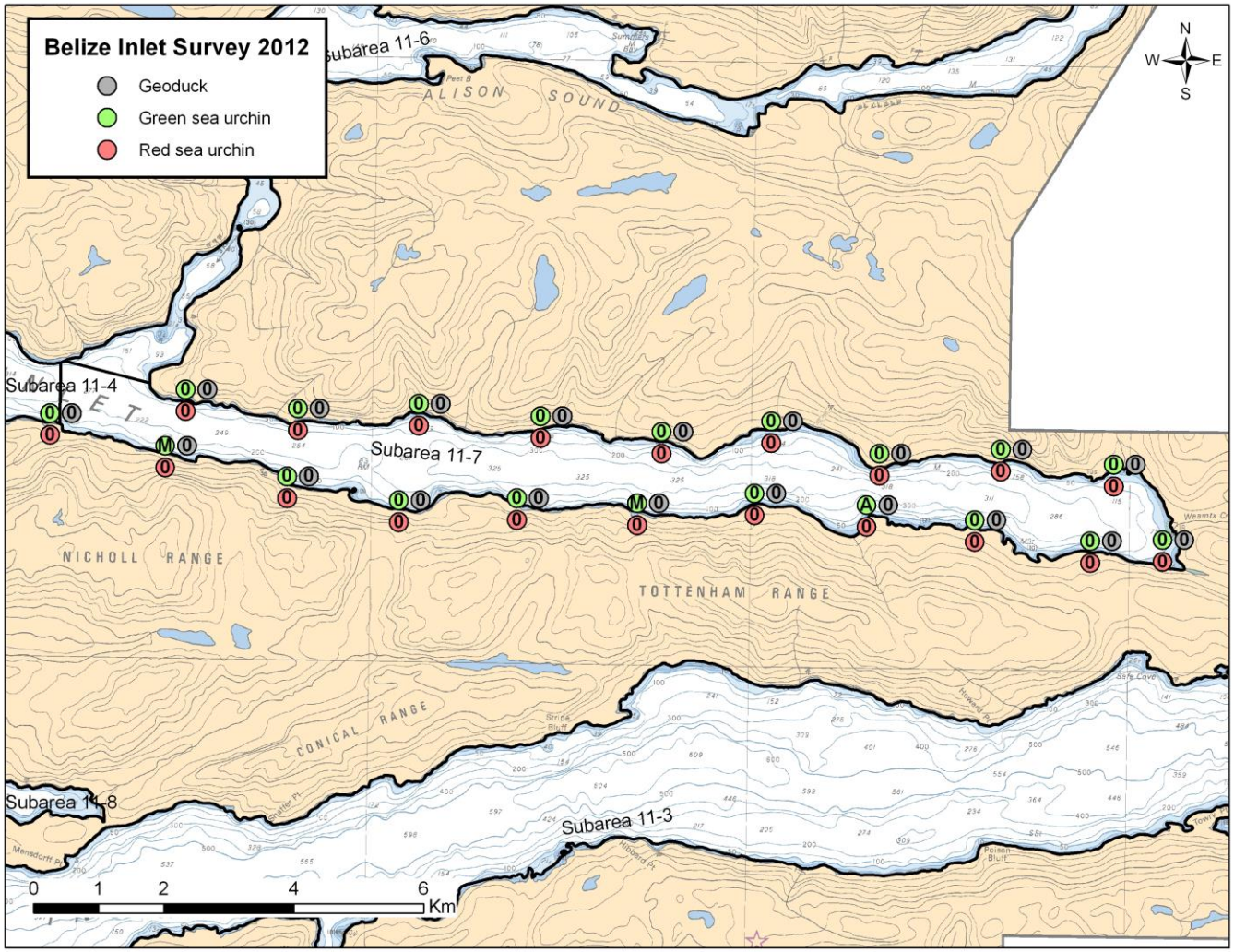

Figure 21. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 11–7. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

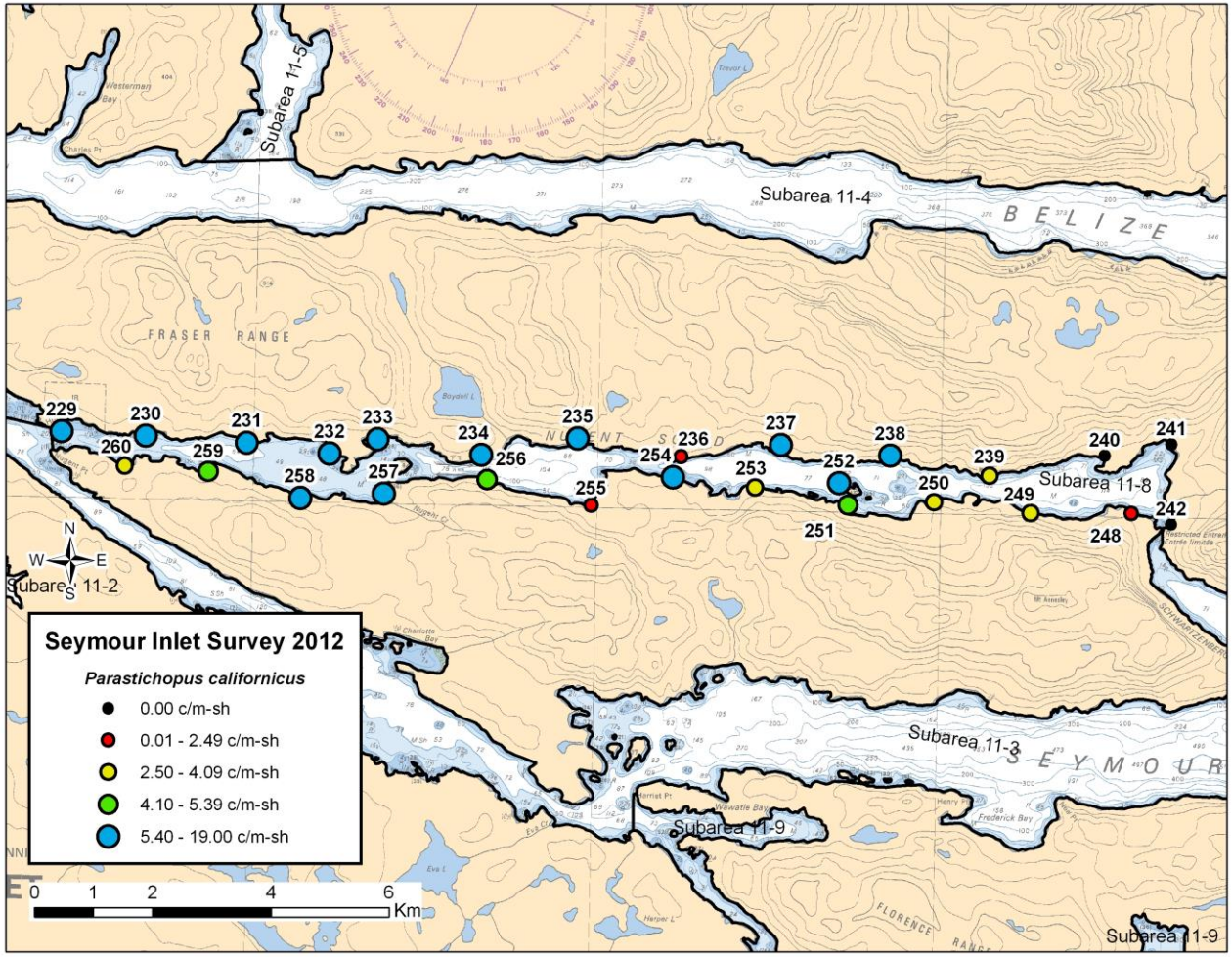

Figure 22. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 11–8, surveyed as part of the Seymour Inlet survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and 3.39 c/m-sh); green = productive locations (between the bootstrapped lower 90% confidence bound calculated for the Subarea and 5.99 c/m-sh); blue = very productive locations (densities above the North Coast regional baseline density).

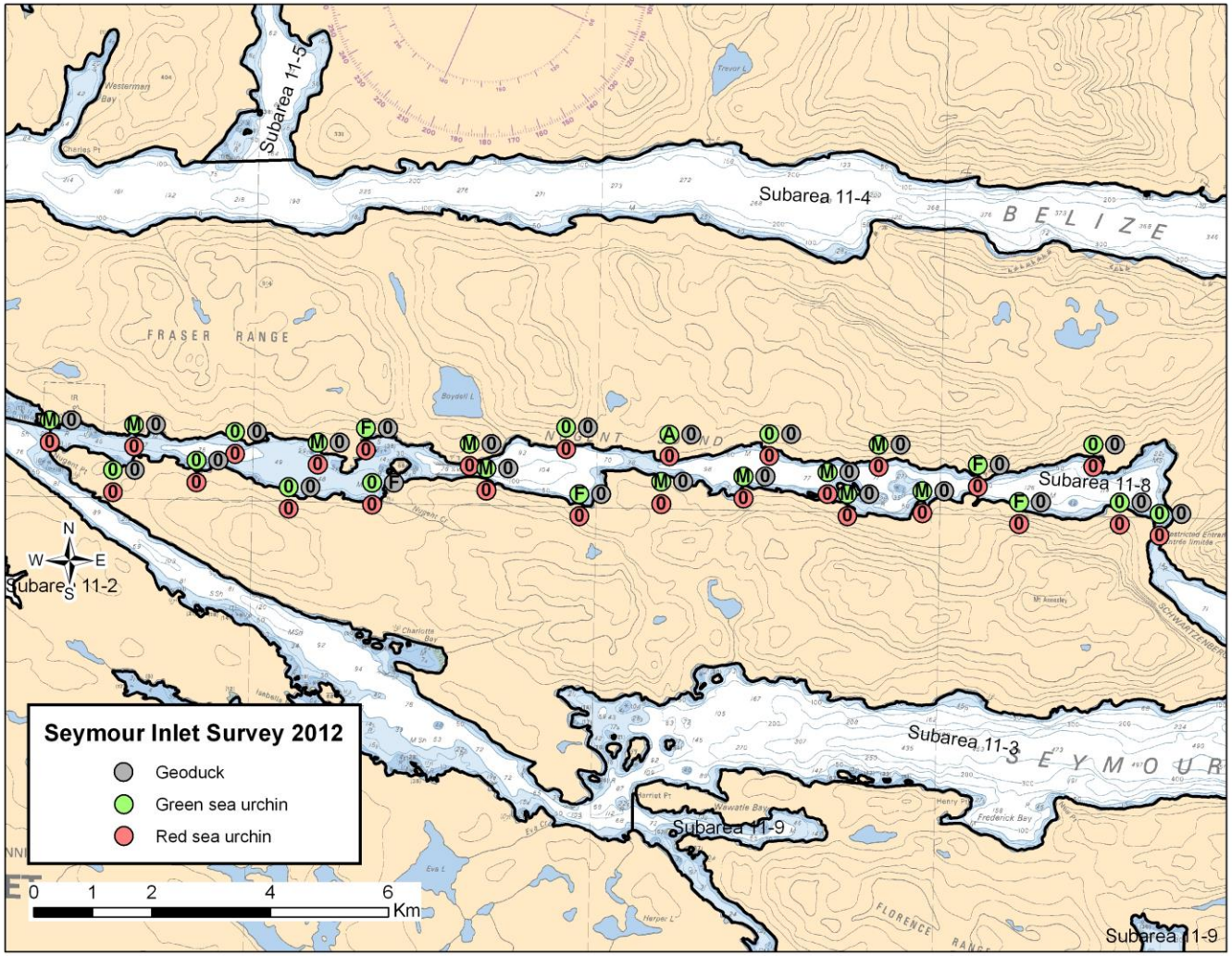

Figure 23. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in a portion of PFMA 11–8. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

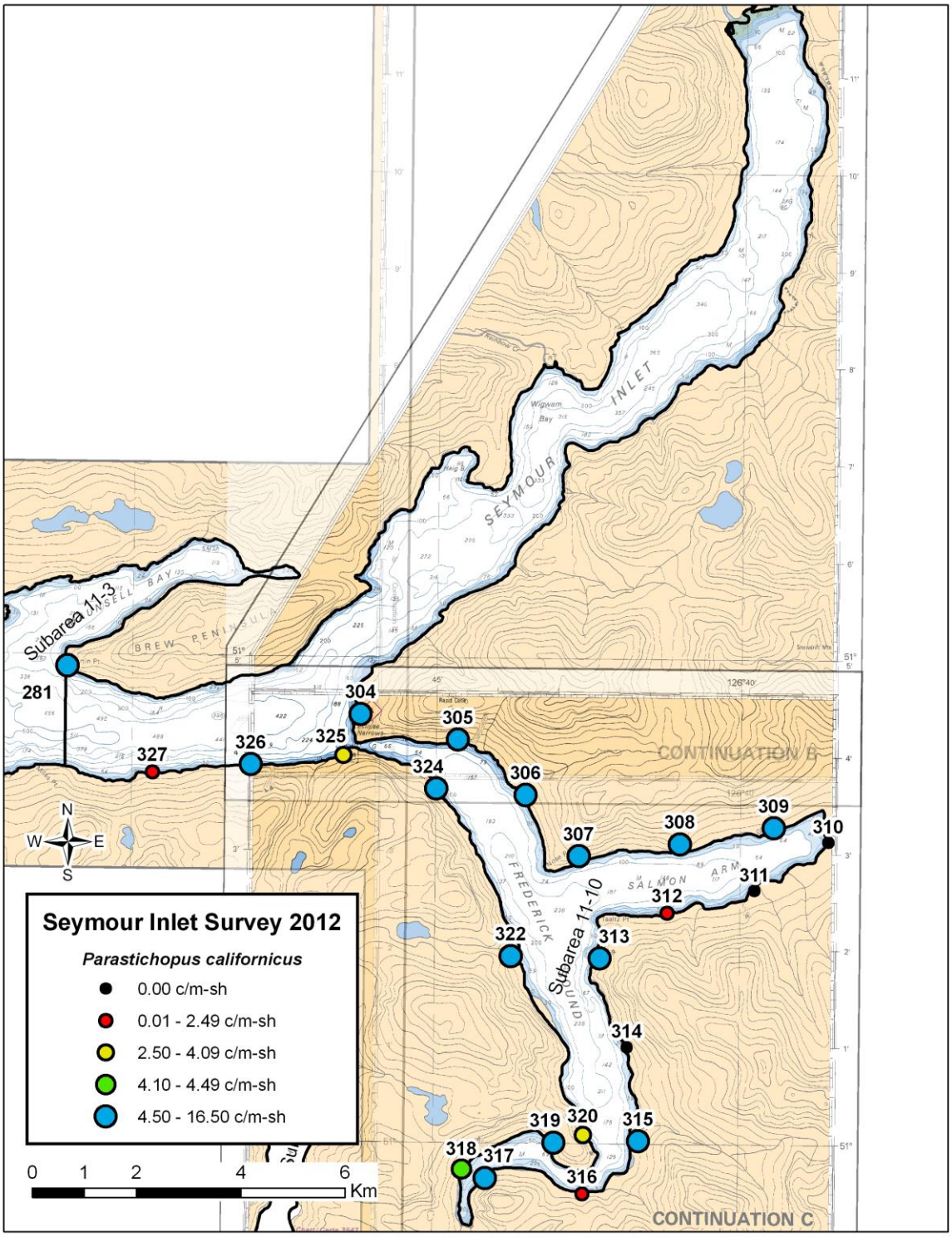

Figure 24. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 11–10, surveyed as part of the Seymour Inlet survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and 5.99 c/m-sh); green = productive locations (between the North Coast regional baseline density and 7.49 c/m-sh); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound for the Subarea).

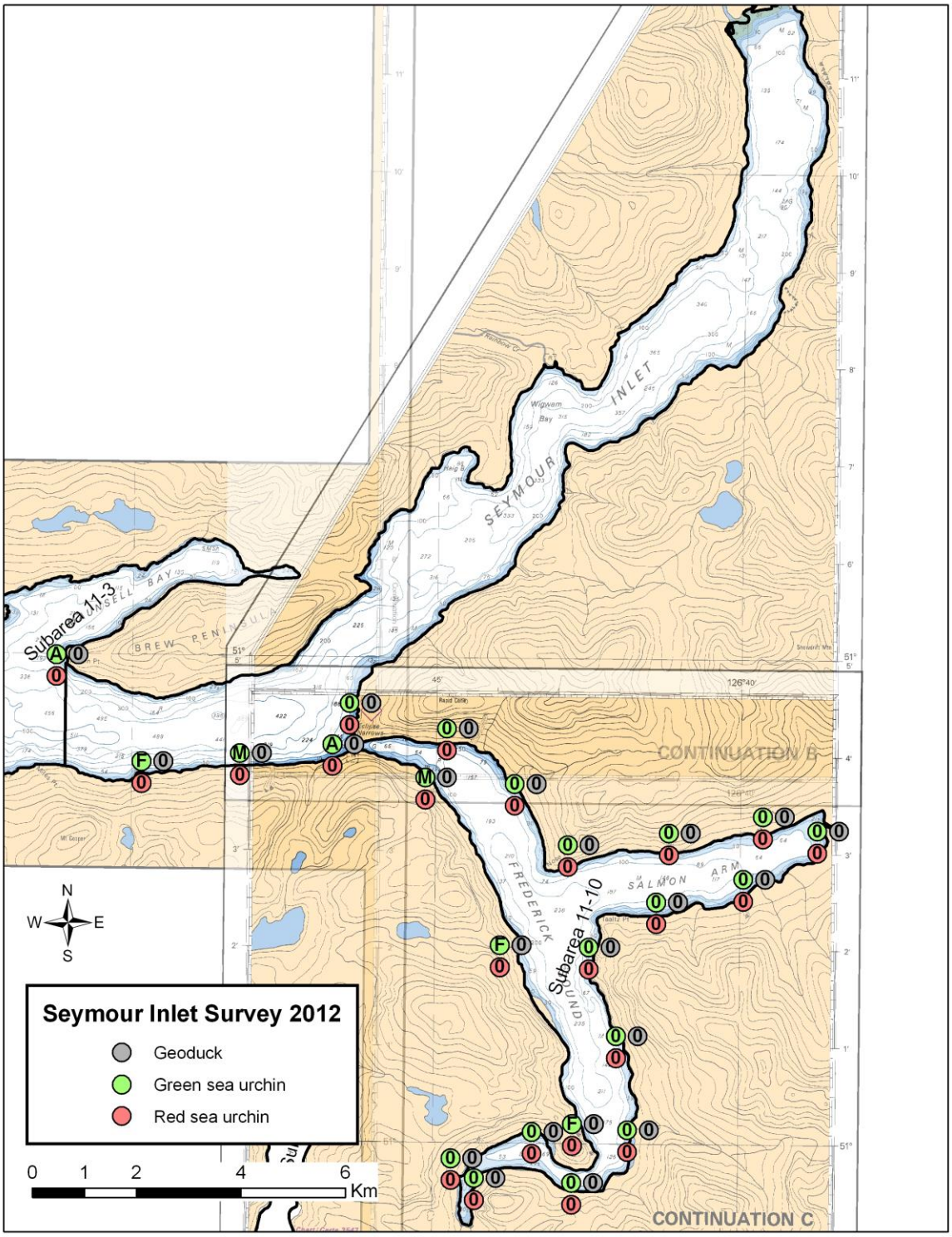

Figure 25. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 11–10. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

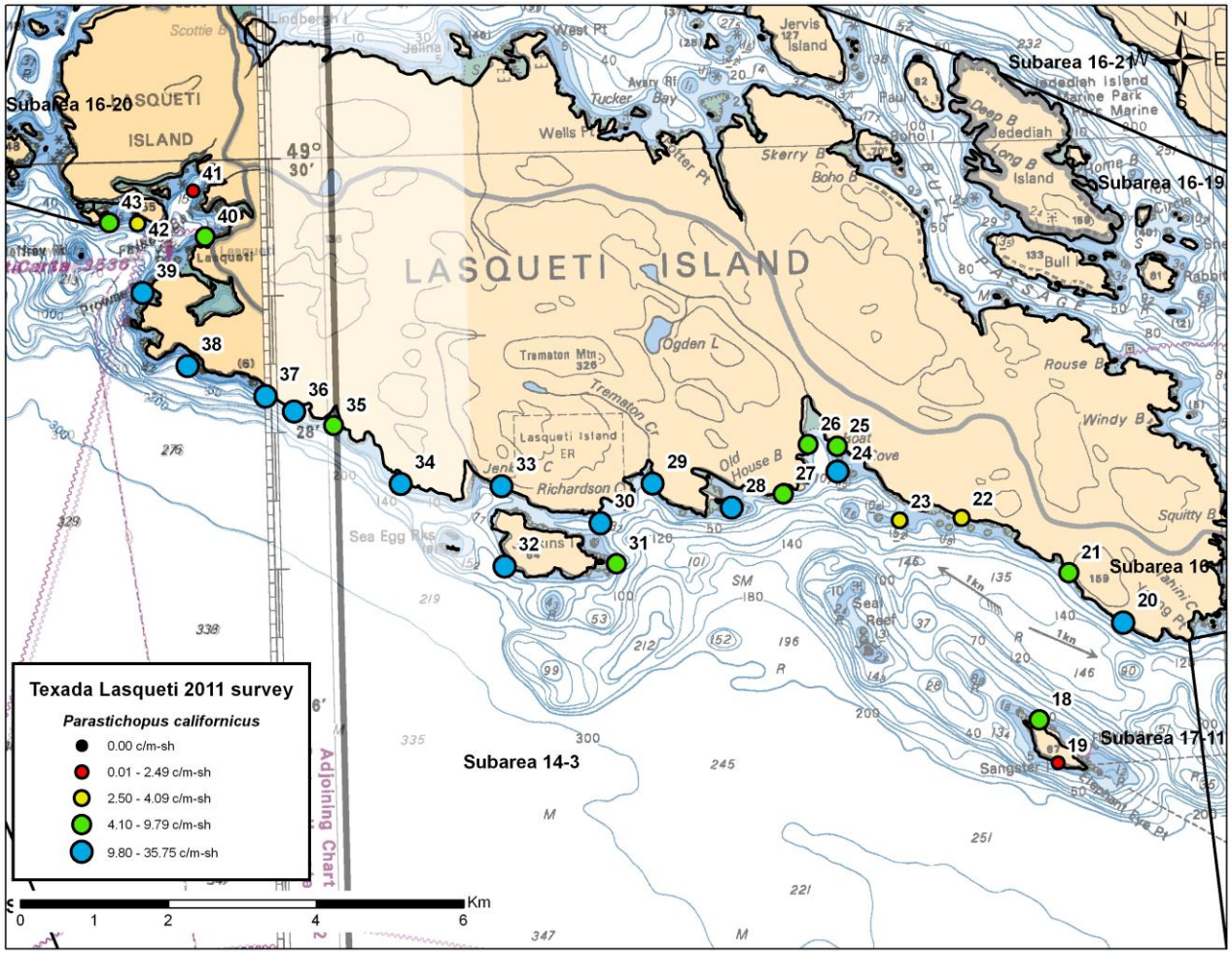

Figure 26. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 14–3, surveyed as part of the Texada – Lasqueti survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and Regional Baseline Density); green = productive locations (between the Regional Baseline Density and the bootstrapped lower 90% confidence bound); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound).

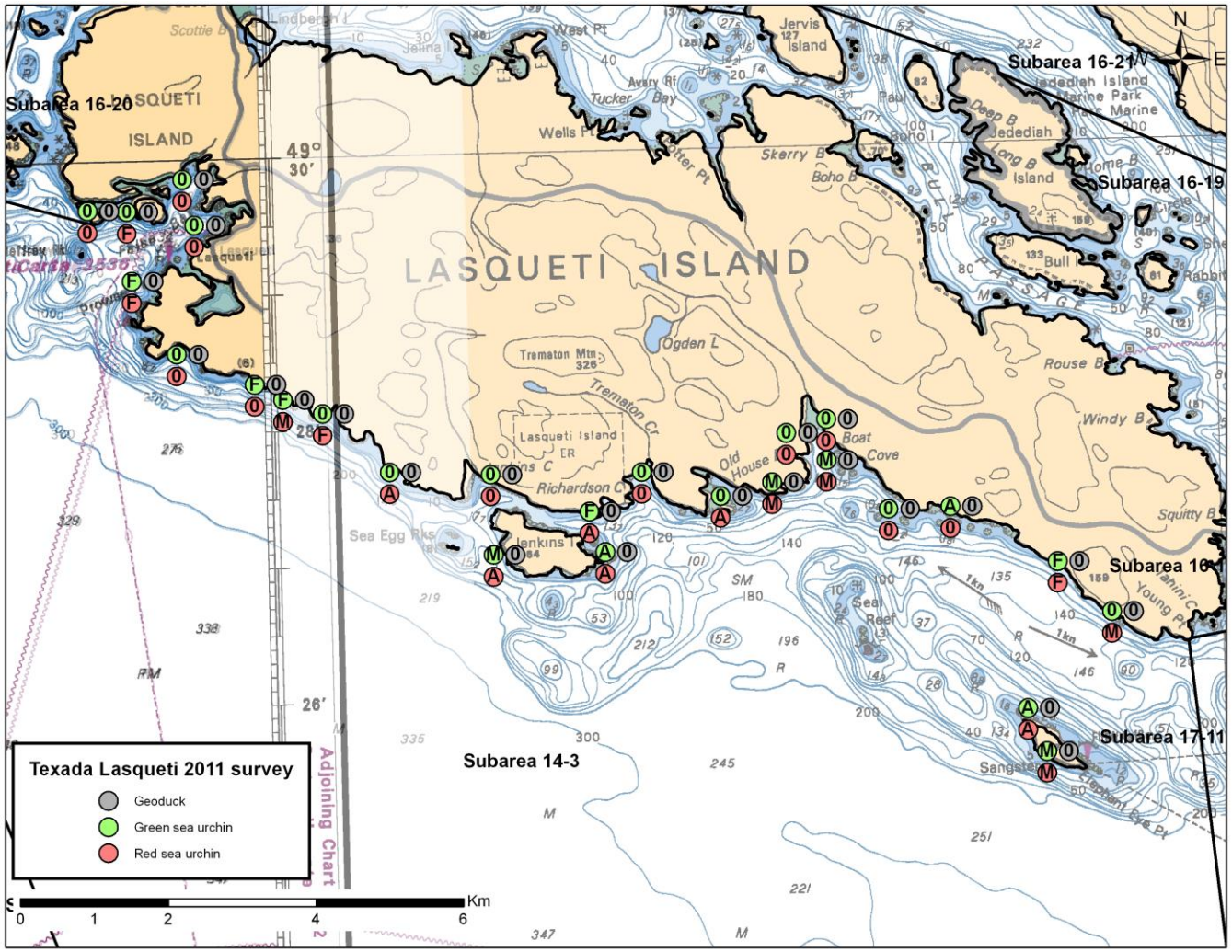

Figure 27. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 14–3. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

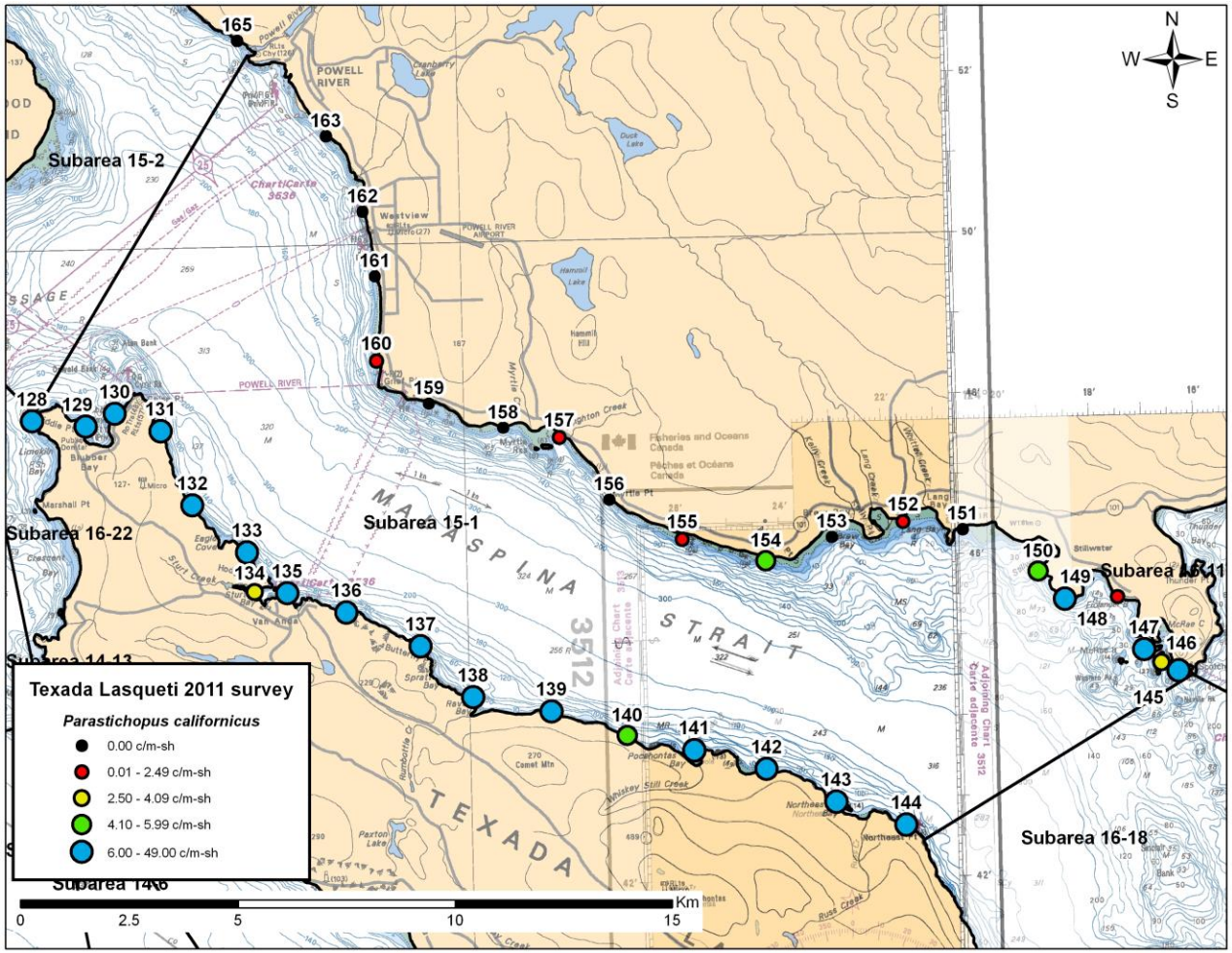

Figure 28. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 15–1, surveyed as part of the Texada – Lasqueti survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 c/m-sh and the Regional Baseline Density); green = productive locations (between the Regional Baseline Density and the bootstrapped lower 90% confidence bound); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound).

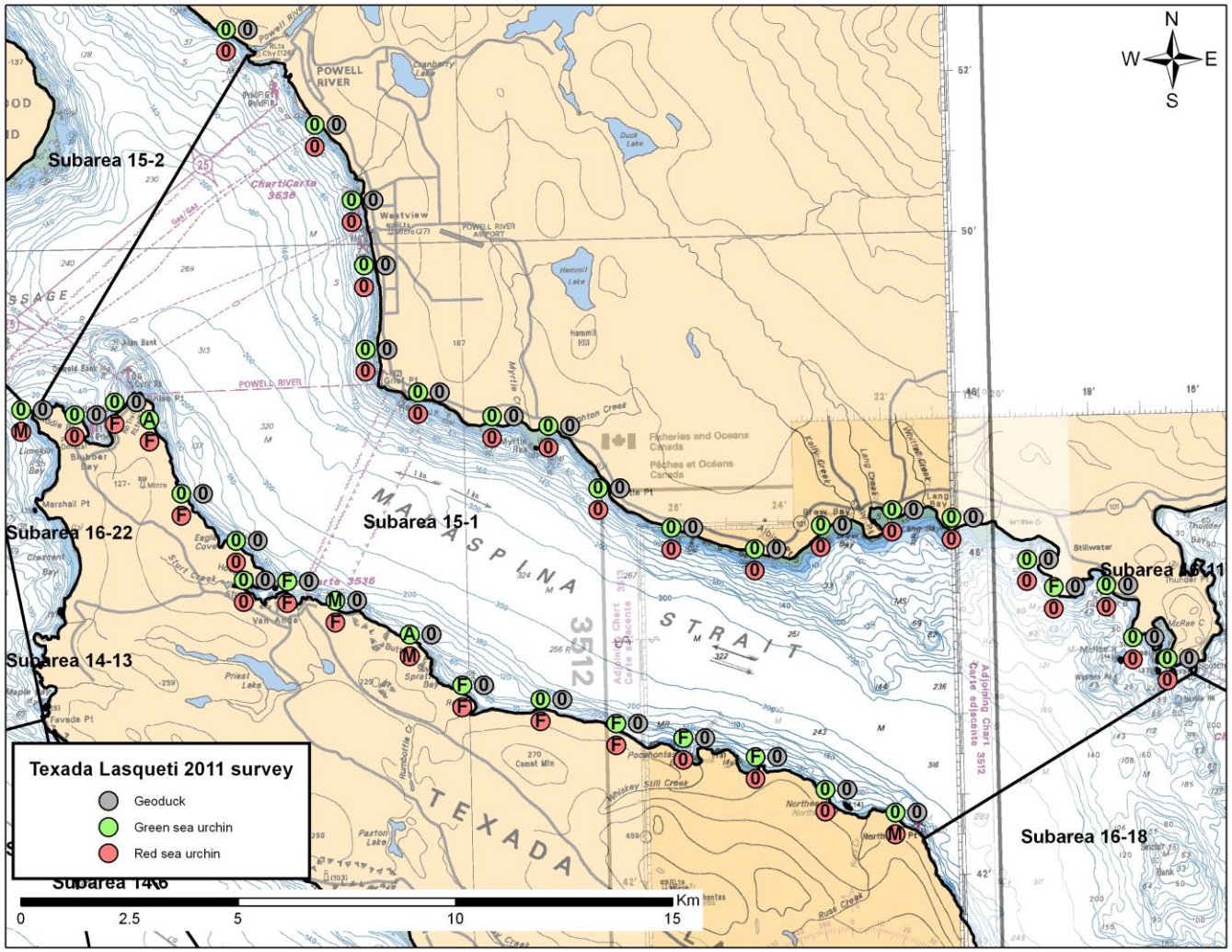

Figure 29. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 15–1. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

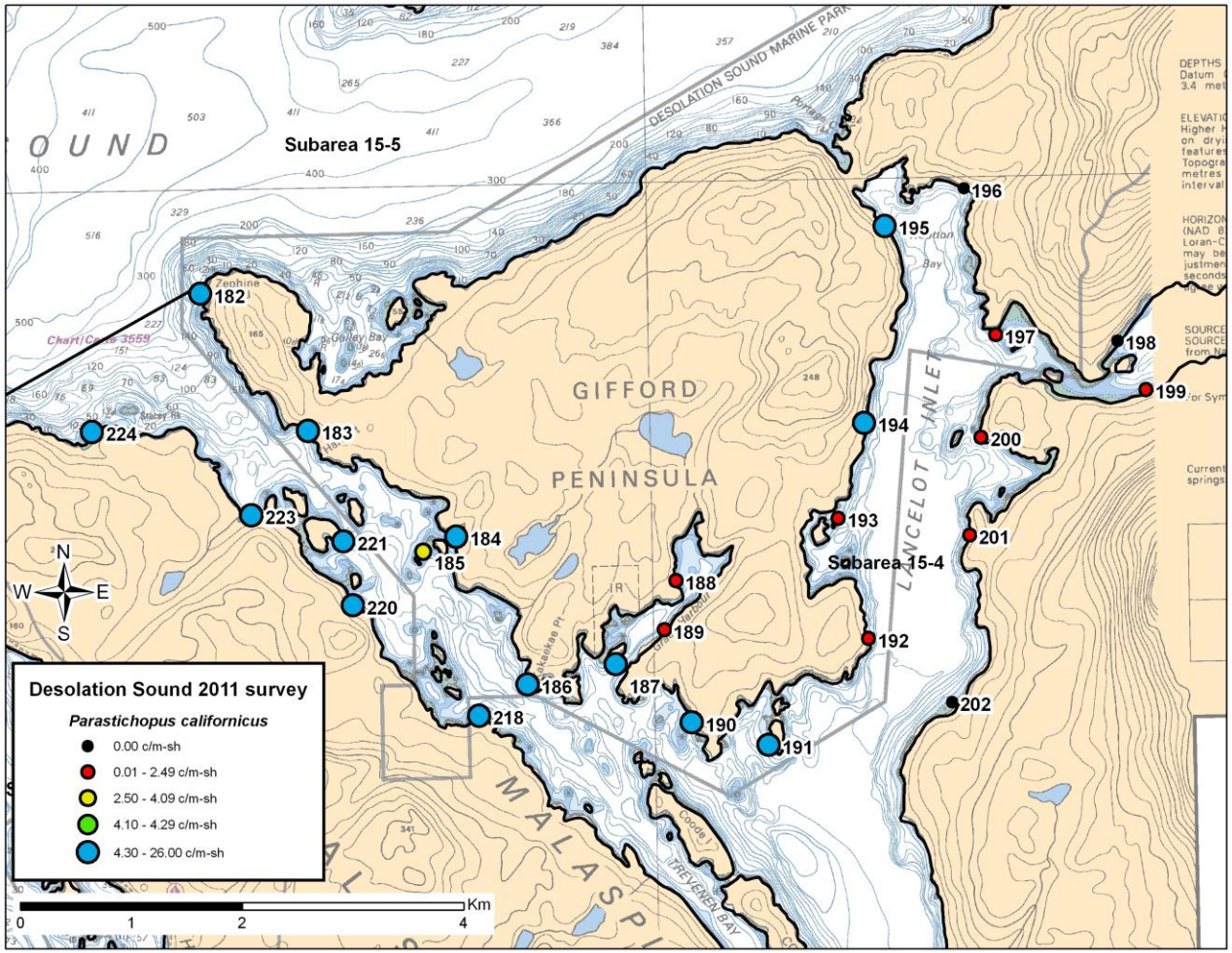

Figure 30a. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 15–4, surveyed as part of the Desolation Sound survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 c/m-sh and the Regional Baseline Density); green = productive locations (between the Regional Baseline Density and bootstrapped lower 90% confidence bound); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound).

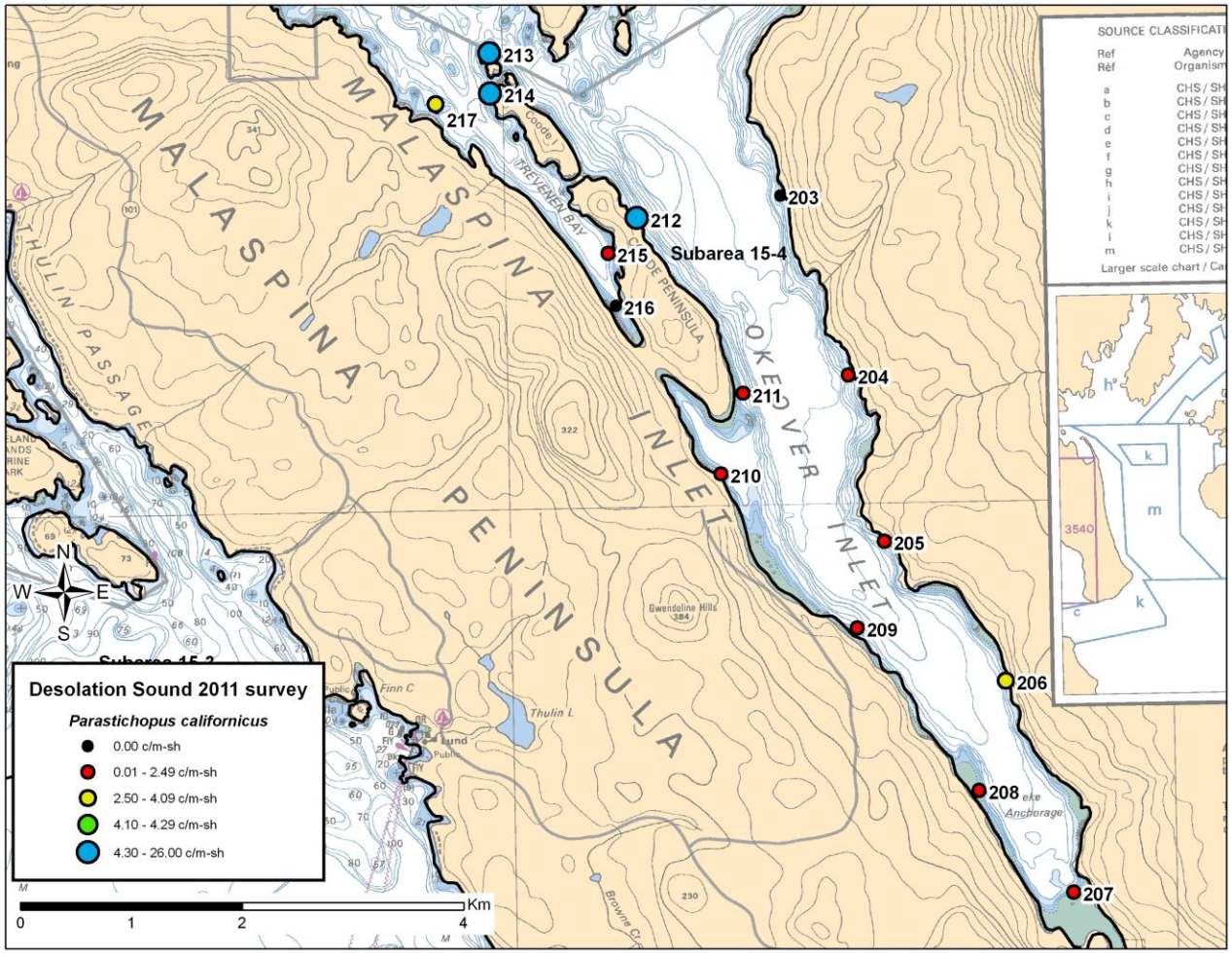

Figure 30b. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 15–4, surveyed as part of the Desolation Sound survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 c/m-sh and the Regional Baseline Density); green = productive locations (between the Regional Baseline Density and bootstrapped lower 90% confidence bound); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound).

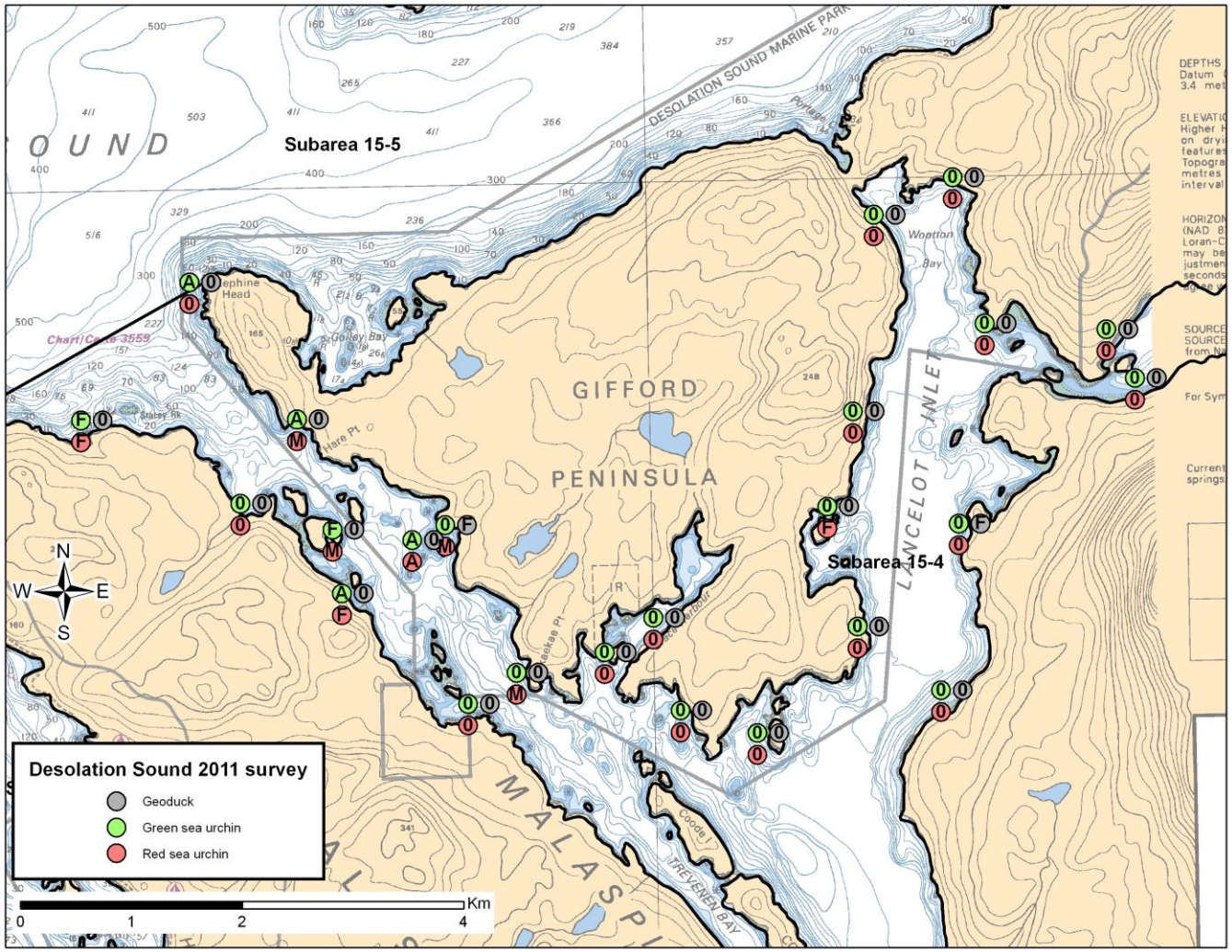

Figure 31a. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 15–4. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

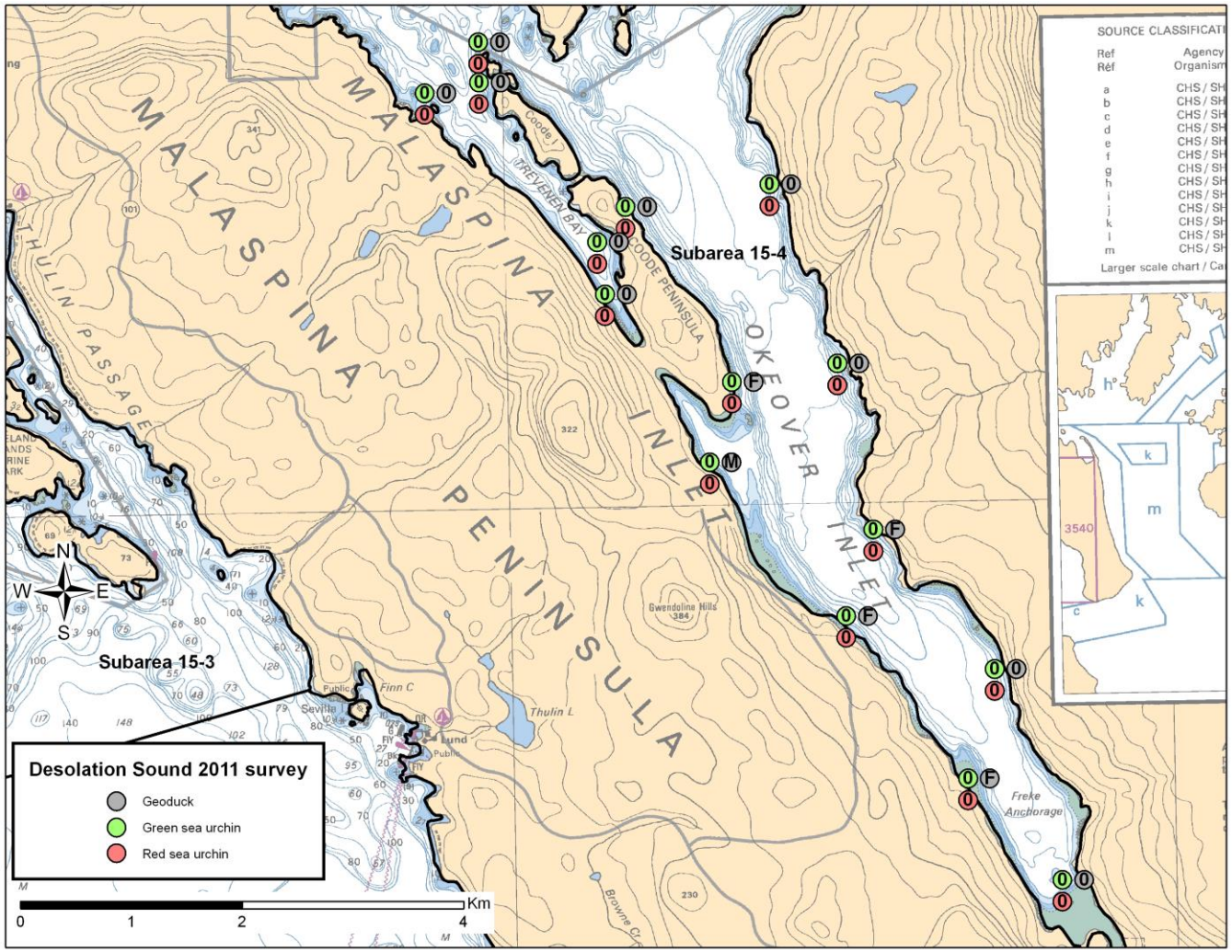

Figure 31b. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 15–4. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

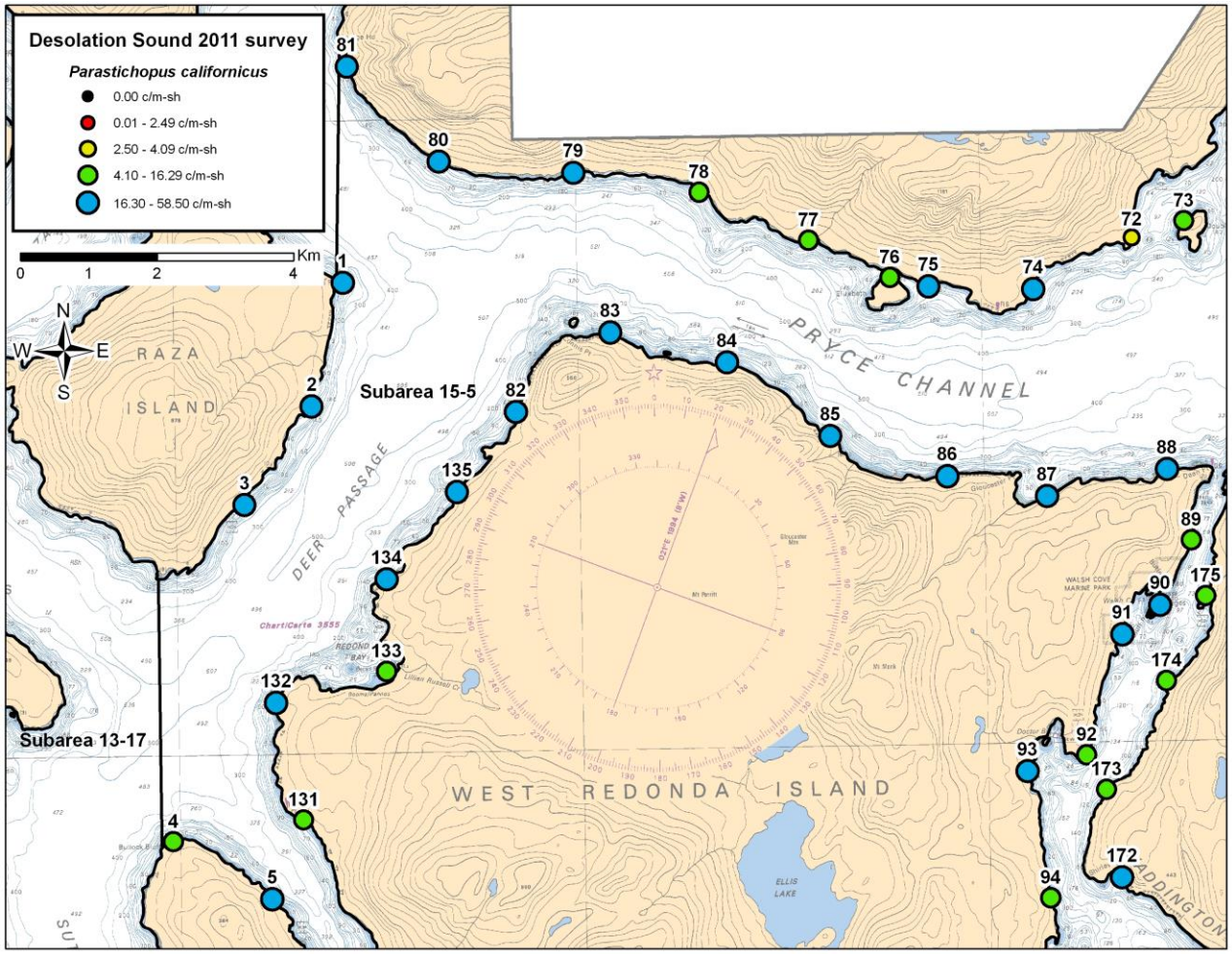

Figure 32a. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 15–5 surveyed as part of the Desolation Sound survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (densities between Regional Baseline Density and bootstrapped lower 90% confidence bound); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound).

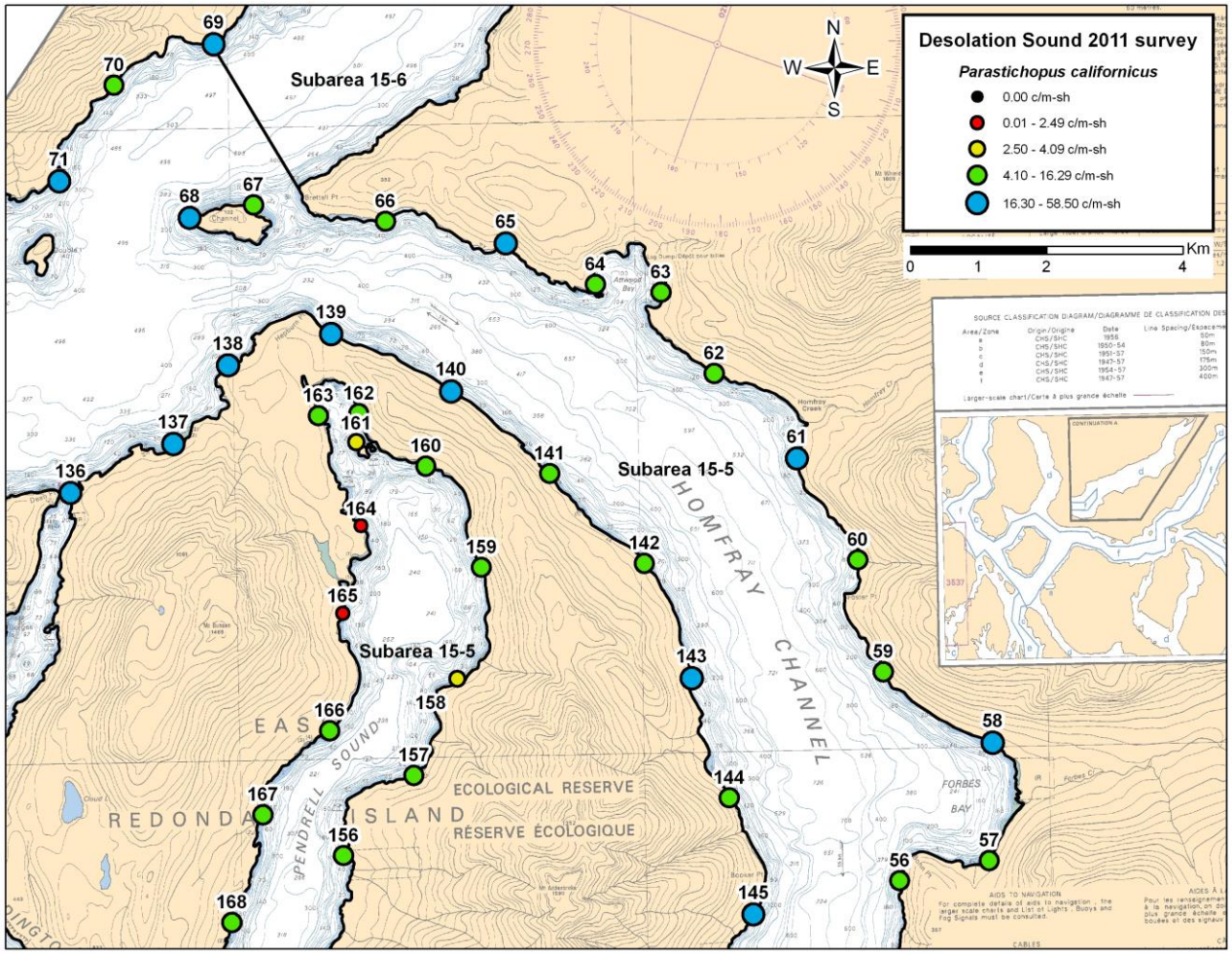

Figure 32b. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 15–5 surveyed as part of the Desolation Sound survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (densities between Regional Baseline Density and bootstrapped lower 90% confidence bound); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound).

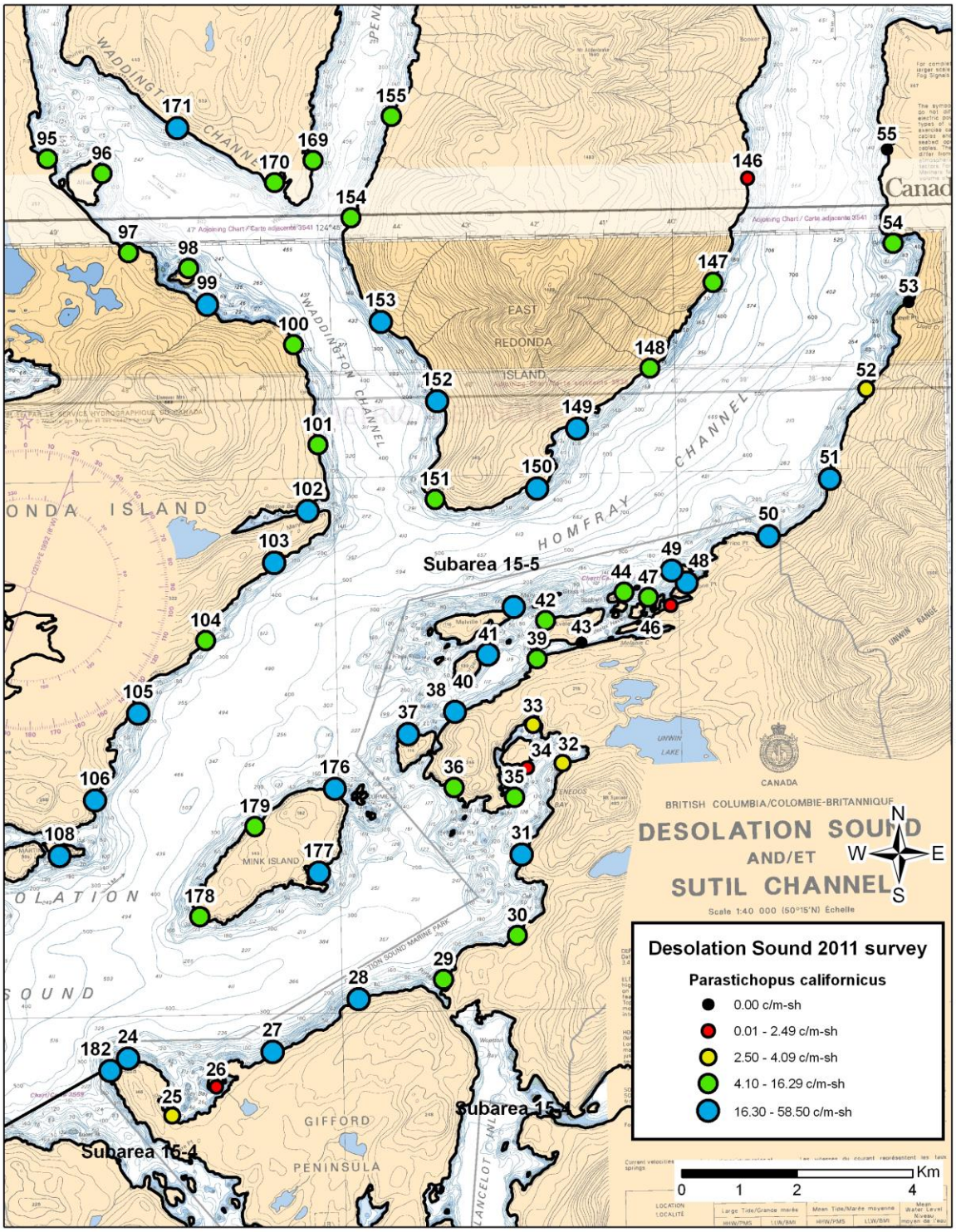

Figure 32c. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 15–5 surveyed as part of the Desolation Sound survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (densities between Regional Baseline Density and bootstrapped lower 90% confidence bound); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound).

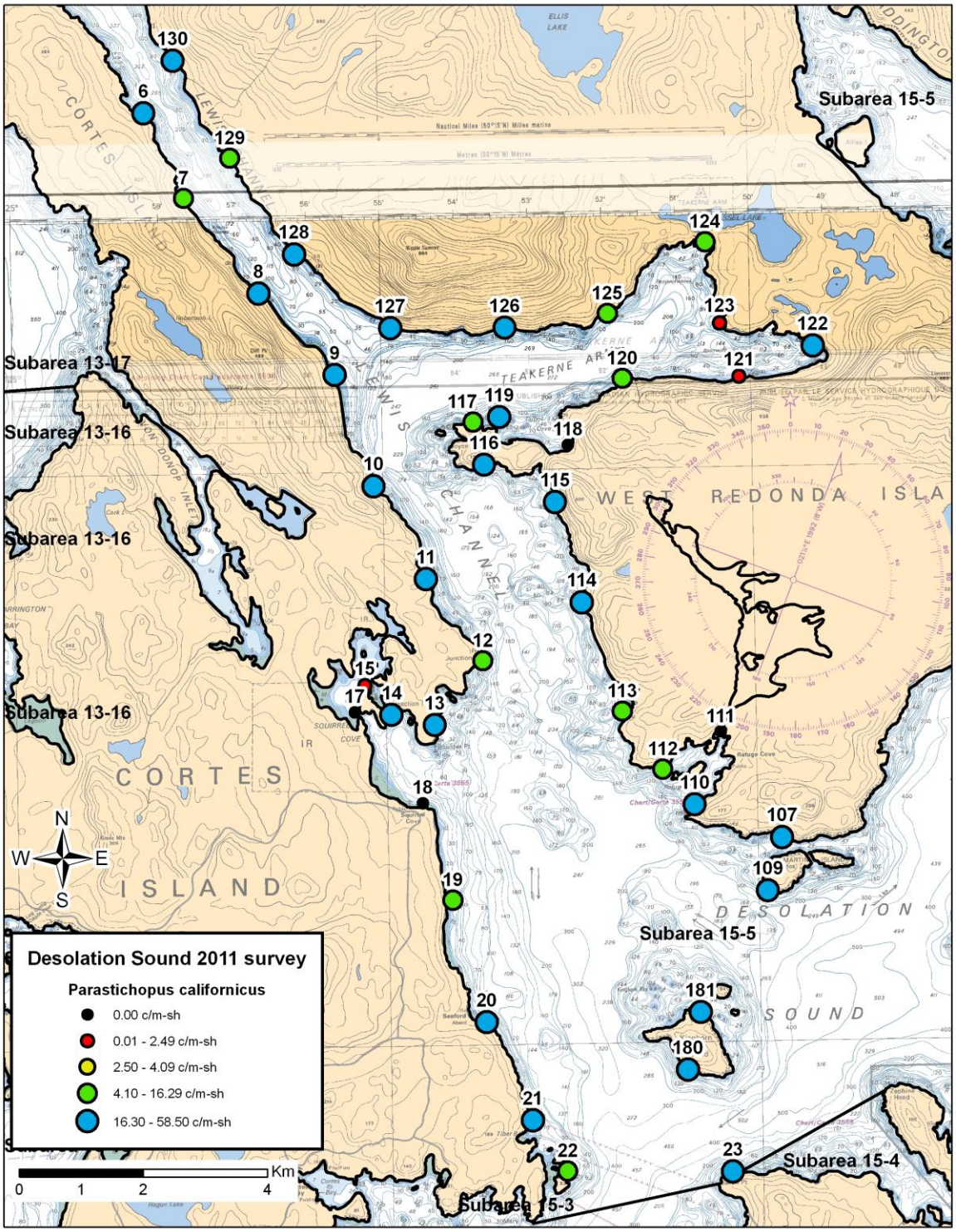

Figure 32d. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 15–5 surveyed as part of the Desolation Sound survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (densities between Regional Baseline Density and bootstrapped lower 90% confidence bound); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound).

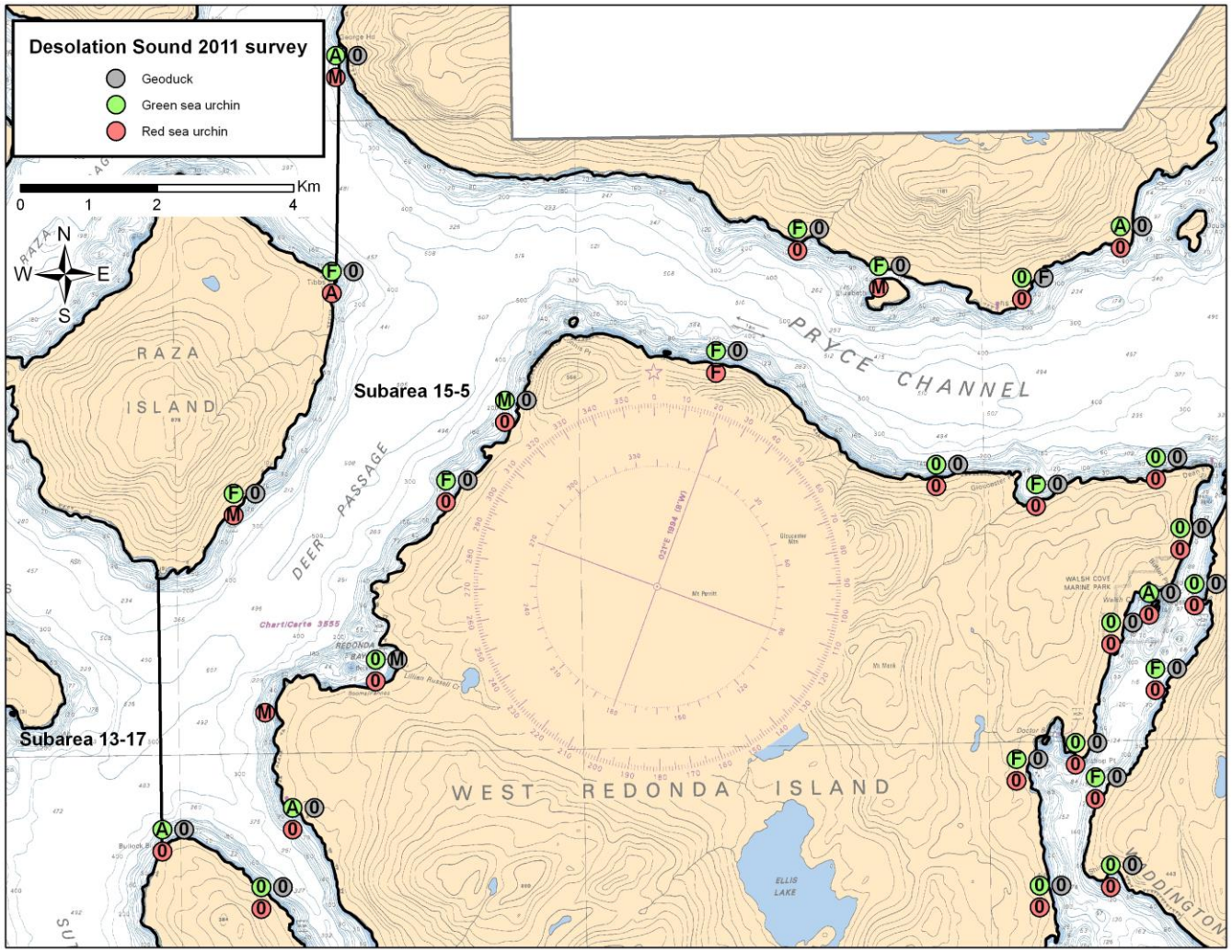

Figure 33a. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 15–5. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

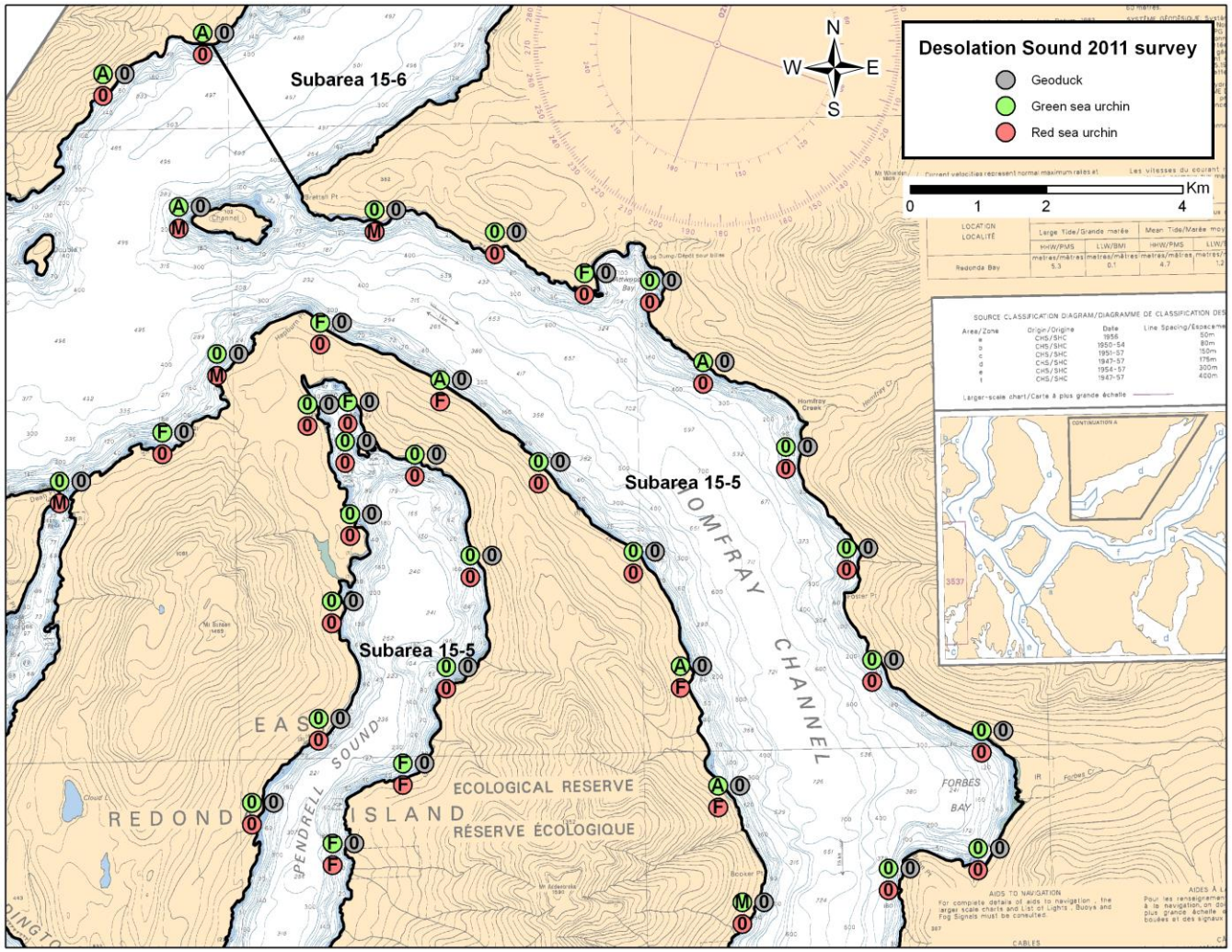

Figure 33b. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 15–5. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

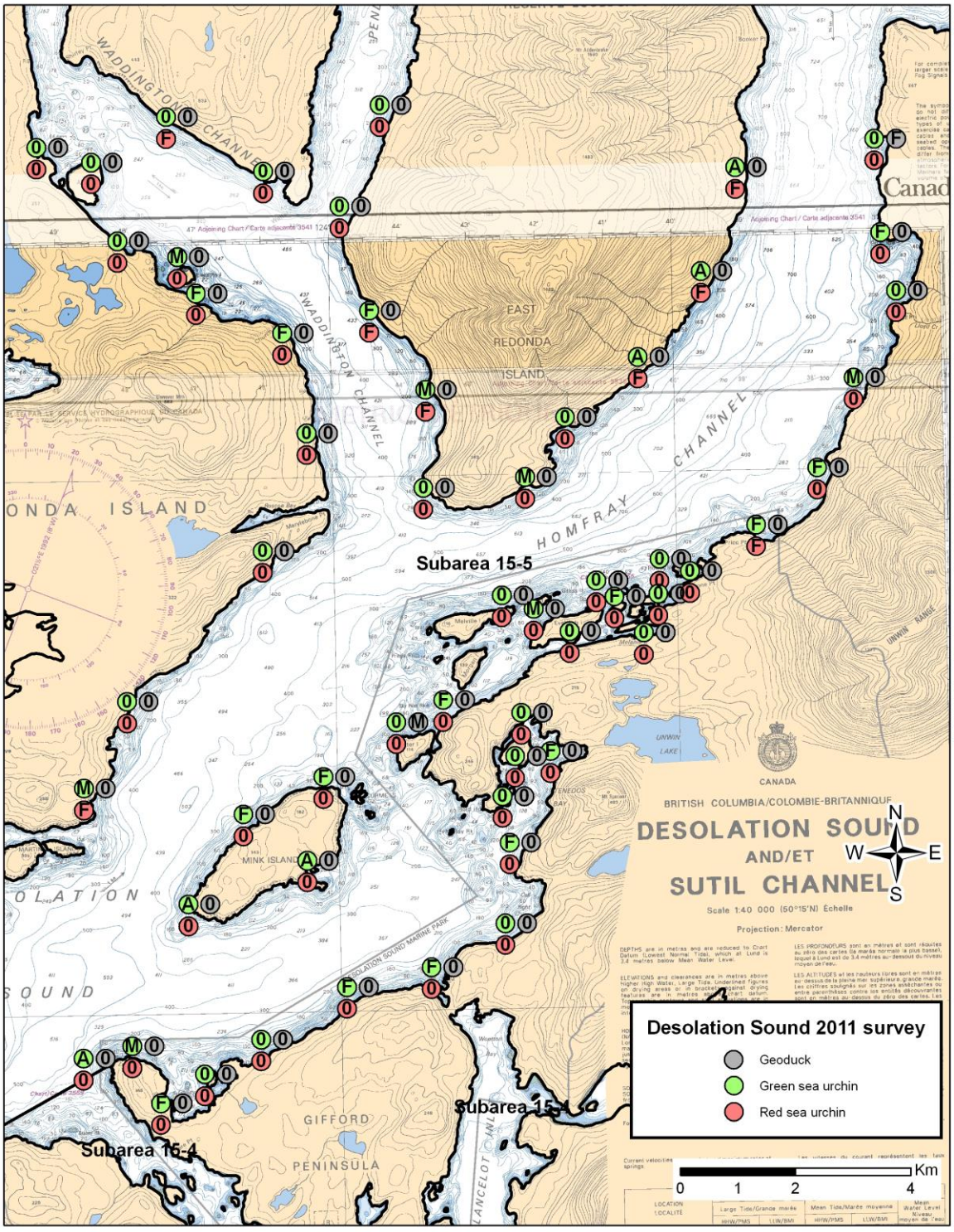

Figure 33c. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 15–5. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

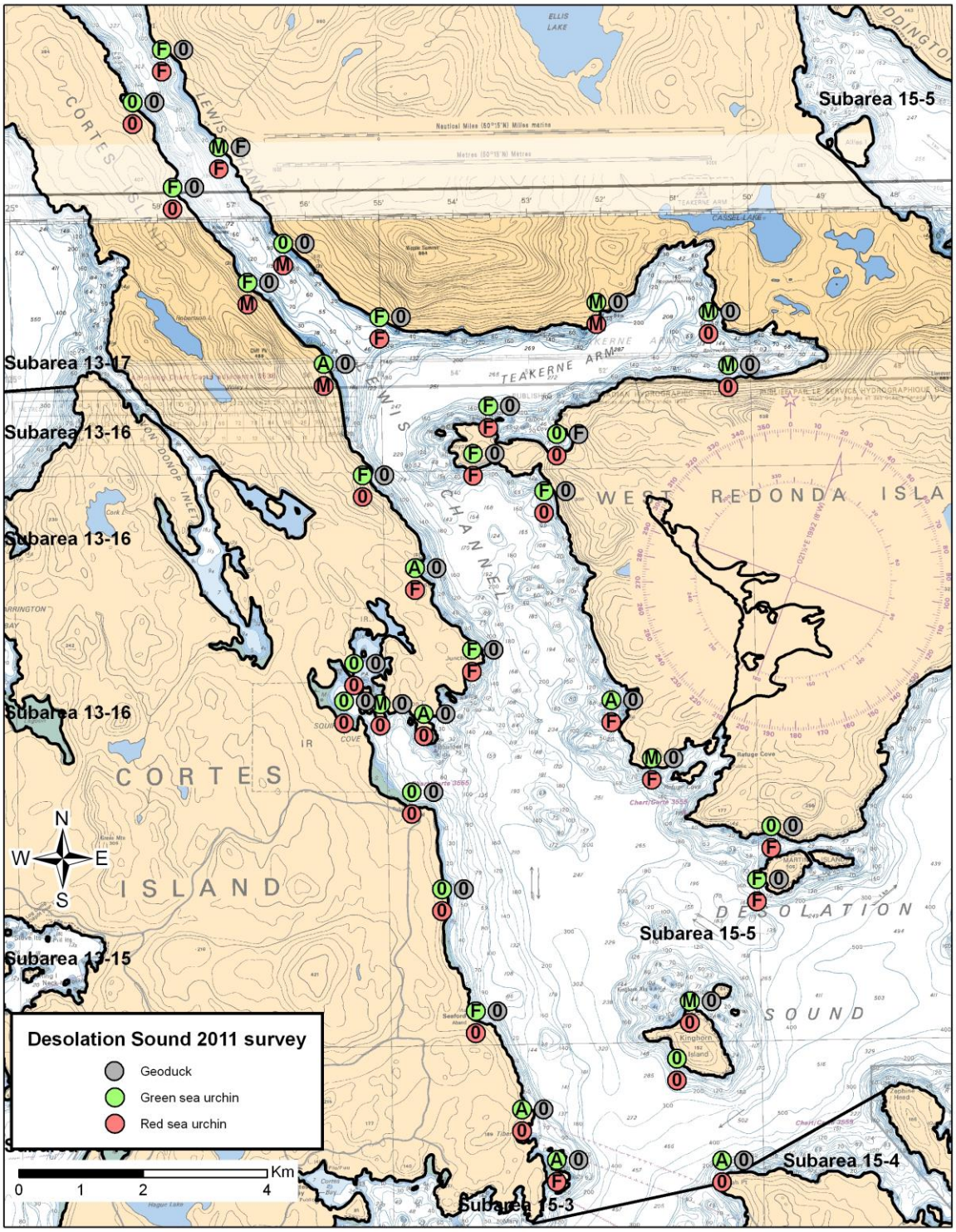

Figure 33d. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 15–5. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

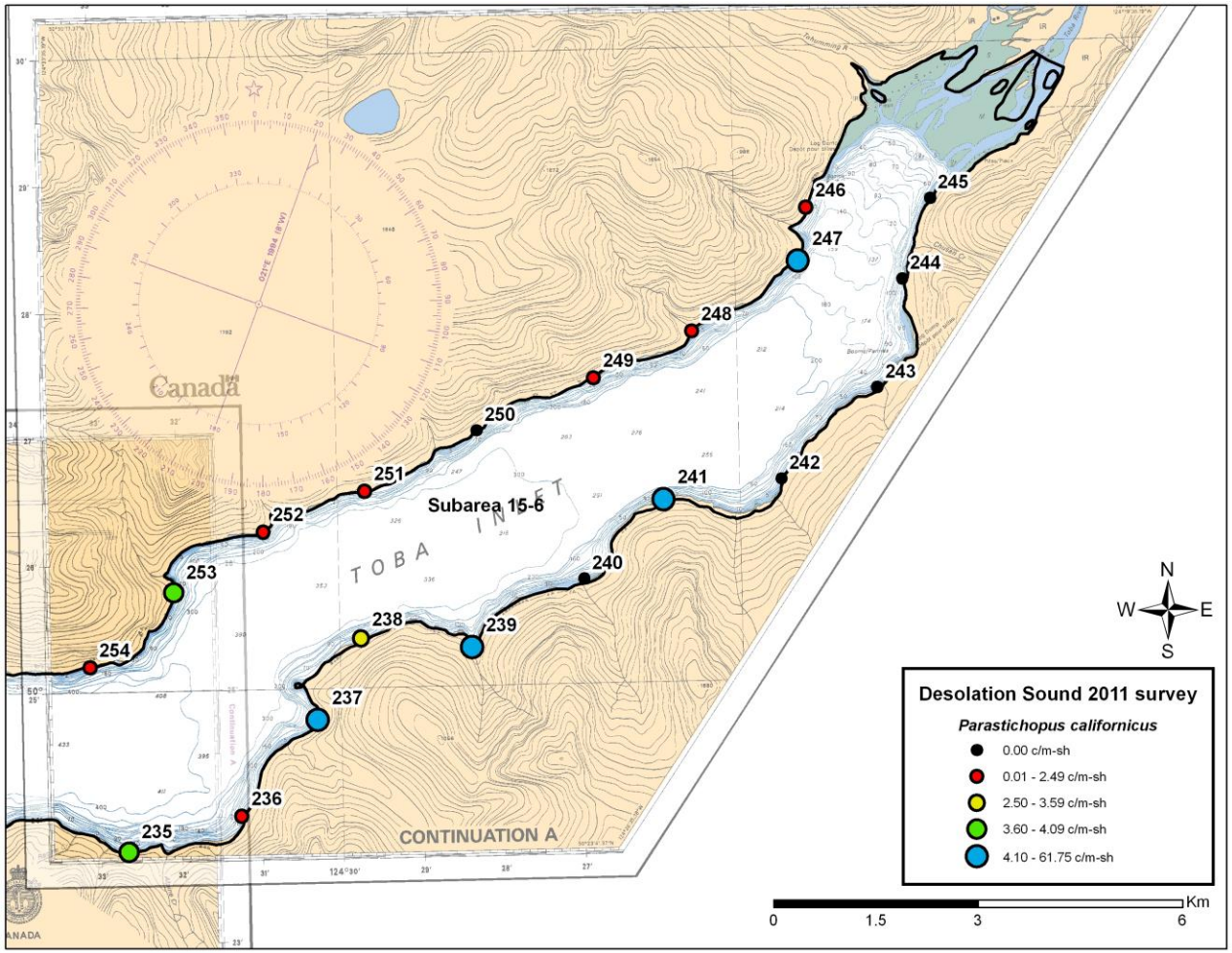

Figure 34a. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 15–6, surveyed as part of the Desolation Sound survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 c/m-sh and the bootstrapped lower 90% confidence bound); green = productive locations (densities between the bootstrapped lower 90% confidence bound and Regional Baseline Density); blue = very productive locations (densities above the Regional Baseline Density).

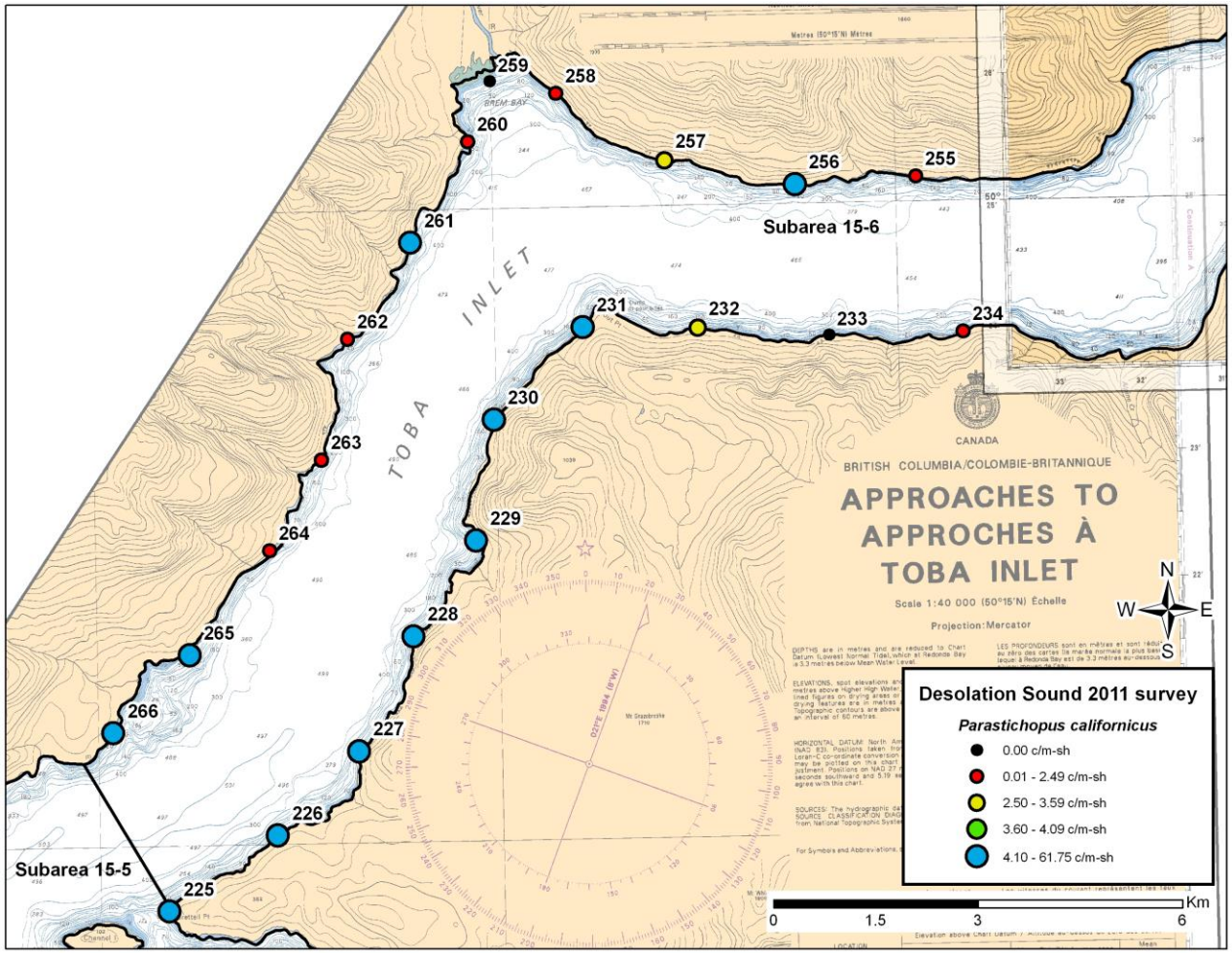

Figure 34b. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 15–6, surveyed as part of the Desolation Sound survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and 3.59 c/m-sh); green = productive locations (densities between the bootstrapped lower 90% confidence bound and Regional Baseline Density); blue = very productive locations (densities above the Regional Baseline Density).

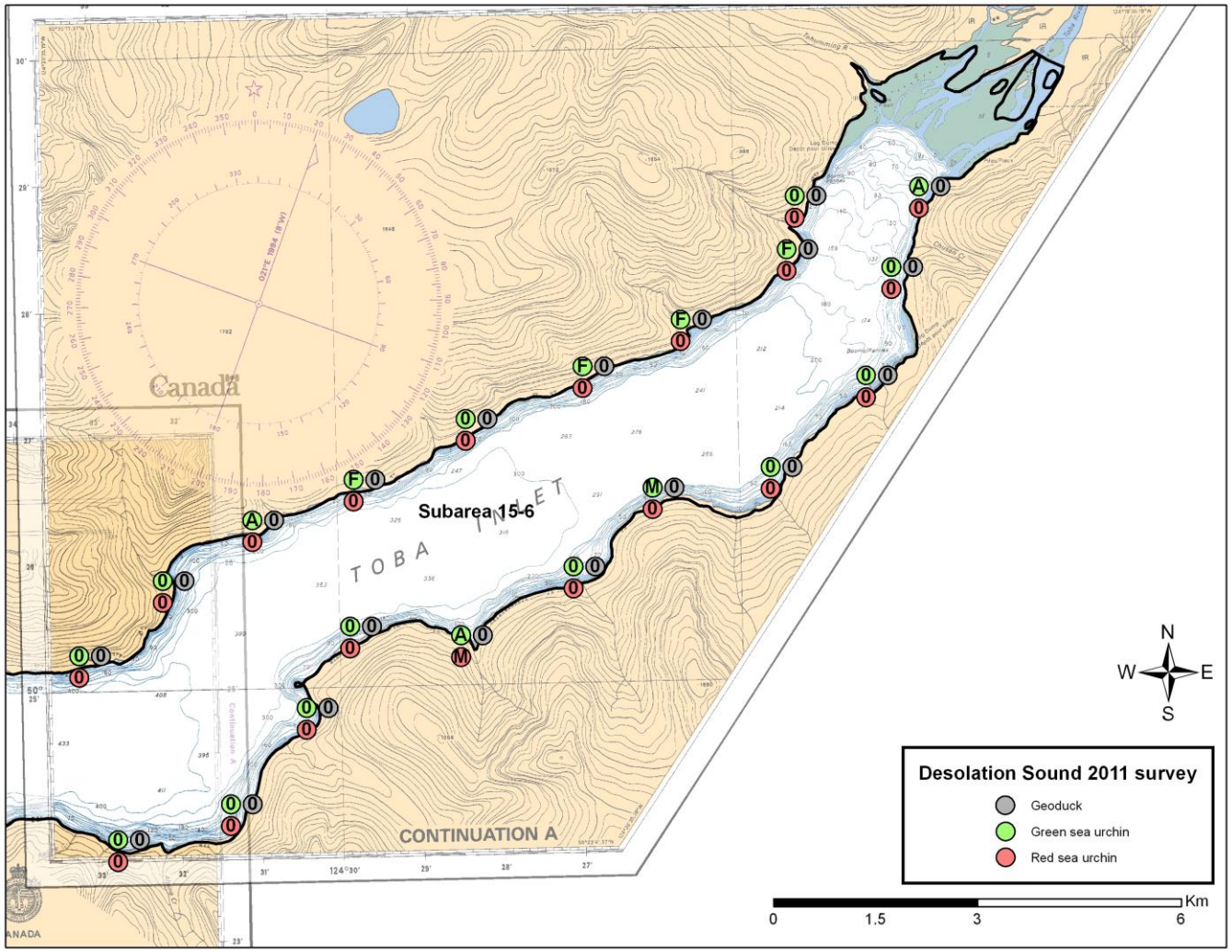

Figure 35a. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 15–6. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

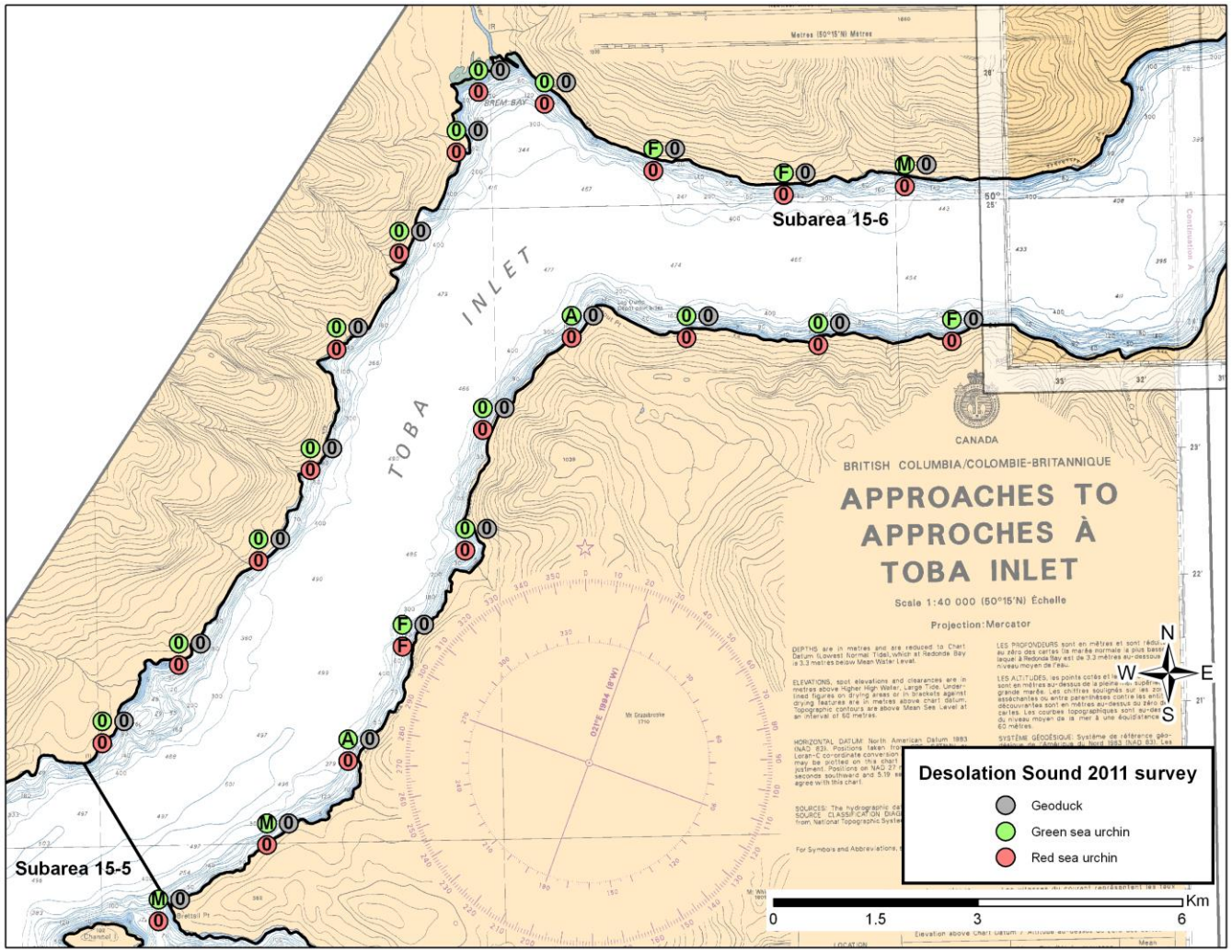

Figure 35b. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 15–6. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

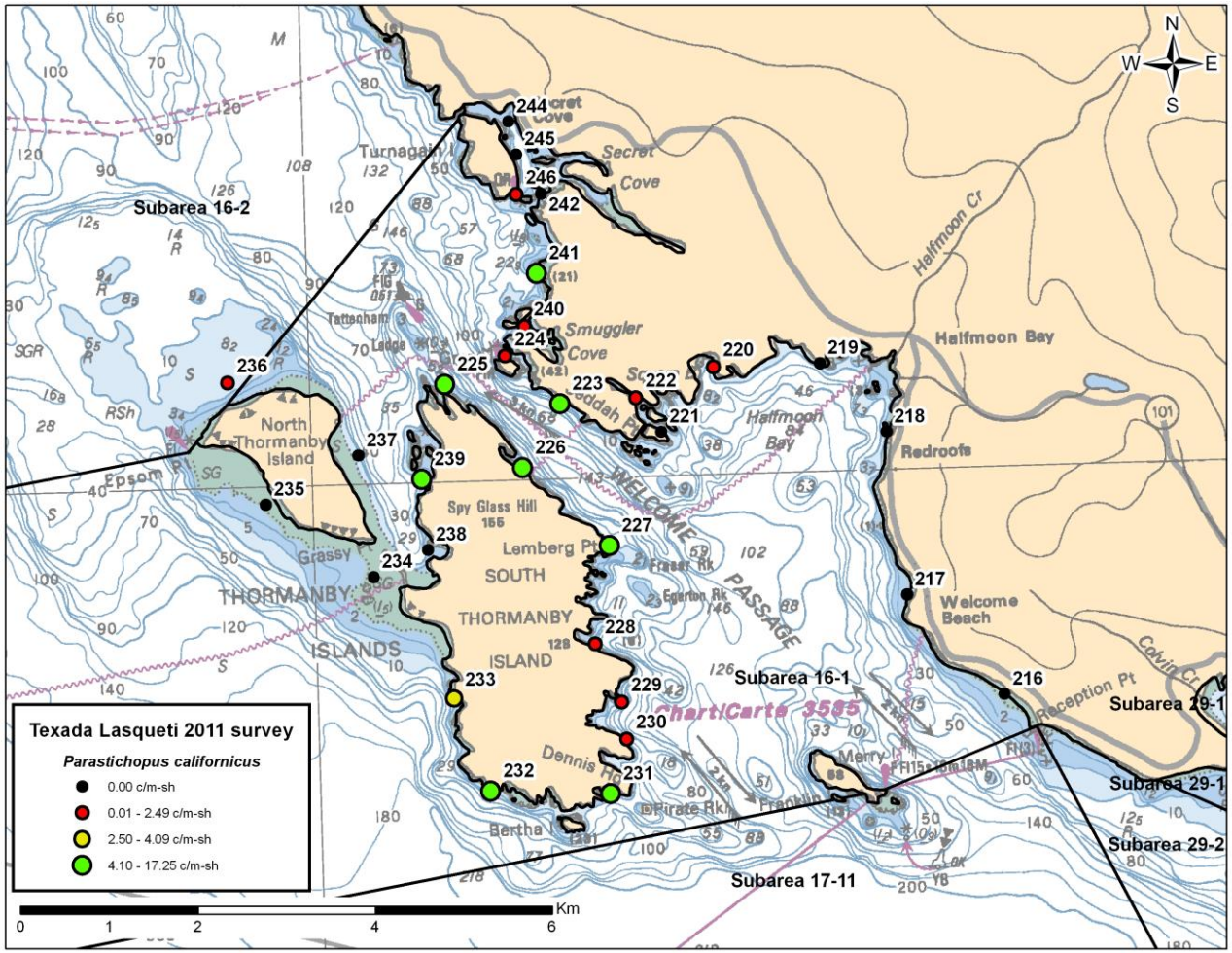

Figure 36. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 16–1, surveyed as part of the Texada – Lasqueti survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 c/m-sh and the Regional Baseline Density); green = productive locations (densities above the Regional Baseline Density).

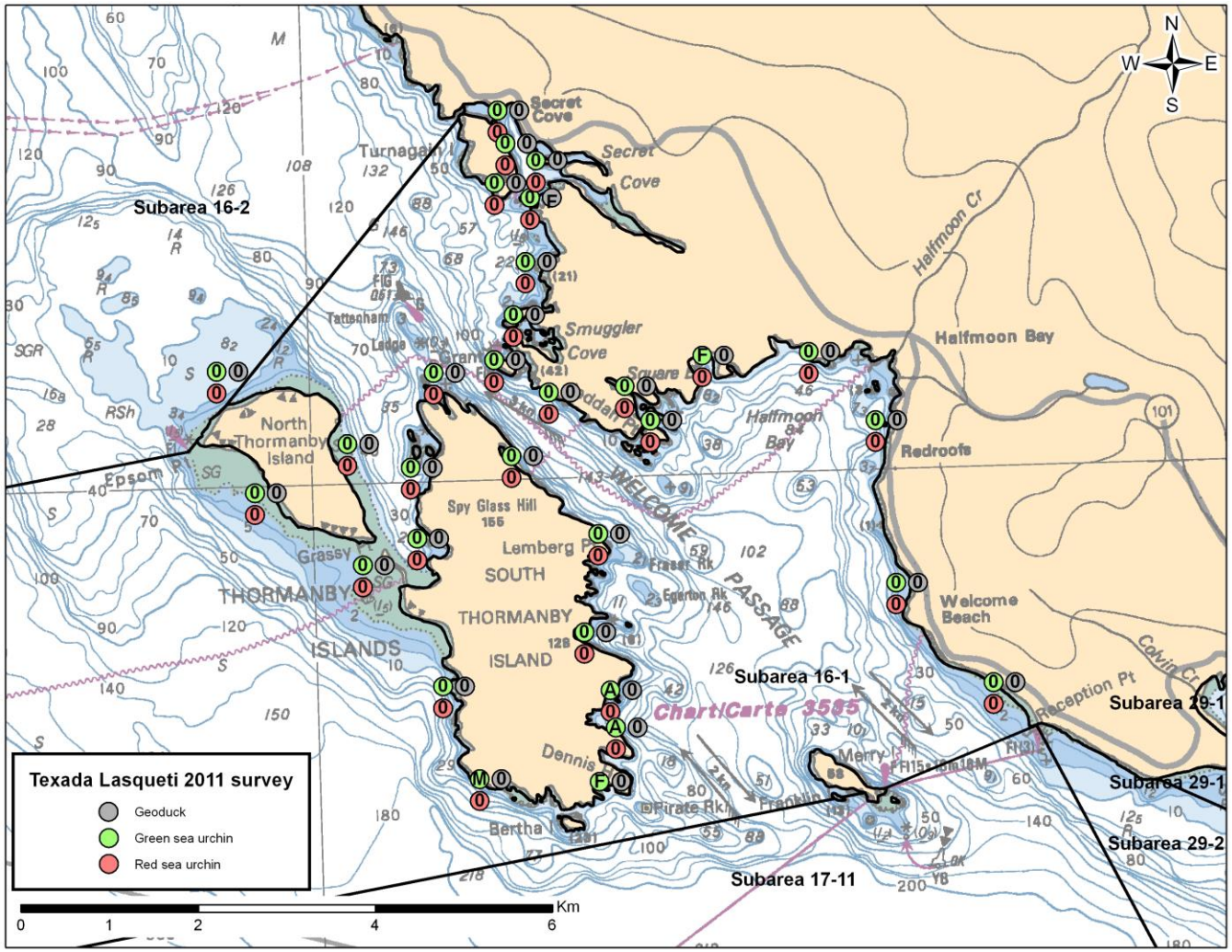

Figure 37. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 16–1. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

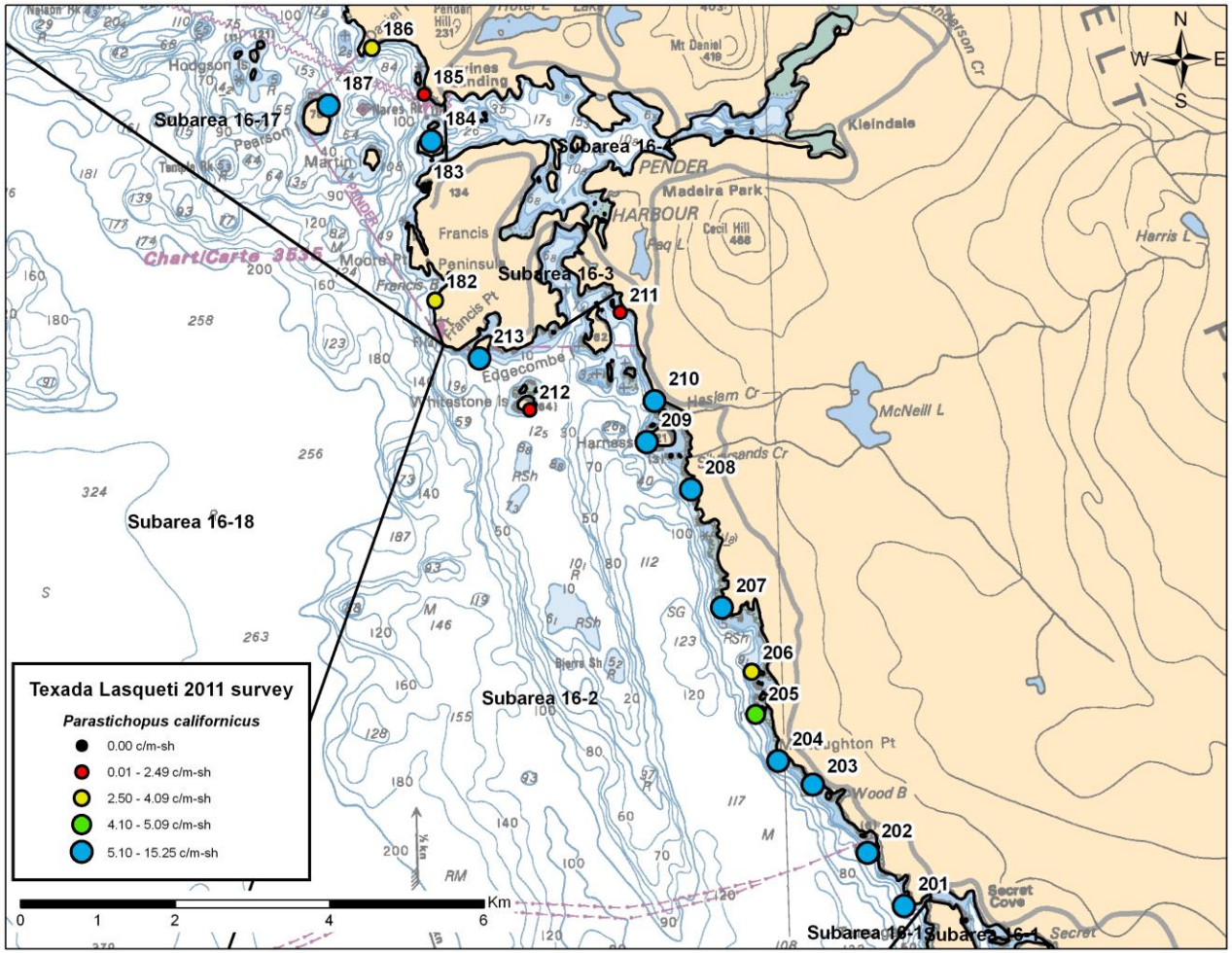

Figure 38. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 16–2 & 17, surveyed as part of the Texada – Lasqueti survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (between the Regional Baseline Density and the bootstrapped lower 90% confidence bound); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound).

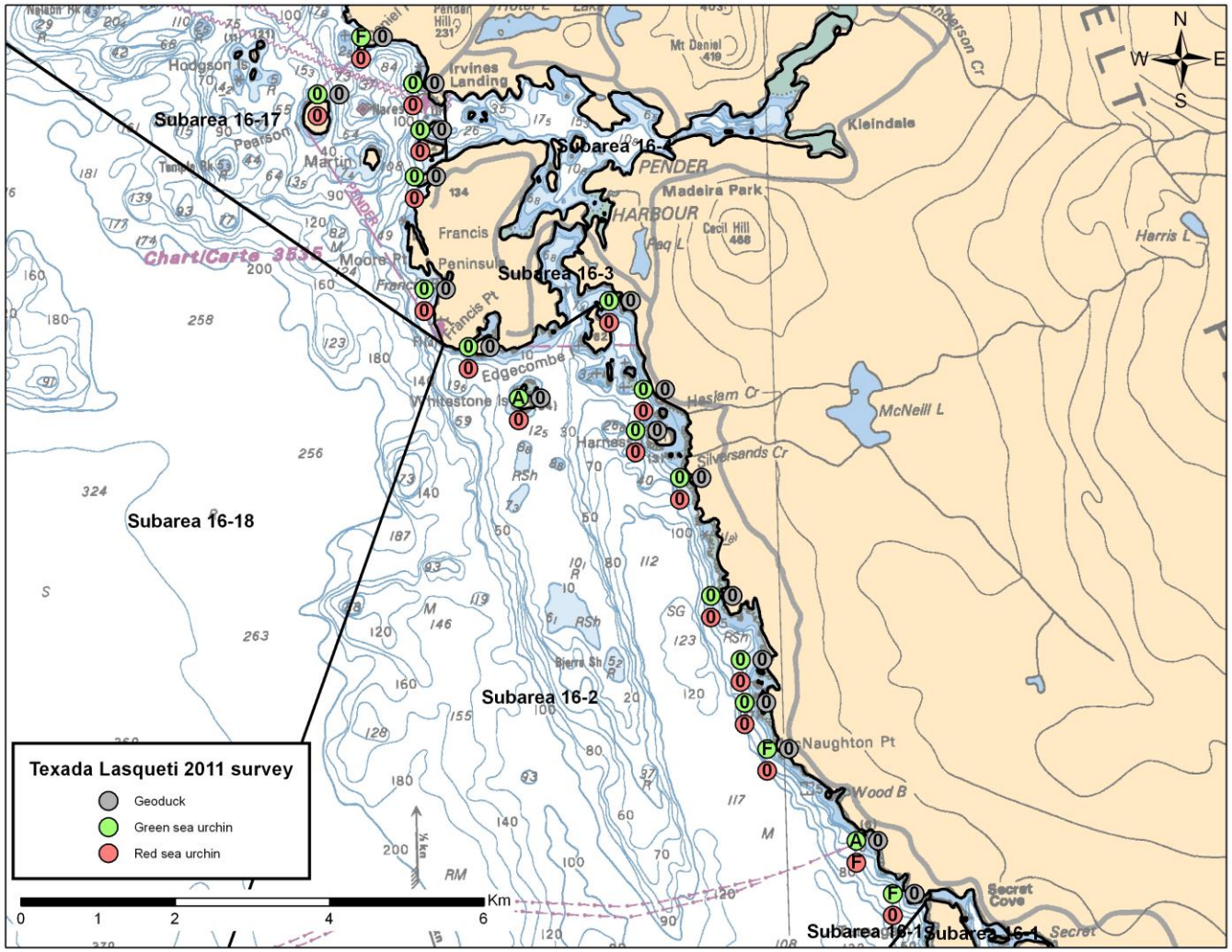

Figure 39. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 16–2 & 17. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

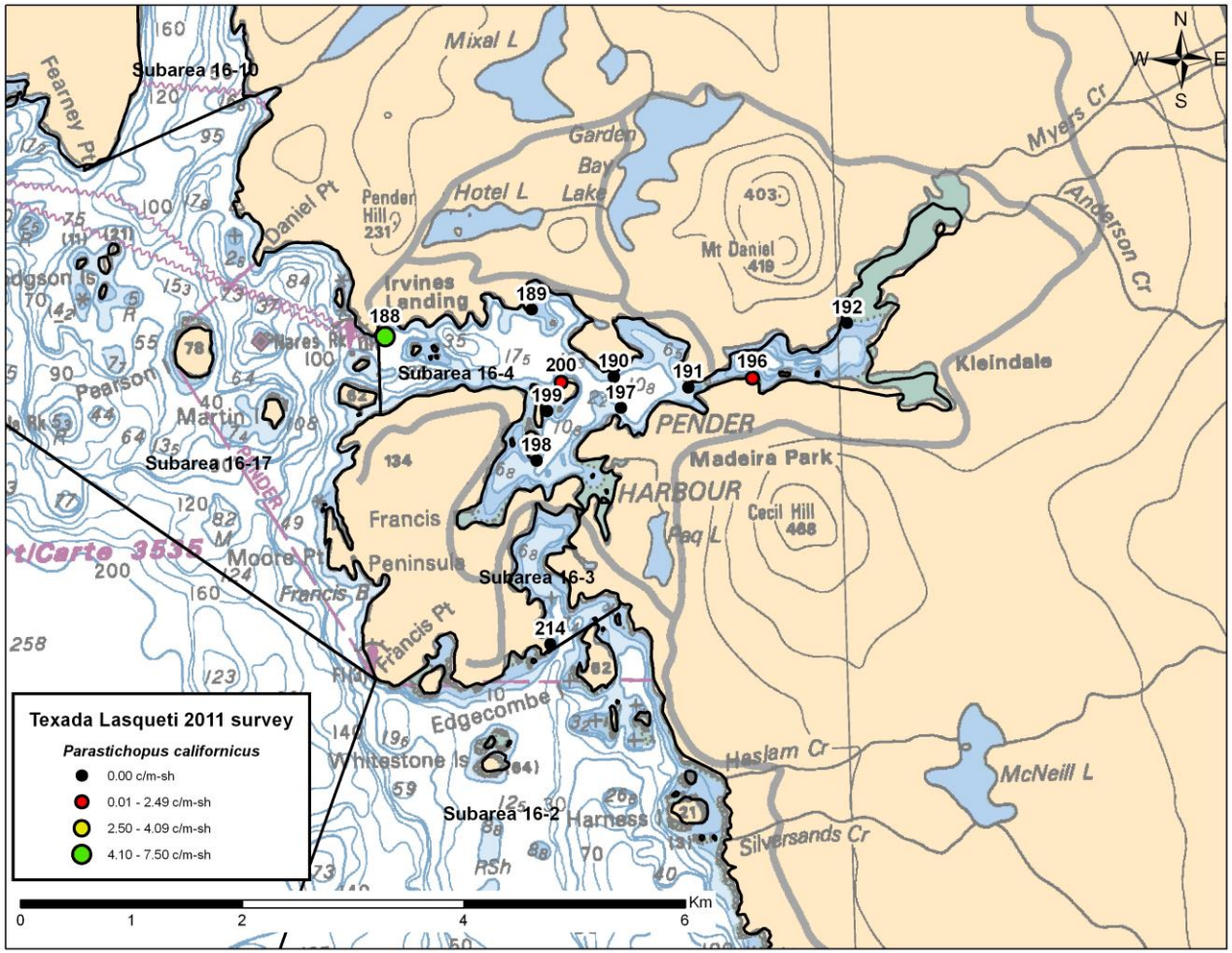

Figure 40. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 16–3 & 4, surveyed as part of the Texada – Lasqueti survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (densities above the Regional Baseline Density).

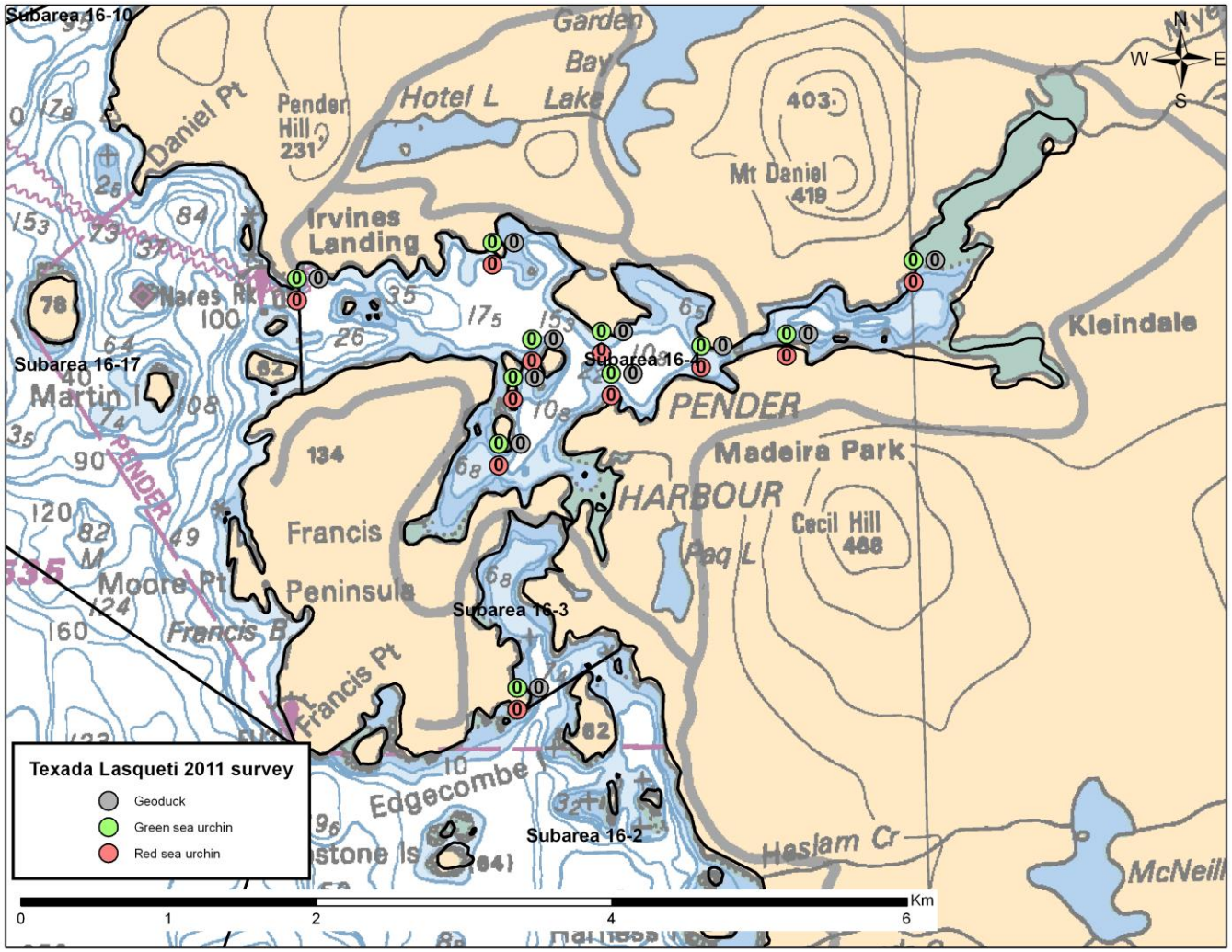

Figure 41. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 16–3 & 4. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

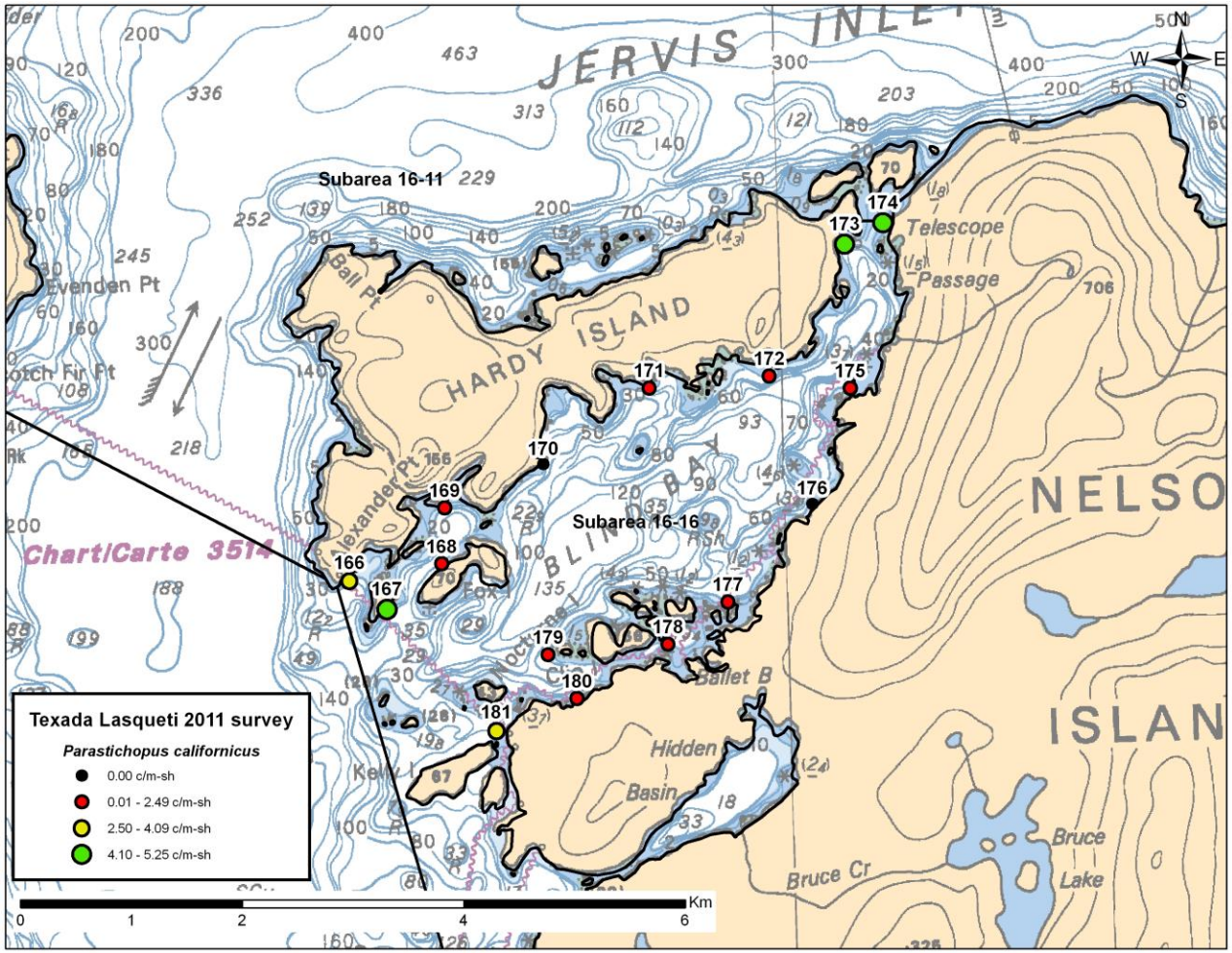

Figure 42. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 16–16, surveyed as part of the Texada – Lasqueti survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (densities above the Regional Baseline Density).

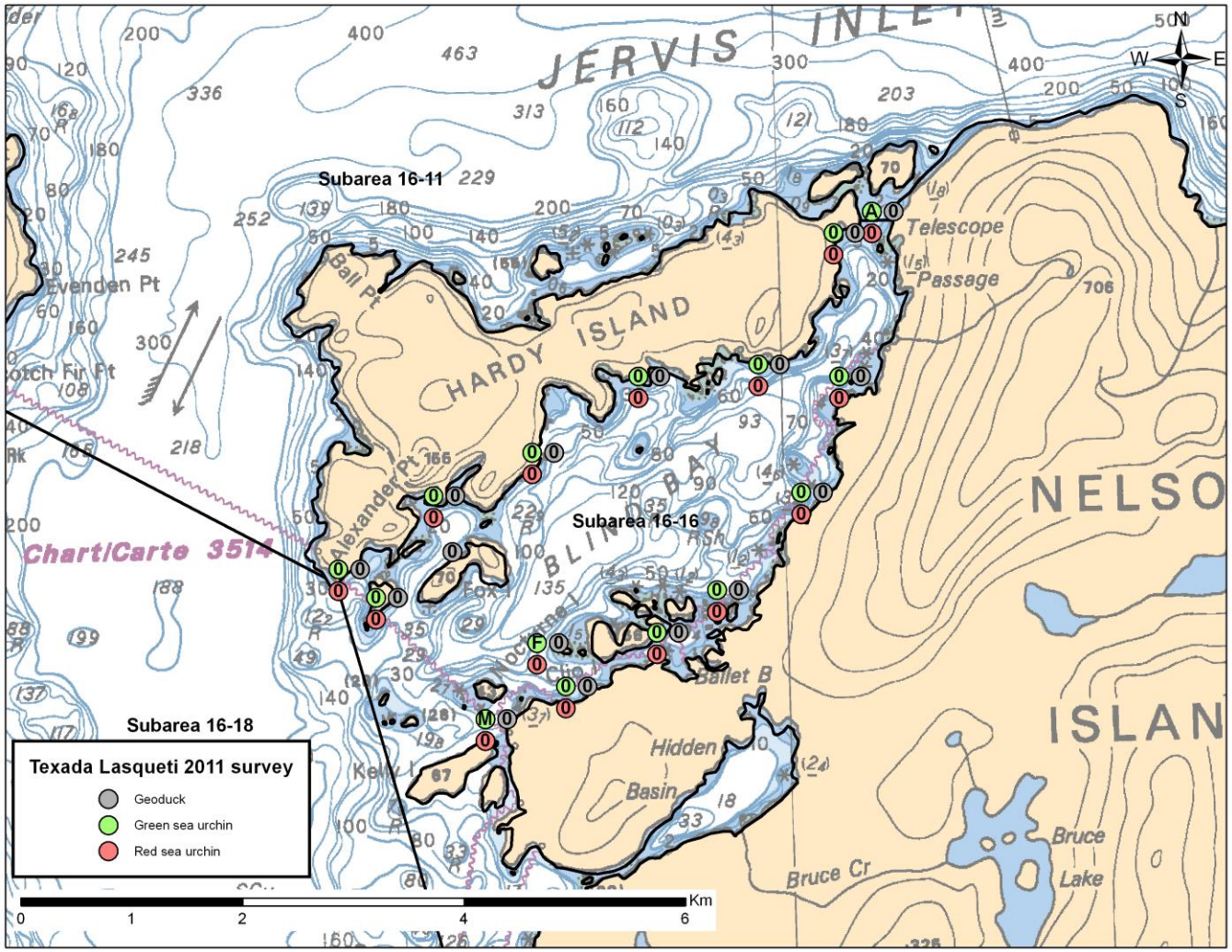

Figure 43. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 16–16. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

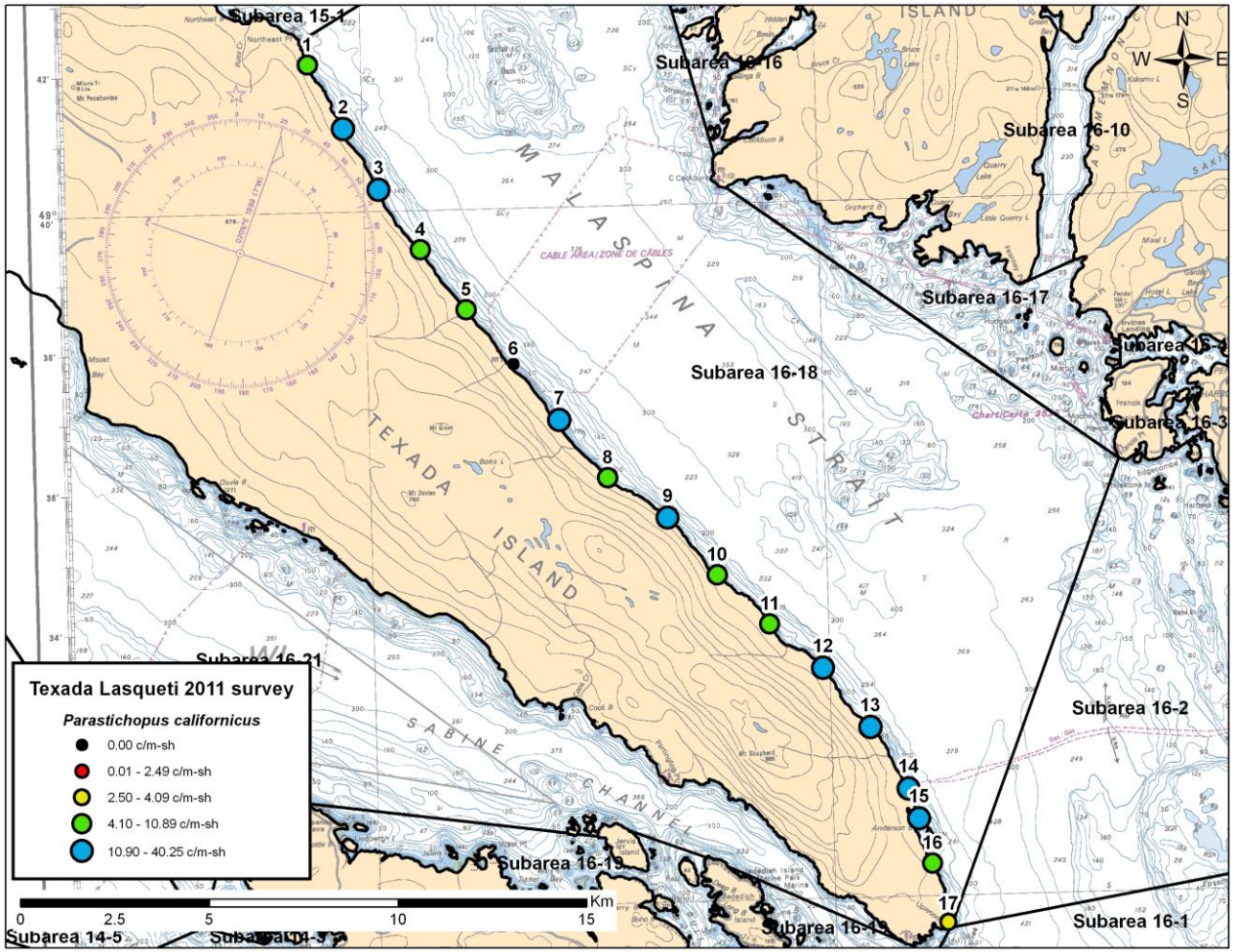

Figure 44. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 16–18, surveyed as part of the Texada – Lasqueti survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and Regional Baseline Density); green = productive locations (densities between the Regional Baseline Density and the bootstrapped lower 90% confidence bound); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound).

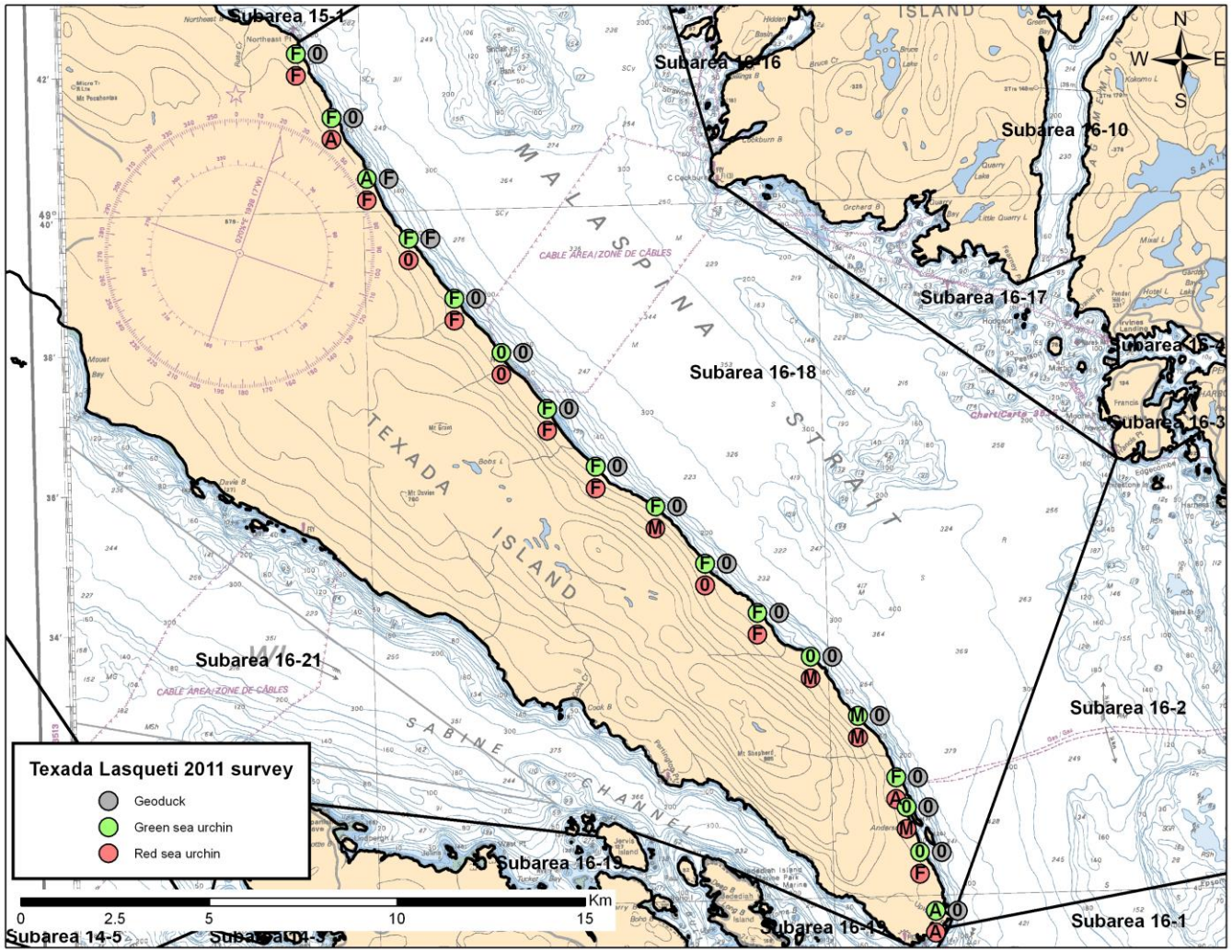

Figure 45. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 16–18. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

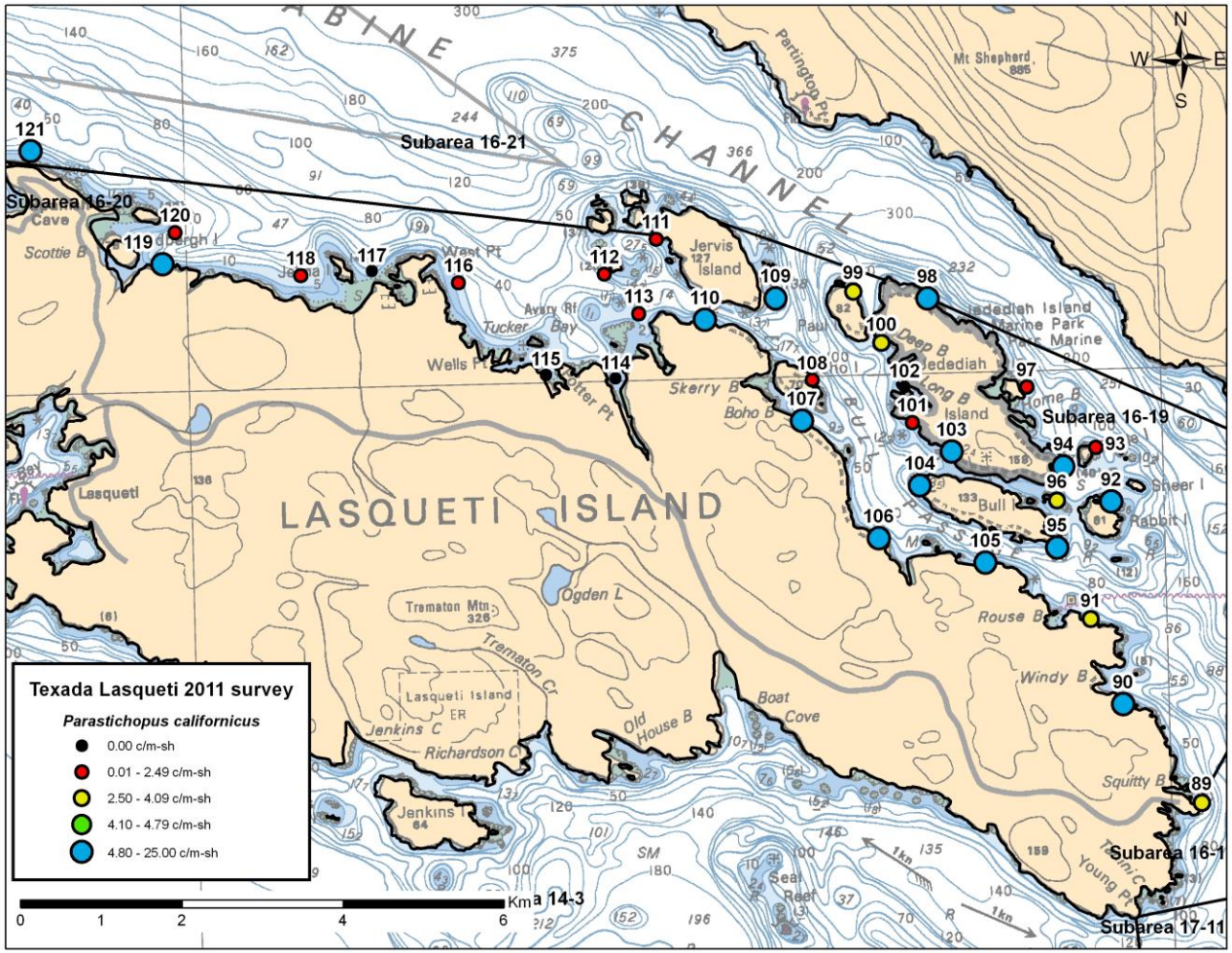

Figure 46. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 16–19, surveyed as part of the Texada – Lasqueti survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and Regional Baseline Density); green = productive locations (densities between the Regional Baseline Density and the bootstrapped lower 90% confidence bound); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound for the Subarea).

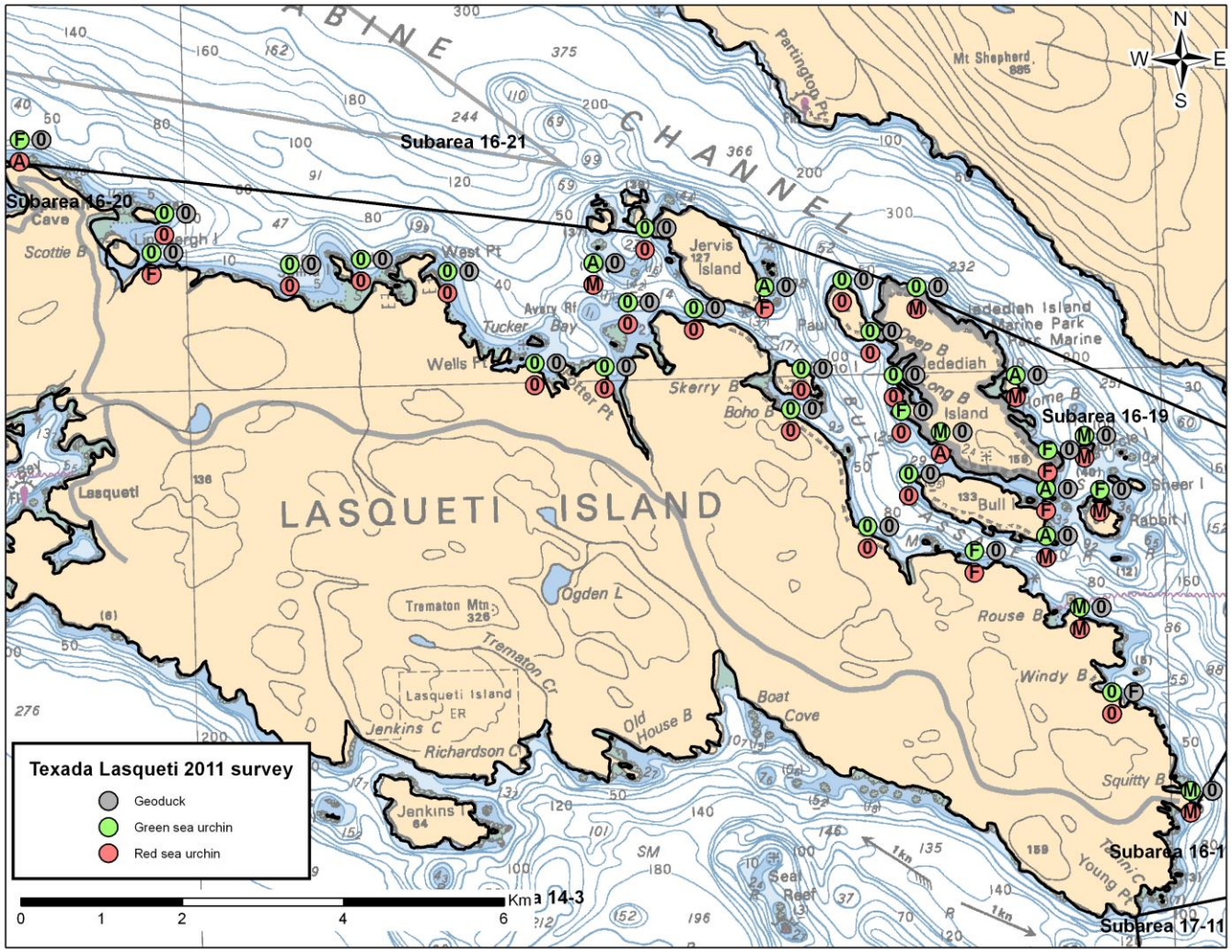

Figure 47. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 16–19. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

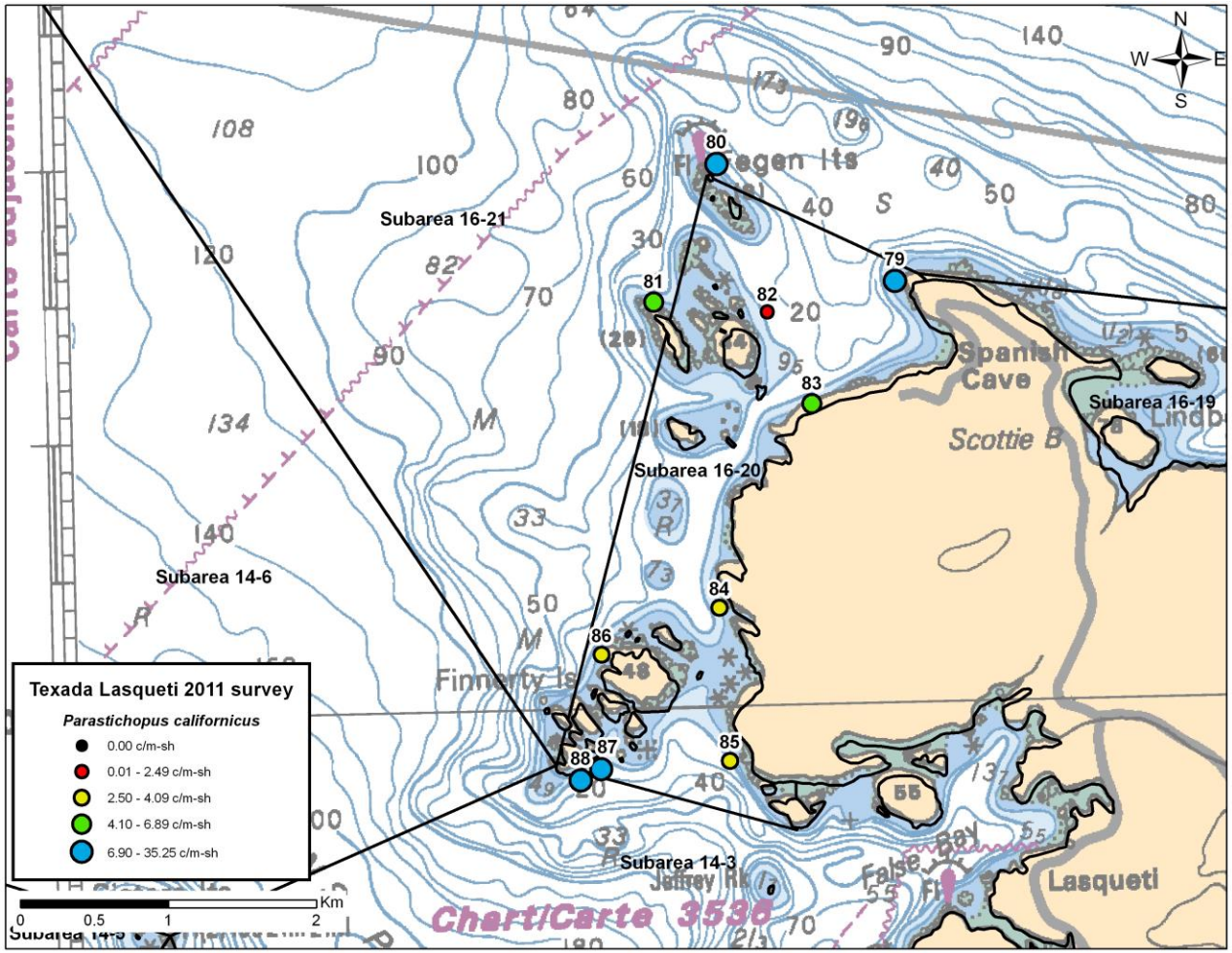

Figure 48. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 16–20, surveyed as part of the Texada – Lasqueti survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and Regional Baseline Density); green = productive locations (densities between the Regional Baseline Density and the bootstrapped lower 90% confidence bound); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound for the Subarea).

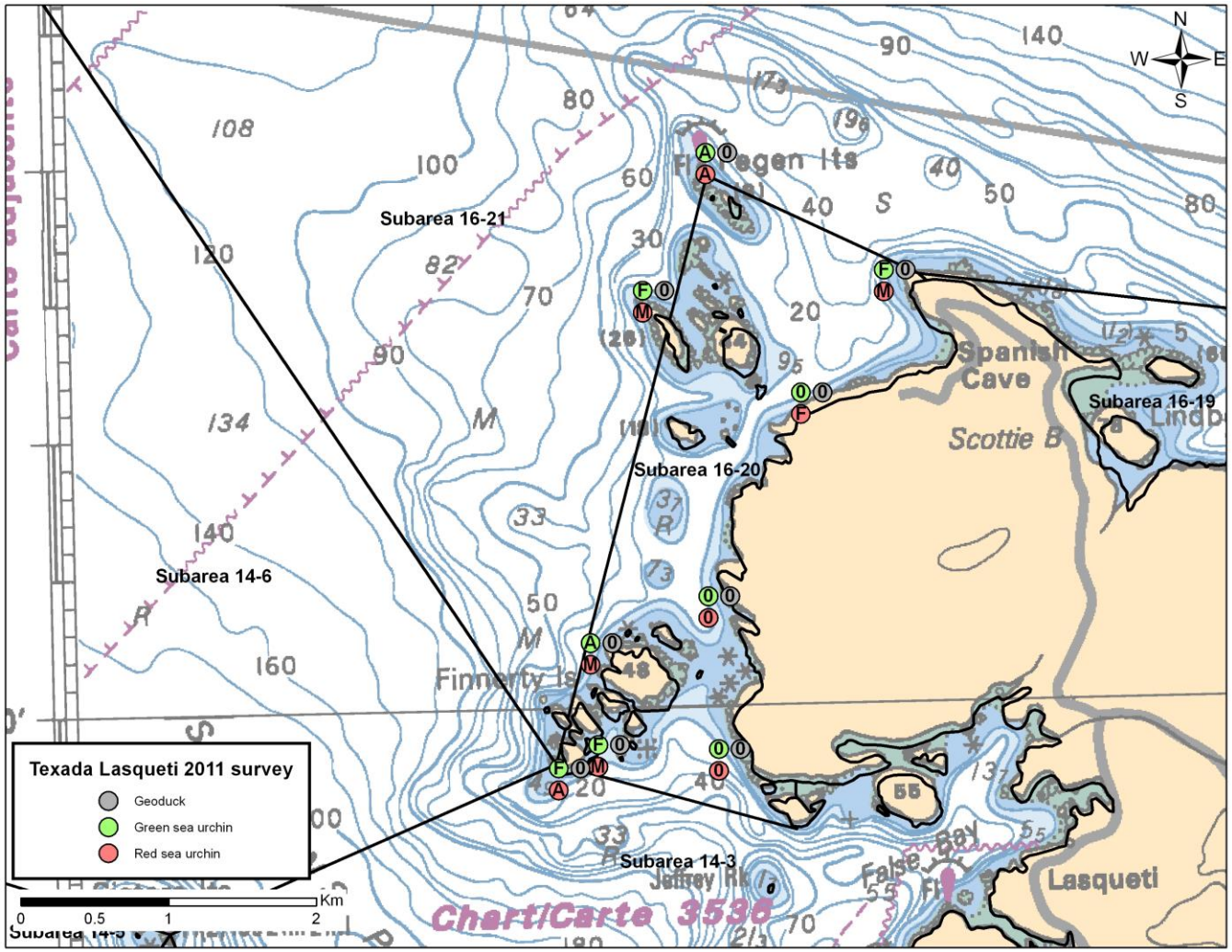

Figure 49. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 16–20. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

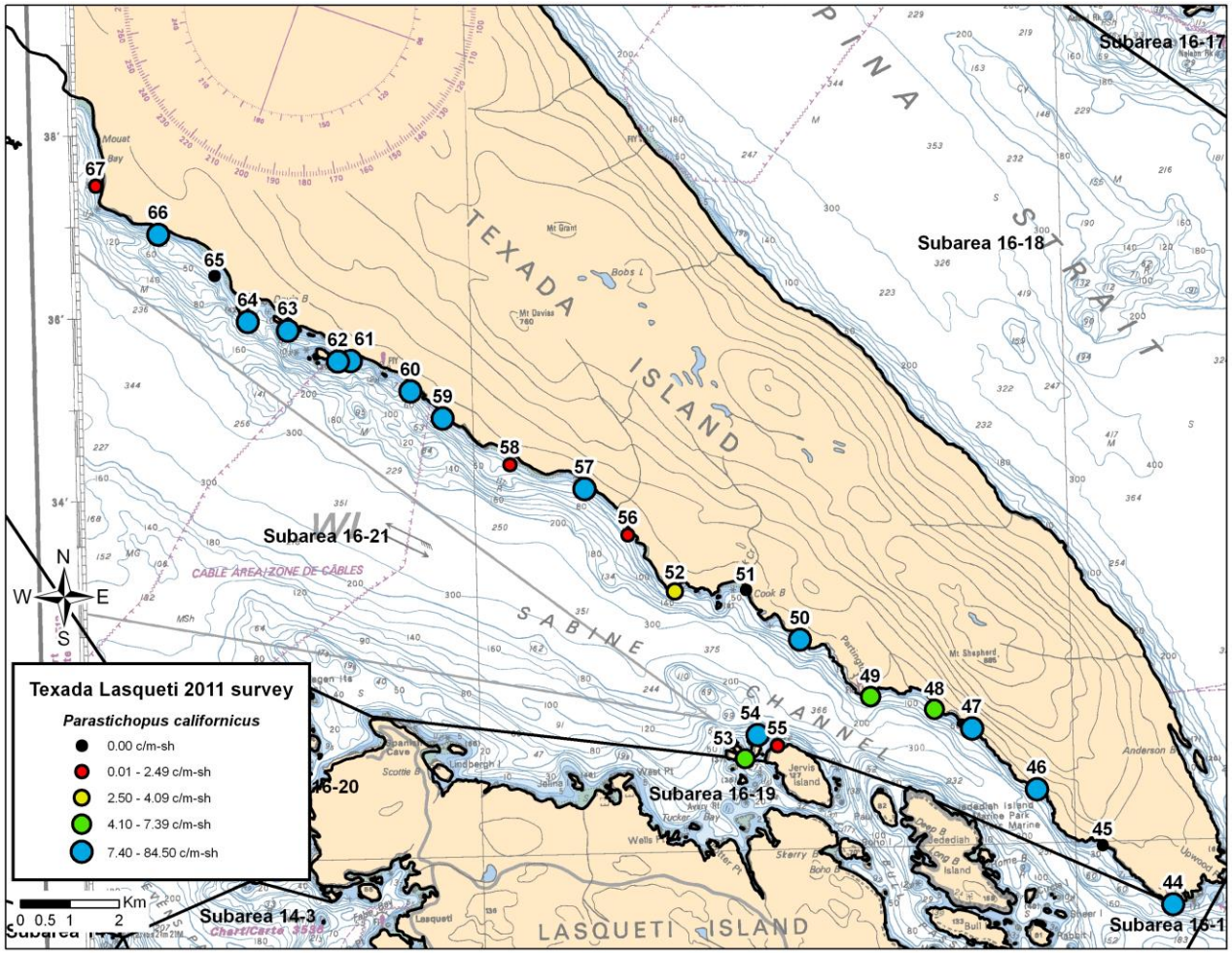

Figure 50a. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 16–21 & 22, surveyed as part of the Texada – Lasqueti survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and Regional Baseline Density); green = productive locations (densities between the Regional Baseline Density and the bootstrapped lower 90% confidence bound); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound for the Subarea).

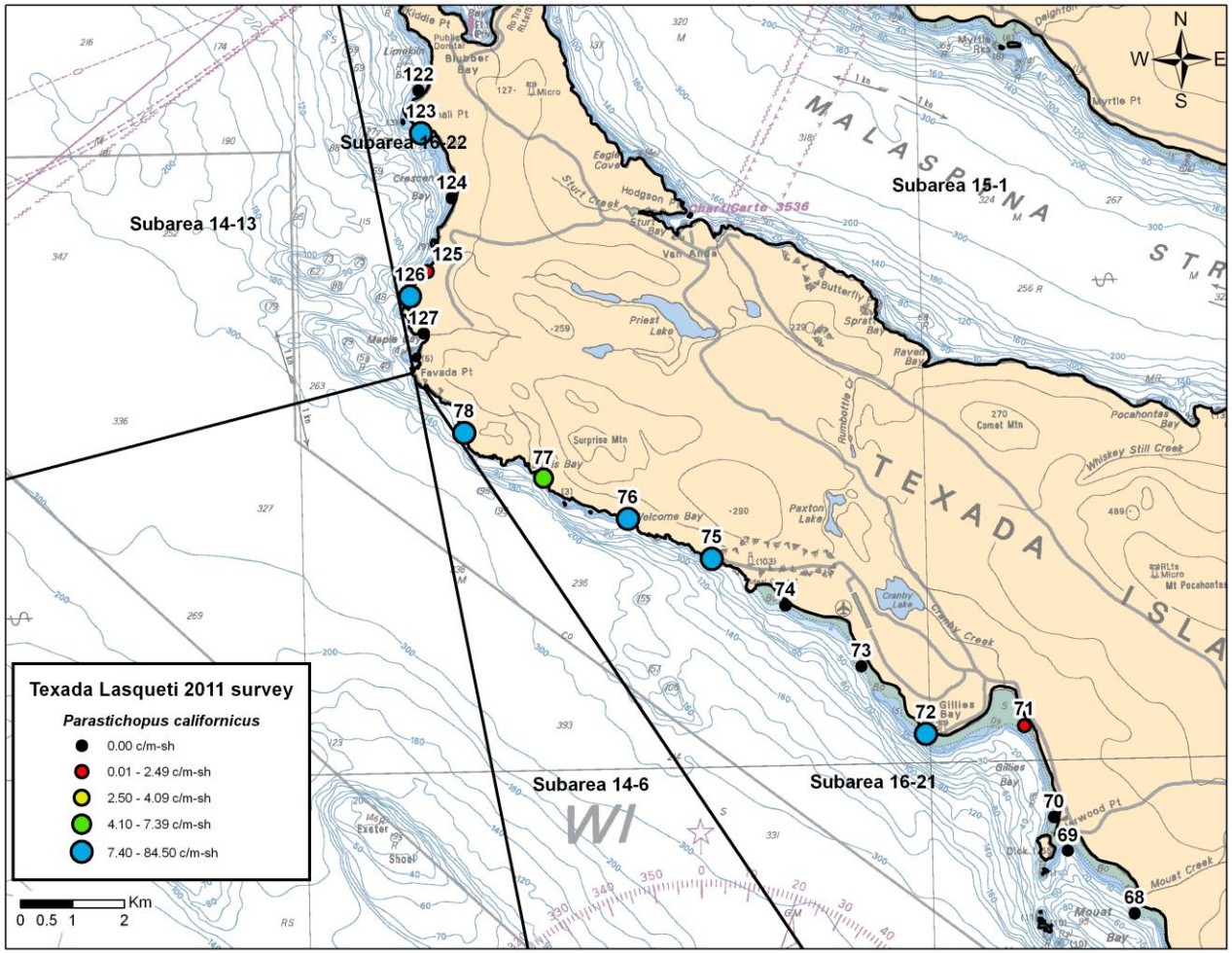

Figure 50b. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 16–21 & 22, surveyed as part of the Texada – Lasqueti survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and Regional Baseline Density); green = productive locations (densities between the Regional Baseline Density and the bootstrapped lower 90% confidence bound); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound for the Subarea).

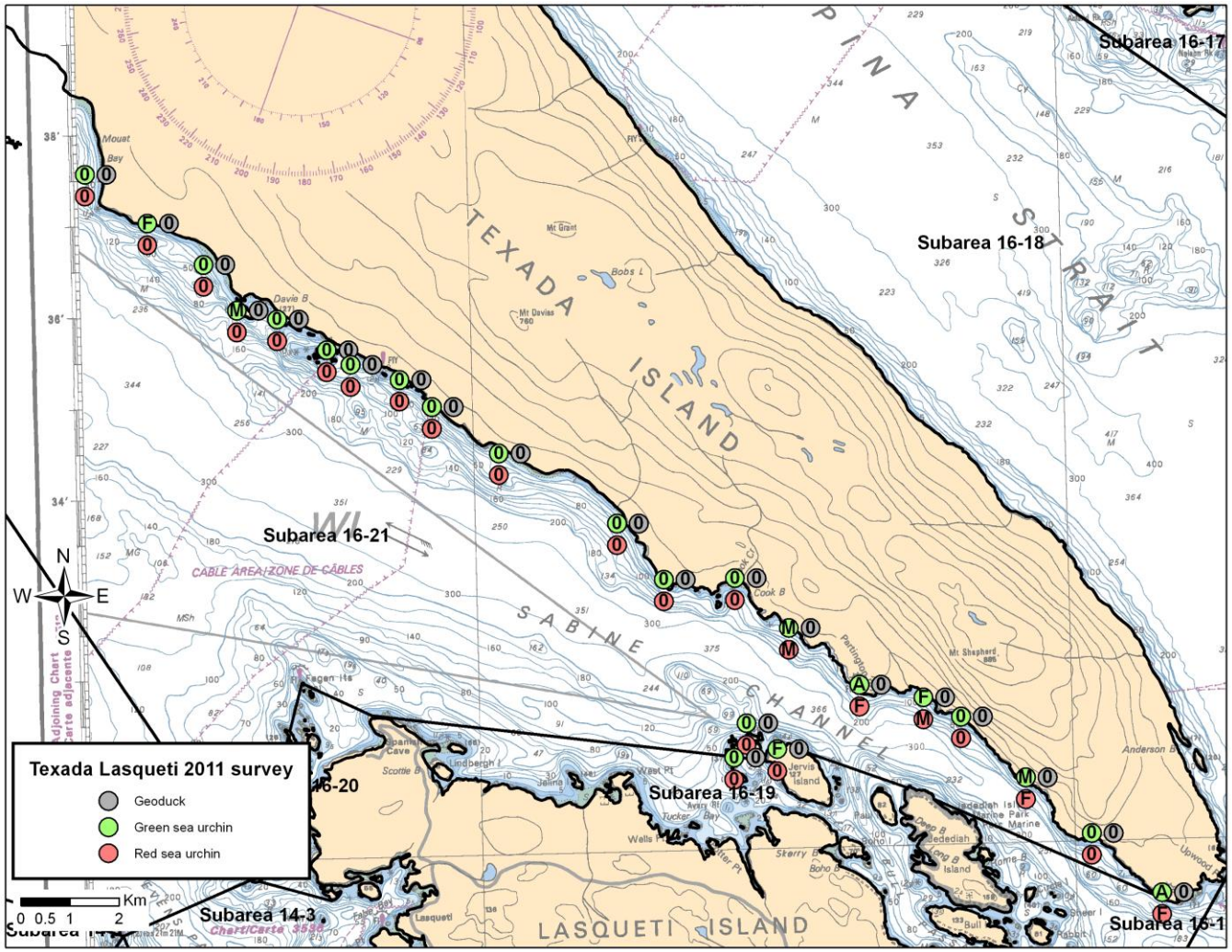

Figure 51a. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 16–21& 22. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

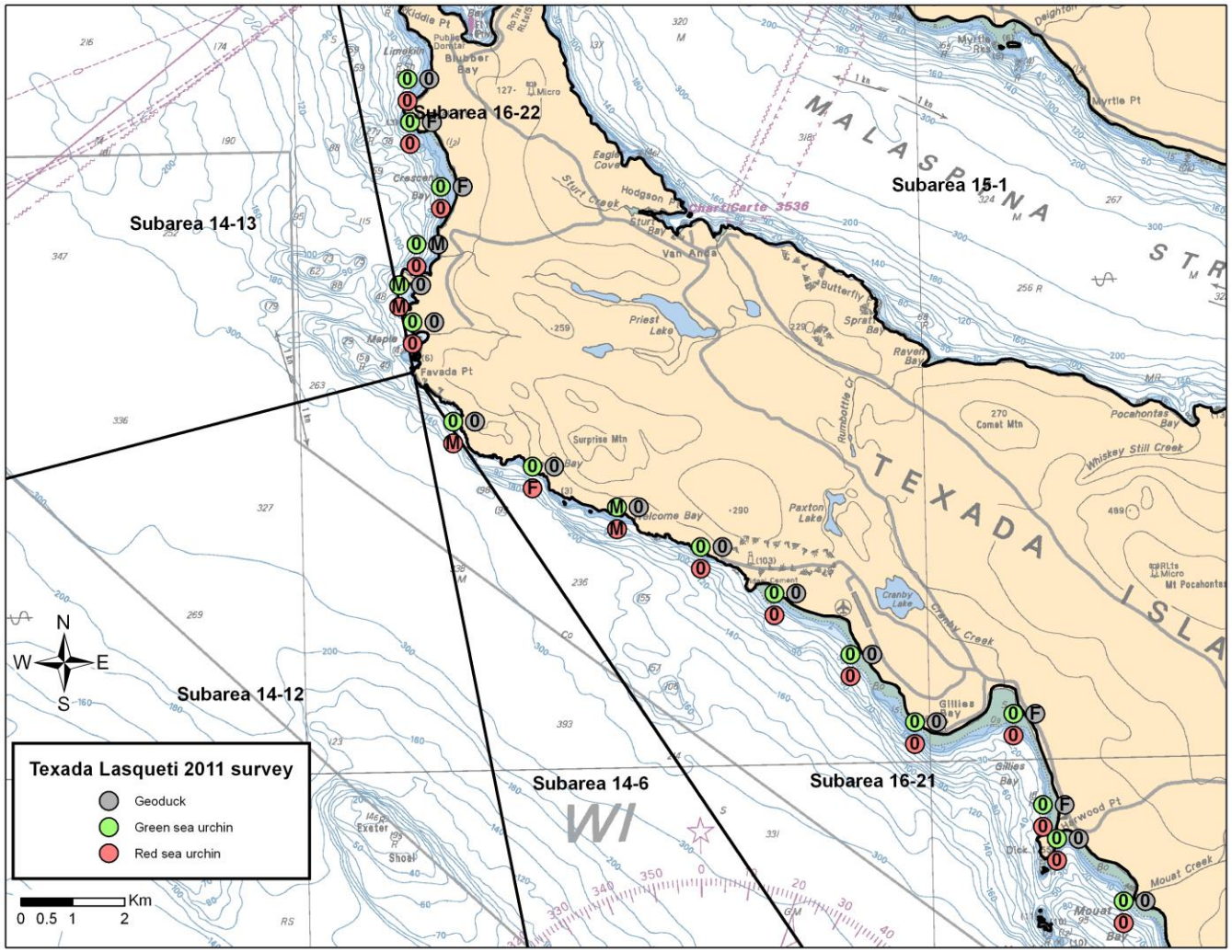

Figure 51b. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 16–21 & 22. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

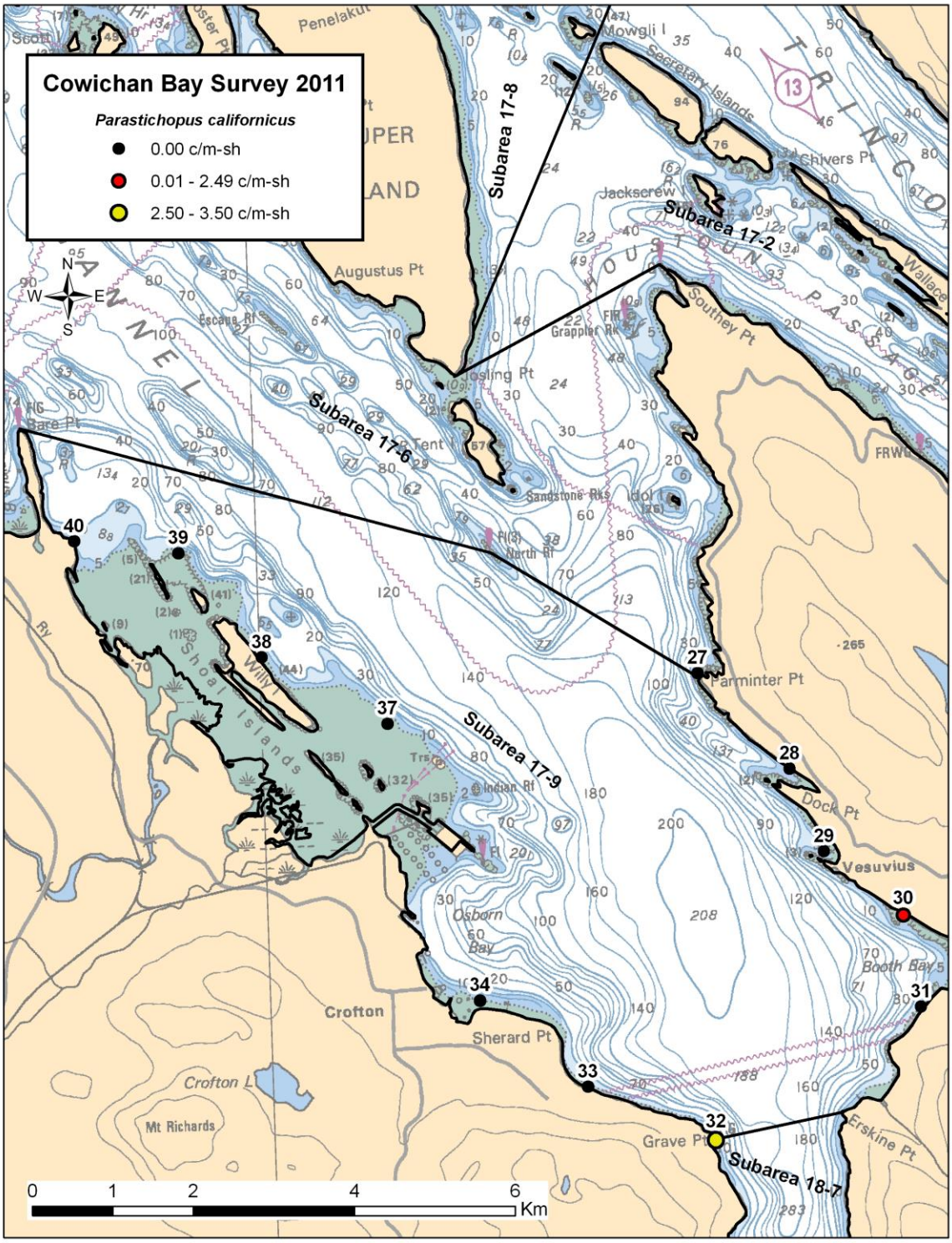

Figure 52. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 17–9, surveyed as part of the Cowichan Bay survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and 3.5 c/m-sh).

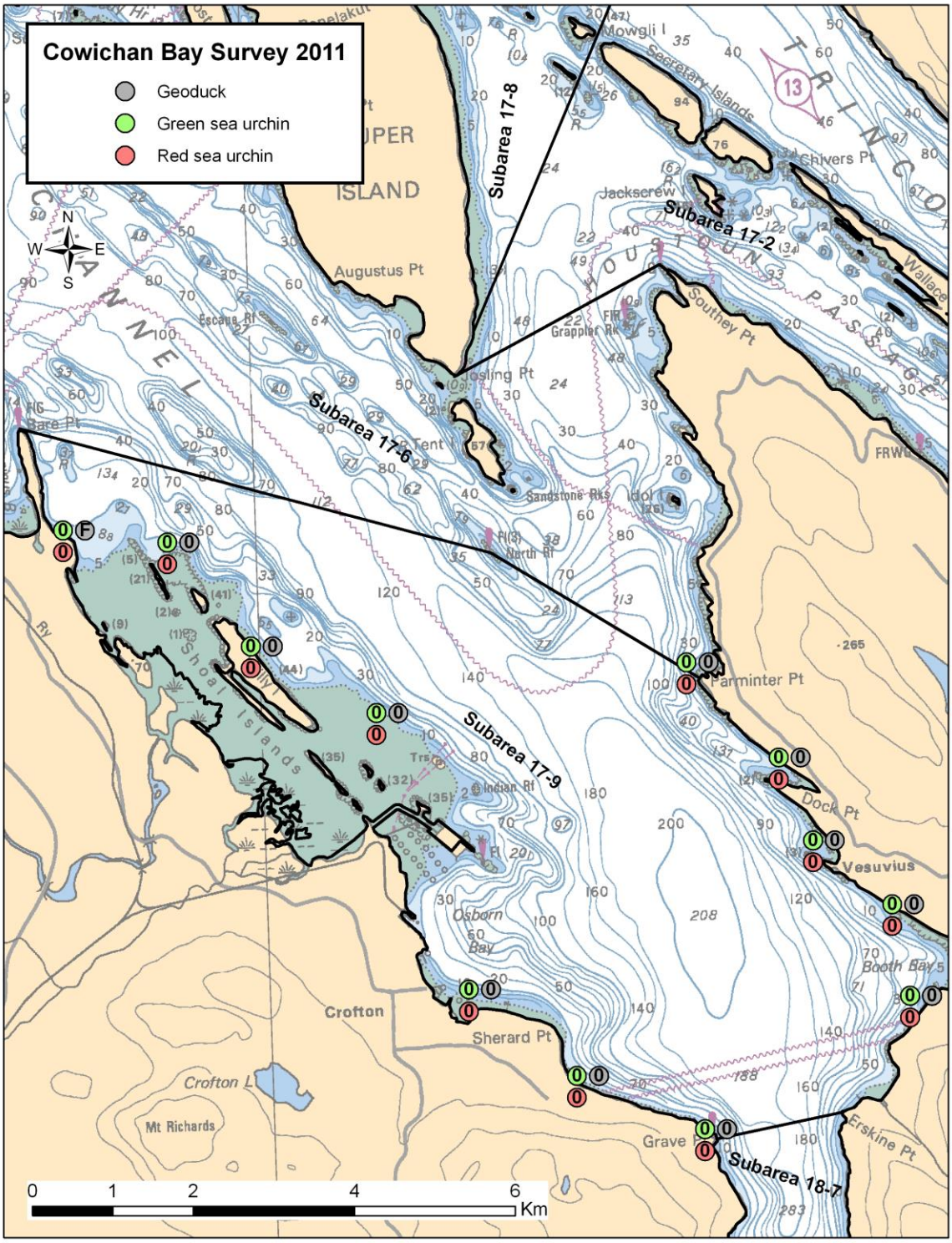

Figure 53. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 17–9. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

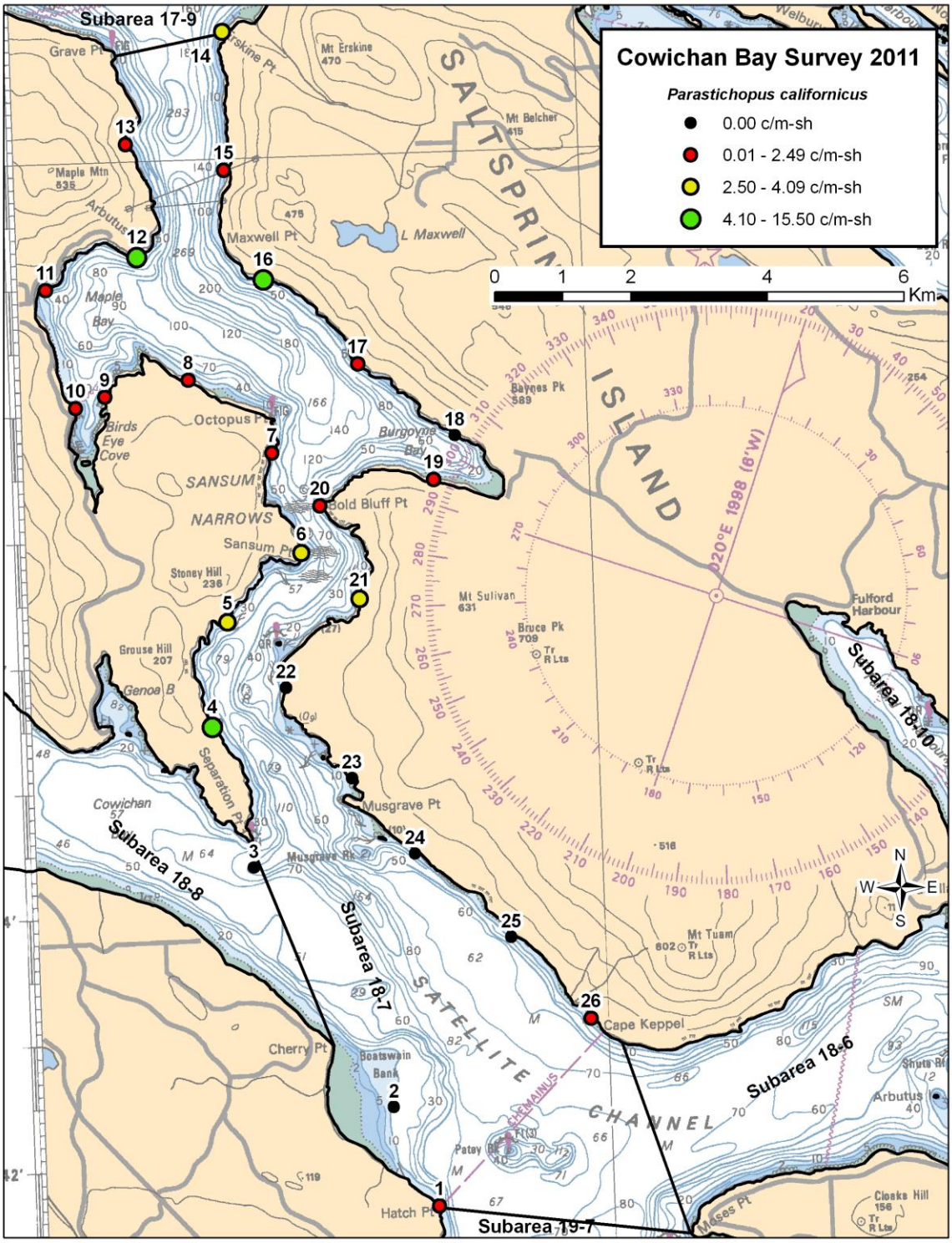

Figure 54. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 18–7, surveyed as part of the Cowichan Bay survey in 2011. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and 4.09 c/m-sh); green = productive locations (densities between the East Coast Vancouver Island regional baseline density and the maximum observed density in the Subarea).

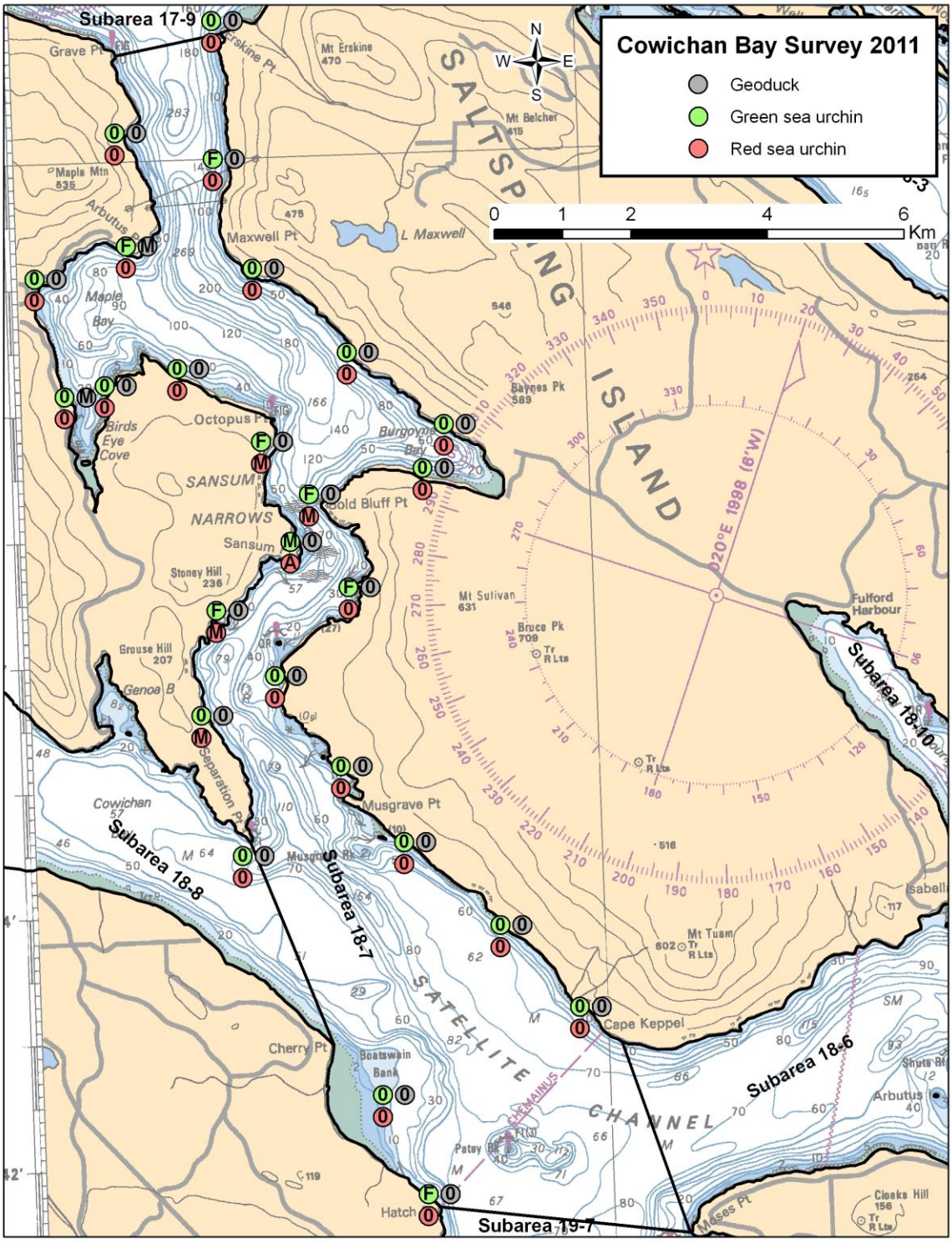

Figure 55. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 18–7. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

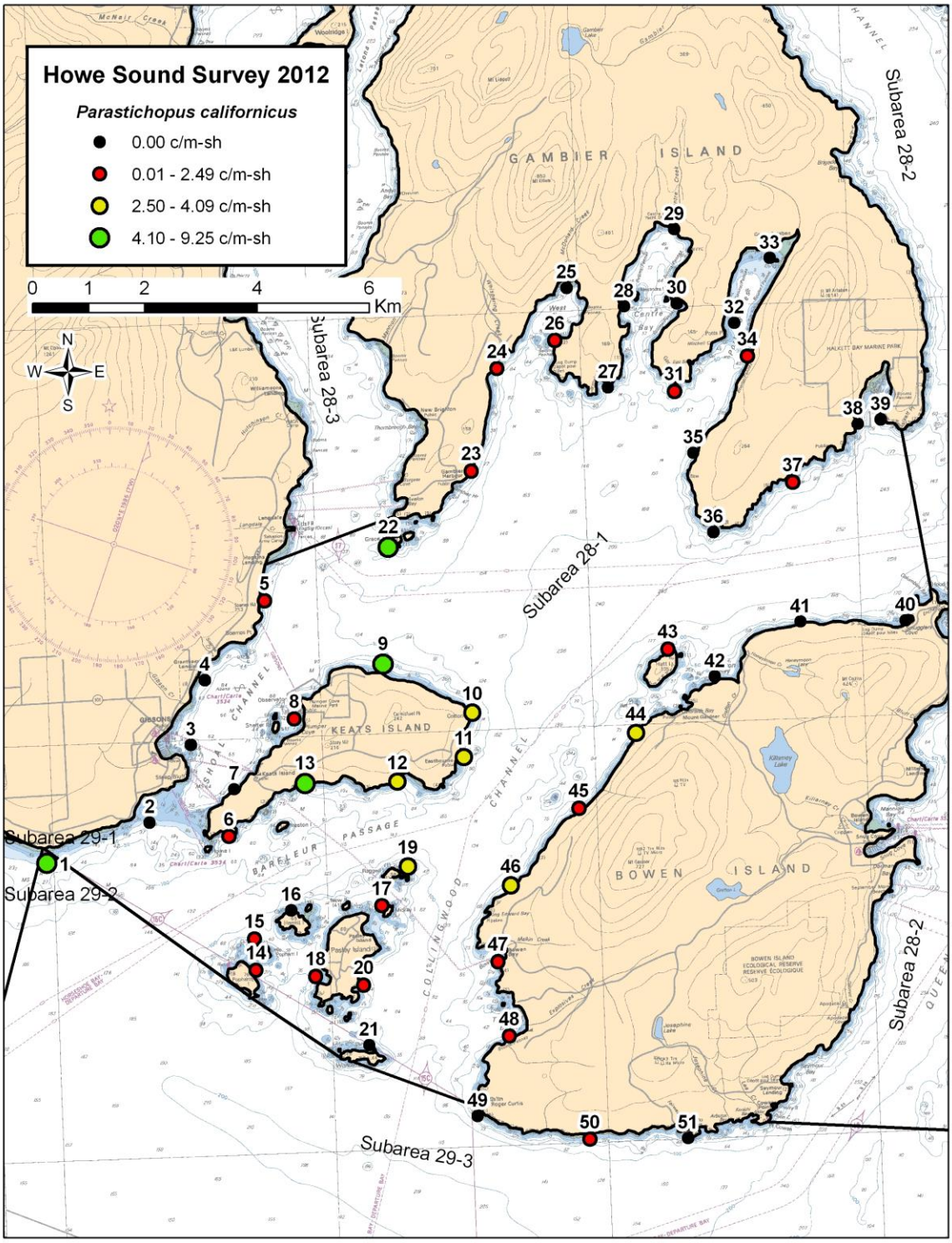

Figure 56. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 28–1 & 29–3, surveyed as part of the Howe Sound survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (between the Regional Baseline Density and the maximum observed density in the Subarea); blue = very productive locations (densities above the bootstrapped lower 90% confidence bound for the Subarea).

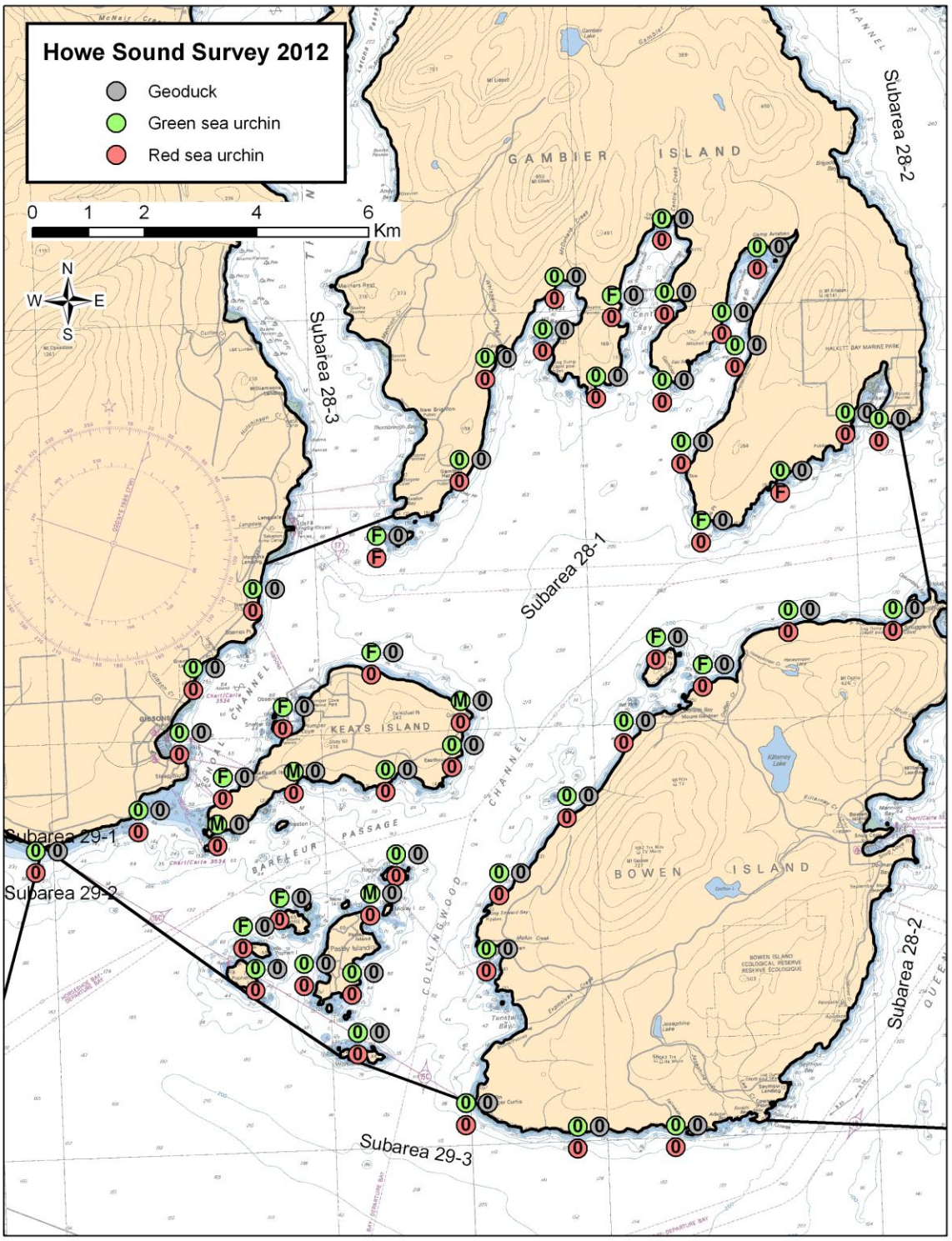

Figure 57. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 28–1 & 29–3. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

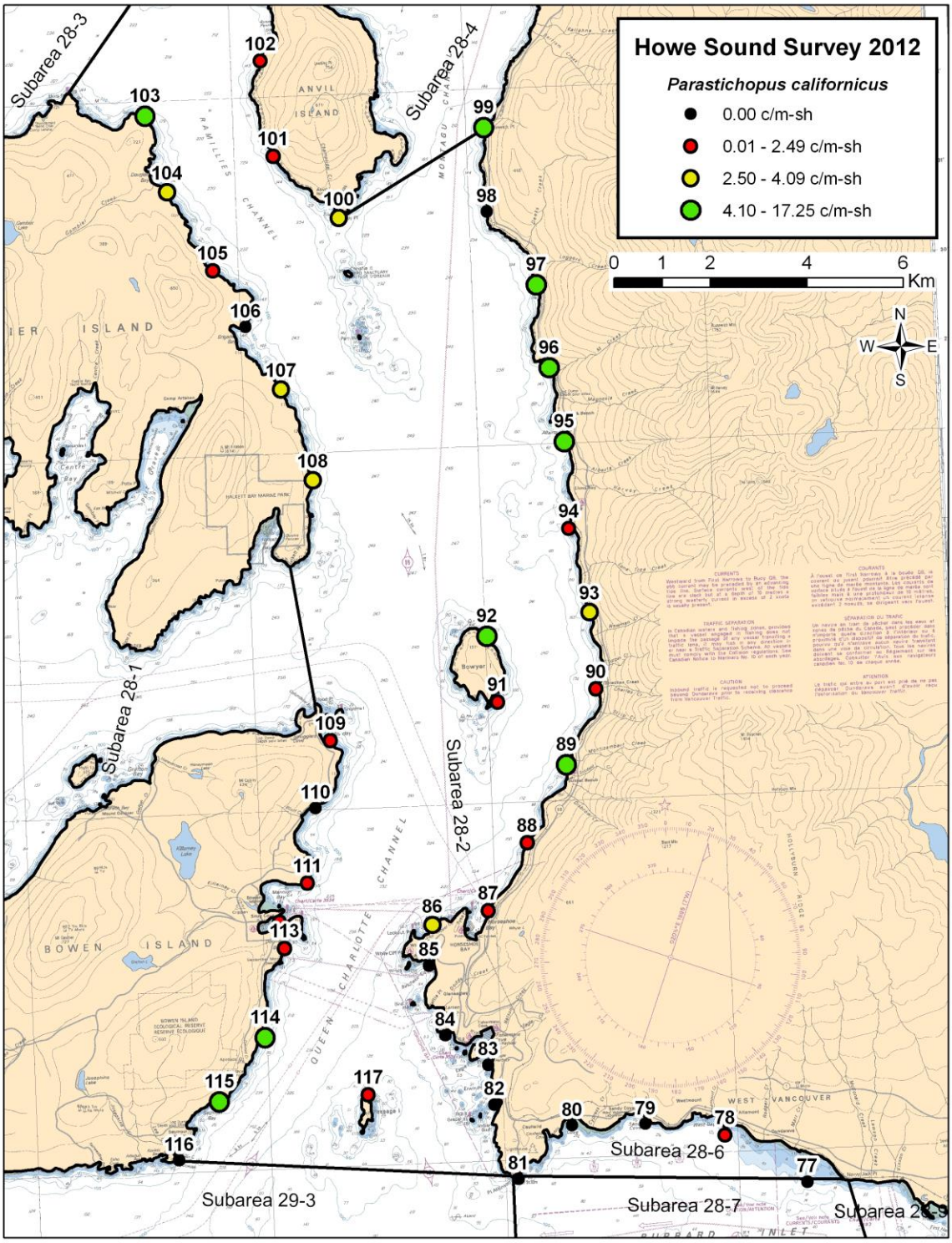

Figure 58. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 28–2 & 6, surveyed as part of the Howe Sound survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (between the Regional Baseline Density and the maximum observed density in the Subarea).

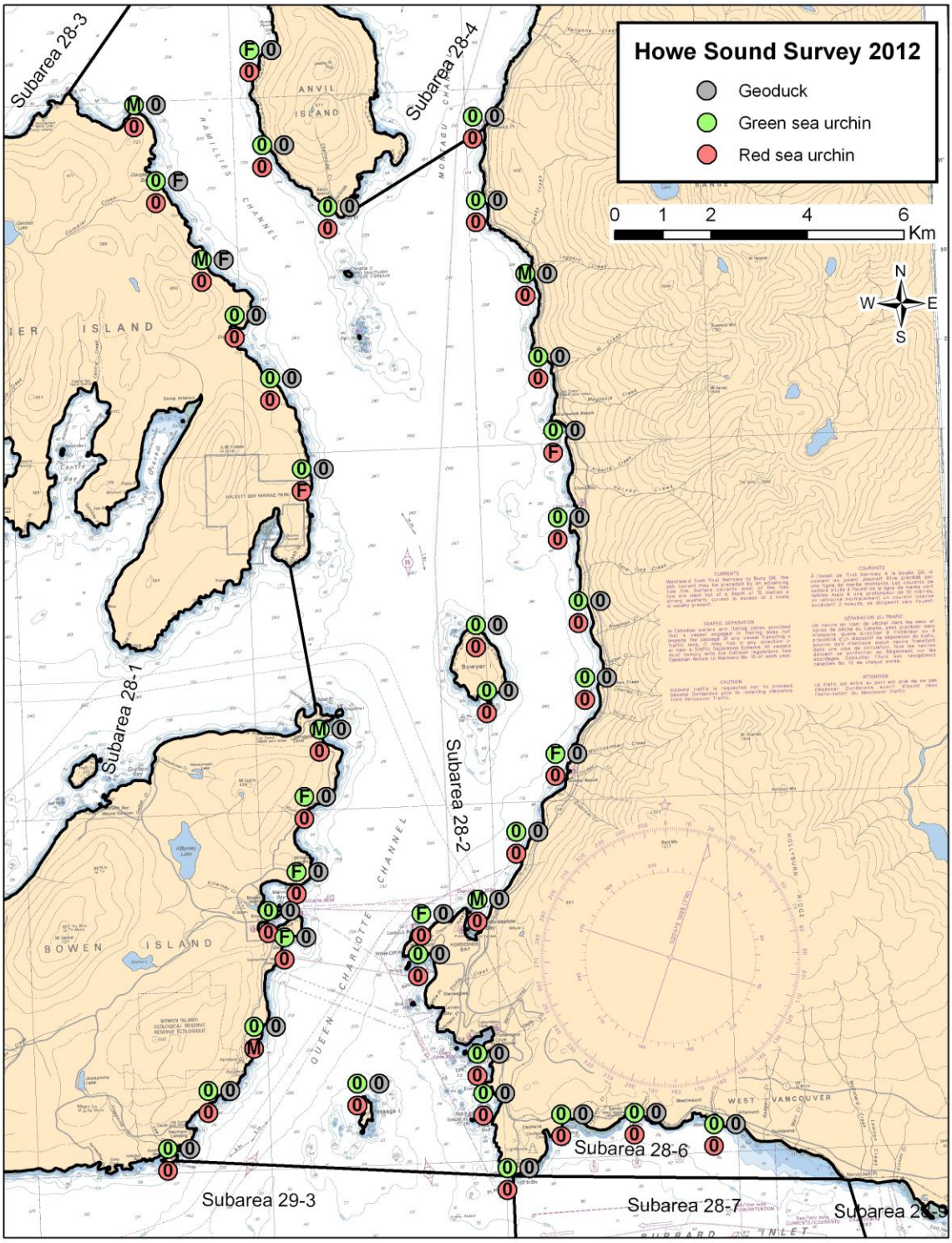

Figure 59. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 28–2 & 6. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

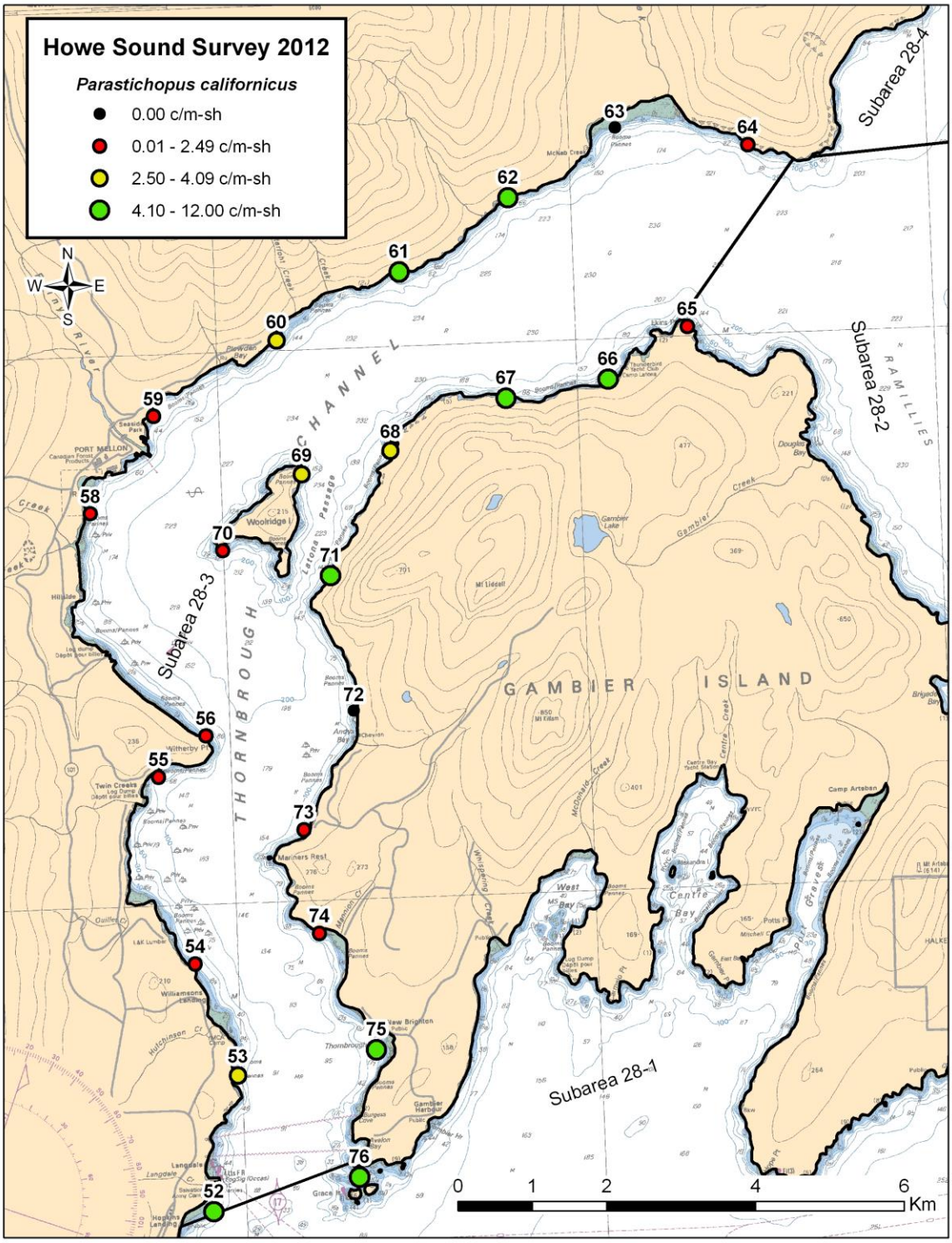

Figure 60. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 28–3, surveyed as part of the Howe Sound survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (between the Regional Baseline Density and the maximum observed density in the Subarea).

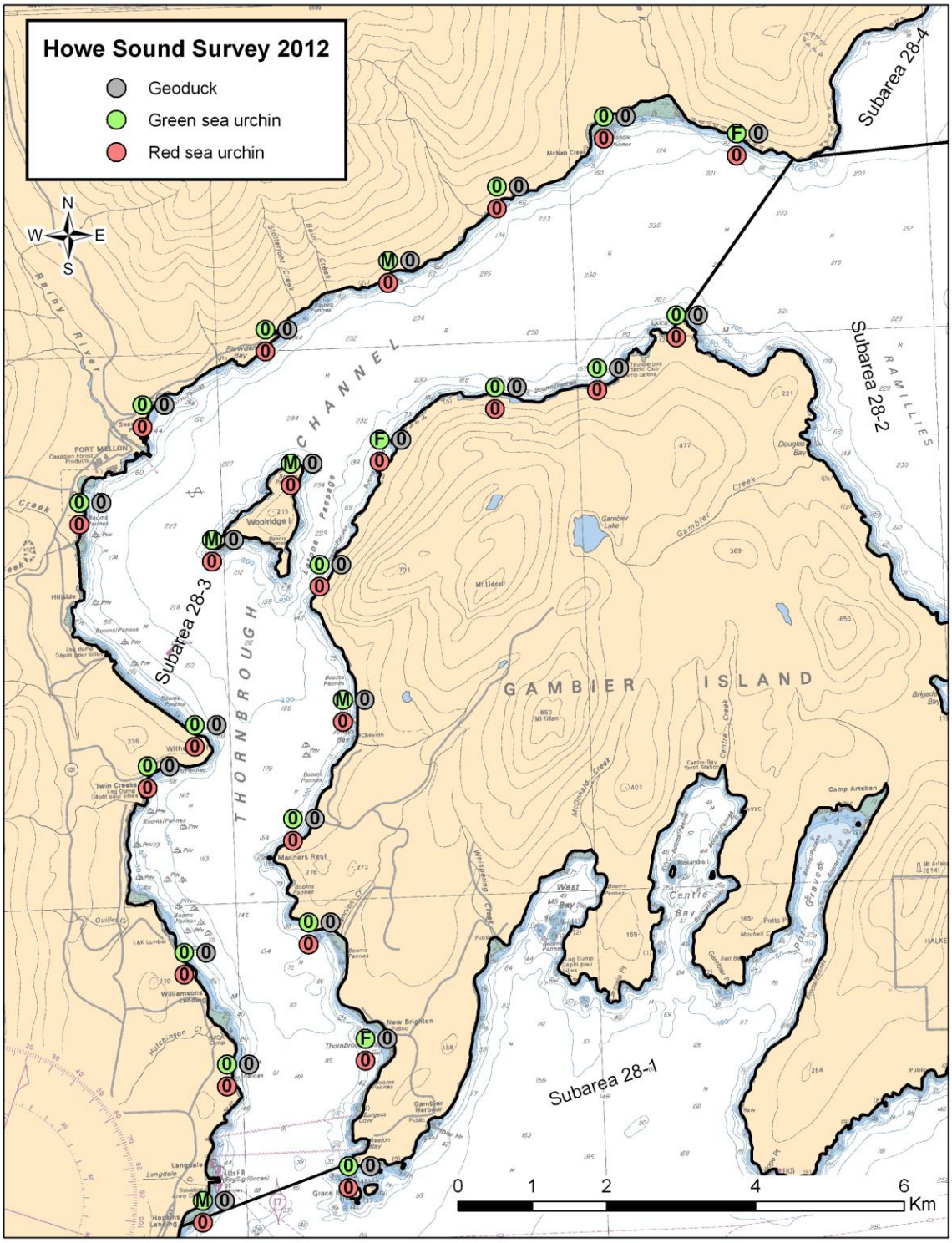

Figure 61. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 28–3. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

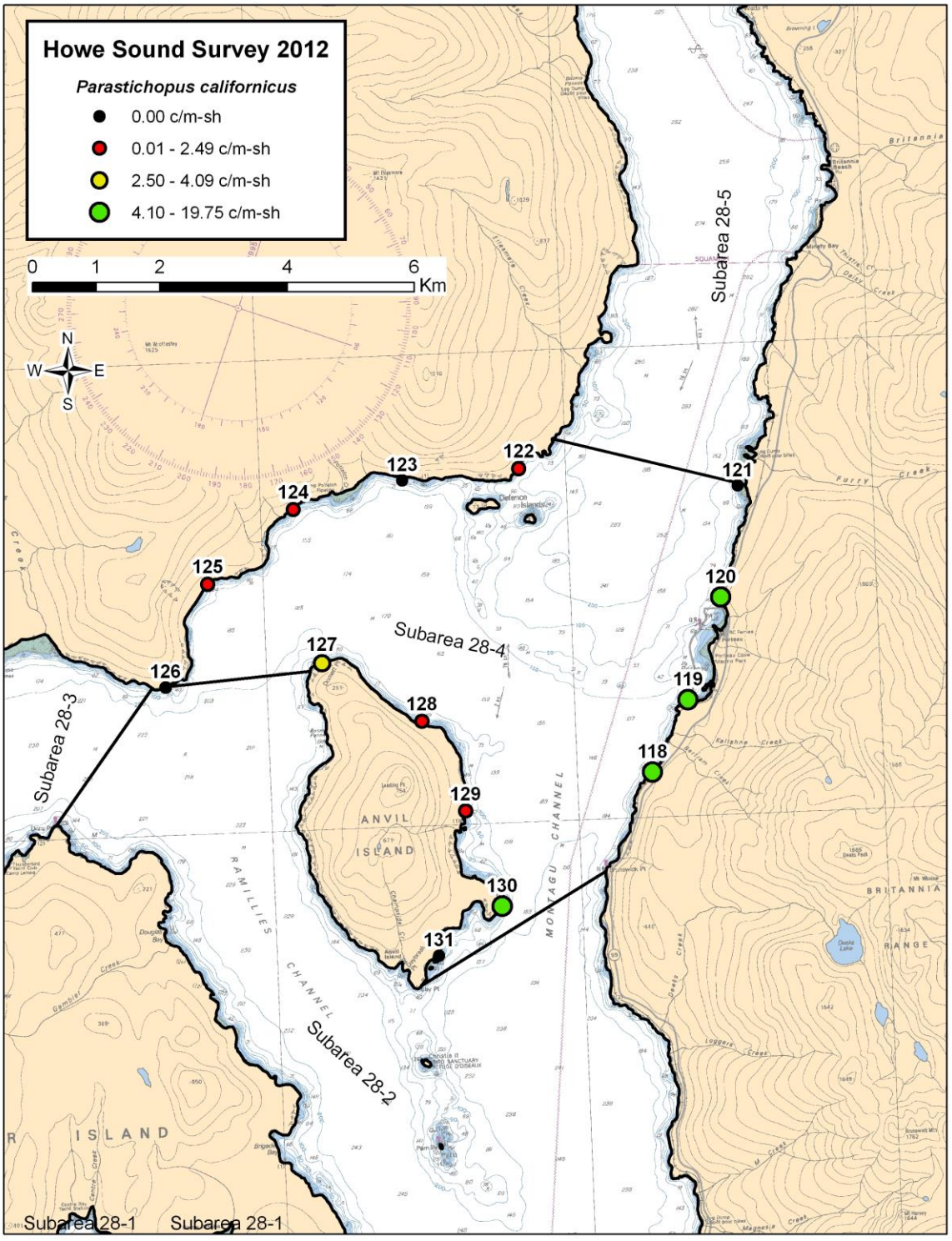

Figure 62. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 28–4, surveyed as part of the Howe Sound survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); and yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (between the Regional Baseline Density and the maximum observed in the Subarea).

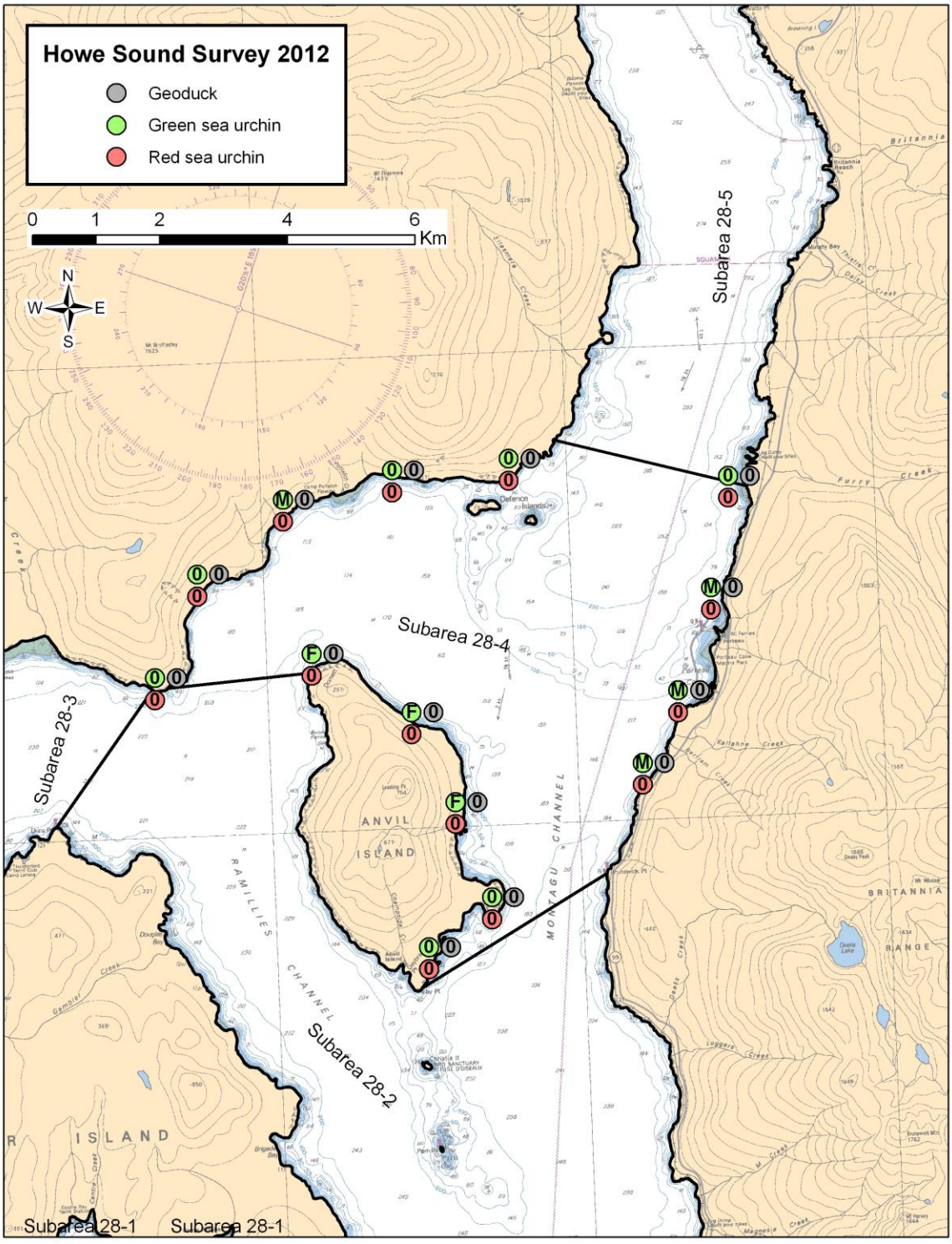

Figure 63. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 28–4. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.

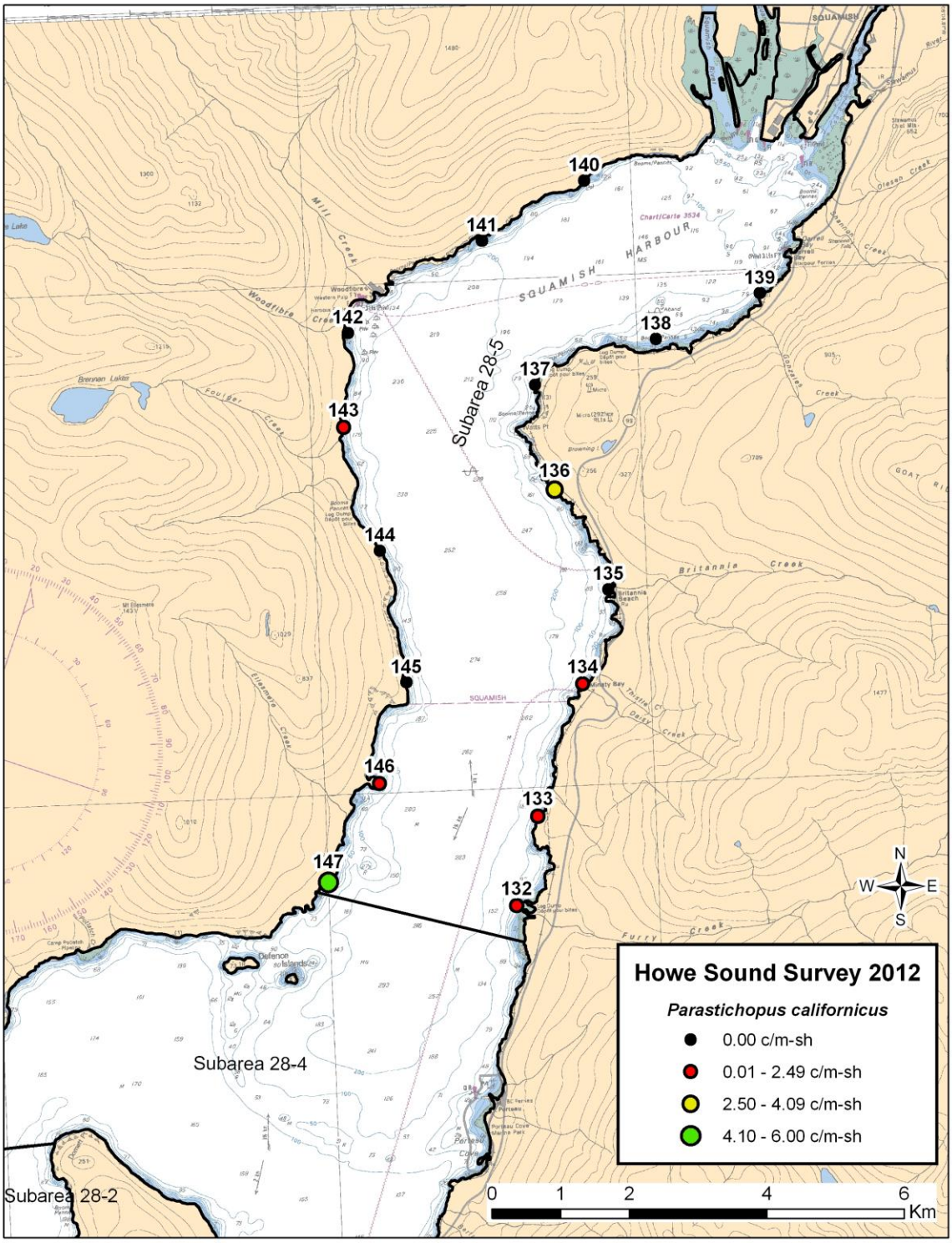

Figure 64. Linear density (sea cucumbers per metre of shoreline; c/m-sh), of *Parastichopus californicus* in PFMA 28–5, surveyed as part of the Howe Sound survey in 2012. Each coloured dot indicates the location of a survey transect identified by the transect number above the dot. Black = zero; red = low density (<2.5 c/m-sh); yellow = medium density (between 2.5 and the Regional Baseline Density); green = productive locations (between the Regional Baseline Density and the maximum observed in the Subarea).

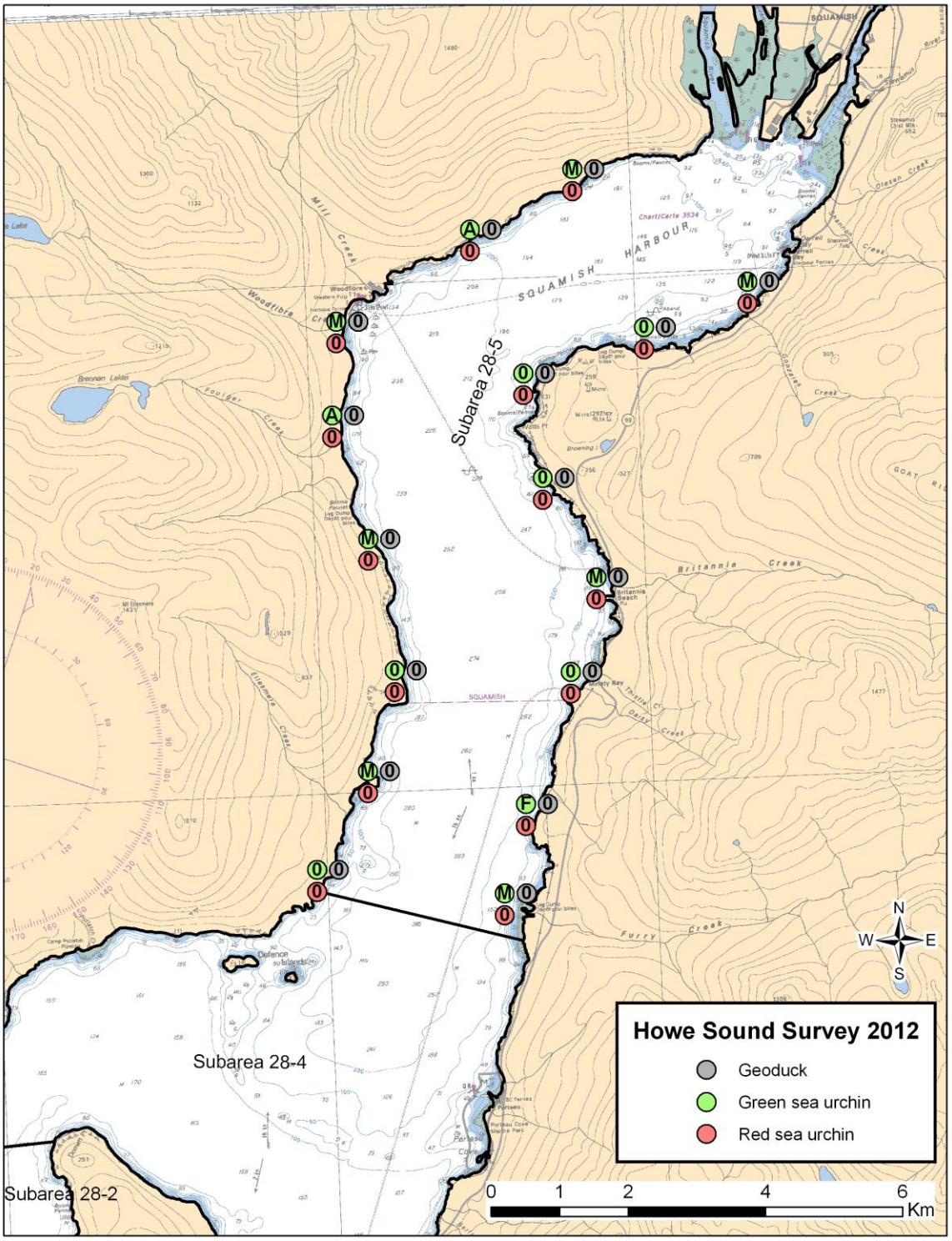

Figure 65. Relative abundance of Red Sea Urchin, Green Sea Urchin and Geoduck on transects surveyed for sea cucumber in PFMA 28–5. The number of animals observed while swimming the transect is noted and given an abundance category: A=Abundant (101+ animals); M=Many (11-100 animals); F=Few (1-10 animals); 0=zero animals.