SGaan Kinghlas-Bowie Seamount Marine Protected Area Species Inventory: Invertebrates (Annelida, Arthropoda, Brachiopoda, Ctenophora, Echinodermata and Mollusca)

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By

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ABSTRACT

Gauthier, M., Curtis, J.M.R., Gale, K.S.P. and Haggarty, D.R. 2018. SGaan Kinghlas-Bowie Seamount Marine Protected Area Species Inventory: Invertebrates (Annelida, Arthropoda, Brachiopoda, Ctenophora, Echinodermata, and Mollusca). Can. Tech. Rep. Fish. Aquat. Sci. 3198: vi + 67 p.

Bowie Seamount or SGaan Kinghlas (the traditional Haida First Nation name) is an isolated biodiversity hotspot located within the Exclusive Economic Zone (EEZ) waters of Canada in the Northeast Pacific Ocean. In 2008, Bowie seamount was protected in the SGaan Kinghlas-Bowie Seamount Marine Protected Area (SK-B MPA) under Canada's Oceans Act. In order to characterize the biodiversity of Bowie Seamount, Fisheries and Oceans Canada (DFO) led three expeditions (DFO Science Cruise Number PAC 2000-031, PAC 2011-062, PAC 2015-048) to survey the benthic communities using submersible in 2000; a Remotely Operated Vehicle (ROV) and an Autonomous Underwater Vehicle (AUV) in 2011; and a tow-camera system in 2015. The 2000 survey was focused on benthic rockfishes, but collected information on habitat and invertebrates as well. A submersible was used to survey between 53-306 m. Longline surveys also occurred to look at fish health and biological traits. The 2011 survey aimed to document the habitats and species on SK-B Seamount and collected benthic imagery using a ROV (28-272 m) and an AUV (180-933 m). The main objective of the 2015 survey was to document benthic biodiversity in the deeper (> 200 m) areas of Bowie and Hodgkins Seamounts. In total, 17 transects were completed between 249 m and 1246 m depth. In total, 72 taxa from the Annelida, Arthropoda, Brachiopoda, Ctenophora, Echinodermata, and Mollusca phyla were observed in the SK-B MPA using the visual surveys. Here we provide a complete list of species observed on the three surveys, and documented in previous reports. We document each record with photographs, whether the species has been previously observed at SK-B MPA, the surveys and depth range the observations were made from, and additional notes. Two companion reports document other invertebrate, chordate, and algae species observed in the SK-B MPA.

RESUME

Gauthier, M., Curtis, J.M.R., Gale, K.S.P. and Haggarty, D.R. 2018. Inventaire des espèces résidant dans la zone de protection marine du mont sous-marin Bowie (SGaan Kinghlas) : Invertébrés (annélides, arthropodes, brachiopodes, cténophores, échinodermes et mollusques). Rapp. tech. can. sci. halieut. aquat. 3198: vi + 67 p.

Le mont sous-marin Bowie ou SGaan Kinghlas (nom traditionnel de la nation Haïda) constitue une zone prioritaire (pour la biodiversité) isolée, située dans les eaux de la zone économique exclusive (ZEE) du Canada, dans le nord-est de l'océan Pacifique. En 2008, la protection du mont sous-marin Bowie a été officialisée par la désignation de la zone de protection marine du mont sous-marin Bowie (SGaan Kinghlas) [ZPM SK-B] en vertu de la Loi sur les océans du Canada. Afin de caractériser la biodiversité du mont sous-marin Bowie, Pêches et Océans Canada (MPO) a dirigé trois expéditions (campagnes scientifiques du MPO nos PAC 2000-031, PAC 2011-062, PAC 2015-048) ayant pour objectif l'étude des communautés benthiques, au moyen d'un engin sous-marin, en 2000; d'un véhicule sous-marin téléguidé (VTG) et d'un un véhicule sous-marin autonome (VSA), en 2011; et d'une caméra sous-marine, en 2015. La campagne scientifique de 2000 était axée sur les sébastes (benthiques), mais elle a aussi permis de recueillir des renseignements quant à l'habitat et aux invertébrés. Un engin sous-marin a été utilisé pour effectuer des levés à une profondeur de 53 à 306 m. Des relevés à la palangre ont également été réalisés afin d'observer l'état de santé des poissons ainsi que leurs caractéristiques biologiques. L'étude de 2011 visait la documentation des habitats et des espèces présentes au mont sous-marin SK-B et a permis de recueillir de l'imagerie benthique au moyen d'un VTG (28 à 272 m) et d'un VSA (180 à 933 m). Le principal objectif la campagne réalisée en 2015 était de documenter la biodiversité benthique des zones plus profondes (> 200 m) des monts sous-marins Bowie et Hodgkins. Au total, des relevés ont été effectués dans 17 transects à une profondeur allant de 249 à 1246 m. Au total, 72 taxons de phylums d'annélides, d'arthropodes, de brachiopodes, de cténophores, d'échinodermes et de mollusques ont été observés dans la ZPM SK-B, au moyen de relevés visuels. Dans ce document, nous fournissons une liste complète des espèces observées lors des trois relevés et documentées dans les rapports précédents. Nous documentons chaque fiche à l'aide de photographies et indiquons si les espèces ont été observées précédemment dans la ZPM SK-B; nous mentionnons les relevés et les tranches d'eau pour lesquelles des observations ont été effectuées, et offrons des remarques supplémentaires. Deux rapports complémentaires documentent les autres espèces d'invertébrés et de cordés observées dans la ZPM SK-B.

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INTRODUCTION

Bowie Seamount or SGaan Kinghlas (SK-B Seamount) is located within Canada's national waters. SGaan Kinghlas is the traditional Haida First Nation name. It is situated 180 km west of Haida Gwaii in Canada's Exclusive Economic Zone (200 nautical miles from the coast). Bowie Seamount is at the southern end of a seamount chain extending from the Aleutian trench in Alaska. It is shallower and younger than other seamounts within the chain. Although the seamount reaches depths of 3,000 metres, its peak is estimated to be 24 metres below the water's surface. Also, it is estimated to be less than a million years old (Canessa et al. 2003). In 2008, SK-B Seamount, along with two deeper, adjacent seamounts, Hodgkins and Davidson Seamounts, were protected under Canada's Oceans Act in the SGaan Kinghlas-Bowie Seamount Marine Protected Area (SK-B MPA) (Figure 1, Figure 2). These seamounts were targeted for protection in an MPA because seamounts are areas of higher biodiversity compared to surrounding ocean. This increased biodiversity is a consequence of nutrient rich waters being brought to the surface through upwelling as well as providing physical habitat (Canessa et al. 2003).

Sporadic surveys have taken place on SGaan Kinghlas-Bowie Seamount since the 1940s, for geological, biological, and naval purposes (see Gale et al. 2017 for summary). Information on target and non-target fish and non-target invertebrate species is available from commercial fishery records, as well as SCUBA dive, submersible, and remotely operated vehicle (ROV) surveys (Canessa et al. 2003).

Fisheries and Oceans Canada (DFO) carried out benthic video surveys in 2000 (Yamanaka 2005), in 2011 (unpublished) and 2015 (Gale et al. 2017). All three surveys took place on board the *CCGS John P. Tully* (Figure 2). The 2000 survey was from July 31st to August 14th (PAC 2000-031). Although the survey was focused on benthic rockfishes, they collected information on all fishes, habitat and invertebrates using video from a human occupied submersible (*Delta* submersible). They also did a longline survey to collect data on fish health and biological traits, collected oceanographic information (CTD and bongo nets), and recorded seabird and mammal observations (Yamanaka 2005). The depths surveyed by submersible ranged from 53-306 m in depth. The 2011 survey, July 19th to August 5th (PAC 2011-062), was led by James Boutillier (Pacific Biological Station, DFO), and was a joint venture between DFO and the United States (US) National Oceanic and Atmospheric Administration (NOAA) and aimed to document the habitats and species on SGaan Kinghlas-Bowie Seamount. The 2011 survey collected benthic imagery using DFO's Phantom ROV (video and photos; survey range 28-272 m) and NOAA's SeaBED AUV (photos; 180-933 m) (unpublished data).

With the exception of the photos taken during the deep AUV dives in 2011, all of the previous visual surveys of benthic communities at SK-B Seamount were restricted to shallow areas around the plateau at depths less than about 300 m (Figure 2c). No visual surveys have previously been done anywhere on Hodgkins or Davidson Seamounts and little was known of the species composition and diversity in the deeper areas of SK-B MPA. Therefore a survey was completed July 4th to July 21st, 2015 (PAC2015-048), using a tow-camera system to survey deeper regions in the SK-B MPA. Goals of this survey were to characterize the deeper biodiversity at SK-B Seamount. The depth range surveyed was from 249 m to 1246 m, although the majority of the area surveyed was below 500 m (Gale et al. 2017).

OBJECTIVE

We present a complete inventory of taxa that have to date been found at SK-B MPA as determined by the three visual surveys described above. We provide a summary of all taxa detected in the SK-B MPA, their scientific and common names, survey photographs, transect information, depth ranges observed at, and our degree of confidence with the observation. The 2011 and 2015 surveys went through a thorough quality assurance/quality control (QAQC) process in 2016 to evaluate the taxa identifications. Although the 2000 survey was not included in the QAQC exercise, the manned submersible allowed for expert ID during the survey itself. In order to reduce the size of the reports, the SK-B MPA species inventory has been divided into three separate reports dealing with the following taxa: species forming biogenic habitat (Algae, Cnidaria, Porifera, Bryozoa; Gauthier et al. 2018a), Chordata (Gauthier et al. 2018b), and other invertebrates (this report).

METHODS

The three surveys used different methods but all had the objective to document benthic communities of SK-B Seamount using imagery.

In 2000, the Delta submersible was used and could hold two people (a pilot and a scientist) (Yamanaka, 2005). Cameras and lasers are mounted externally, with a forward-view as well as a starboard side-view standard definition (SD) camera. Each camera was mounted with parallel lasers. Each submersible dive consisted of two 30 minute transects with a 10 minute break between transect for photography and repositioning. Post-processing of the videotape was conducted by Rick Stanley and Jonathan Martin to assess habitat and enumerate fish by voice recordings from the on-board scientist and visual review of both the forward and the side view videotape (Yamanaka, 2005). Videotapes were subsequently re-reviewed by Jonathan Martin to record details including all species occurrences, habitat type, and image quality using the Video Miner (version 1.2) qualitative protocol. A summary of the depths and durations of the 20 dives completed is found in Table 1.

In 2011 a combination of ROV (DFO's Phantom ROV) and AUV (NOAA's SeaBED AUV) was used. The ROV conducted 16 dives at various locations on the seamount. For each ROV dive SD and high definition (HD) video was collected as well as still photos. The AUV conducted 4 successful dives at various locations on the seamount during which it collected still images. Sarah Cook systematically annotated the video and the digital still photographs from the AUV to record details including all species occurrences, habitat type, and image quality using the Video Miner (version 1.2) qualitative protocol. Only 5 AUV dives had photos (Dives 1,4,5,6,7). A summary of the depths, lengths and durations of the 20 dives completed on this survey is found in Table 2.

In 2015, a tow-camera "BOOTS" (Bathyal Ocean Observation and Televideo System) was used (Gale et al. 2017). An HD MiniZeus video camera was set in the forward-facing position, with capabilities for pan and tilt (horizontal and vertical axes, respectively). Two parallel scaling lasers, positioned 10 cm apart, were attached to the camera's pan-tilt chassis, such that the laser dots always remained in the centre of view. An HD 1CamAlpha+ video camera with 24-megapixel still image capabilities was set in the downward-facing position on the tow-camera frame. There were no scaling lasers associated with the downward-facing camera during the survey. High resolution photographs (6544 x 3680 pixels) were collected using the 1CamAlpha during 16 of the 17 BOOTS dives. The camera was configured to automatically take a photo every 10 seconds, but the actual interval between captured pictures was about 15 seconds (average 4 pictures per minute). Overall, 3546 photos were collected during the BOOTS dives.

In 2015, Maeva Gauthier systematically annotated 42 hours of video to record details including all species occurrences and relative abundance, habitat type, and image quality using Video Miner (version 2.1.4) quantitative protocol. Photographs were not used for this analysis because videos were considered more useful for video annotation (Gale et al. 2017). A summary of the depths, lengths and durations of the 17 dives completed on this survey is found in Table 3.

In addition to video annotation, all videos and still photographs from the surveys were viewed by the experts aboard the cruises (see Expedition Participants, below) in real time and following retrieval of vehicles to compile preliminary list of observed species.

In 2016, a thorough QAQC process was completed on the 2011 and 2015 survey datasets. Five to 10 records of each taxa were randomly selected and reviewed by independent taxonomic experts. In some cases, experts recommended that some taxa be grouped to a higher level of taxonomy to ensure a higher level of confidence for data analysis. There was also a difference in the level of taxonomy between surveys. The image quality during the 2011 survey was better and allowed for lower-level taxonomic identification compared to the 2015 survey.

Species Inventory Format

This species inventory, modelled after the species inventory for Cobb Seamount by Du Preez et al. (2015), documents observations from the SK-B MPA survey using images, taxonomy, scientific and common names, the taxonomic authority, a level of confidence in the identification, the year of the survey and depth range at which the organism was observed, as well as additional notes including pertinent information and relevant references. An example of the inventory format is provided in Table 4. World Register of Marine Species (WoRMS, 2014) was used as authoritative reference.

Taxonomy

The organisms in this invertebrates inventory report are presented in taxonomic order, starting with Class Polychaeta (1.1) and ending with Class Polyplacophora (6.4). Each organism is identified to the lowest taxonomic level possible with confidence. Page headers indicate the Phylum, Class, and Order, and individual inventory records indicate Family, Genus, and Species. If an organism could not be identified to species, the lowest taxonomic level is provided followed by “sp.”. If more than one taxon was observed and differentiated a number follows (e.g. “sp. 1”). If more than one taxon was observed but could not be differentiated, the lowest taxonomic level is followed by “spp.”. Common names (if well established) or a brief description of the organism is also included. If the image does not allow identifying to species level but there are reasons to believe it looks like a known species, “cf.” is used in the species name. See Figure 3 for example of pictures.

Confidence in Identification

Confidence in identification categories refer to previous records of the organism occurring on SK-B Seamount:

- Previously observed: This organism has been observed by divers or in imagery collected from submersibles at SK-B MPA. Our confidence is high but there are no voucher specimens from this location to confirm the identification.
- Previously collected: This organism has been collected at SK-B MPA and identified by taxonomic experts.
- New record: This is the first record of this organism occurring on in SK-B MPA. There are no previous observations and no voucher specimens from this location. It is likely that this organism has been observed and/or collected in neighbouring regions including other seamounts or from the continental shelf at similar depths.

If the organism was previously observed or collected at SK-B MPA a numerical reference of the record's source follows the confidence category. Where,

[1] = Austin (1999)
[2] = Canessa et al. (2003)
[3] = Herlinveaux (1971)
[4] = Boutillier (2011)
[5] = Martin (2010)
[6] = McDaniel (2003)
[7] = Cooke (2011)
[8] = Scagel (1970)
[9] = Scrimger and Bird (1969)
[10] = Yamanaka and Brown (1999)
[11] = Yamanaka (2005), if collected with longline
[12] = Yamanaka (pers. comm.)

Survey year and depth
The survey year(s) and the depth range (in meters) where the organism was observed are provided. If the observed depth range exceeds the species' published known range a footnote indicating the discrepancy with relevant references is included. If a species was only observed once, a single observed depth is mentioned rather than a depth range.

Image(s)
For each taxon record a photograph or video still from the 2000, 2011 or 2015 cruise is provided (with the image credit). Multiple photos are provided when an organism has different morphotypes or distinctly different juvenile and adult life-stages, or to demonstrate the appearance of the organism in a group/colony and the appearance of the organism close up. In images where the organism may be difficult to see, a white arrow or a red box is used to indicate its location. For images that are very low quality, an alternative image has been added from other available online resources. Note that imagery from video is often clearer than it may appear to be from the still screen shots.

Species inventory table
Finally, this information was tabulated into a comprehensive table that details the complete species list recorded from SK-B MPA across all transects undertaken in 2000, 2011, 2015. The table includes images, taxonomy, scientific and common names, the taxonomic authority, the level of identification confidence, and the survey(s) and depth range at which the organism was observed, as well as additional notes and relevant references. An example of the inventory format is provided in Table 4.

A checklist of the taxa presented in this report is found in Appendix 1. Appendix 2 presents all taxa in this report as well as the literature.

Table 1. Depths, length and duration of dives from the 2000 survey of Bowie Seamount.

Date	Number of Transects	Transect names	Min. depth (m)	Max. depth (m)	Av. transect length (m)	Av. dive duration (min)
3 Aug 2000	2	5182 [1,2]	73	169	-	103
5 Aug 2000	2	5183 [1,2]	224	306	-	132
5 Aug 2000	2	5184 [1,2]	146	233	-	101
5 Aug 2000	2	5185 [1,2]	195	300	-	110
6 Aug 2000	2	5186 [1,2]	100	260	-	102
6 Aug 2000	2	5187 [1,2]	105	290	-	104
6 Aug 2000	2	5188 [1,2]	67	218	-	86
7 Aug 2000	2	5189 [1,2]	76	183	-	74
7 Aug 2000	2	5191 [1,2]	72	177	-	96
7 Aug 2000	2	5192 [1,2]	53	210	-	93
8 Aug 2000	2	5193 [1,2]	133	200	-	88
9 Aug 2000	2	5195 [1,2]	78	153	-	83
9 Aug 2000	1	5196 [1]	114	147	-	50
10 Aug 2000	2	5198 [1,2]	95	158	-	80
10 Aug 2000	2	5199 [1,2]	62	178	-	75
10 Aug 2000	2	5200 [1,2]	0	196	-	80
10 Aug 2000	2	5201 [1,2]	120	220	-	87
11 Aug 2000	2	5202 [1,2]	147	175	-	62
11 Aug 2000	2	5203 [1,2]	0	231	-	89
11 Aug 2000	2	5206 [1,2]	0	220	-	69

Table 2. Vehicle type, depths, length and duration of dives from the 2011 survey of Bowie Seamount.

Date	Type	Transect Name	Min Depth	Max Depth	Transect Length (m)	Duration (min)
24 Jul 2011	ROV	1	165	246	1252	58
24 Jul 2011	ROV	2	232	239	1281	43
25 Jul 2011	ROV	3	170	269	1386	67
25 Jul 2011	ROV	4	156	251	2240	109
25 Jul 2011	ROV	5	141	178	630	63
26 Jul 2011	ROV	6	50	225	1069	91
26 Jul 2011	ROV	7	64	103	434	44
26 Jul 2011	ROV	8	214	234	2055	86
31 Jul 2011	ROV	9	29	90	594	79
31 Jul 2011	ROV	10	43	190	977	97
01 Aug 2011	ROV	11	64	231	974	93
01 Aug 2011	ROV	12	98	196	986	89
02 Aug 2011	ROV	13	48	227	1012	85
02 Aug 2011	ROV	14	78	111	385	28
02 Aug 2011	ROV	15	67	82	na	100
02 Aug 2011	ROV	16	101	103	202	64
23-24 Jul 2011	AUV	d20110723_1	186	259	1093	1440 (24 hr)
25-26 Jul 2011	AUV	d20110725_4	428	483	1444	1440 (24 hr)
27 Jul 2011	AUV	d20110726_5	449	451	47	163
01 Aug 2011	AUV	d20110801_6	176	498	760	51
02 Aug 2011	AUV	d20110801_7	420	930	1305	87

Table 3. Depths, length and duration of dives from the 2015 survey of SGaan Kinghlas-Bowie Marine Protected Area. Transect length for each dive is reported based on camera positioning (USBL, if available for the entirety of the dive) and the ship's positioning (A-frame).

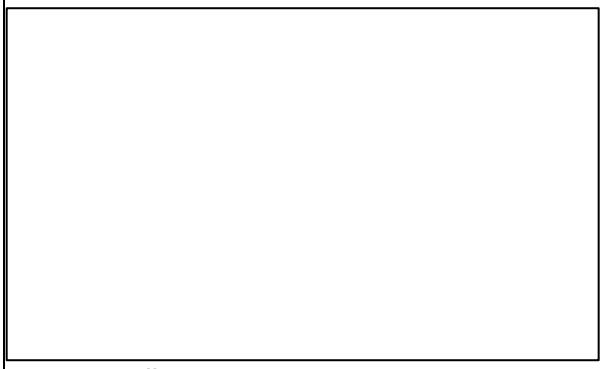
Date	Number of Transects	Transect names	Min. depth (m)	Max. depth (m)	Transect length (m) / USBL/A-frame	Transect duration (min)
10 Jul 2015	1	5	272	327	—— / 247	30
10 Jul 2015	1	6	556	613	—— / 256	31
11 Jul 2015	1	7	716	733	261 / 257	43
11 Jul 2015	1	8	854	968	265 / 261	45
12 Jul 2015	1	9	1016	1176	606 / 526	56
12 Jul 2015	1	10	401	463	263 / 264	32
12 Jul 2015	1	11	871	928	—— / 258	29
12 Jul 2015	1	12	727	845	—— / 266	43
13 Jul 2015	1	13	316	350	—— / 266	42
13 Jul 2015	1	14	682	747	241 / 257	32
13 Jul 2015	1	15	749	830	313 / 271	43
13 Jul 2015	1	16	1011	1246	835 / 710	84
16 Jul 2015	1	17	591	677	262 / 263	38
16 Jul 2015	1	18	632	840	559 / 515	70
16 Jul 2015	2	19a	674	956	534 / 511	68
		b	704	882	375 / 251	29
17 Jul 2015	1	20	1028	1125	270 / 251	31

Table 4. An example of the inventory record format and brief explanation of notation.

#. Phylum

#.#. Class

#.#.#. Order

 Image credit Photograph or video filename	Family name Scientific name Common name Taxonomic authority Confidence of identification Survey(s) where the organism was observed Depth range of the observations (meters) Footnotes (if applicable)

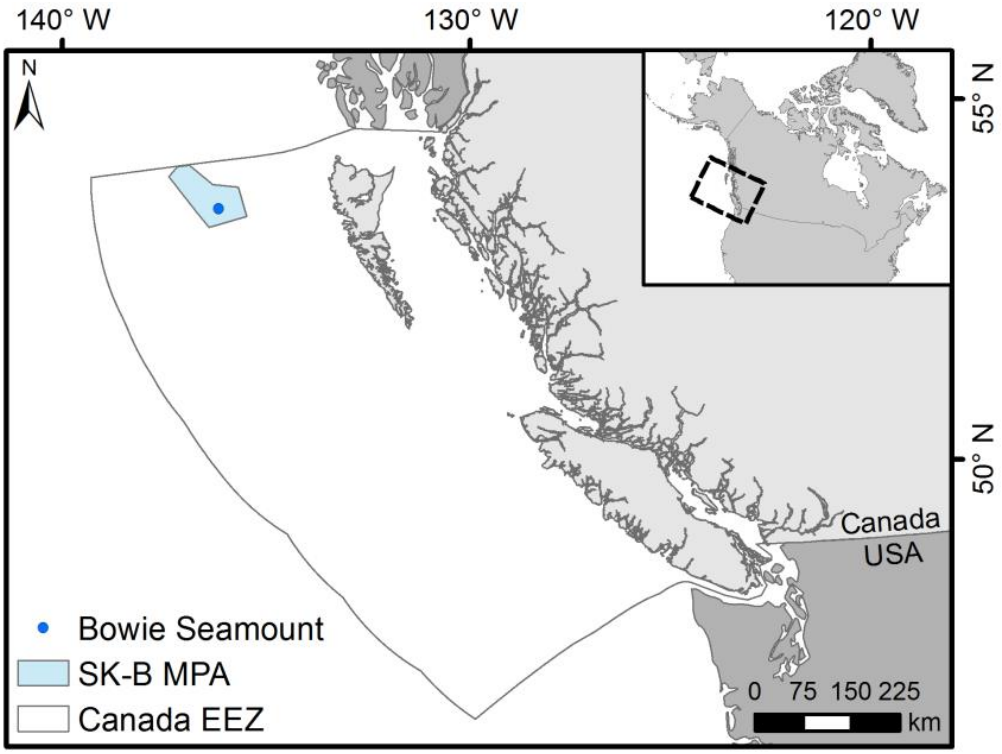


Figure 1. Location of Bowie Seamount and SGaan Kinghlas-Bowie Marine Protected Area (SK-B MPA) within Canada's EEZ (Exclusive Economic Zone).

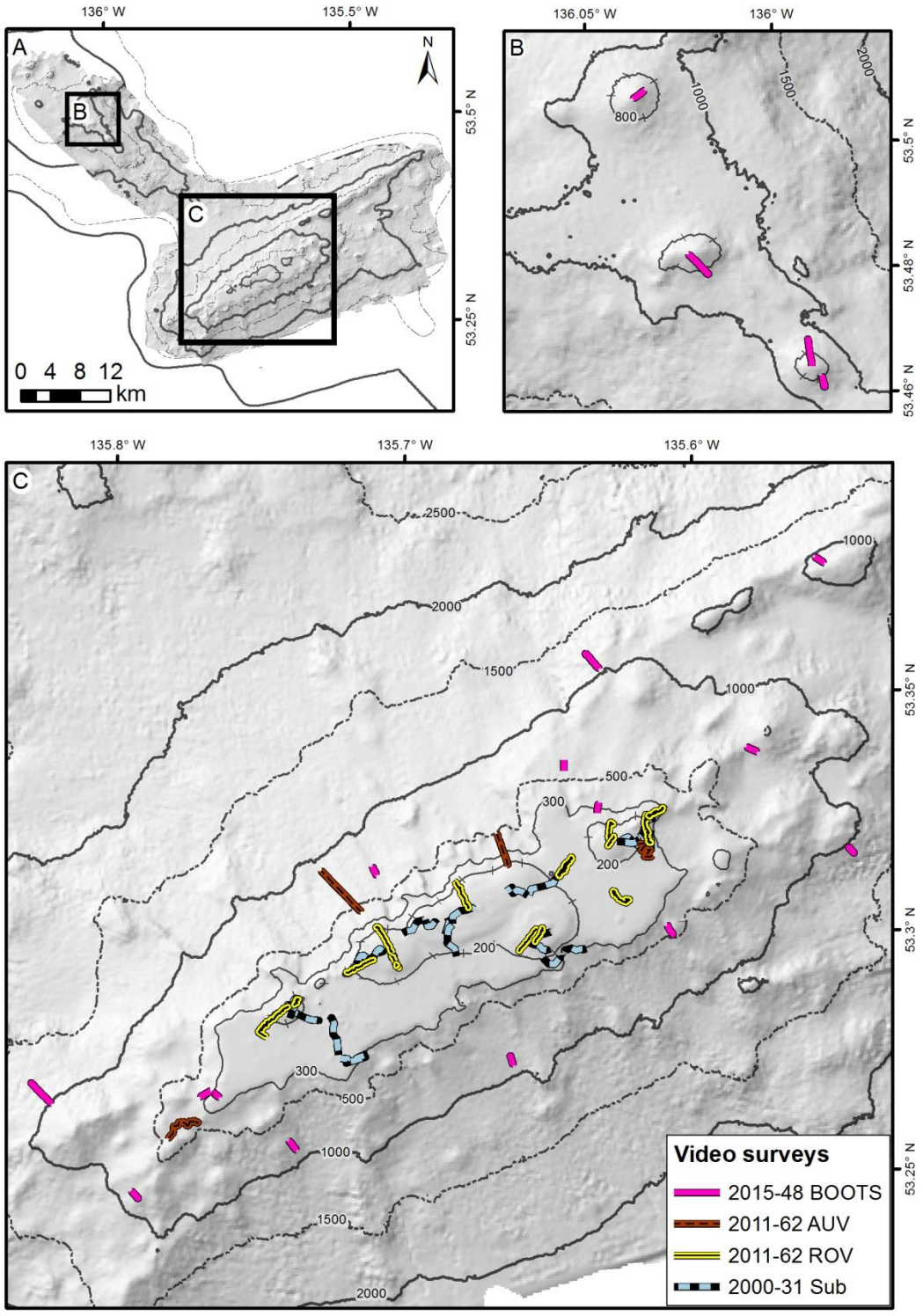


Figure 2. Locations of video surveys carried out by DFO at Bowie and Hodgkins Seamounts from 2000 (Delta submersible; Yamanaka 2005), 2011 (Phantom ROV and SeaBED AUV; unpublished), and 2015 (BOOTS tow-camera system; Gale et al. 2017); A) Bowie and Hodgkins Seamounts, B) the three summits of Hodgkins Seamount, and C) part of Bowie Seamount including the shallow summit.

Figure 3. Examples of organisms observed during the SK-B MPA 2000, 2011, and 2015 surveys. Top left: *Farrea* spp. sponge with deep-sea sunflower star (*Rathbunaster californicus*). Lower left: Benthopectinidae sea stars and boot sponges (Rosselidae). Right: Poacher (Agonidae) and squat lobsters (*Munida quadrispina*) surrounding an orange sea pen (*Ptilosarcus gurneyi*). Image credits: © Fisheries and Oceans Canada, 2011(top left and right) and DFO Science (BOOTS Tow-camera, 2015-048; bottom left).

1. Phylum: Annelida – worms
1.1. Class: Polychaeta
1.1.1. Order: Sabellida

Family Serpulidae

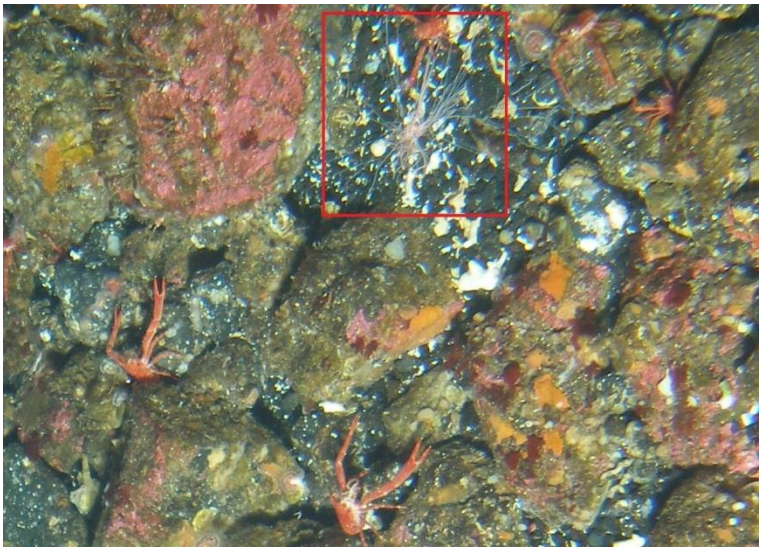
Authority: Rafinesque, 1815

Confidence: New record

Survey(s): 2011
Depths (m): 82-126

Credit: © Fisheries and Oceans Canada, 2011
Photo: 072611_162633_ 160 - Copy.jpg and P8010166 (2).JPG

1. Phylum: Annelida – worms
1.1. Class: Polychaeta
1.1.2. Order: Terebellida



Family Terebellidae

Spaghetti-worms

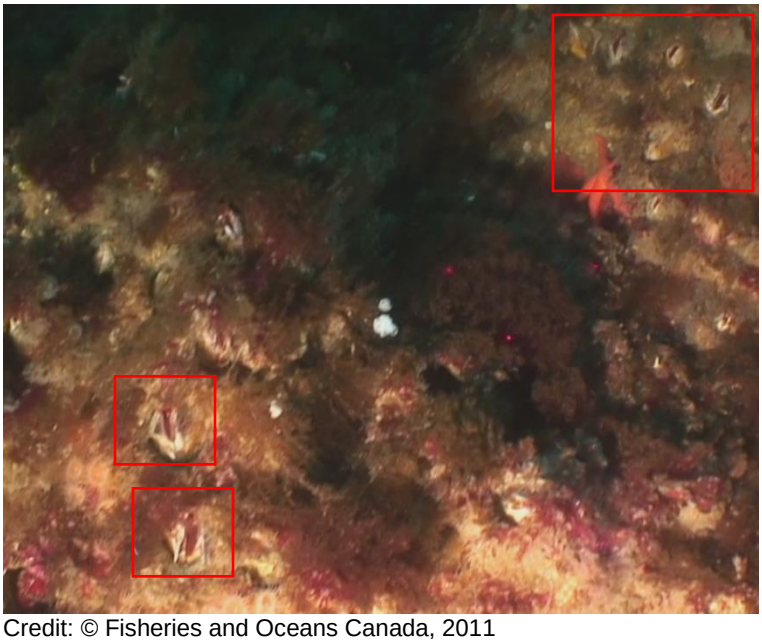
Authority: Johnston, 1846

Confidence: New record

Survey(s): 2011
Depths (m): 75-158

Credit: © Fisheries and Oceans Canada, 2011
Photo: P8010266.JPG

2. Phylum: Arthropoda – crabs, hermits, & others
2.2. Infraclass: Cirripedia
2.2.1. Order: Sessilia



Family Balanidae

Balanus nubilus
Giant Barnacle

Authority: Darwin, 1854

Confidence: Previously observed [6, 9]

Survey(s): 2011
Depth (m): 29-40

Credit: © Fisheries and Oceans Canada, 2011
Video still: Pac2011_Dive009_Screengrab204416_Giant_Barnacle.png

2. Phylum: Arthropoda – crabs, hermits, & others
2.3. Class: Malacostraca
2.3.1. Order: Decapoda

Credit: © Fisheries and Oceans Canada, 2011
Photo: P8010241 (2).JPG

Family Cancridae

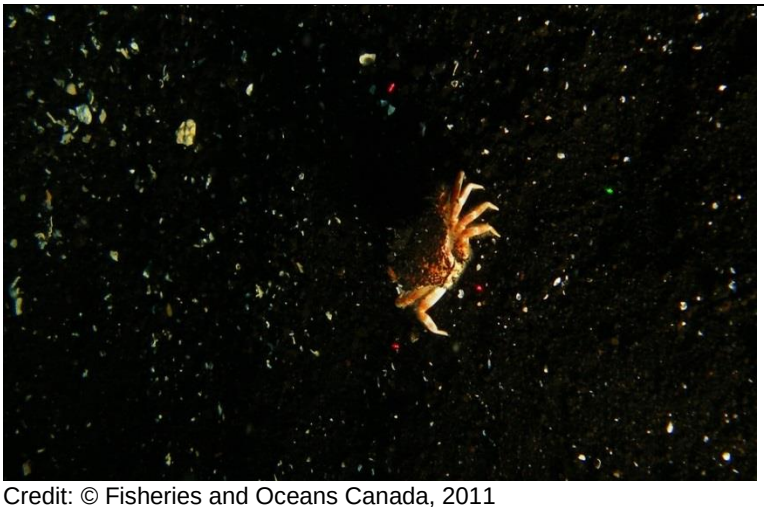
Glebocarcinus oregonensis
Pygmy Rock Crab

Authority: Dana, 1852

Confidence: New record

Survey(s): 2011
Depth (m): 85

Notes: Observed in the pictures, but not during the video annotation. It is not in the 2011 database.



Credit: © Fisheries and Oceans Canada, 2011
Photo: 073111_200607_ 110.jpg

Family Cancridae

Romaleon branneri
Furrowed Rock Crab

Authority: Rathbun, 1926

Confidence: New record

Survey(s): 2011
Depth (m): 75-86

Notes: *Romaleon branneri* is also called *Cancer branneri* in other taxonomic databases.

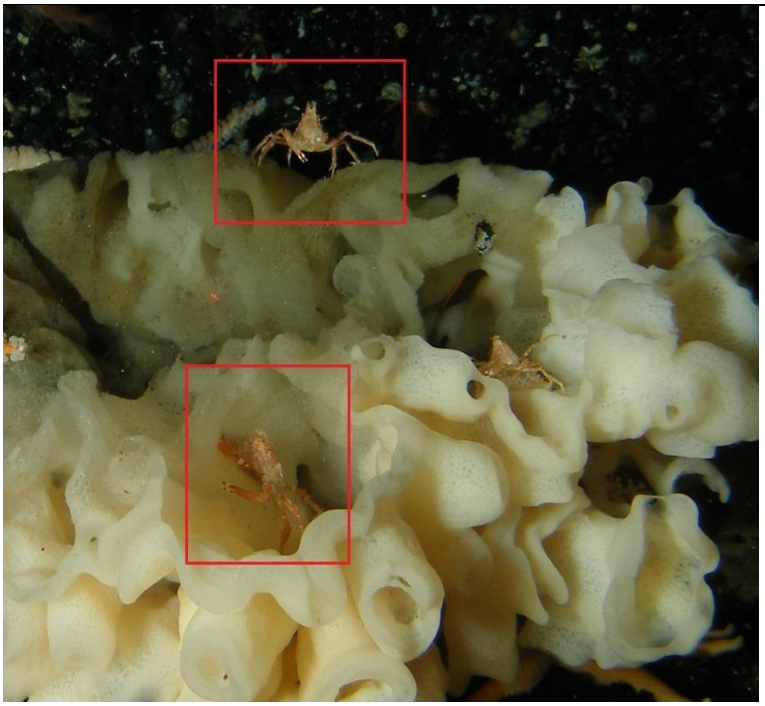
Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video still: PAC2015-048_Dive007 (155).jpg

Family Chirostylidae

Authority: Ortmann, 1892

Confidence: Previously observed [1]

Survey(s): 2015
Depths (m): 657-958



Credit: © Fisheries and Oceans Canada, 2011
Photo: P8010494.JPG

Family Epialtidae

Chorilia longipes
Redclaw Crab

Authority: Dana 1851

Confidence: Previously observed [6]

Survey(s): 2011
Depths (m): 194-236

Credit: © Fisheries and Oceans Canada, 2011
Photo: Pac2011_Dive004_160711.png

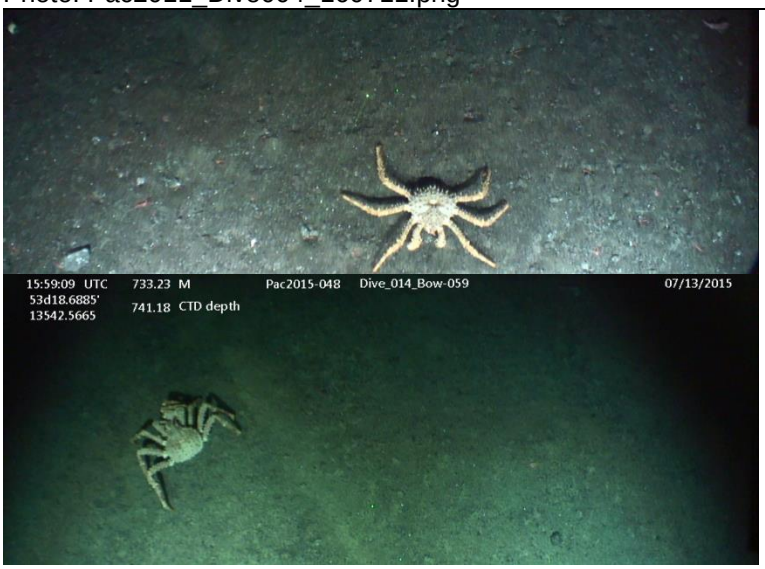
Family Hapalogastridae

Acantholithodes hispidus
Spiny Lithode Crab

Authority: Stimpson, 1860

Confidence: New record

Survey(s): 2011
Depth (m): 246-251



Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video still: Pac2015_Dive005_Screengrabs-RedKingCrab_001.png and Pac2015_Dive014_Screengrabs-GoldenKingCrab_001.png

Family Lithodidae

Lithodes aequispinus, Paralithodes camtschaticus
Golden King Crab, Red King Crab

Authority: Benedict 1895, Tilesius, 1815

Confidence: Previously observed [10]

Survey(s): 2011, 2015
Depths (m): 251-770

Credit: © Fisheries and Oceans Canada, 2011
Video still: Pac2011_Dive003_050210.png (bottom) Golden King Crab

Family Lithodidae

Lithodes aequispinus
Golden King Crab

Authority: Benedict 1895, Tilesius, 1815

Confidence: Previously observed [10]

Survey(s): 2011
Depths (m): 251

Credit: © Fisheries and Oceans Canada, 2011
Photo: 072411_174000_ 71.jpg

Family Lithodidae

Lopholithodes foraminatus
Brown Box Crab

Authority: Stimpson, 1859

Confidence: New record

Survey(s): 2011
Depth (m): 236

Credit: © Fisheries and Oceans Canada, 2011
Video still: Pac2011-062_HD_7_25_2011_53035_Majidae.png

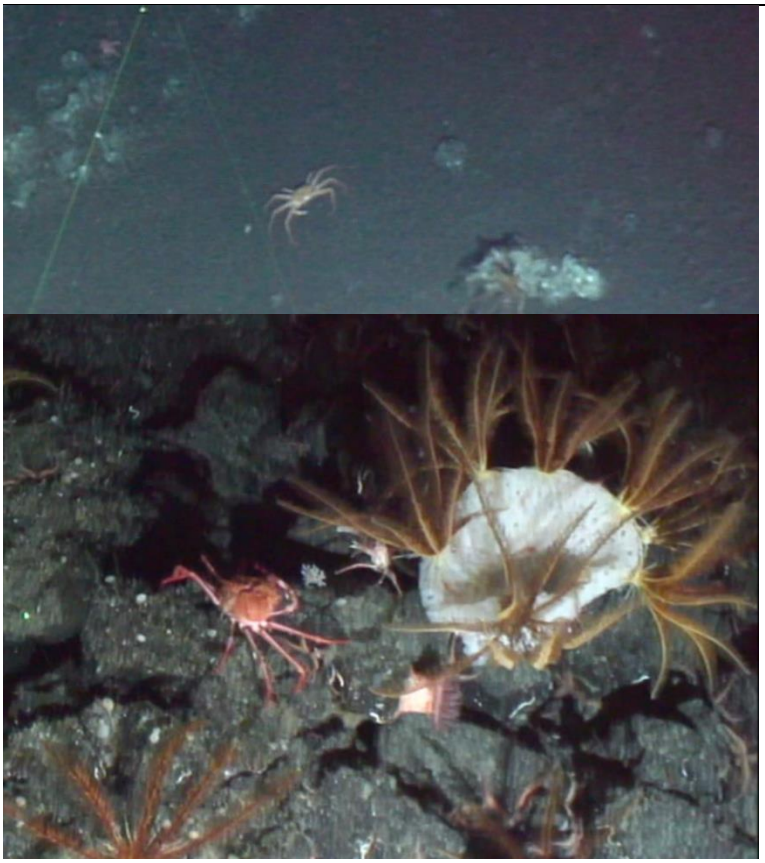
Family Majidae

Majidae spp.

Authority: Samouelle, 1819

Confidence: Previously observed [10]

Survey(s): 2011
Depths (m): 67-232



Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video still: Pac2015_Dive007_Screengrabs-CTanneri_001.png (top) and Pac2015-048_SZ_HD_7_11_2015_PM015_161730.png (bottom)

Family Majidae

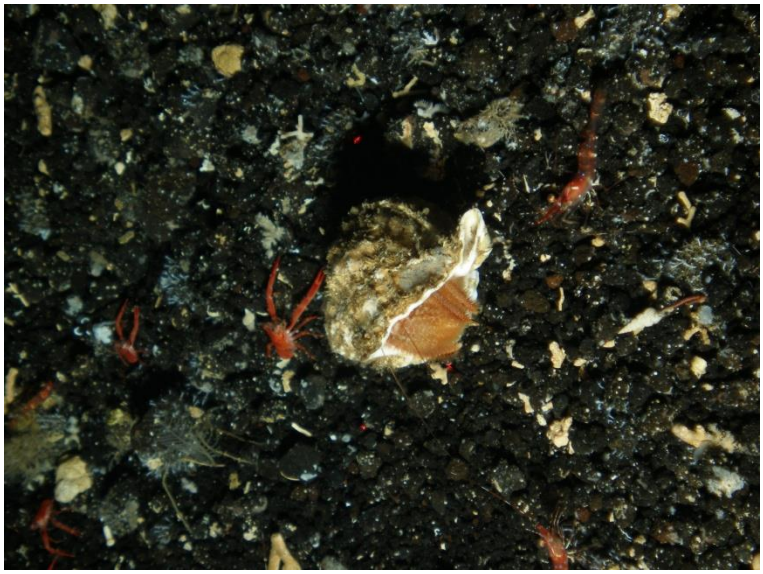
***Chionoecetes* (*Chionoecetes tanneri, Chionoecetes bairdi*) Tanner Crabs**

Authority: Rathbun, 1893, Rathbun, 1924

Confidence: Previously observed [10]

Survey(s): 2015
Depths (m): 309-1133

Notes: *Chionoecetes tanneri* was identified multiple times when the camera was closer to the organism.



Credit: © Fisheries and Oceans Canada, 2011
Photo: P8010496.JPG

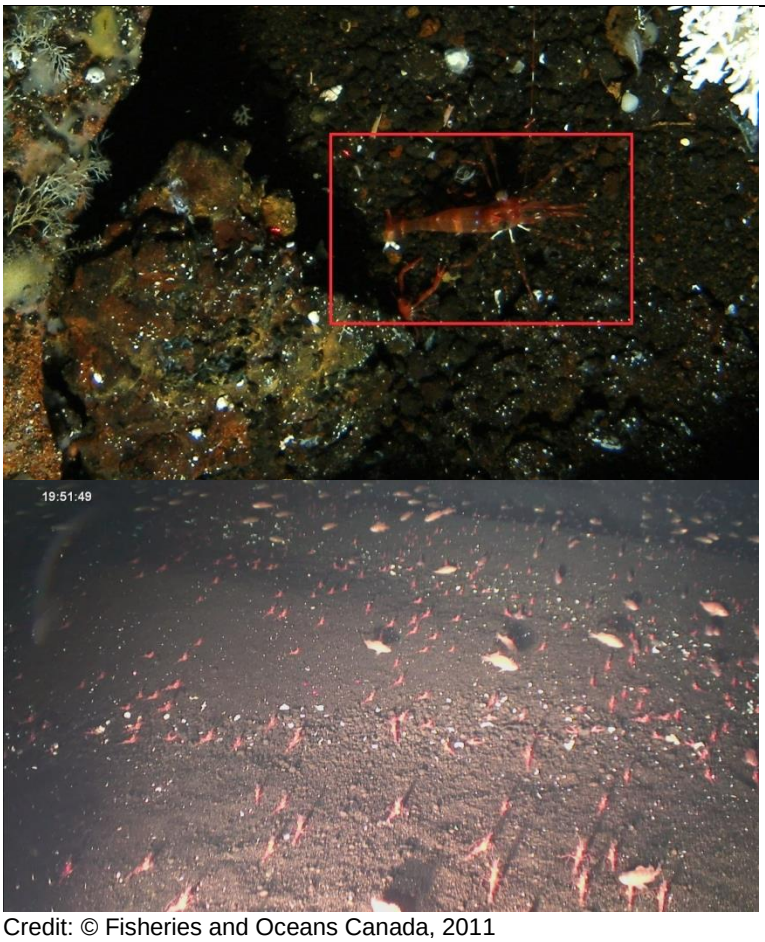
Family Paguridae

Unknown Paguridae
Hermit Crab

Authority: Latreille, 1802

Confidence: Previously observed [5]

Survey(s): 2000, 2011
Depths (m): 36-220



Credit: © Fisheries and Oceans Canada, 2011
Video still: 072511_170305_ 305 - Copy.jpg and Pac2011_Dive009_195149.png (bottom)

Family Pandalidae

Pandalidae spp.
Unknown shrimp

Authority: Haworth, 1825

Confidence: Previously observed [5]

Survey(s): 2011, 2015
Depth (m): 87-1123

Credit: © Fisheries and Oceans Canada, 2011
Photo: P8010112.JPG

Family Munididae

Munida quadrispina
Squat Lobster

Authority: Benedict, 1902

Confidence: Previously observed [1]

Survey(s): 2000, 2011, 2015
Depths (m): 54-728

Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video still: Pac2015_Dive008_Screengrabs-MunidopsisQuadrata_001.png

Family Munidopsidae

Munidopsis quadrata
Squat Lobster

Authority: Faxon, 1893

Confidence: New record

Survey(s): 2015
Depths (m): 339-1100

3. Phylum: Brachiopoda - lampshells

Credit: © Fisheries and Oceans Canada, 2011
Video still: .Pac2011-062_Dive004_Brachiopoda.png

Brachiopoda

Authority: Dumeril, 1805

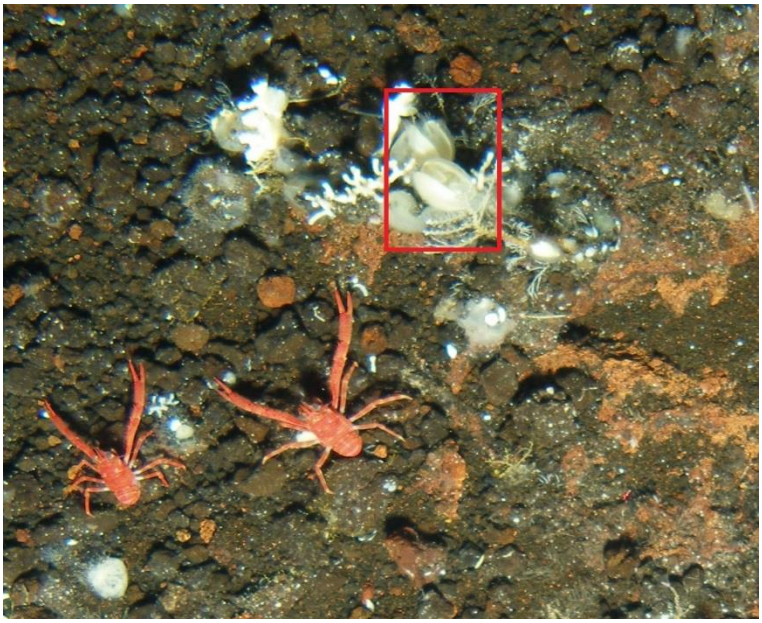
Confidence: New record

Survey(s): 2011
Depths (m): 157-248

Notes: All brachiopods were recorded at the phylum level in the video annotation database.

3.1. Class: Rhynchonellata

3.1.1. Order: Terebratulida



Credit: © Fisheries and Oceans Canada, 2011
Video still: 072511_170350_ 308 (2).jpg

Family Laqueidae

Laqueus californianus
California Lamp Shell

Authority: Koch 1848

Confidence: New record

Survey(s): 2011
Depths (m): NA

Notes: Observed in the pictures, but not during the video annotation. It is not in the 2011 database.

Credit: © Fisheries and Oceans Canada, 2011
Photo: P8010305.JPG

Family Terebrataliidae

***Terebratalia* sp.**
Transverse Lamp Shell

Authority: Beecher, 1893

Confidence: New record

Survey(s): 2011
Depths (m): NA

Notes: Observed in the pictures, but not during the video annotation. It is not in the 2011 database.

4. Phylum: Ctenophora

Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video still: Pac2015-048_SZ_HD_7_12_2015_182840_PM010_Ctenophora.png

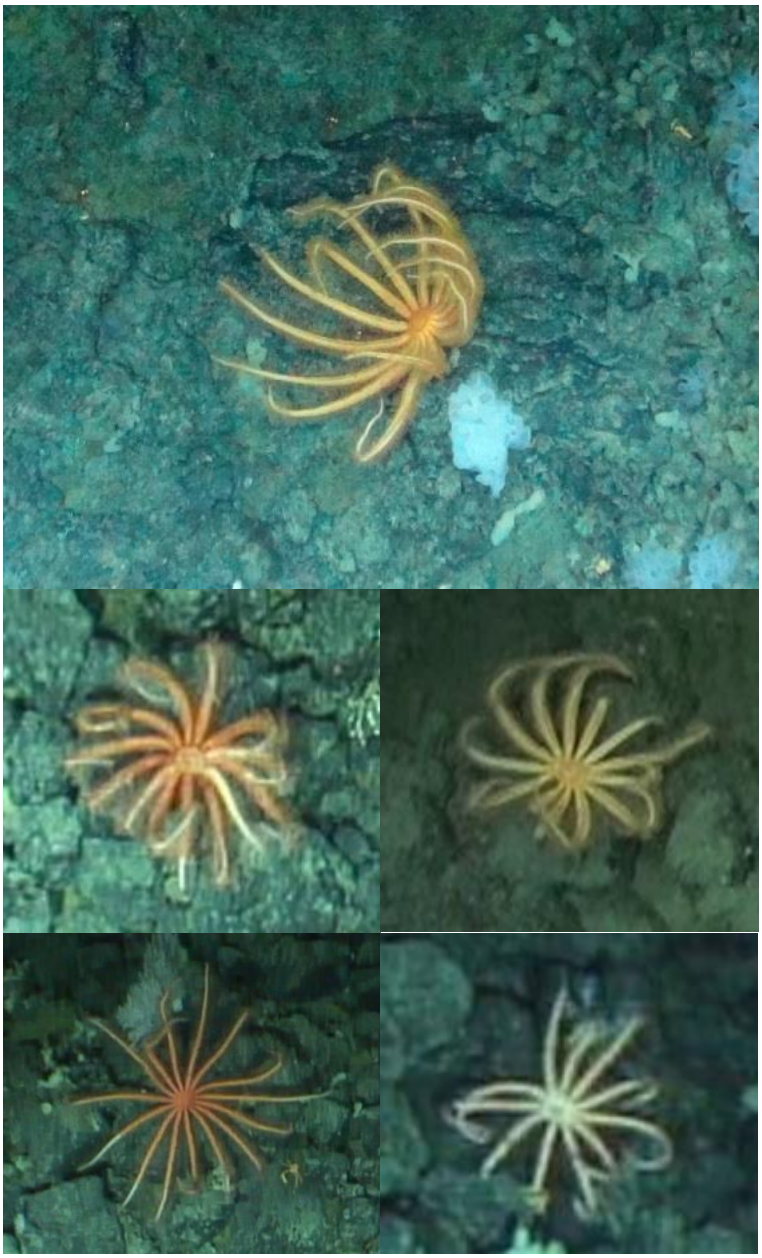
Ctenophora sp.

Authority: Eschscholtz, 1829

Confidence: Previously observed [6]

Survey(s): 2015
Depths (m): 909-917

5. Phylum: Echinodermata – sea stars, sea cucumbers, & others
5.1. Class: Asteroidea – sea stars
5.1.1. Order: Brisingida



Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video still: PAC2015-048_Dive008 (67).jpg (top), Dive19-1026 (2).png [2015 Tow-camera] (middle left), Dive16-487_8_11-53.png [2015 Tow-camera] (middle right), Dive19-781.png (bottom left), Dive19-1043.png (bottom right)

Order Brisingida

Brisingida sp.

Authority: Fisher 1917

Confidence: New record

Survey(s): 2015
Depths (m): 443-1139

Notes: Possibly *Brisinga* cf. *synaptoma* (Fisher 1917; previously observed) or *Hymenodiscus* sp. (Asbjørnsen 1856). Brisingidans (including families Brisingidae and Freyellidae) are difficult to identify from images, and it is likely that multiple species are represented in SKB-MPA.

5. Phylum: Echinodermata – sea stars, sea cucumbers, & others
5.1. Class: Asteroidea – sea stars
5.1.2. Order: Forcipulatida

Credit: © Fisheries and Oceans Canada, 2011
Video still: 072511_170750_ 324.jpg

Family Asteriidae

Rathbunaster californicus
Deep-sea Sunflower Star

Authority: Fisher 1906

Confidence: Previously observed [5]

Survey(s): 2000, 2011
Depths (m): 65-227

Credit: © Fisheries and Oceans Canada, 2011
Video still: Pac2011-062_Dive004_172234.png

Family Asteriidae

Stylasterias forreri
Velcro Star or Fish Eating Star

Authority: de Loriol 1887

Confidence: Previously observed [5, 6]

Survey(s): 2000, 2011, 2015
Depths (m): 69-410

Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video still: Dive06-26_4_05-57.png [2015 tow-camera] (top), Dive06-97_5_13-18.png [2015 tow-camera] (bottom)

Family Pedicellasteridae

***Ampheraster* sp.**

Authority: Fisher, 1923

Confidence: New record

Survey(s): 2015
Depths (m): 558-608

Credit: © Fisheries and Oceans Canada, 2011
Photo: P8010255.JPG

Family Pycnopodiidae

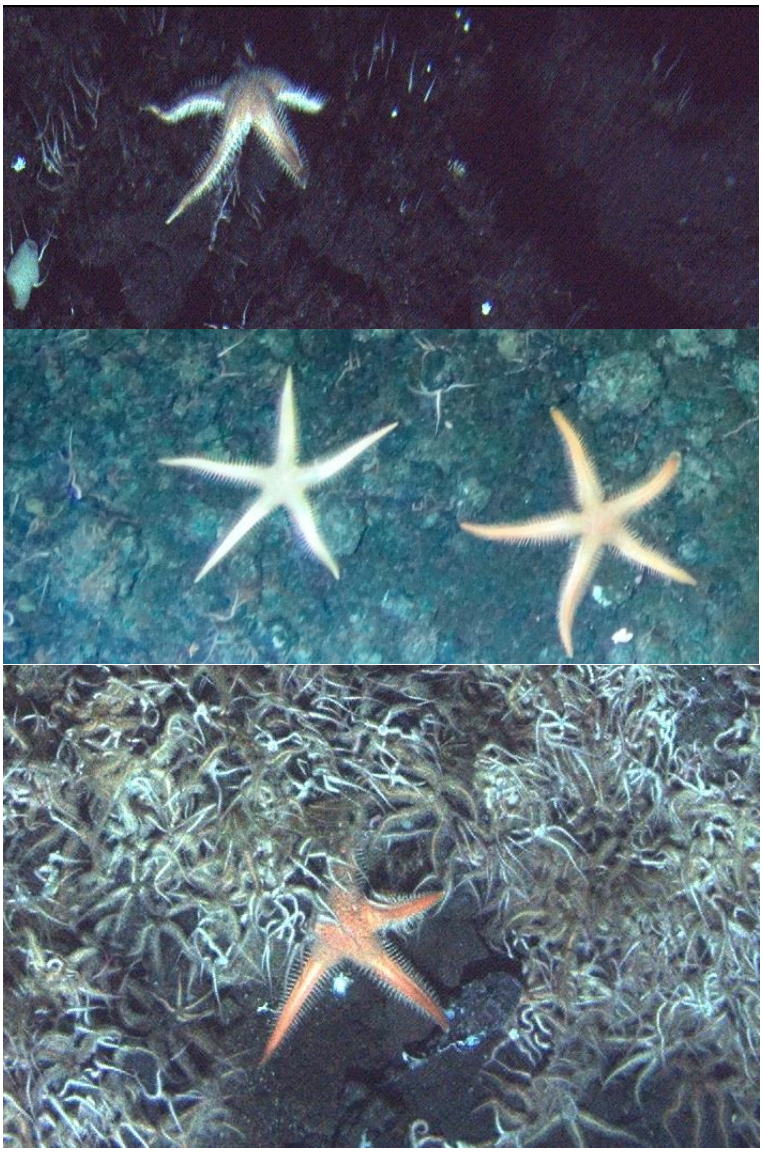
Pycnopodia helianthoides
Sunflower Star

Authority: Brandt 1835

Confidence: Previously observed [1, 2, 5, 6]

Survey(s): 2000, 2011
Depths (m): 72-98

5. Phylum: Echinodermata – sea stars, sea cucumbers, & others
5.1. Class: Asteroidea – sea stars
5.1.3. Order: Notomyotida



Credit: NOAA NWFSC/PIFSC AUV Team and DFO Science (BOOTS Tow-camera, 2015-048)
Video still: 20110726.011053.01477 copy.jpg (top), PAC2015-048_Dive010 (61).jpg (middle), 20110726.020603.02470 copy.jpg (bottom)

Family Benthopectinidae

Benthopectinidae sp*. (Cheiraster (Luidiaster) dawsoni* or *Nearchaster* sp.*)*

Authority: Verrill, 1880; Fisher, 1911

Confidence: New record

Survey(s): 2011 (AUV), 2015
Depths (m): 408-912

5. Phylum: Echinodermata – sea stars, sea cucumbers, & others
5.1. Class: Asteroidea – sea stars
5.1.3. Order: Paxillosida

Credit: © Fisheries and Oceans Canada, 2011
Photo: 072511_202253_ 96.jpg

Family Pseudarchasteridae

Gephyreaster swifti
Sowder Star

Authority: Fisher, 1905

Confidence: Previously observed [5]

Survey(s): 2000, 2011
Depths (m): 145-153

5. Phylum: Echinodermata – sea stars, sea cucumbers, & others
5.1. Class: Asteroidea – sea stars
5.1.4. Order: Spinulosida

Credit: © Fisheries and Oceans Canada 2000 (Delta Submersible)
Video Still: Pac2000_Dive5184_Screengrabs-Henricialeviuscula_001.png

Family Echinasteridae

Henricia leviuscula
Blood Star

Authority: Stimpson 1857

Confidence: Previously observed [2, 6]

Survey(s): 2000
Depths (m): 53-306

Credit: © Fisheries and Oceans Canada, 2011 and DFO Science (BOOTS Tow-camera, 2015-048)
Photo: 080211_162229_ 137.jpg (top), Dive16-445_5-06-05.png [Tow-camera 2015] (bottom left), Dive08-164.png [Tow-camera 2015] (bottom right)

Family Echinasteridae

***Henricia* spp.**

Authority: Gray, 1840

Confidence: New record

Survey(s): 2000, 2011 & 2015
Depths (m): 29-1236

Notes: Top photo specimen could be *Anteliaster coscinactis* (Family Pedicellasteridae, Order Forcipulatida; Fisher 1923) *Henricia* spp. are difficult to identify from images, and it is likely that multiple species occur in SKB-MPA. Other thin-armed, pale asteroids (e.g., Family Zoroasteridae) can be mistaken for *Henricia* in imagery.

5. Phylum: Echinodermata – sea stars, sea cucumbers, & others
5.1. Class: Asteroidea – sea stars
5.1.5. Order: Valvatida

Credit: © Fisheries and Oceans Canada, 2011
Photo: 072611_153839_ 49.jpg

Family Asteropseidae

Dermasterias imbricata
Leather Sea Star

Authority: Grube, 1857

Confidence: Previously observed [1, 2, 5, 6]

Survey(s): 2011
Depth (m): 29-177

Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video still: Pac2015_Dive006-29.png (top), Dive06-22_4_05-13/[mg (bottom left), Dive06-41_4_13-00.png (bottom right)

Family Goniasteridae

Goniasteridae sp. 1

Confidence: New record

Survey(s): 2015
Depths (m): 314-1212

Credit: © Fisheries and Oceans Canada, 2011
Photo: 072611_153839_ 49.jpg

Family Goniasteridae

Ceramaster patagonicus
Cookie Star

Authority: Sladen 1889

Confidence: Previously observed [5]

Survey(s): 2000, 2011
Depths (m): 206-248

Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video still: Pac2015_Dive005_220210.png

Family Goniasteridae

***Ceramaster* sp.**
Cookie Star

Authority: Sladen 1889 Forbes, 1841

Confidence: Previously observed [5]

Survey(s): 2015
Depths (m): 268-731

Credit: DFO Science (BOOTS Tow-camera, 2015-048), © Fisheries and Oceans Canada, 2011
Video still: Dive13-396_3_04-25.png [2015 tow-camera] (top), Photo: 072511_160338_ 65.jpg (middle), 2011_Dive5-20-44-15.jpg [2011 ROV] (bottom)

Family Goniasteridae

***Hippasteria* sp.**
Spiny Sea Star

Authority: Gray, 1840

Confidence: Previously observed [5]

Survey(s): 2011, 2015
Depths (m): 145-958

Credit: © Fisheries and Oceans Canada, 2011
Photo: 2011_Dive14-18-03-50.jpg

Family Goniasteridae

Mediaster aequalis
Vermilion Sea Star

Authority: Stimpson, 1857

Confidence: Previously observed [5]

Survey(s): 2000, 2011
Depths (m): 54-172

Credit: © Fisheries and Oceans Canada, 2011
Photo: 073111_201427_ 135.jpg

Family Poraniidae

***Poraniopsis* sp.**

Authority: Perrier, 1891

Confidence: Previously observed [5]

Survey(s): 2011, 2015
Depths (m):71-334

Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video still: 073111_200127_ 95.jpg

Family Solasteridae

***Crossaster* sp.**

Authority: Muller and Troschel, 1840

Confidence: Previously observed [5]

Survey(s): 2015
Depths (m): 406-427

Credit: © Fisheries and Oceans Canada, 2011
Video still: 2011_Dive9_20-01-28.jpg [2011 ROV]

Family Solasteridae

Crossaster papposus
Rose Star

Authority: Linnaeus 1767

Confidence: Previously observed [5]

Survey(s): 2000, 2011
Depths (m): 76-235

Credit: © Fisheries and Oceans Canada, 2011and DFO Science (BOOTS Tow-camera, 2015-048)
Video still: 072611_155538_ 90.jpg (top), Dive07-133c_7_11-04.png [2015 tow-camera] (middle), Dive13-393_3_02-13.png [2015 tow-camera] (bottom)

Family Solasteridae

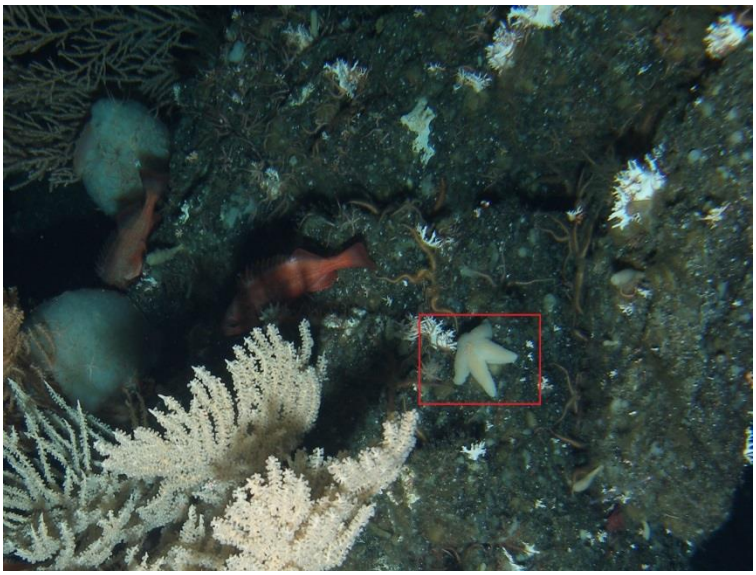
***Solaster* spp.**
Sun Star

Authority: Forbes, 1839

Confidence: Previously observed [5]

Survey(s): 2000, 2011 & 2015
Depth (m): 69-1123

5. Phylum: Echinodermata – sea stars, sea cucumbers, & others
5.1. Class: Asteroidea – sea stars
5.1.6. Order: Velatida



Credit: © Fisheries and Oceans Canada, 2011
Video still: 072511_051656_ 82.jpg

Family Pterasteridae

***Pteraster* sp.**

Authority: Müller & Troschel 1842

Confidence: Previously observed [5]

Survey(s): 2015
Depths (m): 341-1140

Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video still: Pac2015_Dive018_Screengrabs-PterasterMilitaris_Wrinkledstar_001.png

Family Pterasteridae

Pteraster* cf. *militaris
Wrinkled Star

Authority: O.F. Müller 1776

Confidence: Previously observed [5]

Survey(s): 2015
Depths (m): 417-665

Family Pterasteridae

Pteraster tesselatus
Cushion Star

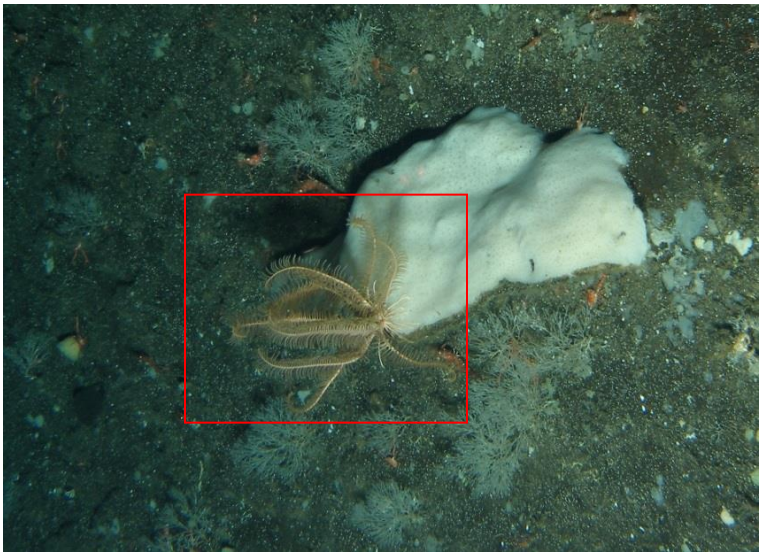
Authority: Ives, 1888

Confidence: Previously observed [5]

Survey(s): 2000, 2011
Depths (m): 45-248

Credit: © Fisheries and Oceans Canada, 2011
Photo: P8010246.JPG

5. Phylum: Echinodermata – sea stars, sea cucumbers, & others
5.2. Class: Crinoidea – crinoids
5.2.1. Order: Comatulida



Family Antedonidae

Florometra serratissima
Feather Star or Crinoid

Authority: Clark 1907

Confidence: Previously observed [5]

Survey(s): 2000, 2011, 2015
Depths (m): 116-1239

Credit: © Fisheries and Oceans Canada, 2011
Video still: 072411_175520_ 117.jpg

Unknown Crinoidea
"Black Crinoid"

Authority: NA

Confidence: New record

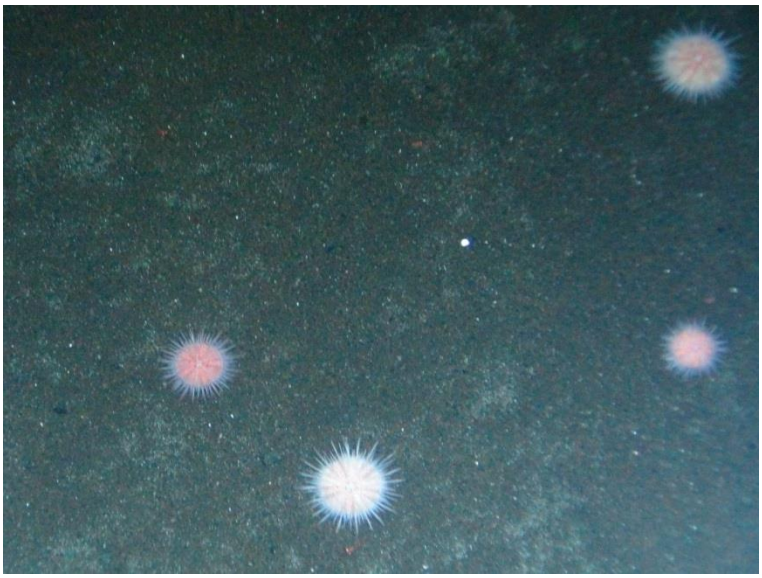
Survey(s): 2015
Depths (m): 870-1093

Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video Still: Pac2015-048_Dive019_215040.png (top) and Pac2015-048_Dive019_215040.png (bottom)

5. Phylum: Echinodermata – sea stars, sea cucumbers, & others

5.3. Class: Echinoidea – urchins

5.3.1. Order: Camarodonta



Family Strongylocentrotidae

Strongylocentrotus fragilis
Fragile Sea Urchin

Authority: Jackson, 1912

Confidence: Previously observed [5]

Survey(s): 2000, 2011, 2015
Depths (m): 215-570

Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video still: PAC2015-048_Dive005 (195).jpg

Credit: © Fisheries and Oceans Canada, 2011
Video still: Pac2011_Dive005_Strongylocentrotuspallidus.png

Family Strongylocentrotidae

Strongylocentrotus pallidus
Pale Urchin

Authority: Sars 1871

Confidence: Previously observed [5]

Survey(s): 2000, 2011
Depths (m): 79-163

5. Phylum: Echinodermata – sea stars, sea cucumbers, & others
5.4. Class: Holothuroidea – sea cucumbers
5.4.1. Order: Aspidochirotida

Credit: © Fisheries and Oceans Canada, 2011
Photo: P8010200.jpg

Family Stichopodidae

Apostichopus californicus
Giant Red Sea Cucumber

Authority: Stimpson, 1857

Confidence: Previously observed [5]

Survey(s): 2000, 2011
Depths (m): 69-101m

Credit: © Fisheries and Oceans Canada, 2011
Photo: 073111_221926_ 51.jpg

Family Stichopodidae

Apostichopus leukothele
White-Spined Sea Cucumber

Authority: Lambert 1986

Confidence: Previously observed [5]

Survey(s): 2000, 2011
Depths (m): 162-219 (*Apostichopus* spp.)

5. Phylum: Echinodermata – sea stars, sea cucumbers, & others
5.4. Class: Holothuroidea – sea cucumbers
5.4.2. Order: Dendrochirotida

Credit: © Fisheries and Oceans Canada, 2011
Photo: P8010471.JPG

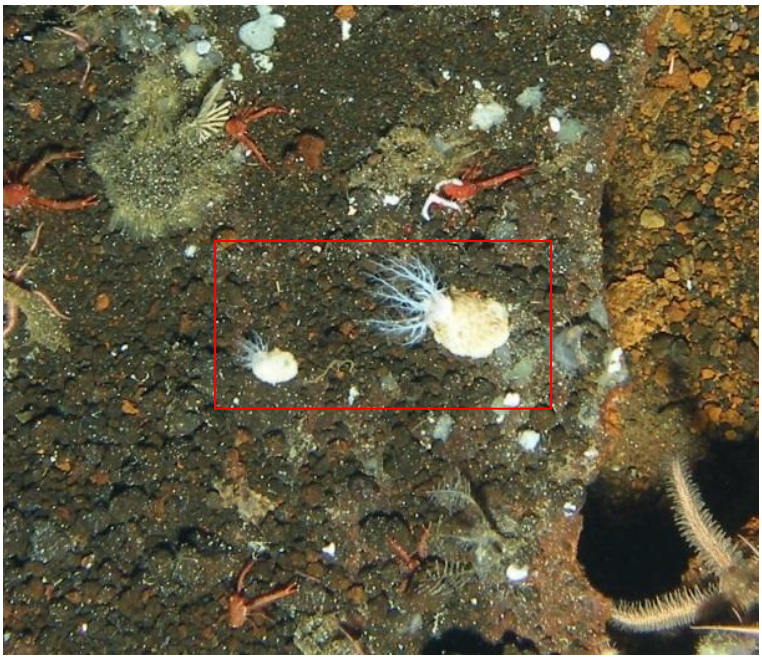
Family Cucumariidae

***Cucumaria* sp.**
White Sea Cucumber

Authority: de Blainville, 1830

Confidence: Previously observed [2, 9]

Survey(s): 2015
Depths (m): 416



Credit: © Fisheries and Oceans Canada, 2011
Video still: 072511_164750_ 244.jpg

Family Psolidae

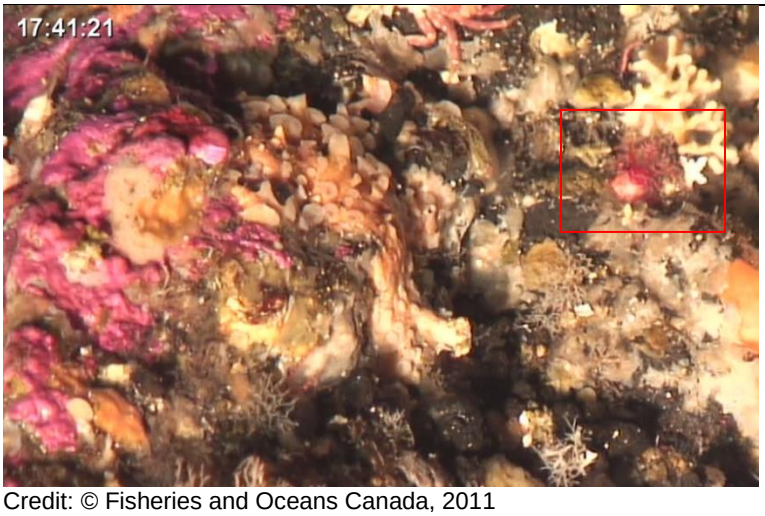
***Psolus* spp.**
or
Psolus squamatus

Authority: Oken, 1815, O.F. Muller, 1776

Confidence: New record

Survey(s): 2011, 2015
Depths (m): 95-1158

Notes: depending on camera distance and water visibility, this organism was identified to genus or species level.



Credit: © Fisheries and Oceans Canada, 2011
Video Still: Pac2011_Dive007_174121.png

Family Psolidae

Psolus chitonoides
Armoured Sea Cucumber

Authority: Clark, 1901

Confidence: New record

Survey(s): 2011
Depths (m): 79-95

5. Phylum: Echinodermata – sea stars, sea cucumbers, & others
5.4. Class: Holothuroidea – sea cucumbers
5.4.3. Order: Elasipodida

Family Laetmogonidae

Pannychia* cf. *moseleyi
White Sea Cucumber

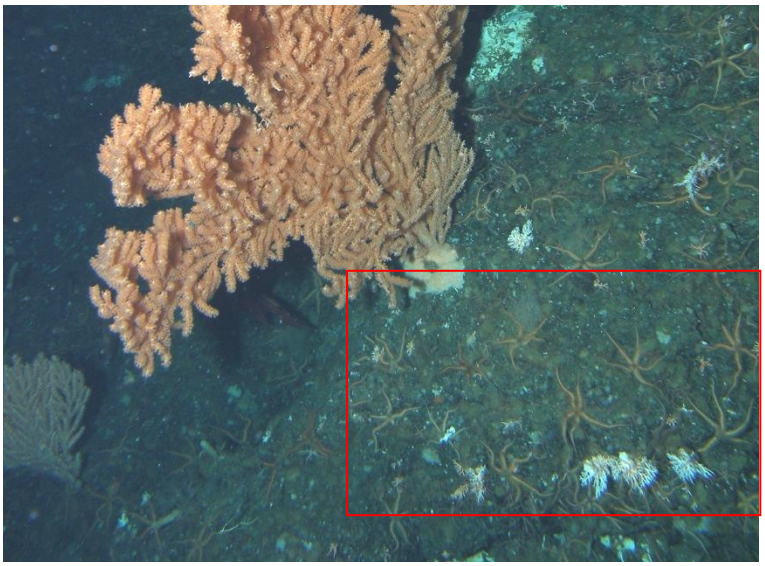
Authority: Théel, 1882

Confidence: New record

Survey(s): 2015
Depths (m): 310-1236

Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video still: PAC2015-048_Dive014 (66).jpg

5. Phylum: Echinodermata – sea stars, sea cucumbers, & others
5.5. Class: Ophiuroidea – brittle stars



Ophiuroidea
Brittle Stars

Authority: Gray, 1840

Confidence: Previously observed [1, 2, 5, 6, 10]

Survey(s): 2000, 2011, 2015
Depths (m): 33-1233

Credit: © Fisheries and Oceans Canada, 2011
Video still: 072511_051020_ 60.jpg

Credit: NOAA NWFSC/PIFSC AUV Team
Video still: 20110801.165504.00681.jpg

Family Ophiacanthidae

***Ophiacantha* sp.**
Brittle Stars

Authority: Muller & Troschel, 1842

Confidence: New record

Survey(s): 2011 (AUV)
Depths (m): 176-498

Notes: The depth range of the AUV transect was used because the depth of the observation was not available.

6. Phylum: Mollusca – bivalves, nudibranchs, octopus, & others

6.1. Class: Bivalvia

6.1.1. Order: Pectinoida

Credit: © Fisheries and Oceans Canada, 2011
Video still: Pac2011_Dive014_Chlamyshastata.png

Family Pectinidae

Chlamys hastata
Swimming Scallop

Authority: Hinds, 1845

Confidence: Previously observed [6]

Survey(s): 2011
Depths (m): 83-97

Notes: It may not always be possible to distinguish *Chlamys* species.

6. Phylum: Mollusca – bivalves, nudibranchs, octopus, & others
6.2. Class: Cephalopoda
6.2.1. Order: Octopoda – octopus

Credit: DFO Science (BOOTS Tow-camera, 2015-048)
Video Screengrab: Pac2015_Dive019_Screengrabs-Graneledone_001.png.jpg

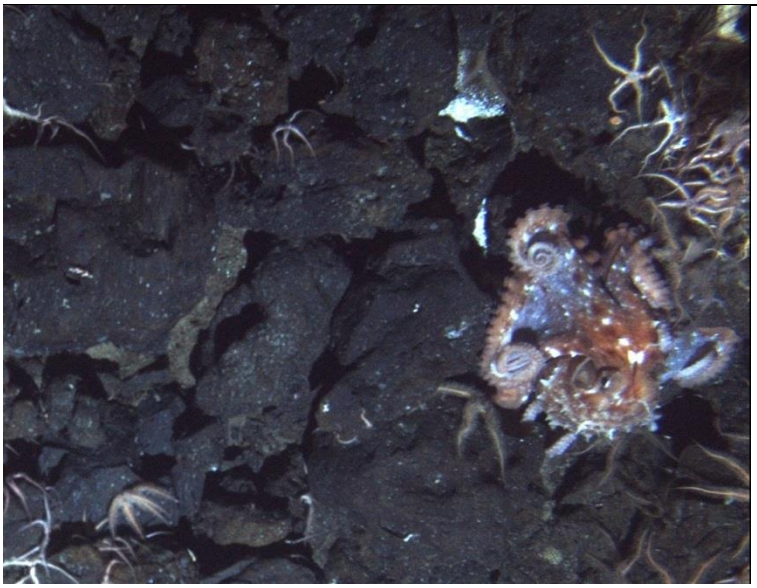
Family Octopodidae

Graneledone boreopacifica

Authority: Nesis, 1982

Confidence: New record

Survey(s): 2015
Depth (m): 833-934



Credit: NOAA NWFSC/PIFSC AUV Team
Photo: 20110726.020213.02402 copy

Family Octopodidae

***Octopus* sp.**

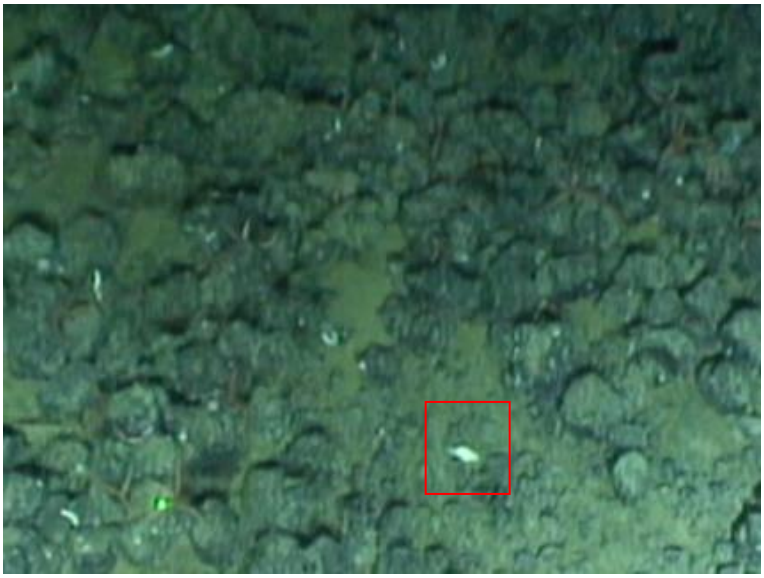
Authority: Cuvier, 1798

Confidence: Previously observed [2, 5, 10]

Survey(s): 2011 (AUV photo)
Depth (m): 420-930

Notes: The depth range of the AUV transect was used because the depth of the observations was not available
.

6. Phylum: Mollusca – bivalves, nudibranchs, octopus, & others
6.3. Class: Gastropoda



Credit: © Fisheries and Oceans Canada, 2011
DFO Science (BOOTS Tow-camera, 2015-048)
Video still: Pac2011-062_Dive005_194747.png (top) and Pac2015-048_Dive016_235940_PM020.png (bottom)

Class Gastropoda

Authority: Cuvier, 1795

Confidence: Previously observed [6]

Survey(s): 2011, 2015
Depths (m): 73-1220

Notes: These gastropods look similar to *Fusitriton oregonensis,* but the 2015 imagery is insufficient to see the hairy projections on the periostracum and the depth range is much deeper than *F. oregonensis* is thought to inhabit

6. Phylum: Mollusca – bivalves, nudibranchs, octopus, & others
6.3. Class: Gastropoda
6.3.1. Order: Littorinimorpha

Credit: © Fisheries and Oceans Canada, 2011
Photo: 072511_171320_ 346.jpg

Family Ranellidae

Fusitriton oregonensis
Oregon Triton

Authority: Redfield 1846

Confidence: Previously collected [5, 11]

Survey(s): 2000, 2011
Depths (m): 75-248

Notes: This depth range extends slightly deeper than the species' published maximum depth: 180 m (Lamb & Hanby 2005).

6. Phylum: Mollusca – bivalves, nudibranchs, octopus, & others
6.3. Class: Gastropoda
6.3.1. Order: N/A

Family Calliostomatidae

Authority: Thiele, 1924

Confidence: New record

Survey(s): 2011
Depths (m): 99

Credit: © Fisheries and Oceans Canada, 2011
Photo: 072611_162010_ 148.jpg

6. Phylum: Mollusca – bivalves, nudibranchs, octopus, & others
6.3. Class: Gastropoda
6.3.2. Order: Neogastropoda

Family Muricidae

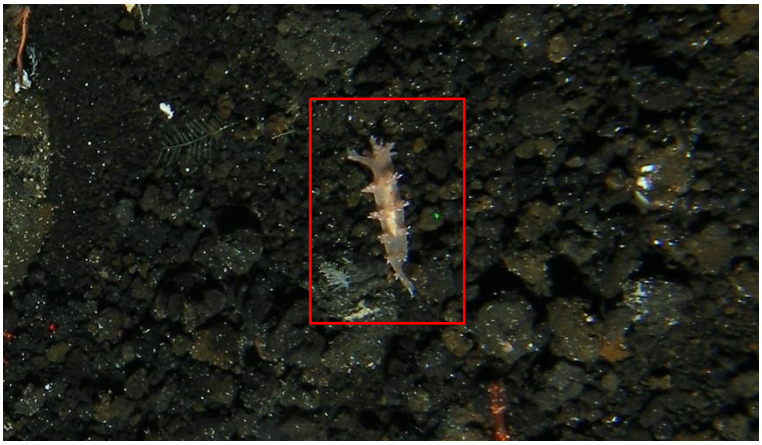
Authority: Rafinesque, 1815

Confidence: New record

Survey(s): 2011
Depths (m): 239-240

Credit: © Fisheries and Oceans Canada, 2011
Video still: Pac2011_Dive004_Muricidae.png

6. Phylum: Mollusca – bivalves, nudibranchs, octopus, & others
6.3. Class: Gastropoda
6.3.1. Order: Nudibranchia



Credit: © Fisheries and Oceans Canada, 2011
Photo: P8010437 (2).JPG

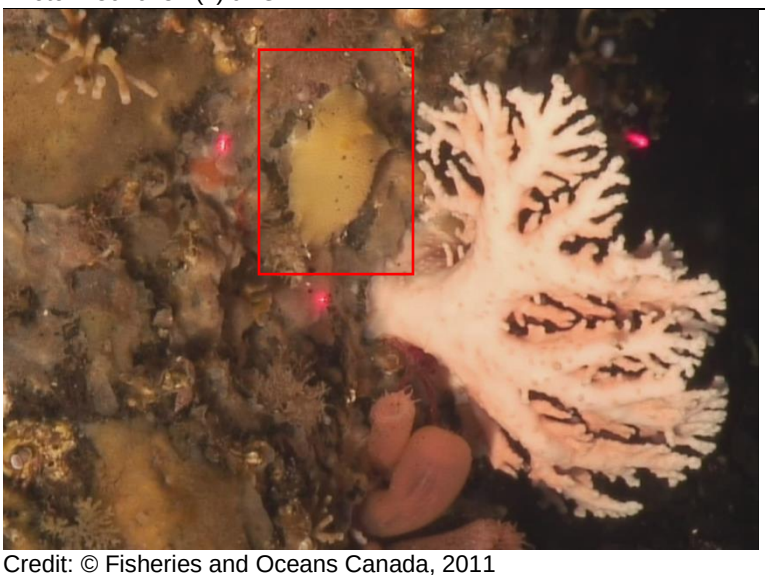
Family Dendronotidae

***Dendronotus* sp.**

Authority: Alder & Hancock, 1845

Confidence: Previously observed [6]

Survey(s): 2011
Depths (m): 105



Credit: © Fisheries and Oceans Canada, 2011
Video Still: Pac2011-062_Dive014_175622.png

Family Doridiidae

Authority: Rafinesque, 1815

Confidence: Previously observed [6]

Survey(s): 2011
Depth (m): 92

Family Flabellinidae

Flabellina verrucosa

Authority: M. Sars, 1829

Confidence: New record

Survey(s): 2011
Depths (m): 84

Credit: © Fisheries and Oceans Canada, 2011
Photo: 072611_213828_ 80.jpg

Family Tritoniidae

Tritonia tetraquetra
Rosy Tritonia

Authority: Pallas, 1788

Confidence: New record

Survey(s): 2011
Depths (m): 206-251

Credit: © Fisheries and Oceans Canada, 2011
Photo: 072511_160250_ 61.jpg

6. Phylum: Mollusca – bivalves, nudibranchs, octopus, & others
6.4. Class: Polyplacophora
6.4.1. Order: Chitonida

Credit: © Fisheries and Oceans Canada, 2011
Video still: Pac2011_Dive009_Cryptochitonstelleri.png

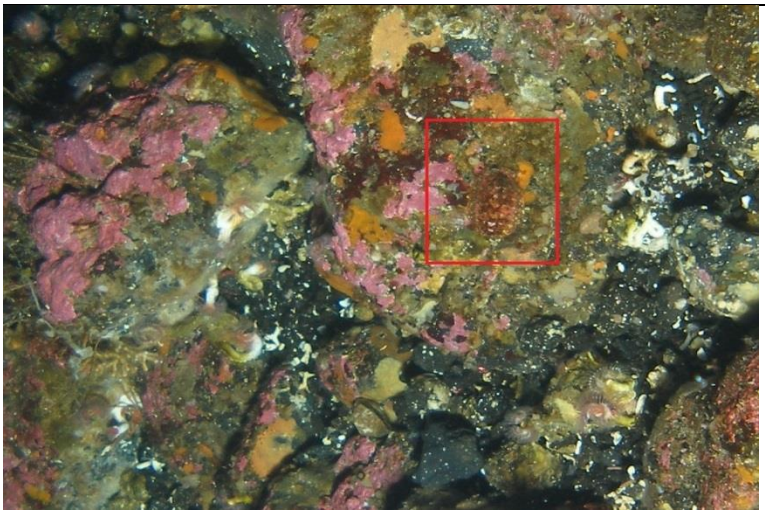
Family Mopaliidae

Cryptochiton stelleri
Gumboot Chiton

Authority: Middendorff, 1847

Confidence: Previously observed [2, 6, 9]

Survey(s): 2011
Depths (m): 30



Credit: © Fisheries and Oceans Canada, 2011
Photo: P8010242.JPG

Subclass Neoloricata

Unidentified Chitons

Authority: Bergenhayn, 1955

Confidence: New record

Survey(s): 2011
Depths (m): 75

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IMAGE CREDITS

Images credited “© Fisheries and Oceans Canada, 2000 (Delta Submersible)” and “NOAA NWFSC/PIFSC AUV Team” were collected during the 2000 survey. Images credited “© Fisheries and Oceans Canada, 2011” were collected during the 2011 survey. Images credited “DFO Science (BOOTS Tow-camera, 2015-048)” were collected during the 2015 expedition.

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NOAA NWFSC/PIFSC AUV Team – Personnel from NOAA (NWFS and Pac Islands).

© Fisheries and Oceans Canada, 2011 – Fisheries and Oceans Canada Pacific Biological Station remotely operated vehicle team

DFO Science (BOOTS Tow-camera, 2015-048) – Fisheries and Oceans Canada Pacific Biological Station Tow-camera team

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Personal communication with Dr. Philip Lambert (Holothuroidea expert)

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APPENDIX 1 – CRUISE TAXONOMIC CHECKLIST

Classification of the 72 organisms observed as occurring on SK-B Seamount during the 2000, 2011, and 2015 surveys from these Invertebrates phyla: Annelida, Arthropoda, Brachiopoda, Ctenophora, Echinodermata, and Mollusca.

Phylum: Annelida
Class: Polychaeta
Polychaeta spp.
Order: Sabellida
Serpulidae
Order: Terebellida
Terebellidae

Phylum: Arthropoda
Infraclass: Cirripedia
Order: Sessilia
Balanus nubilus

Class: Malacostraca
Order: Decapoda
Acantholithodes hispidus
Chionoecetes
Chionoecetes tanneri
Chirostylidae
Chorilia longipes
Decapoda spp.
Glebocarcinus oregonensis
Romaleon branneri
Lithodidae
Lithodes aequispinus
Lopholithodes spp.
Lopholithodes foraminatus
Paguridae
Pandalidae
Majidae
Munida quadrispina
Munidopsis quadrata

Phylum: Brachiopoda
Brachiopoda spp.
Class: Rhynchonellata
Order: Terebratulida
Laqueus californianus
Terebratalia sp.

Phylum: Ctenophora
Ctenophora sp.

Phylum: Echinodermata
Class: Asteroidea
Order: Brisingida
Brisingida sp.
Order: Forcipulatida
Ampheraster sp.
Rathbunaster californicus
Stylasterias forreri
Pycnopodia helianthoides
Order: Notomyotida
Benthopectinidae
Order: Paxillosida
Gephyreaster swifti
Order: Spinulosida
Henricia spp.
Henricia leviuscula
Order: Valvatida
Ceramaster sp .
Ceramaster patagonicus
Crossaster sp.
Crossaster papposus
Dermasterias imbricata
Goniasteridae sp. 1
Mediaster aequalis
Hippasteria sp.
Poraniopsis sp
Solaster spp
Order: Velatida
Pteraster sp.
Pteraster cf. militaris
Pteraster tesselatus

Class: Crinoidea
Order: Comatulida
Crinoidea
Florometra serratissima

Class: Echinoidea
Order: Camarodonta
Strongylocentrotus fragilis
Strongylocentrotus pallidus

Class: Holothuroidea
Holothuroidea spp.
Order: Aspidochirotida
Apostichopus californicus
Apostichopus leukothele
Order: Dendrochirotida
Cucumaria sp.
Psolus spp.
Psolus chitonoides
Psolus squamatus
Order: Elasipodida
Pannychia cf moseleyi

Class: Ophiuroidea
Ophiuroidea
Ophiacanta sp.

Phylum: Mollusca
Class: Bivalvia
Order: Pectinoida
Chlamys hastata

Class: Cephalopoda
Order: Octopoda
Graneledone boreopacifica
Octopus sp.

Class: Gastropoda
Gastropoda spp.
Order: Littorinimorpha
Fusitriton oregonensis
Order: N/A
Calliostomatidae
Order: Neogastropoda
Muricidae
Order: Nudibranchia
Nudibranchia spp.
Dendronotus sp.
Doridídae
Flabellina verrucosa
Tritonia tetraquetra

Class: Polyplacophora
Chitonida sp.
Cryptochiton stelleri

APPENDIX 2 – SUMMARY TAXONOMIC CHECKLIST

Classification of all 148 benthic and mid-water organisms observed as occurring on SK-B Seamount including the 2000, 2011, 2015 survey taxa from these Invertebrates phyla: Annelida, Arthropoda, Brachiopoda, Ctenophora, Echinodermata, and Mollusca) as well as species present from the literature. Species with an asterisk indicate absence from the 2000, 2011, and 2015 surveys.

Phylum: Annelida
Class: Polychaeta
Polychaeta spp.
*Arctonoe fragilis**
*Sedentaria**
Order: Sabellida
Serpulidae
Serpula vermicularis or
*Protura pacifica**
Order: Terebellida
Terebellidae

Phylum: Arthropoda
InfraClass: Cirripedia
Order: Sessilia
Balanus nubilus

Class: Malacostraca
Order: Amphipoda
Amphipoda spp.*
Caprellidae spp.
*Metacaprella kennerlyi**
*Themisto pacifica**
Order: Branchiopoda
Podon sp.*
Order: Decapoda
Acantholithodes hispidus
Calappa sp.*
Chionoecetes
Chionoecetes tanneri
Chirostylidae
Chorilia longipes
Decapoda spp.
Glebocarcinus oregonensis
Romaleon branneri
*Libinia emarginata**
Lithodidae
Lithodes aequispinus
Lopholithodes spp.
Lopholithodes foraminatus
*Libinia emarginata**
Paguridae
Pandalidae
*Pilumnus hirtellus**
*Pugettia gracilis**
Majidae
Munida quadrispina
Munidopsis quadrata
Order: Euphausiacea
Euphausiacea spp.*
Order: Isopoda
Isopoda spp.*
Order: Mysida
Mysida spp.*
Order: Tanaidacea
Tanaidacea spp.*

Class: Hexanauplia
Order: Calanoida
Copepoda spp.
*Acartia (Acartiura) longiremis**
*Calanus marshallae**
Eucalanus sp.*
Metridia sp. *
*Metridia pacifica**
*Neocalanus cristatus**
*Neocalanus flemengeris**
*Neocalanus plumchrus**
*Paracalanus parvus**
*Pseudocalanus mimus**
*Scolecthricella minor**

Order: Cycloploida
*Oithona atlantica**
*Oithona similis**

Class: Ostracoda
Ostracoda spp.*

Class: Pycnogonida
Pycnogonida spp.*

Phylum: Brachiopoda
Brachiopoda spp.
Class: Rhynchonellata
Order: Terebratulida
Laqueus californianus
Terebratalia sp.

Phylum: Ctenophora
Ctenophora sp.
Order: Beroida
Beroe sp.*
Order: Lobata
*Bolinopsis infundibulum**
Order: Cydippida
*Pleurobrachia bachei**

Phylum: Echinodermata
Class: Asteroidea
Order: Brisingida
Brisingidae sp.
Order: Forcipulatida
Ampheraster sp.
*Evasterias troschelii**
*Orthasterias koehleri**
*Pisaster brevispinus**
Pycnopodia helianthoides
Rathbunaster californicus
Stylasterias forreri
Order: Notomyotida
Benthopectinidae
Cheiraster (Luidiaster) dawsoni
Order: Paxillosida
*Ctenodiscus crispatus**
Gephyreaster swifti
*Leptychaster pacificus**
*Lophaster furcilliger**
*Pseudarchaster alascensis**
Order: Spinulosida
Henricia sp.
Henricia leviuscula
Order: Valvatida
Asterinidae sp.*
Ceramaster sp .
*Ceramaster arcticus**
Ceramaster patagonicus
Crossaster sp.
Crossaster papposus
Dermasterias imbricata
Goniasteridae spp.
Mediaster aequalis
Hippasteria sp.
Hippasteria phrygiana
*Lophaster furcilliger**
*Mediaster aequalis**
Poraniopsis sp
*Poraniopsis inflata**
Solaster spp
*Solaster dawsoni**
*Solaster paxillatus**
Order: Velatida
Pteraster sp.
*Pteraster jordani**
Pteraster cf. militaris
Pteraster tesselatus

Class: Crinoidae
Order: Comatulida
Crinoidea
Florometra serratissima

Class: Echinoidea
Order: Camarodonta
*Mesocentrotus franciscanus**
*Strongylocentrotus droebachiensis**
Strongylocentrotus fragilis
Strongylocentrotus pallidus
*Strongylocentrotus purpuratus**

Class: Holothuroidea
Holothuroidea spp.
Order: Aspidochirotida
Apostichopus californicus
Apostichopus leukothele
Order: Dendrochirotida
Cucumaria sp.
*Cucumaria quinquesemita**
Psolus spp
Psolus chitonoides
Psolus squamatus
Order: Elasipodida
Pannychia cf moseleyi

Class: Ophiuroidea
Ophiuroidea
Order: Ophiuroida
Ophiacanta sp.
*Ophiopholis aculeata**
Order: Euryalida
*Gorgonocephalus eucnemis**

Phylum: Foraminifera*

Phylum: Mollusca
Class: Bivalvia
Order: Adapedonta
*Hiatella arctica**
Order: Mytilida
*Mytilus californianus**
Order: Pectinida
Chlamys hastata
*Crassadoma gigantea**
*Pododesmus macrochisma**

Superorder: Anomalodesmata
*Entodesma navicula**

Class: Cephalopoda
Order: Octopoda
Graneledone boreopacifica
Octopus sp

Class: Gastropoda
Gastropoda spp.
*Diodora aspera**
Order: Littorinimorpha
Fusitriton oregonensis
Order: N/A
Calliostomatidae

Order: Neogastropoda
Muricidae
Neogastropoda spp.*
Order: Nudibranchia
Nudibranchia spp.
Dendronotus sp.
*Dirona albolineata**
Doridiidae
Flabellina verrucosa
*Hermissenda crassicornis**
*Janolus fuscus**
*Montereina nobilis**
*Dendronotus frondosus**
*Triopha catalinae**
Tritonia tetraquetra
Order: Thecosomata
*Limacina helicina**

Class: Polyplacophora
Chitonida sp.
Cryptochiton stelleri

Phylum: Radiozoa*

Phylum: Sipuncula*

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