Trap camera videos from SGaan Kinghlas - Bowie Seamount: Overview of data obtained during Sablefish bottom longline trap fishing in 2017

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TRAP CAMERA VIDEOS FROM SGAAN KINGHLAS – BOWIE SEAMOUNT: OVERVIEW OF DATA OBTAINED DURING SABLEFISH BOTTOM LONGLINE TRAP FISHING IN 2017

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TABLE OF CONTENTS

ABSTRACT

Gauthier, M. 2018. Trap camera videos from SGaan Kinghlas – Bowie Seamount: Overview of data obtained during sablefish bottom longline trap fishing in 2017. Can. Dat. Rep. Fish. Aquat. Sci. 1289: v + 13 p.

SGaan Kinghlas-Bowie (SK-B) was designated as a Marine Protected Area (MPA) in 2008 and is co-managed by the Government of Canada and the Council of the Haida Nation. A Sablefish (*Anoplopoma fimbria*) fishery has occurred in some areas of the Bowie Seamount since 1985. A joint research project between DFO, Simon Fraser University, and Wild Canadian Sablefish Ltd. has occurred since 2012 to capture deep-sea videos from the Sablefish longline trap fishery. This data report gives an overview of the video annotation of the habitat (substrate), impacts detected, and soft corals (Alcyonacea, Antipatharia and Pennatulacea Orders; Stylasteridae Family) observed from the SK-B fishing trip in May 2017. Overall, 17 sets allowed for video observations of the substrate and benthic communities. Four locations showed a presence of deep-sea corals (Alcyonacea and Stylasteridae) or sponges, while absent from the 13 other set locations. Soft bottom substrates (mud or sand) were prevalent (47%) followed by hard substrates (35%) consisting of gravel, cobbles, boulders or bedrock. Finally, 59% of the fishing sets (10) indicated observations of the traps dragging, rolling, or bouncing on the seafloor. This report will help support future analyses on the biology of Bowie Seamount and SK-B MPA.

RÉSUMÉ

Gauthier, M. 2018. Vidéos obtenues au mont sous-marin Bowie (SGaan Kinghlas) à l'aide de caméras-pièges : Vue d'ensemble des données obtenues pendant la pêche à la palangre de fond et au casier à la morue charbonnière en 2017. Rapp. stat. can. sci. halieut. aquat. 0000 : v + 12 p.

Le mont sous-marin Bowie (SGaan Kinghlas) (SK-B) a été désigné comme zone de protection marine (ZPM) en 2008 et est géré conjointement par le gouvernement du Canada et le Conseil de la Nation Haïda. Une pêche à la morue charbonnière (*Anoplopoma fimbria*) se déroule dans certaines zones du mont sous-marin Bowie depuis 1985. Le MPO, l'Université Simon Fraser, et Wild Canadian Sablefish Ltd. ont entamé un projet de recherche conjoint en 2012 pour saisir des vidéos des grands fonds de la pêche à la palangre et au casier à la morue charbonnière. Ce rapport de données offre une vue d'ensemble de l'annotation des vidéos concernant l'habitat (substrat), les impacts détectés, ainsi que les coraux mous (ordres Alcyonacea, Antipatharia et Pennatulacea; famille Stylasteridae) observés pendant le voyage de pêche dans la ZPM SK-B en mai 2017. Dans l'ensemble, 17 calées ont permis l'observation vidéo du substrat et des communautés benthiques. Quatre emplacements ont montré une présence de coraux d'eau profonde (Alcyonacea et Stylasteridae) ou d'éponges qui étaient cependant absents des 13 autres endroits. Les substrats de fond meuble (de vase ou de sable) étaient très répandus (47 %), suivis par des substrats durs (35 %) composés de gravier, de galets, de rochers ou de substrats rocheux. Enfin, 59 % des traits de pêche (10) ont permis d'observer des casiers qui traînaient, qui roulaient ou qui rebondissaient sur le fond. Ce rapport contribuera aux analyses futures de la biologie du mont sous-marin Bowie et de la ZPM SK-B.

BACKGROUND

Since 1985, Sablefish (*Anoplopoma fimbria*) fishery in British Columbia has occurred at SGaan Kinghlas - Bowie (SK-B) Seamount (Murie et al. 1996). Conical traps are used with a bottom diameter of 54-58" (Murie et al. 1996) and are attached to bottom longlines that are anchored, typically a fishing set will comprise 40-80 traps. The SK-B Seamount Marine Protected Area (MPA) was established in 2008 around three seamounts: Hodgkins, Davidson and Bowie (SGaan Kinghlas). To manage commercial fishing activities, the SK-B MPA was separated into three zones. Zone 1 (SK-B seamount down to 457 m) and Zone 3 (Hodgkins and Davidson seamounts) are closed to fishing, while zone 2 is open for Sablefish longline trap fishery deeper than 457 m on SK-B Seamount (DFO 2015; see Figure 1). Also, there has been a change in management measures including at-sea observer coverage, biosample collection procedures, and deep water cameras and accelerometers deployment (DFO, 2016).

A joint research project between DFO, Simon Fraser University, and Wild Canadian Sablefish Ltd. has been carried out since 2012 to capture deep-sea videos from the Sablefish longline trap fishery. Figure 2 illustrates the fishing gear and camera system to monitor the potential effect of fishing gear on benthic ecosystems in Zone 2 (Doherty and Cox, 2017).

This data report gives an overview of the video annotation of the habitat (substrate), impacts detected, and soft corals (Alcyonacea and Stylasteridae Family) observed from the SK-B fishing trip in May 2017. Trap camera observations at SK-B from 2014-2015 fishing trips and video review methods are previously described in Doherty and Cox (2017).

CAMERA DEPLOYMENTS

Camera systems were mounted in Sablefish traps. To allow for a clearer field of view, the net was removed from one side of the trap (Figure 2; from Doherty and Cox, 2017). For a general view of the deployment, see Doherty and Cox (2017). Although the linear distance between set endpoints ranged from 2.2 to 3.8 km, with a median set length of 3.0 km, the gear position on bottom may differ because of prevailing currents, depth, and/or substrate type.

Cameras were deployed on 22 of the 56 fishing sets for the May 2017 (May 6 - June 3). Between 52-64 traps were deployed on each fishing set. Traps with cameras remained on the seafloor for between 20-48 hours, with a median bottom time of 46 hours.

Video observations of bottom substrate were successfully obtained from 17 of the trap camera fishing sets. Some videos within those sets did not allow for video observations of the bottom substrate because:

(1) The image turned black;

(2) The trap rested on its side or was dragging in a position where the bottom substrate was not visible;

(3) The trap was suspended in the water column while being set or retrieved;

(4) The visibility was extremely poor due to sediments in the water column.

VIDEO PROCESSING

VideoMiner Software version 3.0.8.0 developed by DFO (Available at: downloads.crmltd.ca/f/Crm1335/) was used to annotate the videos. Attributes related to the physical substrate, current speed and direction, and trap position and movements were stored in a Microsoft Access database.

Video clips recorded were of 60 seconds duration and varied between 10 and 35 clips per set. Cameras were programmed to record video at 2-hour intervals while the trap was stationary on the seabed. Accelerometers within the camera housings were used to trigger supplementary video clips of gear movement during retrieval. All videos were processed to capture movement, bottom type, and species while the trap was stationary. All videos were processed for trap movement during gear retrieval.

Video annotation of all benthic species was influenced by the distance to the camera, the visibility, the field of view (obstructed or not) and a lack of species samples to allow for precise identification (Cairns 2007, Reiswig 2015). Species were identified to the lowest taxonomic rank possible (e.g. species, genus, family, order, etc.) with higher confidence, meaning that if the confidence was low for a species, the higher taxonomic rank would be chosen to increase the confidence level. Identification confidence scores of “low”, “medium”, or “high” were used nonetheless (Appendix 2), but this reduces the prevalence for low confidence level observations. Recent Quality Assurance Quality Control on SK-B video annotation data has shown that it was preferred to use a higher taxonomy level to increase the level of confidence for data analysis (Gauthier and Gale, 2017).

Video recordings of the seabed varied with movement of the traps. Some sets allowed for more field of view of the seabed than others because of that reason. Recordings happened while the trap was not moving, in addition to a variable amount of video while the gear was retrieved. These new bottom observations while the trap was retrieved varied with how many videos were collected during that time, how long the trap was moving along the seafloor, the position of the trap (dragging, rolling, suspended), the camera angle, and the water clarity.

Most observations of coral and sponges did not require access to resources because the taxonomy level was at the Order or Class level. Nonetheless, primary resources included Lamb and Hanby 2005, Wing and Bernard 2004, Clark 2006, Cairns 2007, Jamieson et al. 2007, Etnoyer 2008, Stone et al. 2011, Williams 2013 and Du Preez et al. 2015. The World Register of Marine Species (WoRMS; www.marinespecies.org; accessed November 2016) was used to verify nomenclature. Video stills of the taxa observed can be found in Appendix 1. Because the quality of video footage is always superior to video stills, they are a bit blurry.

SUMMARY OF VIDEO OBSERVATIONS

CORALS AND SPONGES

Out of 17 fishing set locations, 35% (5) included observations of corals (Table 1). No sponges were observed. Gorgonian corals (Order Alcyonacea) were found in 4 locations and hydrocorals (Family Stylasteridae) in 1 location.

Table 1. Number of sets where corals and/or sponges were present based on video observations during June 2017 Sablefish fishing trips at SK-B seamount.

Observations	**June**	**%**
Alcyonacea Order (Gorgonian corals)	4	29
Pennatulacea	0	0
Antipatharia Order (Black corals)	0	0
Soft Corals/Octocorals (ID'd at higher level)	0	0
Porifera Phylum (Sponges)	0	0
Hydrocorals (Stylasteridae family)	1	6
Presence of Corals and Sponges	5	35
Absence of Corals and Sponges	12	65
Total Observations	**5**	**35**

Overall, 17 sets totalizing 53 videos showed presence of coral, for a total of 5 unique observations of corals. No sponges were observed. Sets of videos while traps were stationary (20 sets; 52 videos) and videos in motion (all types of motions) (1 set; 1 video) accounted for 1 observation of coral (see Appendix 2).

BOTTOM SUBSTRATE

The prevalent bottom substrate was Soft bottom as primary substrate, followed by Boulders as the primary substrate (Table 2). Some sets did not allow the annotation of the bottom substrate because of the trap position or motion, or the image was black.

Table 2. Number of total camera sets and sets where corals and/or sponges were present arranged by substrate type for video observations during June 2017 Sablefish fishing trips at SK-B seamount.

Substrate	Number of Camera Sets	Percent of Sets	Sets with Presence of Coral or Sponge
Soft bottom as primary substrate:			
Soft bottom (mud) only 7 + blanks	2		0
Soft bottom (mud) only 7 + 9	1		0
Soft bottom (sand) only 9	1		0
Sand with bedrock 7+1 or 2	0		0
Sand with gravel 7 + 5	2		0
Sand with cobbles 7 + 4	1		0
Sand with boulders 7 + 3	1		0
Total on soft bottom	8	47%	0
Hard bottom as primary substrate:			
Boulders 3	5		3
Gravel with sand 5 + 7	0		0
Gravel with boulders 5 + 3	0		0
Cobbles with sand 4 + 7	0		0
Cobbles with boulders 4+ 3	0		0
Bedrock with boulders 1 + 2 + 3	0		0
Bedrock with mud or sand 1, 2, 7, 9	1		1
Total on hard bottom	6	35%	
Notes: Hard bottom substrate was classified based on substrate descriptors in 'VideoMiner' software: Gravel, between 1/8 inch and 3 inch (combined observations classified as "pea gravel" or "gravel" in database) Cobble, between 3 inches and basketball size Boulders, bigger than a basketball			

TRAP MOTION AND IMPACTS OBSERVED

Out of 17 sets, 10 (59%) indicated the traps dragging, rolling or bouncing on the seafloor. The trap was dragging on the seabed in 6 sets (17 videos) but only 4 sets (12 videos) allowed a camera angle to observe impacts evidence on sessile species. 5 sets (14 videos) showed the trap rolling or bouncing on the seafloor, while 4 sets out of those (12 videos) allowed for the observation of impacts on sessile or habitat-forming ecosystems.

Overall, there was no observed drag marks on the bottom, 2 sets (5 videos) showed damage to invertebrates, and 7 sets (25 videos) showed damage to habitat-forming ecosystems (corals).

CONCLUSION

In May 2017, 56 longline trap fishing sets were deployed on fishing trips to SK-B Seamount. Overall, 17 sets allowed for video observations of the substrate and benthic communities. 4 sets showed a presence of deep-sea corals (Alcyonacea or Stylasteridae), while absent from the 13 other fishing set locations.

Soft bottom substrates (mud or sand) were prevalent (47%) followed by hard substrates (35%) consisting of gravel, cobbles, boulders or bedrock. Other types of substrate were not in those categories.

Alcyonacea corals were not present where the main substrate was mud or sand, and in 4 locations where the main substrate was hard bottom (gravel, cobbles, bedrock and boulders) (see Appendix 2).

Finally, 59% of the sets (10) indicated observations of the traps dragging, rolling, or bouncing on the seafloor. Overall, 2 sets (5 videos) showed damage to invertebrates and 7 sets (25 videos) showed dame to habitat-forming ecosystems (corals).

ACKNOWLEDGEMENTS

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FIGURES

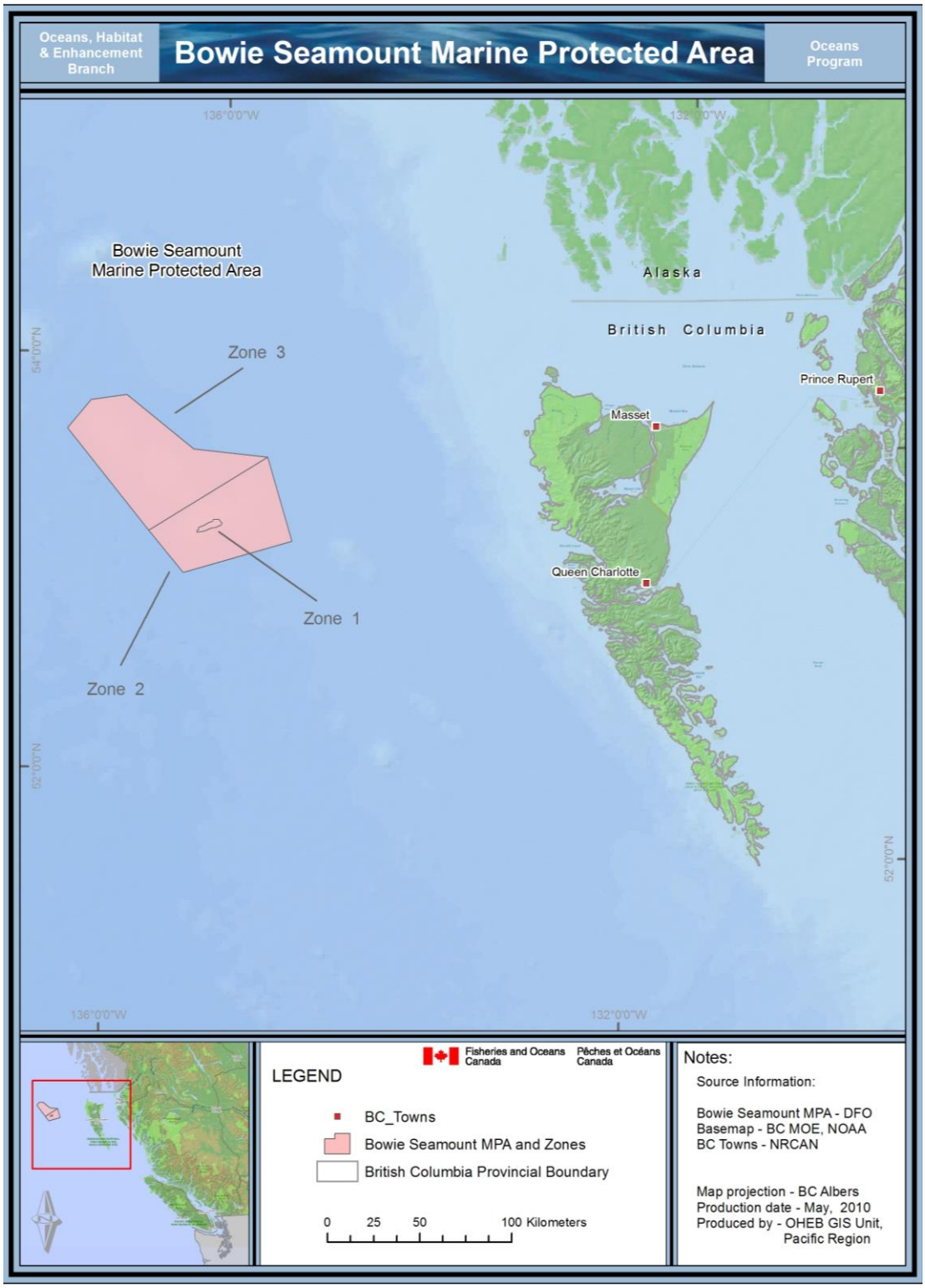
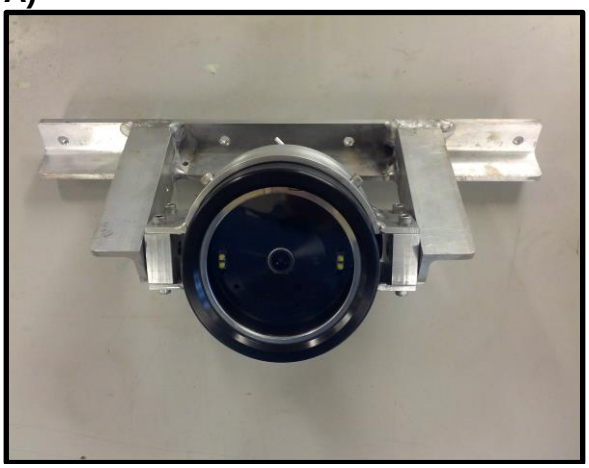


Figure 1. Map of SGaan Kinghlas-Bowie Seamount Marine Protected Area and fishery management zones (Source: DFO 2011).

A)



B)

Figure 2. A) Camera in bracket. B) Front view (left) and top view (right) of camera (grey bracket) and accelerometer (orange bracket) mounted in Sablefish trap.

APPENDIX 1 - CORAL AND SPONGE VIDEO STILLS

PHYLUM CNIDARIA

CLASS ANTHOZOA

Order Alcyonacea - Gorgonian corals

Unknown Gorgonians

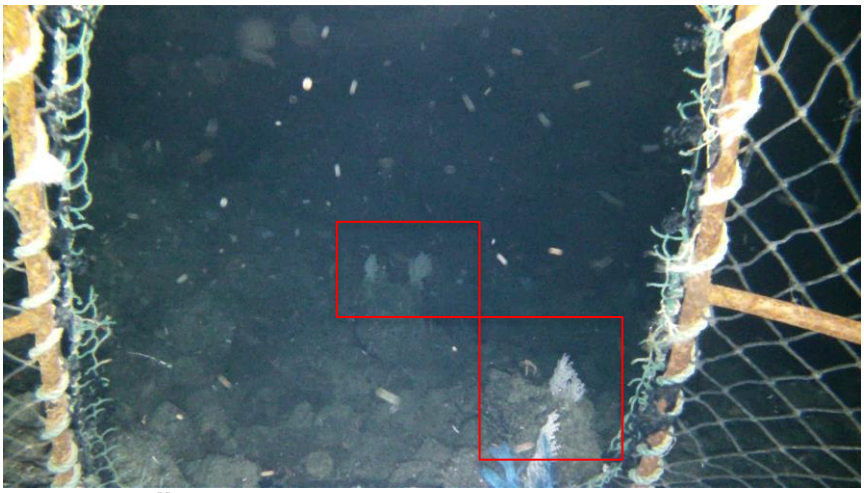


Image Credit:
Wild Canadian Sablefish Ltd.
Observed Depths: 823m

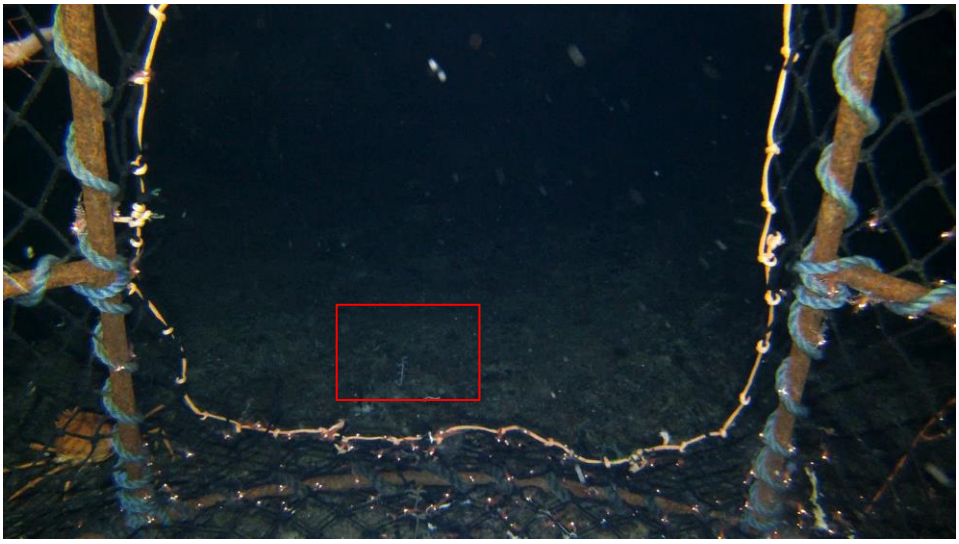


Image Credit:
Wild Canadian Sablefish Ltd.
Observed Depths: 854m

Image Credit:
Wild Canadian Sablefish Ltd.
Observed Depths: 960m

CLASS HYDROZOA

Order Anthoathecata

Family Stylasteridae - Hydrocorals

Unidentified Stylasteridae spp.

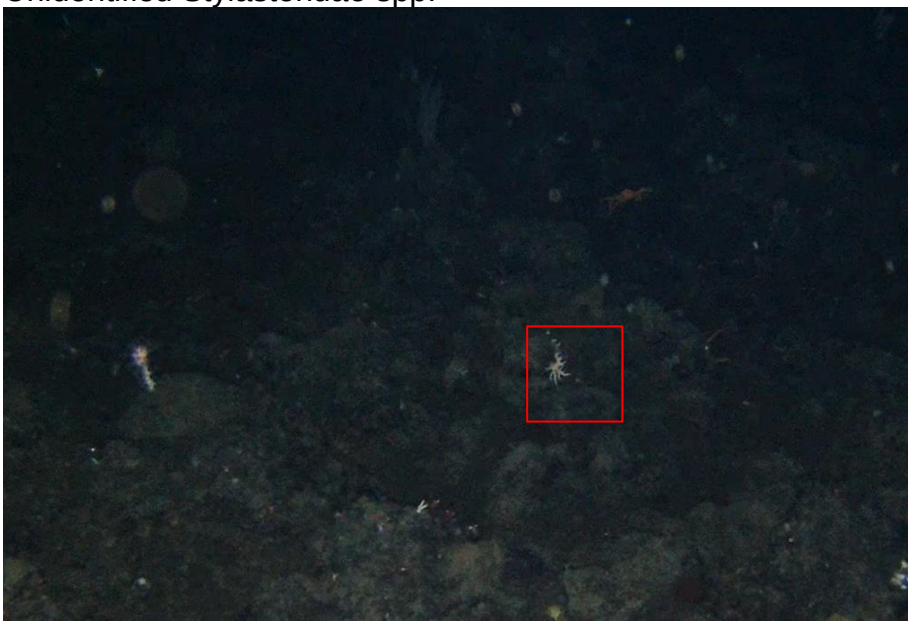


Image Credit:
Wild Canadian Sablefish Ltd.
Observed Depth: 960m

APPENDIX 2 – SUMMARY OF CORAL BOTTOM OBSERVATIONS

Order/Phylum	Taxa	Count	Depth (m)	Trap Status	Comment	IDConfidence	Substrate
Alcyonacea	Alcyonacea	1	960	Stationary		High	Bedrock with sand
Alcyonacea	Alcyonacea	4	823	Trap rolling	Damaged soft coral	High	Boulders with cobbles
Alcyonacea	Alcyonacea	1	854	stationary		High	Soft bottom with pea gravel
Alcyonacea	Alcyonacea	1	854	Stationary		Medium	Soft bottom with pea gravel
Anthoathecata	Stylasteridae	1	960	stationary		High	Bedrock with mud

Notes:

- When available, depth is the mean bottom depth measured from Seabird SBE39 depth sensors deployed in traps. When SBE39 data were not available depths were taken from trap camera depth sensors. When depth data was not available from either SBE39 or trap camera depth sensors, depths are estimated as the midpoint of the set.
- Hard bottom substrate was classified based on substrate descriptors in 'VideoMiner' software:
  - Gravel, between 1/8 inch and 3 inch (combined observations classified as "pea gravel" or "gravel" in database)
  - Cobble, between 3 inches and basketball size
  - Boulders, bigger than a basketball

APPENDIX 3 – LIST OF SPECIES/TAXA FROM 2017 VIDEO DATA

List of Species/Taxa* from 2017
Bat star (*Patiria miniata*)
Brittle star
Decorator crabs
Feather star
Giant grenadier (*Albatrossia pectoralis*)
Gorgonian
Grooved tanner crab (*Chionoecetes tanneri*)
Pacific grenadier
Sablefish (*Anoplopoma fimbria*)
Scarlet king crab (*Lithodes Couesi*)
Sea whip
Snailfishes
Spiny red sea star (*Hippasteria spinose*)
Squat lobster (*Munida quadrispina*)
Stylasteridae
Swimming anemone
Thornyheads – *Sebastolobus* genus
Unidentified crab
Unidentified sea cucumber
Unidentified sea star
Unidentified shrimp
Whelks

*lowest level of classification known is listed. Both scientific and common names are given where available.