

Supplemental Material

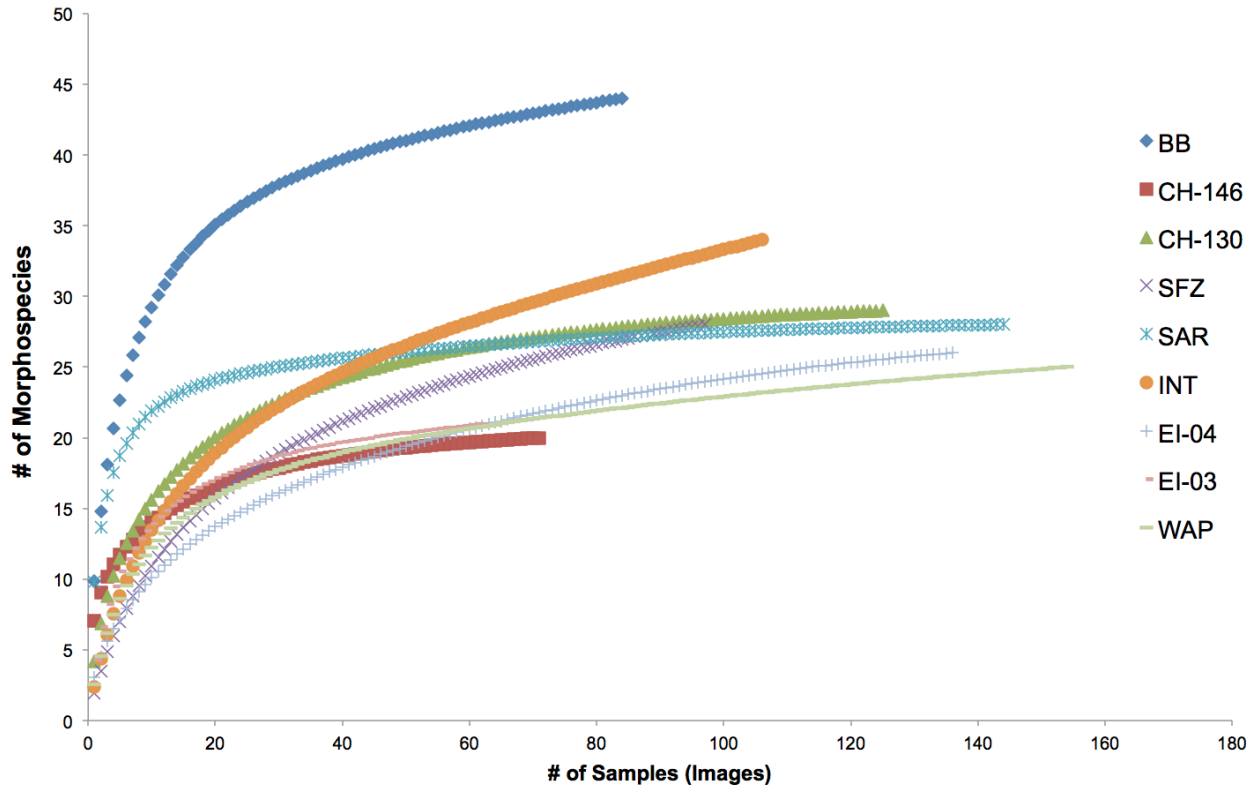


Figure S1: Species-accumulation curves for all TowCam survey transects.

Table S1: Summary of megafaunal species abundance at Burdwood Bank. Species are ranked by percent total abundance.

| Morphospecies | n | Mean n/100m² | ± S.E. | % Total Abundance |
|--|----------|------------------------------------|---------------|------------------------------|
| Ophiuroid sp. 1 | 1577 | 194.90 | 33.89 | 29.73 |
| Primnoid whip sp. 2 | 833 | 111.55 | 12.76 | 15.71 |
| Primnoid whip sp. 1 | 489 | 57.31 | 8.86 | 9.22 |
| Sponge morphotype 16 | 341 | 40.35 | 4.93 | 6.43 |
| <i>Balanophyllia malouinensis</i> | 323 | 39.38 | 15.85 | 6.09 |
| Primnoid bottlebrush sp. 4 | 267 | 29.54 | 3.43 | 5.03 |
| <i>Bayergorgia vermidoma</i> | 240 | 27.44 | 3.36 | 4.52 |
| Primnoid fan sp. 1 | 212 | 22.71 | 2.97 | 4.00 |
| <i>Astrotoma cf. agassizii</i> | 192 | 23.96 | 3.39 | 3.62 |
| Sponge morphotype 14 | 181 | 23.55 | 2.91 | 3.41 |
| <i>Digitogorgia</i> sp. 1 | 107 | 14.83 | 7.03 | 2.02 |
| <i>Austrocidaris</i> sp. 1 | 102 | 12.36 | 1.82 | 1.92 |
| Sponge morphotype 4 | 52 | 6.41 | 1.45 | 0.98 |
| <i>Thouarella</i> sp. 1 (<i>cf. viridis</i>) | 43 | 6.32 | 1.96 | 0.81 |
| Sponge morphotype 8 | 34 | 3.79 | 0.69 | 0.64 |
| <i>Fannyella</i> sp. 1 | 32 | 3.85 | 0.82 | 0.60 |
| <i>Sterechinus</i> sp. 1 | 28 | 3.59 | 1.10 | 0.53 |
| <i>Patagonotothen</i> sp. 1 | 23 | 2.58 | 0.55 | 0.43 |
| <i>Metafannyella</i> sp. 1 | 22 | 3.19 | 1.62 | 0.41 |
| Asteroid sp. 1 | 22 | 2.86 | 0.83 | 0.41 |
| <i>Bolocera kerguelensis</i> | 17 | 1.71 | 0.53 | 0.32 |
| <i>Liponema</i> sp. 1 | 17 | 2.02 | 0.58 | 0.32 |
| <i>Paragorgia</i> sp. 1 | 17 | 2.57 | 1.42 | 0.32 |
| <i>Coelorinchus</i> sp. 1 | 15 | 2.03 | 0.56 | 0.28 |
| Primnoid bottlebrush sp. 5 | 14 | 1.60 | 0.47 | 0.26 |
| Sponge morphotype 2 | 14 | 1.67 | 0.58 | 0.26 |
| Sponge morphotype 15 | 14 | 1.83 | 0.65 | 0.26 |
| Sponge morphotype 18 | 12 | 1.22 | 0.50 | 0.23 |
| Asteroid sp. 2 | 9 | 0.82 | 0.28 | 0.17 |
| Actinian sp. 12 | 7 | 0.72 | 0.26 | 0.13 |
| <i>Gorgonocephalus chilensis</i> | 7 | 0.98 | 0.46 | 0.13 |
| <i>Pteraster</i> sp. 1 | 6 | 0.62 | 0.26 | 0.11 |

Table S1: Continued

| Morphospecies | n | Mean n/100m² | ± S.E. | % Total Abundance |
|---|-------------|------------------------------------|---------------|------------------------------|
| Sponge morphotype 17 | 6 | 0.68 | 0.30 | 0.11 |
| <i>Diplasterias</i> sp. 1 | 4 | 0.43 | 0.28 | 0.08 |
| <i>Thymops birsteini</i> | 4 | 0.45 | 0.23 | 0.08 |
| Gastropod sp. 1 | 4 | 0.41 | 0.20 | 0.08 |
| Octopod sp. 2 (possibly <i>Pareledone</i> <i>sp.</i>) | 4 | 0.46 | 0.23 | 0.08 |
| <i>Porania</i> sp. 1 | 3 | 0.43 | 0.25 | 0.06 |
| Asteroid sp. 3 | 2 | 0.20 | 0.14 | 0.04 |
| Unid fish sp. 1 | 2 | 0.23 | 0.16 | 0.04 |
| <i>Solaster cf. regularis</i> | 1 | 0.09 | 0.09 | 0.02 |
| <i>Diplopteraster</i> sp. 1 | 1 | 0.11 | 0.11 | 0.02 |
| <i>Galatheid</i> sp. 1 | 1 | 0.16 | 0.16 | 0.02 |
| <i>Benthoctopus</i> sp. 1 | 1 | 0.08 | 0.08 | 0.02 |
| <i>Dissotichus eleginoides</i> | 1 | 0.12 | 0.12 | 0.02 |
| <i>Bathyraja</i> sp. 1 | 1 | 0.09 | 0.09 | 0.02 |
| Total | 5304 | 652.2 | 119.2 | 100 |

Table S2: Summary of megafaunal species abundance at CH-146. Species are ranked by percent total abundance.

| Morphospecies | n | Mean n/100m ² | ± S.E. | % Total Abundance |
|---|-------------|-----------------------------|-------------|----------------------|
| Red Stoloniferous Octocoral sp. 2 | 2310 | 247.9 | 14.2 | 48.87 |
| Sponge morphotype 14 | 1005 | 108.1 | 8.4 | 21.26 |
| Primnoid whip sp. 2 | 481 | 50.1 | 5.4 | 10.18 |
| Sponge morphotype 15 | 391 | 45.6 | 4.3 | 8.27 |
| Sponge morphotype 4 | 158 | 17.9 | 1.8 | 3.34 |
| <i>Thouarella</i> sp. 1 (<i>cf. viridis</i>) | 96 | 11.9 | 2.2 | 2.03 |
| Sponge morphotype 11 | 82 | 8.9 | 1.1 | 1.73 |
| <i>Balanophyllia malouinensis</i> | 79 | 7.6 | 5.8 | 1.67 |
| Pagurid sp. 1 | 34 | 4.2 | 0.8 | 0.72 |
| Primnoid bottlebrush sp. 2 | 27 | 3.6 | 1.1 | 0.57 |
| Asteroid sp. 1 | 16 | 1.9 | 0.5 | 0.34 |
| Sponge morphotype 2 | 15 | 1.6 | 0.7 | 0.32 |
| Octopod sp. 4 (possibly <i>Graneledone</i> sp.) | 9 | 0.9 | 0.3 | 0.19 |
| Shrimp sp. 6 | 7 | 0.6 | 0.3 | 0.15 |
| <i>Pteraster</i> sp. 1 | 5 | 0.5 | 0.2 | 0.11 |
| Galatheid sp. 4 | 4 | 0.4 | 0.2 | 0.08 |
| <i>Anthoptilum cf. grandiflorum</i> | 3 | 0.3 | 0.2 | 0.06 |
| Asteroid sp. 9 | 3 | 0.3 | 0.2 | 0.06 |
| <i>Bayergorgia vermidoma</i> | 1 | 0.1 | 0.1 | 0.02 |
| Unid. fish sp. 4 | 1 | 0.1 | 0.1 | 0.02 |
| Total | 4727 | 512.5 | 47.9 | 100 |

Table S3: Summary of megafaunal species abundance at CH-130. Species are ranked by percent total abundance.

| Morphospecies | n | Mean n/100m ² | ± S.E. | % Total Abundance |
|---|-------------|-----------------------------|--------------|----------------------|
| <i>Flabellum curvatum</i> | 316 | 29.30 | 3.31 | 25.3 |
| Primnoid bottlebrush sp. 1 | 260 | 24.58 | 2.34 | 20.8 |
| Primnoid whip sp. 2 | 161 | 14.79 | 1.81 | 12.9 |
| <i>Thouarella</i> sp. 1 (<i>cf. viridis</i>) | 95 | 7.28 | 2.54 | 7.6 |
| <i>Thouarella</i> sp. 2 | 78 | 6.99 | 1.22 | 6.2 |
| <i>Ctenocidaris</i> sp. 2 | 42 | 4.28 | 0.70 | 3.4 |
| Gastropod sp. 3 | 39 | 3.73 | 0.78 | 3.1 |
| Ophiuroid sp. 8 | 37 | 3.25 | 0.55 | 3.0 |
| <i>Austrocidaris</i> sp. 1 | 34 | 3.70 | 0.72 | 2.7 |
| Primnoid whip sp. 3 | 28 | 3.21 | 0.83 | 2.2 |
| <i>Anthomastus</i> sp. 1 | 24 | 1.71 | 0.78 | 1.9 |
| Farrid sponge sp. 1 | 21 | 2.06 | 0.61 | 1.7 |
| Sponge morphotype 11 | 18 | 1.55 | 0.53 | 1.4 |
| Shrimp sp. 5 | 15 | 1.44 | 0.42 | 1.2 |
| <i>Bayergorgia vermidoma</i> | 14 | 0.93 | 0.68 | 1.1 |
| Sponge morphotype 13 | 12 | 1.16 | 0.38 | 1.0 |
| Sponge morphotype 10 | 8 | 0.69 | 0.27 | 0.6 |
| Macrourid sp. 3 | 7 | 0.60 | 0.24 | 0.6 |
| Sponge morphotype 5 | 6 | 0.69 | 0.28 | 0.5 |
| Asteroid sp. 7 | 6 | 0.56 | 0.24 | 0.5 |
| Galatheid sp. 3 | 6 | 0.52 | 0.22 | 0.5 |
| Octopod sp. 3 (possibly <i>Graneledone</i> sp.) | 4 | 0.40 | 0.20 | 0.3 |
| Gastropod sp. 4 | 4 | 0.70 | 0.56 | 0.3 |
| Actinian sp. 11 | 3 | 0.25 | 0.15 | 0.2 |
| Unid fish sp. 3 | 3 | 0.34 | 0.21 | 0.2 |
| <i>Bolocera kerguelensis</i> | 2 | 0.24 | 0.17 | 0.2 |
| <i>Sterechinus</i> sp. 1 | 2 | 0.27 | 0.20 | 0.2 |
| <i>Ceramaster</i> sp. 1 | 2 | 0.14 | 0.11 | 0.2 |
| Asteroid sp. 8 | 1 | 0.04 | 0.04 | 0.1 |
| Zoarcid sp. 3 | 1 | 0.18 | 0.18 | 0.1 |
| Total | 1249 | 115.58 | 21.25 | 100 |

Table S4: Summary of megafaunal species abundance at the Shackleton Fracture Zone. Species are ranked by percent total abundance.

| Morphospecies | n | Mean n/100m ² | ± S.E. | % Total Abundance |
|--|------------|-----------------------------|-------------|----------------------|
| Actinian sp. 17 | 66 | 4.50 | 0.65 | 23.91 |
| Ophiuroid sp. 2 | 40 | 3.02 | 0.52 | 14.49 |
| Shrimp sp. 1 | 28 | 2.49 | 0.59 | 10.14 |
| Cup coral sp. 1 | 25 | 2.23 | 0.59 | 9.06 |
| Hexactinellid sp. 1 | 19 | 1.58 | 0.36 | 6.88 |
| Actinian sp. 7 | 12 | 0.65 | 0.34 | 4.35 |
| Serolid sp. 1 | 11 | 0.68 | 0.21 | 3.99 |
| <i>Hymenaster</i> sp. 1 | 9 | 0.56 | 0.20 | 3.26 |
| <i>Benthodytes</i> sp. 1 | 8 | 0.49 | 0.17 | 2.90 |
| Hemichordate sp. 1 | 8 | 0.59 | 0.24 | 2.90 |
| Anthomastus sp. 1 | 7 | 0.60 | 0.27 | 2.54 |
| Unid. Xenophyophore | 7 | 0.59 | 0.28 | 2.54 |
| Gastropod sp. 5 | 6 | 0.42 | 0.17 | 2.17 |
| Crinoid sp. 1 | 5 | 0.33 | 0.15 | 1.81 |
| <i>Thouarella</i> sp. 1 (<i>cf. viridis</i>) | 3 | 0.15 | 0.09 | 1.09 |
| Cidarid sp. 1 | 3 | 0.26 | 0.17 | 1.09 |
| Actinian sp. 15 | 2 | 0.14 | 0.10 | 0.72 |
| Holothurian sp. 1 | 2 | 0.16 | 0.11 | 0.72 |
| Irregular urchin sp. 1 | 2 | 0.14 | 0.10 | 0.72 |
| Pycnogonid sp. 1 | 2 | 0.18 | 0.15 | 0.72 |
| Macrourid sp. 1 | 2 | 0.15 | 0.11 | 0.72 |
| Zoarcid sp. 4 | 2 | 0.15 | 0.11 | 0.72 |
| Actinian sp. 14 | 1 | 0.06 | 0.06 | 0.36 |
| Actinian sp. 16 | 1 | 0.06 | 0.06 | 0.36 |
| Asteroid sp. 4 | 1 | 0.06 | 0.06 | 0.36 |
| <i>Freyella</i> sp. 1 | 1 | 0.05 | 0.05 | 0.36 |
| Brisingid sp. 3 | 1 | 0.08 | 0.08 | 0.36 |
| Peniagone sp. 1 | 1 | 0.06 | 0.06 | 0.36 |
| Cidarid sp. 2 | 1 | 0.05 | 0.05 | 0.36 |
| Total | 276 | 20.50 | 6.11 | 100 |

Table S5: Summary of megafaunal species abundance at Sars Seamount. Species are ranked by percent total abundance.

| Morphospecies | n | Mean n/100m ² | ± S.E. | % Total Abundance |
|--|-------------|-----------------------------|--------------|----------------------|
| Shrimp sp. 4 | 2909 | 230.73 | 18.86 | 42.26 |
| Red Stoloniferous Octocoral sp. 1 | 651 | 51.89 | 3.76 | 9.46 |
| <i>Bolocera kerguelensis</i> | 612 | 42.14 | 4.45 | 8.89 |
| Sponge morphotype 5 | 519 | 41.78 | 3.18 | 7.54 |
| Sponge morphotype 2 | 467 | 31.57 | 3.30 | 6.78 |
| Sponge morphotype 1 | 346 | 24.35 | 2.07 | 5.03 |
| Sponge morphotype 7 | 195 | 13.02 | 4.06 | 2.83 |
| Galatheid sp. 2 | 187 | 12.99 | 1.22 | 2.72 |
| Sponge morphotype 8 | 165 | 13.95 | 2.02 | 2.40 |
| Primnoid whip sp. 2 | 134 | 9.57 | 1.36 | 1.95 |
| Sponge morphotype 6 | 131 | 9.15 | 1.45 | 1.90 |
| Farrid sponge sp. 1 | 82 | 5.84 | 0.75 | 1.19 |
| Sponge morphotype 9 | 76 | 5.80 | 0.86 | 1.10 |
| Sponge morphotype 10 | 71 | 5.46 | 1.01 | 1.03 |
| <i>Thouarella</i> sp. 1 (<i>cf. viridis</i>) | 66 | 5.23 | 2.29 | 0.96 |
| Sponge morphotype 11 | 61 | 4.24 | 0.71 | 0.89 |
| Sponge morphotype 4 | 40 | 3.77 | 0.86 | 0.58 |
| Sponge morphotype 3 | 37 | 2.77 | 0.49 | 0.54 |
| Asteroid sp. 1 | 36 | 2.75 | 0.59 | 0.52 |
| Sponge morphotype 12 | 31 | 2.25 | 0.47 | 0.45 |
| Lithodid sp. 1 | 27 | 1.87 | 0.39 | 0.39 |
| <i>Mancopsetta maculata</i> | 14 | 1.15 | 0.32 | 0.20 |
| Zoarcid sp. 5 | 13 | 1.29 | 0.46 | 0.19 |
| <i>Pteraster</i> sp. 1 | 5 | 0.47 | 0.22 | 0.07 |
| <i>Anthoptilum cf. grandiflorum</i> | 3 | 0.14 | 0.08 | 0.04 |
| Octocoral sp. 2 | 2 | 0.19 | 0.19 | 0.03 |
| Asteroid sp. 3 | 2 | 0.13 | 0.09 | 0.03 |
| Unid fish sp. 2 | 2 | 0.12 | 0.09 | 0.03 |
| Total | 6884 | 524.60 | 55.59 | 100 |

Table S6: Summary of megafaunal species abundance at Interim Seamount. Species are ranked by percent total abundance.

| Morphospecies | n | Mean n/100m ² | ± S.E. | % Total Abundance |
|---------------------------------|------------|-----------------------------|-------------|----------------------|
| Actinian sp. 8 | 44 | 3.67 | 0.70 | 15.71 |
| <i>Edwardsia</i> sp. 1 | 41 | 3.92 | 0.67 | 14.64 |
| Actinian sp. 7 | 35 | 2.88 | 0.60 | 12.50 |
| Unid Psychropotid sp. 1 | 17 | 1.23 | 0.29 | 6.07 |
| Irregular urchin sp. 1 | 16 | 1.25 | 0.30 | 5.71 |
| <i>Peniagone</i> sp. 1 | 16 | 1.07 | 0.27 | 5.71 |
| Shrimp sp. 3 | 12 | 0.98 | 0.28 | 4.29 |
| Hemichordate sp. 3 | 11 | 0.76 | 0.25 | 3.93 |
| Asteroid sp. 6 | 10 | 0.80 | 0.26 | 3.57 |
| <i>Actinoscyphia</i> sp. 1 | 8 | 0.59 | 0.21 | 2.86 |
| Crinoid sp. 1 | 8 | 0.76 | 0.27 | 2.86 |
| Brisingid sp. 2 | 8 | 0.56 | 0.22 | 2.86 |
| Ophiuroid sp. 6 | 7 | 0.67 | 0.27 | 2.50 |
| <i>Benthodytes</i> sp. 1 | 7 | 0.44 | 0.16 | 2.50 |
| Pycnogonid sp. 2 | 6 | 0.44 | 0.18 | 2.14 |
| Hemichordate sp. 2 | 5 | 0.35 | 0.18 | 1.79 |
| Unid. Xenophyophore | 4 | 0.31 | 0.16 | 1.43 |
| <i>Umbellula</i> sp. 1 | 4 | 0.25 | 0.12 | 1.43 |
| Actinian sp. 9 | 3 | 0.21 | 0.13 | 1.07 |
| Actinian sp. 18 | 3 | 0.18 | 0.11 | 1.07 |
| Hexactinellid sp. 1 | 2 | 0.12 | 0.09 | 0.71 |
| <i>Schizopathes</i> sp. 1 | 2 | 0.13 | 0.09 | 0.71 |
| Actinian sp. 10 | 1 | 0.07 | 0.07 | 0.36 |
| <i>Anthomastus</i> sp. 1 | 1 | 0.11 | 0.11 | 0.36 |
| <i>Anthomastus bathyproctus</i> | 1 | 0.06 | 0.06 | 0.36 |
| <i>Hymenaster</i> sp. 1 | 1 | 0.05 | 0.05 | 0.36 |
| <i>Bathycrinus</i> sp. 1 | 1 | 0.10 | 0.10 | 0.36 |
| Cidarid sp. 3 | 1 | 0.12 | 0.12 | 0.36 |
| <i>Benthogone</i> sp. 1 | 1 | 0.06 | 0.06 | 0.36 |
| Holothurian sp. 1 | 1 | 0.06 | 0.06 | 0.36 |
| Gastropod sp. 2 | 1 | 0.07 | 0.07 | 0.36 |
| Cladorhizid sp. 1 | 1 | 0.15 | 0.15 | 0.36 |
| Ascidean sp. 1 | 1 | 0.07 | 0.07 | 0.36 |
| Total | 280 | 22.49 | 6.73 | 100 |

Table S7: Summary of megafaunal species abundance at EI-04. Species are ranked by percent total abundance.

| Morphospecies | n | Mean n/100m ² | ± S.E. | % Total Abundance |
|--------------------------------|-------------|-----------------------------|-------------|----------------------|
| <i>Notocrangon antarcticus</i> | 734 | 34.60 | 1.34 | 49.66 |
| Ophiuroid sp. 3 | 244 | 14.50 | 1.70 | 16.51 |
| Actinian sp. 19 | 237 | 12.20 | 1.63 | 16.04 |
| Actinian sp. 22 | 86 | 4.48 | 0.62 | 5.82 |
| Cup coral sp. 1 | 55 | 3.07 | 0.73 | 3.72 |
| Umbellula sp. 1 | 22 | 1.20 | 0.26 | 1.49 |
| Macrourid sp. 5 | 15 | 0.72 | 0.19 | 1.01 |
| Hemichordate sp. 4 | 13 | 0.92 | 0.27 | 0.88 |
| Unid. Xenophyophore | 13 | 1.14 | 0.39 | 0.88 |
| Primnoid bottlebrush sp. 3 | 10 | 0.46 | 0.15 | 0.68 |
| Hexactinellid sp. 2 | 8 | 0.51 | 0.24 | 0.54 |
| <i>Benthodytes</i> sp. 1 | 8 | 0.35 | 0.13 | 0.54 |
| <i>Aforia magnifica</i> | 5 | 0.29 | 0.15 | 0.34 |
| Actinian sp. 7 | 4 | 0.25 | 0.16 | 0.27 |
| Pycnogonid sp. 4 | 4 | 0.18 | 0.09 | 0.27 |
| Octocoral whip sp. 1 | 3 | 0.27 | 0.22 | 0.20 |
| <i>Chondrocladia</i> sp. 1 | 2 | 0.09 | 0.06 | 0.14 |
| Actinian sp. 21 | 2 | 0.07 | 0.05 | 0.14 |
| Asteroid sp. 12 | 2 | 0.20 | 0.15 | 0.14 |
| <i>Ctenocidaris perrieri</i> | 2 | 0.11 | 0.08 | 0.14 |
| Holothurian sp. 1 | 2 | 0.08 | 0.06 | 0.14 |
| Notothenioid sp. 2 | 2 | 0.07 | 0.05 | 0.14 |
| Actinian sp. 20 | 1 | 0.06 | 0.06 | 0.07 |
| Asteroid sp. 13 | 1 | 0.04 | 0.04 | 0.07 |
| Peniagone sp. 1 | 1 | 0.06 | 0.06 | 0.07 |
| Octopod sp. 6 | 1 | 0.03 | 0.03 | 0.07 |
| Zoarcid sp. 2 | 1 | 0.04 | 0.04 | 0.07 |
| Total | 1478 | 76.00 | 8.93 | 100 |

Table S8: Summary of megafaunal species abundance at EI-03. Species are ranked by percent total abundance.

| Morphospecies | n | Mean n/100m ² | ± S.E. | % Total Abundance |
|---------------------------------------|-------------|-----------------------------|--------------|----------------------|
| <i>Flabellum impensum</i> | 365 | 30.82 | 4.06 | 28.88 |
| Ophiuroid sp. 9 | 343 | 28.04 | 2.98 | 27.14 |
| Primnoid bottlebrush sp. 3 | 233 | 18.71 | 3.31 | 18.43 |
| Irregular urchin sp. 1 | 121 | 9.55 | 1.31 | 9.57 |
| <i>Labidiaster cf. annulatus</i> | 39 | 3.11 | 1.01 | 3.09 |
| Bayergorgia vermidoma | 28 | 2.15 | 0.49 | 2.22 |
| Asteroid sp. 10 | 25 | 1.88 | 0.40 | 1.98 |
| <i>Sterechinus cf. antarcticus</i> | 24 | 2.10 | 0.59 | 1.90 |
| Pycnogonid sp. 3 | 15 | 1.13 | 0.52 | 1.19 |
| <i>Anthomastus bathyproctus</i> | 14 | 1.10 | 0.32 | 1.11 |
| Crinoid sp. 2 | 11 | 0.91 | 0.36 | 0.87 |
| Asteroid sp. 11 | 10 | 0.88 | 0.26 | 0.79 |
| Sponge morphotype 19 | 7 | 0.54 | 0.33 | 0.55 |
| Holothurian sp. 2 | 6 | 0.46 | 0.20 | 0.47 |
| Octocoral whip sp. 1 | 4 | 0.36 | 0.18 | 0.32 |
| <i>Thouarella sp. 1 (cf. viridis)</i> | 4 | 0.32 | 0.16 | 0.32 |
| Octopod sp. 5 | 4 | 0.36 | 0.18 | 0.32 |
| <i>Bathyraja sp. 3</i> | 4 | 0.31 | 0.15 | 0.32 |
| <i>Promachocrinus kerguelensis</i> | 2 | 0.14 | 0.14 | 0.16 |
| <i>Ctenocidaris perrieri</i> | 2 | 0.17 | 0.12 | 0.16 |
| <i>Chaenocephalus sp. 1</i> | 2 | 0.17 | 0.17 | 0.16 |
| <i>Umbellula sp. 1</i> | 1 | 0.08 | 0.08 | 0.08 |
| Total | 1264 | 103.29 | 17.35 | 100 |

Table S9: Summary of megafaunal species abundance at the Western Antarctic Peninsula shelf site. Species are ranked by percent total abundance.

| Morphospecies | n | Mean n/100m ² | ± S.E. | % Total Abundance |
|------------------------------------|------------|-----------------------------|-------------|----------------------|
| <i>Hormathia</i> sp. 1 | 74 | 3.35 | 0.49 | 15.38 |
| Irregular urchin sp. 1 | 67 | 2.97 | 0.41 | 13.93 |
| <i>Anthomastus bathyproctus</i> | 58 | 2.47 | 0.33 | 12.06 |
| <i>Flabellum impensum</i> | 49 | 2.03 | 0.33 | 10.19 |
| Actinian sp. 4 | 43 | 1.81 | 0.30 | 8.94 |
| Cerianthid sp. 2 | 25 | 0.97 | 0.24 | 5.20 |
| <i>Ctenocidaris perrieri</i> | 25 | 1.03 | 0.21 | 5.20 |
| Shrimp sp. 2 | 23 | 1.10 | 0.24 | 4.78 |
| Actinian sp. 2 | 20 | 0.84 | 0.21 | 4.16 |
| Zoarcid sp. 1 | 15 | 0.62 | 0.16 | 3.12 |
| <i>Promachocrinus kerguelensis</i> | 12 | 0.50 | 0.14 | 2.49 |
| Actinian sp. 3 | 10 | 0.43 | 0.13 | 2.08 |
| Actinian sp. 5 | 10 | 0.48 | 0.15 | 2.08 |
| Cerianthid sp. 1 | 9 | 0.34 | 0.11 | 1.87 |
| Notothenioid sp. 1 | 8 | 0.33 | 0.12 | 1.66 |
| Ophiuroid sp. 5 | 7 | 0.37 | 0.14 | 1.46 |
| Octopod sp. 1 | 6 | 0.27 | 0.11 | 1.25 |
| Pennatulacea sp. 1 | 4 | 0.16 | 0.09 | 0.83 |
| Ophiuroid sp. 4 | 4 | 0.16 | 0.08 | 0.83 |
| <i>Aforia magnifica</i> | 3 | 0.19 | 0.11 | 0.62 |
| <i>Bathylotes bongraini</i> | 2 | 0.10 | 0.07 | 0.42 |
| <i>Bathyraja</i> sp. 2 | 2 | 0.09 | 0.07 | 0.42 |
| Actinian sp. 6 | 1 | 0.06 | 0.06 | 0.21 |
| <i>Peniagone vignoni</i> | 1 | 0.05 | 0.05 | 0.21 |
| Asteroid sp. 5 | 1 | 0.05 | 0.05 | 0.21 |
| Serolid sp. 1 | 1 | 0.05 | 0.05 | 0.21 |
| <i>Notothenia cf. corriceps</i> | 1 | 0.04 | 0.04 | 0.21 |
| Total | 481 | 20.86 | 4.49 | 100 |

Table S10: Summary of R-statistic values for pairwise ANOSIM tests. Tests are between sampling sites based on morphospecies abundance. Global R=0.72, p-values for all sites <0.001.

| Site | INT | SFZ | EI-03 | EI-04 | WAP | BB | CH-146 | SAR | CH-130 |
|--------|------|------|-------|-------|------|------|--------|------|--------|
| INT | | | | | | | | | |
| SFZ | 0.36 | | | | | | | | |
| EI-03 | 0.45 | 0.59 | | | | | | | |
| EI-04 | 0.75 | 0.79 | 0.99 | | | | | | |
| WAP | 0.37 | 0.43 | 0.21 | 0.68 | | | | | |
| BB | 0.60 | 0.67 | 0.99 | 0.99 | 0.56 | | | | |
| CH-146 | 0.55 | 0.62 | 0.99 | 0.99 | 0.53 | 0.93 | | | |
| SAR | 0.77 | 0.82 | 1.00 | 0.99 | 0.70 | 0.99 | 0.98 | | |
| CH-130 | 0.65 | 0.70 | 0.88 | 0.93 | 0.61 | 0.82 | 0.76 | 0.91 | |

Table S11: Drake Passage seafloor environmental data. Temperature and salinity data were collected from the in situ on the TowCam unit. Dissolved oxygen data was acquired from a separate unit during full water column casts nearby each tow. Sites are arranged by increasing latitude from North to South.

| Location | Station ID | Mean Seafloor Temperature (°C ± SD) | Mean Seafloor Salinity (psu ± SD) | Seafloor Dissolved Oxygen (ml/L) |
|-----------------------------|-------------------|--|--|---|
| Burdwood Bank | BB | 4.87 ± 0.01 | 34.13 ± 0.001 | 6.4 |
| Cape Horn | CH-146 | 4.69 ± 0.13 | 34.16 ± 0.01 | 5.9 |
| Cape Horn | CH-130 | 3.09 ± 0.12 | 34.4 ± 0.03 | 3.8 |
| Shackleton Fracture Zone | SFZ | 0.79 ± 0.01 | 34.7 ± 0.001 | 4.2 |
| Sars Seamount | SAR | 2.82 ± 0.02 | 34.34 ± 0.03 | 4.3 |
| Interim Seamount | INT | 0.83 ± 0.01 | 34.7 ± 0.001 | 4.4 |
| Elephant Island | EI-04 | 0.54 ± 0.005 | 34.7 ± 0.001 | 4.4 |
| Elephant Island | EI-03 | 1.15 ± 0.05 | 34.63 ± 0.009 | 3.9 |
| Western Antarctic Peninsula | WAP | 1.00 ± 0.02 | 34.63 ± 0.01 | 3.9 |

Table S12: Summary of biodiversity metrics by site. Sites are arranged by increasing latitude from North to South.

| Site | Station ID | Total Species Observed | Mean Density (n/m² ± SE) | Es(100) ± SE | J' ± SE | H'(log e) ± SE |
|-----------------------------|-------------------|-------------------------------|--|---------------------|----------------|-----------------------|
| Burdwood Bank | BB | 46 | 6.52 ± 1.19 | 9.87 ± 0.35 | 0.79 ± 0.01 | 1.77 ± 0.05 |
| Cape Horn - 146 | CH-146 | 21 | 5.13 ± 0.48 | 6.98 ± 0.19 | 0.72 ± 0.01 | 1.38 ± 0.03 |
| Cape Horn - 130 | CH-130 | 30 | 1.16 ± 0.21 | 4.22 ± 0.15 | 0.88 ± 0.01 | 1.19 ± 0.04 |
| Shackleton Fracture Zone | SFZ | 30 | 0.21 ± 0.06 | 1.95 ± 0.23 | 0.96 ± 0.01 | 0.52 ± 0.03 |
| Sars Seamount | SAR | 28 | 5.25 ± 0.56 | 9.77 ± 0.12 | 0.75 ± <0.01 | 1.66 ± 0.05 |
| Interim Seamount | INT | 34 | 0.22 ± 0.07 | 2.4 ± 0.13 | 0.98 ± <0.01 | 0.73 ± 0.05 |
| Elephant Island - 04 | EI-04 | 28 | 0.76 ± 0.09 | 3.06 ± 0.11 | 0.79 ± 0.01 | 0.82 ± 0.03 |
| Elephant Island - 03 | EI-03 | 24 | 1.03 ± 0.17 | 4.32 ± 0.23 | 0.78 ± 0.02 | 1.08 ± 0.05 |
| Western Antarctic Peninsula | WAP | 27 | 0.21 ± 0.05 | 2.56 ± 0.11 | 0.97 ± <0.01 | 0.77 ± 0.04 |