Background
The Drake Passage region has long been recognized as a biogeographic discontinuity for marine organisms (Ekman, 1953). Recent expansions in sampling in the Southern Ocean have added to our knowledge of biodiversity (Brandt et al. 2007), but further questions remain about biogeographic patterns of poorly sampled communities in the central Drake Passage deep-sea environment. Intermediate benthic communities can provide insight to better define latitudinal and meridional biogeographic patterns at depth, as well as identify areas of widespread species richness. Herein, we report on the biodiversity and structure of the benthic communities of the West Antarctic Peninsula region and across the Southern Ocean as expected to contribute substantially to range shifts of benthic taxa (Clarke et al. 2007) and lead to ecologically deleterious species invasions over the coming decades.

Methods
During a series of cruises to the Drake Passage in 2008 and 2011 (Waller et al. 2011), deep benthic environments were surveyed using a high-resolution towed camera platform TowCam (Fornari. 2003. Fig. 7) allowing bottom images to be taken at a fixed altitude (3-5 m) above the seafloor. A drop-camera was employed to image seafloor habitat where topography was unsuitable for long-duration tows. For further identification, representative biological samples were obtained using bottom trawls at each site. In our analysis, megafauna (here defined by the resolution of the camera as organisms greater than a few centimeters in size) were identified and enumerated within photo frames. Towed camera photos were examined at one-minute intervals across transects to avoid image overlap.

In all, 7712 m² of seafloor were examined across N=590 images. Mean photo area covered was 11.6 m² (± 3.9 m²) with approximately 100-200 photos per site.

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Initial Findings & Discussion
- Drake Passage benthic megafaunal communities, while similar at a regional scale, can exhibit a high degree of site-specificity.
- Generally, northern sites (i.e., Burwood Bank, Cape Horn, Sars & Interim Seamounts) were dominated by coralline anemones, stalked crinoids, and solitary corals (Paramuricea imperialis). Mobile megafauna included muncid isopods, caridean shrimps, notothenioid fishes (Dissostichus spp.). (B) Elephant Island, 2002MHzwith habitat similarities to the more southern WAP shelf sites. Elephant Island channel several faunal similarities with communities on Burwood Bank, Cape Horn, and both seamounts. Widespread mussel shell deposits were commonly observed, possibly indicating previous hydrothermal activity in the area. Scale bars = 15 cm.

Figure 1: Burwood Bank (A) 720m. Dense gardens of octocorals (Thysanodiscus sp., Berycogorgia lamellifera, Conohelmus cyclosporum, Ophdobipora alveolata) and stylasterid hydrocorals with numerous solitary corals (Tubophyllum malvinensis). (B) 325m. Dropstone community from the Burwood Bank shelf composed of prismatic octocorals (Thysanodiscus sp., Ophdobipora alveolata, C. lamellifera, Primnoela sp.) and encrusting sponges with echinoderm associates (Gigantochirina sphinctiformis, Gorgonomorpha chelici, Astrotoma sp.). Scale bar = 15 cm.

Figure 2: Cape Horn (A) 871m. Stylasterid hydrocoral spp. reef structures within large dense hexactinellid sponge beds. (B) 844m. Dense beds of toleranctin cup corals (Lubiculum carinatum, B. malvinensis) and pleuroacton octocoral, B. verrucosum, and flattened the stylasterid rubble substrate. Scale bar = 15 cm.

Figure 3: Seamounts (A) 1120m. Large bamboo corals (Pleuroeis sp.) were seldom observed while prismatic whip and bottlebrush corals (Thysanodiscus sp., Conohelmus sp.) were most abundant, often forming dense gardens. (B) 817m. Isolated knolls west of the main summit supported extremely dense aggregations of ophiothoids, particularly G. chelici. (C) 915m. Groups of grazing echinoderms, including stemmoozus sp., were commonly observed grazing upon prismatic whips. (D) 1256m. Massive hexactinellid sponges and stylasterid corals were observed as dominant structures across both Interim and Sars Seamounts. Scale bars = 15 cm.

Figure 4: Maps and ‘Interim’ Seamounts (A) 1120m. Large bamboo corals (Pleuroeis sp.) were seldom observed while prismatic whip and bottlebrush corals (Thysanodiscus sp., Conohelmus sp.) were most abundant, often forming dense gardens. (B) 817m. Isolated knolls west of the main summit supported extremely dense aggregations of ophiothoids, particularly G. chelici. (C) 915m. Groups of grazing echinoderms, including stemmoozus sp., were commonly observed grazing upon prismatic whips. (D) 1256m. Massive hexactinellid sponges and stylasterid corals were observed as dominant structures across both Interim and Sars Seamounts. Scale bars = 15 cm.

Figure 5: West Antarctic Peninsula (A) West Antarctic Peninsula (WAP) slope, 2491m. Soft sediment bottom communities were often dominated by coralline anemones, stalked crinoids, and solitary corals (Paramuricea imperialis). Mobile megafauna included mussid isopods, caridean shrimps, notothenioid fishes (Dissostichus spp.). (B) Elephant Island, 2002MHzwith habitat similarities to the more southern WAP shelf sites. Elephant Island channel several faunal similarities with communities on Burwood Bank, Cape Horn, and both seamounts. Widespread mussel shell deposits were commonly observed, possibly indicating previous hydrothermal activity in the area. Scale bars = 15 cm.

Figure 6: Multibeam bathymetric plots of Sars Seamount (Peak 400m) within the central Drake Passage. TowCam track lines and drop-camera sites are shown on right.

Figure 7: Deep-sea imaging collections. (A) NBP 08-05 TowCam in 2008, (B) NBP 11-01 Drop-camera deployment, and (C) NBP11-05 TowCam in 2011.

Figure 8: Total abundance percentages of the dominant taxonomic groups among all sites. Cnidarians (including octocoral, solitary corals, and anemones) were observed to be among the most diverse and well-represented throughout the region. Biological dissimilarity between sites was often correlated with benthic substrate type.