

Supplementary Tables S1-S2

“Sudden collapse of a mesopredator reveals its complementary role in
mediating rocky reef regime shifts”

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Table S1. Length-biomass relationships for converting individual sea star lengths (longest diameter across) and urchin test diameters to biomass.

Species	Length-biomass relationship	Reference
Sea stars		
<i>Crossaster papposus</i>	$\exp(-2.454) * (\text{length.cm}^2.5226)$	Vicknair & Estes 2012
<i>Dermasterias imbricata</i>	$0.045 * (\text{length.cm})^2.835$	R. Martone, unpublished data
<i>Evasterias troschellii</i>	$\exp(-2.8661) * (\text{length.cm}^2.4038)$	Vicknair & Estes 2012 (for <i>Evasterias retifera</i>)
<i>Henricia leviuscula</i>	$0.082 * (\text{length.cm}^2.159)$	R. Martone, unpublished data
<i>Mediaster aequalis</i>	$0.045 * (\text{length.cm}^2.735)$	Used relationship for <i>Dermasterias</i> , the closest in morphology
<i>Orthasterias koehleri</i>	$\exp(-2.8661) * (\text{length.cm}^2.4038)$	Used relationship for <i>Evasterias</i> , similar in morphology
<i>Pisaster brevaspinus</i>	$0.002 * (\text{length.mm})^2.147$	Reed et al. 2016
<i>Pycnopodia helianthoides</i>	$\exp(-3.9989) * \text{length.cm}^3.133$	Lee et al. 2016
<i>Solaster spp.</i>	$\exp(-3.9989) * \text{length.cm}^2.9$	Used relationship for <i>Evasterias</i> , the closest in morphology
<i>Stylasterias forreri</i>	$\exp(-2.8661) * (\text{length.cm}^2.4038)$	Used relationship for <i>Evasterias</i> , similar in morphology
Sea urchins		
<i>S. droebachiensis</i>	$11.2181 * (\text{test.diameter.mm}/30)^2.754085$	Lohead et al. 2015
<i>M. franciscanus</i>	$0.0010169 * (\text{test.diameter.mm})^2.7787$	Lohead et al. 2015
<i>S. purpuratus</i>	$0.00051 * (\text{test.diameter.mm})^2.9035$	Oftedal et al. 2007

Lee, L. C., J. C. Watson, R. Trebilco, and A. K. Salomon. 2016. Indirect effects and prey behavior mediate interactions between an endangered prey and recovering predator. *Ecosphere* 7:1–26.

Lohead, J., W. C. Hajas, and D. Leus. 2015. Calculation of mean abundance in the red urchin analysis program and green urchin analysis program. Canadian Manuscript Report for Fisheries and Aquatic Sciences. 3065: vi +41p.

Oftedal OT, Ralls K, Tinker MT, Green A (2007) Nutritional constraints on the southern sea otter in the Monterey Bay National Marine Sanctuary and a comparison to sea otter populations at San Nicolas Island, California, and Glacier Bay, Alaska. Joint Final Report to Monterey Bay National Marine Sanctuary and The Marine Mammal Commission. 263 pp.

Reed, D. C., J. C. Nelson, S. L. Harrer, and R. J. Miller. 2016. Estimating biomass of benthic kelp forest invertebrates from body size and percent cover data. *Marine Biology* 163:1–11.

Vicknair, K., and J. A. Estes. 2012. Interactions among sea otters, sea stars, and suspension-feeding invertebrates in the western Aleutian archipelago. *Marine Biology* 159:2641–2649.

Table S2. Total count and biomass (kg) for the three urchin species summed across all eleven rocky reef sites on the central coast of B.C. The proportion of total urchin count and biomass that is *M. franciscanus* also given.

	2013		2014		2015		2016	
Species	count	biomass	count	biomass	count	biomass	count	biomass
<i>S. purpuratus</i>	2	0.1	0	0.0	2	0.3	13	0.8
<i>S. droebachiensis</i>	93	2.6	21	0.8	212	2.0	183	7.2
<i>M. franciscanus</i>	873	189.2	514	113.3	925	150.8	1139	159.0
Proportion								
<i>M. franciscanus</i>	90.2%	98.6%	96.1%	99.3%	81.2%	98.5%	85.3%	95.2%
Total average proportion <i>M. franciscanus</i> : 88.2 % (count) 97.9 % (biomass)								