Supplementary Tables S1-S2

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

Proceedings of the Royal Society B – DOI: 10.1098/rspb.2018.0553

Jenn M. Burt[1,2], Tim M. Tinker[3], Daniel K. Okamoto[1,4], Kyle W. Demes[1,2,5], Keith Holmes[2], Anne K. Salomon[1,2]

1 - School of Resource and Environmental Management, Simon Fraser University, BC, Canada
2 - Hakai Institute, BC, Canada
3 - Department of Ecology and Evolutionary Biology, University of California Santa Cruz, CA, USA
4 - Department of Biological Sciences, Florida State University, Tallahassee, Florida, USA
5 - Department of Zoology, The University of British Columbia, BC, Canada

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Dermasterias imbricata	0.045*(length.cm)^2.835	R. Martone, unpublished data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Henricia leviuscula	0.082*(length.cm^2.159)	R. Martone, unpublished data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

Lochead, 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**
S. purpuratus	2	0.1	0	0.0	2	0.3	13	0.8
S. droebachiensis	93	2.6	21	0.8	212	2.0	183	7.2
M. franciscanus	873	189.2	514	113.3	925	150.8	1139	159.0
Proportion M. franciscanus	**90.2%**	**98.6%**	**96.1%**	**99.3%**	**81.2%**	**98.5%**	**85.3%**	**95.2%**

Total average proportion *M. franciscanus*: 88.2 % (count) 97.9 % (biomass)