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## Evaluating the promise and pitfalls of a potential climate change tolerant sea urchin fishery in southern California

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**Table 1.** Subregion within the Southern California Bight, collection date, GPS coordinates, and depths of stations where *Strongylocentrotus fragilis* were sampled via otter trawl and dissected for gonad index measurement.

Subregion	Date Collected	Latitude (°)	Longitude (°)	Depth (m)
Los Angeles	8/14/2013	33.7668	-118.4600	130
	9/4/2013	33.9340	-118.5905	200
	8/14/2013	33.6941	-118.3460	253
	8/16/2013	33.7215	-118.4180	293
	2/13/2014	33.6959	-118.3509	305
		33.6787	-118.3276	305
	7/21/2014	33.5045	-118.0396	458
8/16/2013	33.6761	-118.3320	470	
San Diego	8/6/2013	32.5954	-117.3286	136
	8/1/2013	32.6434	-117.4277	150
	8/8/2013	32.8254	-117.3660	182
	8/7/2013	32.9092	-117.2951	184
	7/27/2014	32.8211	-117.3690	200
		32.6720	-117.3542	200
	11/3/2012	32.6736	-117.3602	215
	7/27/2013	32.6694	-117.3975	300
	12/15/2012	32.6916	-117.3758	300
	4/20/2014	32.6986	-117.3765	300
	12/12/2012	32.8100	-117.4004	300
	7/8/2012	32.8786	-117.3436	300
	6/13/2015	32.7209	-117.3737	325
	3/13/2016	32.7035	-117.3776	340
	11/1/2014	32.7070	-117.3760	340
	11/2/2014	32.7070	-117.3760	340
	10/18/2015	32.7244	-117.3660	340
	4/12/2015	32.6908	-117.6908	340
	7/9/2016	32.7015	117.3796	340
	7/26/2014	32.7010	-117.3852	360
	12/12/2012	32.8100	-117.4004	400
	12/9/2012	32.9471	-117.3416	400
	8/13/2013	33.0938	-117.4172	400
	10/19/2013	32.7461	-117.4159	427
	8/1/2013	32.6683	-117.4197	435
	7/14/2014	33.1547	-117.5011	439
	7/16/2014	32.8990	-118.6182	475
	7/29/2014	32.8908	-117.4745	697
	4/18/2015	32.8828	-117.4830	715
	10/14/2014	32.8230	-118.0330	758
32.8327		-118.0292	768	
7/9/2016	32.8706	-117.5941	900	
7/1/2014	33.2165	-118.2318	1096	
Santa Barbara	7/16/2014	34.0069	-118.9009	77
	7/15/2014	34.0720	-119.6489	90
	8/22/2013	34.2068	-119.6353	154
	8/23/2013	34.1327	-119.3699	172
		34.1072	-119.3190	195
	8/21/2013	34.2251	-119.7320	196
		34.2778	-119.7183	200
	8/22/2013	34.1690	-119.5420	237
	8/21/2013	34.1186	-119.6305	260
	8/20/2013	33.9774	-118.8764	493

**Table 2.** Collection date, season, and mean gonad index ( $\pm 1$  S.E.) of *Strongylocentrotus fragilis* collected *via* otter trawl at a single station (~340 m) off of Point Loma, San Diego, CA.

<b>Year</b>	<b>Season</b>	<b>Date</b>	<b>Gonad Index (<math>\pm 1</math> S.E.)</b>
2012	Summer	7/8/2011	3.114 $\pm$ 0.237
	Winter	12/12/2012	7.815 $\pm$ 0.913
2013	Summer	7/27/2013	3.547 $\pm$ 0.306
	Winter	2/13/2014	8.487 $\pm$ 0.825
2014	Spring	4/20/2014	3.923 $\pm$ 0.304
	Summer	7/26/2014	3.448 $\pm$ 0.487
	Fall	11/1/2014	5.583 $\pm$ 0.525
2015	Spring	4/12/2015	2.107 $\pm$ 0.226
	Summer	6/13/2015	2.402 $\pm$ 0.292
	Fall	10/18/2015	3.545 $\pm$ 0.274
2016	Spring	3/13/2016	2.880 $\pm$ 0.267

**Table 3.** Collection sites of *Strongylocentrotus fragilis* individuals in the Southern California Bight that were analyzed in the lab for relative growth rate. Hydrographic data (depth, dissolved oxygen, temperature and *in situ* pH) were measured from a single vertical profile in December 2012 (32.69012° N, -117.53061° W) (Nam *et al.*, 2015).

Depth of Urchin (m)	Mean Growth ( $\pm$ S.D.)	Latitude (°)	Longitude (°)	Depth of CTD (m)	Oxygen ( $\mu\text{mol kg}^{-1}$ )	Temperature (°C)	<i>in situ</i> pH
100	5.21 $\pm$ 1.63	32.9641	-117.3136	100	138.198	11.442	7.75
300	2.75 $\pm$ 0.69	32.9523	-117.3184	300	46.815	8.1301	7.46
400	2.12 $\pm$ 0.52	32.9471	-117.3416	400	26.355	7.2387	7.44
700	1.78 $\pm$ 0.39	32.8128	-117.4676	700	9.187	5.1982	7.39
1096	1.86 $\pm$ 0.41	33.2165	-118.2318	1051	19.336	4.0242	7.42

**Table 4.** *Strongylocentrotus fragilis* threshold results from *in situ* visual surveys conducted by remotely operated vehicles. Mean environmental conditions over which *S. fragilis* abundances were 25-75% of the maximum abundances counted during each dive. Values in brackets are standard deviations.

Vehicle	Vessel	Date	Mean Latitude (°N)	Mean Longitude (°W)	Depth (m)	Salinity (PSU)	Temperature (°C)	O <sub>2</sub> (μmol kg <sup>-1</sup> )	Proportion of Max Abundance	No. of Frames Analyzed
Hercules	E/V <i>Nautilus</i>	8/1/2015	32.8134	-117.4121	487.1 [3.3]	34.326 [0.001]	7.52 [0.01]	16.945 [0.077]	0.46 [0.14]	38
Jason	R/V <i>Sally Ride</i>	12/3/2016	32.7085	-117.4144	478.6 [30.7]	34.290 [0.015]	6.34 [0.21]	13.614 [2.467]	0.54 [0.11]	31