

California sea lion Population Growth and Status*

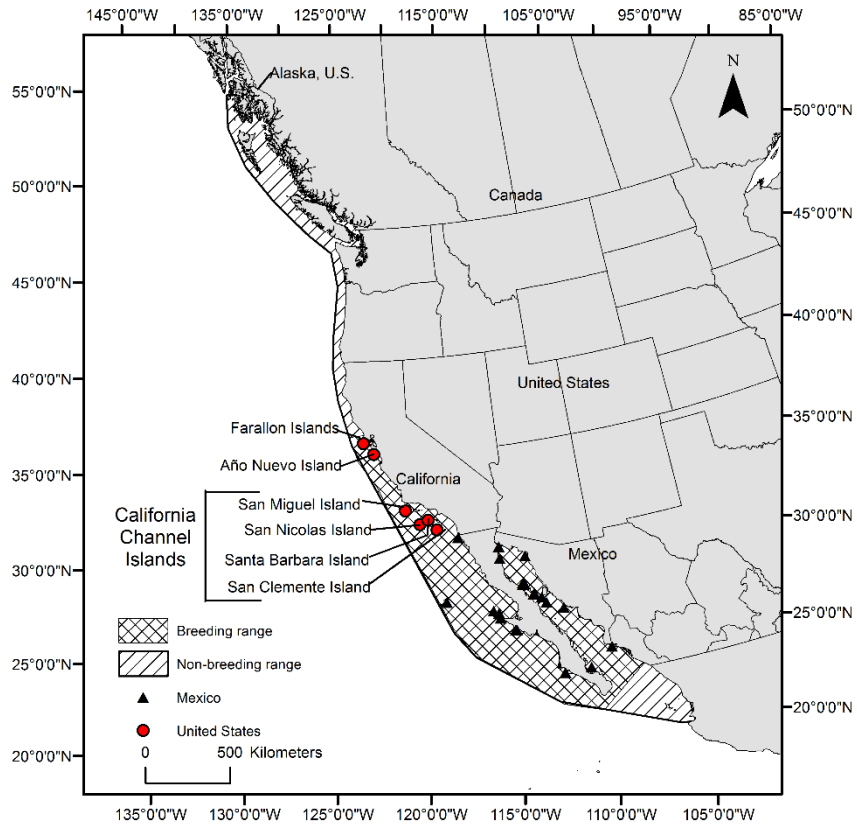


Achieving the goals of the Marine
Mammal Protection Act

*Laake, J.L., M.S. Lowry, R.L. DeLong, S.R. Melin and
J.V. Carretta 2018.

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Distribution of California Sea Lion



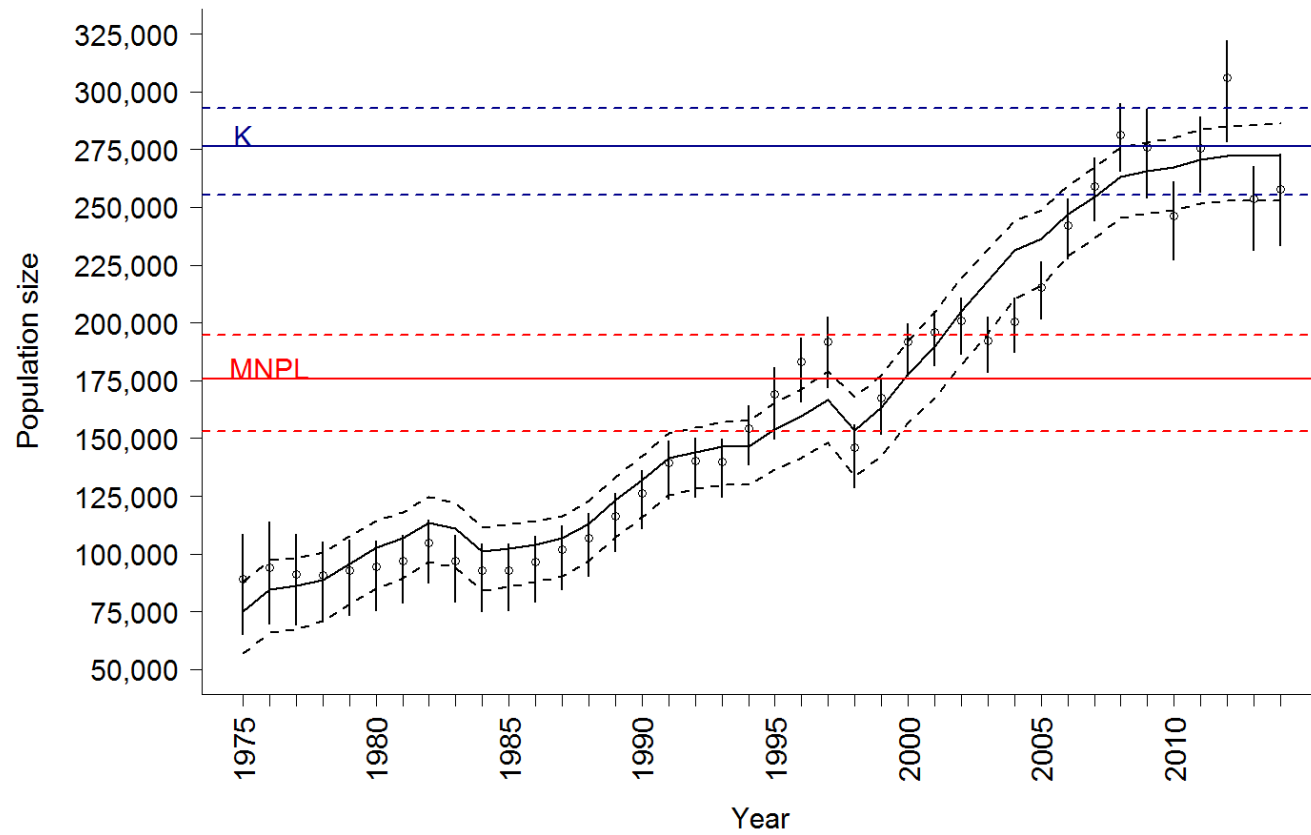
A novel method to assess population growth and status

- Time series of 39 years of pup counts for all rookeries (6) in California waters 1975 – 2014 (Lowry et al 2017)
- Sex and age- Specific Survival Rates (28 years) 1975 to 2013 (DeLong et al 2017. MM Sci.)
- Begin 1975 population with stable age distribution, use annual pup counts and survival estimates to reconstruct abundance of all age and sex components of population for each year
- Fit generalized logistic growth curve to time series of population size at each year to estimate MNPL ,K and population status

California sea lion Population Structure

			Population estimate		
Year	Pup count		F	M	Total
1975	12,499		49,136	39,788	88,924
1976	14,749		51,944	42,226	94,170
1977	11,712		50,784	40,415	91,199
1978 ^a	13,449		50,942	39,971	90,913
1979 ^a	14,145		52,151	40,661	92,812
1980 ^a	14,878		53,180	41,153	94,333
1981	16,701		54,748	42,249	96,997
1982	20,540		58,881	45,899	104,780
1983	11,595		55,342	41,465	96,807
1984	13,550		53,657	39,354	93,011
1985	15,224		53,753	39,259	93,012
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2004	43,490		114,985	85,342	200,327
2005	48,331		122,423	92,825	215,248
2006	56,144		135,829	106,364	242,193
2007	54,088		144,443	114,561	259,004
2008	59,774		156,091	125,359	281,450
2009	35,914		154,229	121,926	276,155
2010	33,873		139,983	106,348	246,331
2011	62,109		155,174	120,315	275,489
2012	67,396		171,149	135,071	306,220
2013	42,913		146,010	107,652	253,662
2014	47,691		148,499	109,107	257,606

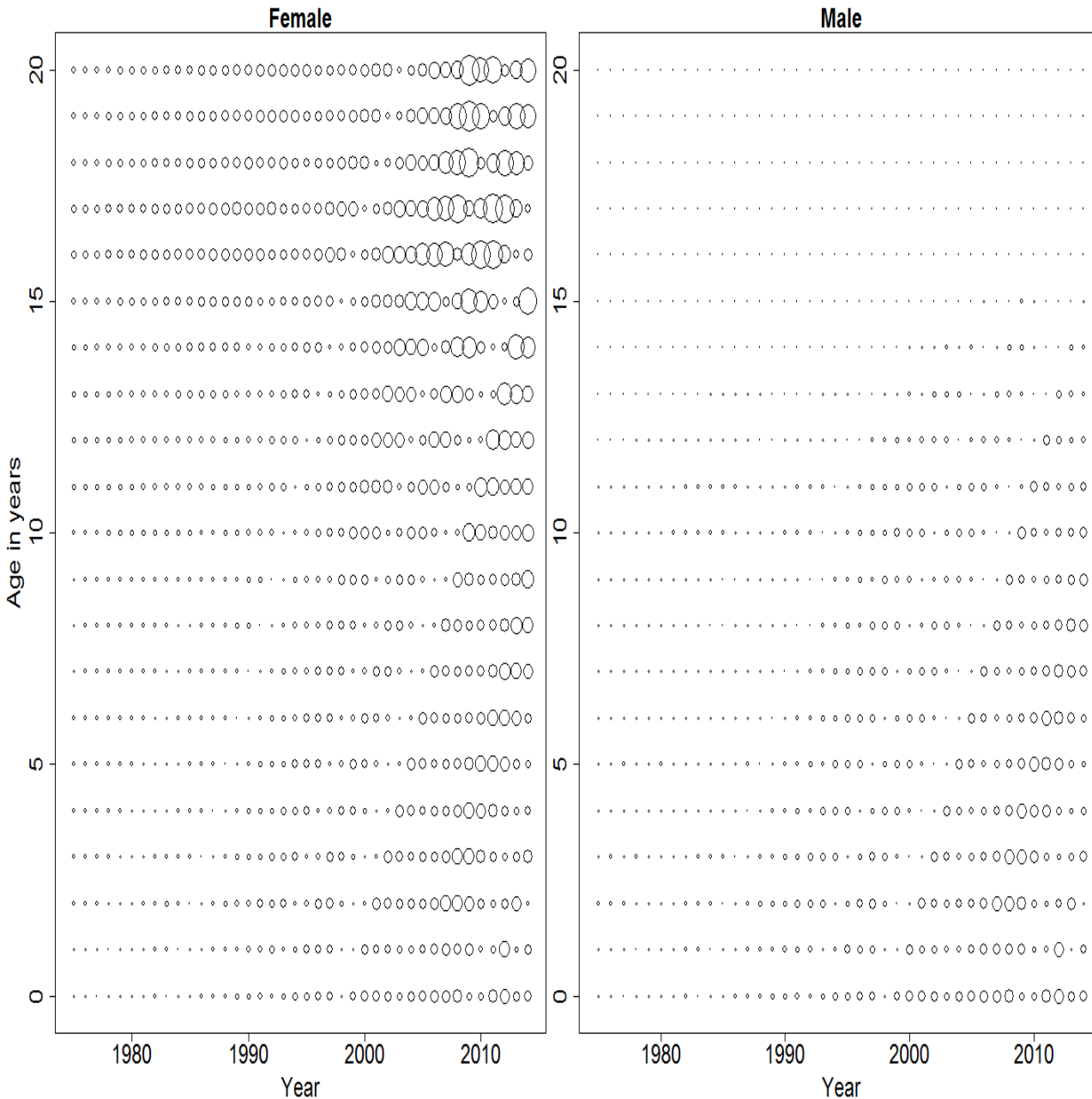
California sea lion Population Growth



Result

- MNPL (183,481), K (275,631) and population status N_{2014}/MNPL
- Annual Growth rate = 0.07, $N_{2014}/\text{MNPL} = 1.2$,
 $N_{2014}/K = 0.94$
- Increase of 1° C SST results in 7% decline in annual growth rate, bringing it to zero; 2° C SST > 14% decline in growth rate and a population decline of 7 %
- Increased climate/oceanographic variability in last decade will result in increased SST, decrease in CSL abundance

Relative Abundance of Females and Males in the U.S. California sea Lion population 1975 to 2014



Model Estimates:

Males 4-7 yr ~ 29,000

Males \geq 8 yr ~ 38,500

Potential Migrant Males in 2014
was ~67,500 animals

PBR for males 8 years and older:
Nmin is (27,451) X $\frac{1}{2}$ of Rmax
(0.12) and recovery factor of 1.0
27,451 X 0.06 X 1.0 = 1,647

Potential Biological Removals (PBR)

MMPA definition “the maximum number of animals, not including natural mortality, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.” The mortality is assumed to occur over all age and sex groups of the population.

PBR is product of 3 elements: the minimum population estimate (Nmin); half the maximum net productivity rate (0.5 Rmax or 0.06); a recovery factor (Fr ranging from 0.1 to 1.0 for species within the range of OSP)

Current PBR (2019): (Nmin) 233,515 X 0.06 (1/2 Rmax) X 1.0 Fr =14,011

Approximately 200 are taken annually in commercial fisheries and an additional ~ 100 are recorded as serious injuries and mortalities based on strandings (2019 SSR)

Task Force should consider male only PBR for Section 120 removals in Columbia River as all sea lions removed are males

PBR for males 8 years and older: Nmin is (27,451) X ½ of Rmax (0.12) and recovery factor of 1.0: 27,451 X 0.06 X 1.0 = 1,647

California sea lion Summary

- CSL Rookeries are in Southern California, females and pups stay “home” and males migrate north to No. CA, OR, WA, BC and Alaska during non-breeding season
- CSL population is abundant (~258,000 in 2014) and has been within the range of OSP since 1996
- Small proportion of ~67,000 CSL males 4 years or older occur in the Columbia River outside the breeding season (~ 1 to 4 K depending on the year)
- Climate change could change CSL age profile in CR