The following supplement accompanies the article

Estimating Hawaiian monk seal range-wide abundance and associated uncertainty

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Figure S1. Demonstration of method for characterizing the proportion of the total non-pup population counted in years when field effort was of insufficient duration to identify all seals. Main graph shows the known
proportion of the non-pup population (open circles) identified, plotted against cumulative field survey effort reference years for subpopulations from Kure Atoll to French Frigate Shoals, as described in the Results and Discussion. Subpopulation-specific reference years were as follows: Kure Atoll—2004, 2006-2007, 2011, 2014-2015; Midway Atoll—1998-2002, 2004-2005, 2010; Pearl and Hermes Reef—2006-2007, 2009-2011; Lisianski Island—1983, 1992, 1995-1999, 2001-2004, 2006, 2011; Laysan Island—1988, 1990-1994, 1996-2004, 2009-2011; French Frigate Shoals—2005-2006 (Pearl and Hermes Reef reference years also used for French Frigate Shoals analysis). Total hours of survey effort expended were calculated in years when field seasons were of insufficient duration to conclude total enumeration had been achieved. Proportions of the total identified in each reference year at these effort time points (vertical red lines) are shown (grey bars) in the inset probability density histograms for each subpopulation. Total effort hours and associated year (in parentheses) are shown. Abundance distributions (included in Figures S2-S4) were generated by dividing the total number of seals counted in each year by 10,000 randomly sampled proportions from beta distributions fitted to the observed proportions (black lines in inset graphs).
Figure S2. Distributions of 10,000 randomly drawn estimates of Hawaiian monk seal abundance in 2013 at sites with error information. Estimation methods varied by site and year but included either capture-recapture (Program CAPTURE), minimum counts adjusted by the estimated proportion of the population identified based upon discovery curves, or standardized counts corrected for the proportion of seals on shore. Bottom right graph shows total range-wide abundance representing 10,000 sums of random draws from each preceding distribution, plus the tally of seals counted in the main Hawaiian Islands excluding Ni‘ihau and Lehua Islands.
Figure S3. Distributions of 10,000 randomly drawn estimates of Hawaiian monk seal abundance in 2014 at sites with error information. Estimation methods varied by site and year but included either capture-recapture (Program CAPTURE), minimum counts adjusted by the estimated proportion of the population identified based upon discovery curves, or standardized counts corrected for the proportion of seals on shore. Bottom right graph shows total range-wide abundance representing 10,000 sums of random draws from each preceding distribution, plus the tally of seals counted in the main Hawaiian Islands excluding Ni’ihau and Lehua Islands. Note that no counts were available from Necker Island since 2013, so that year's data was used for 2014 and 2015.
Figure S4. Distributions of 10,000 randomly drawn estimates of Hawaiian monk seal abundance in 2015 at sites with error information. Estimation methods varied by site and year but included either capture-recapture (Program CAPTURE), minimum counts adjusted by the estimated proportion of the population identified based upon discovery curves, or standardized counts corrected for the proportion of seals on shore. Bottom right graph shows total range-wide abundance representing 10,000 sums of random draws from each preceding distribution, plus the tally of seals counted in the main Hawaiian Islands excluding Ni’ihau and Lehua Islands. Note that no counts were available from Necker Island since 2013, so that year's data was used for 2014 and 2015.
Figure S5. Hawaiian monk seal abundance (median and 95% confidence intervals) at individual sites, 2013-2015. Confidence intervals are absent when either minimum tallies are plotted (i.e., top panel, main Hawaiian Islands from Kauai to Hawaii Island) or when total enumeration was achieved (Kure Atoll 2014-2015). Note that Necker Island is not shown because this site was only surveyed in 2013.