Apparent age-specific survival of harbor seals at Tugidak Island, Alaska

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Understanding population dynamics of harbor seals at Tugidak Island, Alaska, became important after severe declines in the maximum numbers of seals hauled-out per day from > 9,000 in the 1970s to 1,000–1,500 seals in the last decade. From 2000-2007, we conducted a photographic-identification study using natural pelage markings, collecting 13,251 good quality photographs of up to 4,801 individuals in a photograph library. We estimated apparent age-specific survival probabilities of the seals first photographed as pups (n=569) using mark-recapture models incorporating effects of cohort, birth site, year, sex, color phase and age. Pre-weaning mortality was significant, and/or larger body size of pups improved survival of pups to age 1 and older. For pups last photographed during their birth year as weaned or large pups, annual survival estimates of light phase seals ranged from 0.69 from 0 - 1 yr to 0.97 from 6 -7 yrs, with cumulative survival from 0-7 yrs of 0.37. For harbor seal pups last photographed during their birth year as newborns or smaller pups, first year survival was reduced by 0.11 compared to pups judged larger or weaned, and cumulative survival from 0-7 yrs was 0.21. Compared to females, annual apparent survival of males was 0.04 - 0.06 lower to ages 1-3 yrs. A photogrammetrically-derived index of body size indicated males were slightly larger than females from 1-4 yrs, with this sex difference more pronounced from 4-7 yrs. Resighting probabilities averaged 0.30, 0.43 and 0.47 for 1, 2 and 3+ yr-olds, respectively; and varied among years and ages from 0.14 to 0.64. Resighting probabilities averaged 0.13 higher for light phase than non-light phase seals. Using our entire photograph library, we are estimating population parameters (survival, population size, immigration rates, population trends) to determine which age-sex classes and population processes contributed most to observed population trends.

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