

Body condition of Southern Resident killer whales, fall 2022 to spring 2023

Holly Fearnbach and John Durban

SR3, SeaLife Response Rehabilitation and Research; hfearnbach@sealifer3.org

Sample Data. The body condition of 62 different Southern Resident killer whale (SRKW) individuals was measured from vertical drone photographs (Durban et al. 2015) in the fall-spring 2022-2023, specifically between November 12th 2022 and April 24th 2023. This comprised all 25 members of J-pod, 10/16 whales from K pod and 27/32 whales from L pod. The remaining six members of K pod were last imaged in September 2022 and were also included in this analysis. Our sample therefore included 68/73 members of the population known to be alive between September 2022 and April 2023; only absent were L54, L88, L77, L119 and L124.

Identifying whales in “poor” body condition. Using the image measurements and statistical analyses detailed in Stewart et al. (2021), we identified whales in “poor condition” as those estimated to be in the lowest body condition state BC1. These were whales for which the measured eye patch ratio (EPR, a sensitive proxy for body condition; Fearnbach et al. 2020) at the time of their most recent photograph had a residual difference to the EPR expected for their age and sex that fell into the lowest 20% of residuals for measurements from the comparable November-May period from 2016-2023. The expectation was calculated by fitting generalized additive models of EPR against age, separately for each sex, to data available from the November-May period from 2016-2023. For those K pod whales imaged most recently in September 2022, the expected EPR and residual distributions were estimated from data available from the comparable September period from 2008, 2013 and 2015-2022. We have documented whales in BC1 to have an elevated probability of subsequent mortality compared to those in more robust states BC2-5 (Stewart et al. 2021).

There were eight whales in BC1 state, comprising whales from all three pods, including one adult male (M), two adult females (F) and five sub-adult males (S):

J16(F), J44(S), J39(M), J49(S), K38(S), L90(F), L110(S), L117(S)

This includes five whales that were also measured to be in BC1 in fall-spring 2021-2022.

References

- Durban, J.W., Fearnbach, H., Barrett-Lennard, L.G., Perryman, W.L. and Leroi, D.J., 2015. Photogrammetry of killer whales using a small hexacopter launched at sea. *Journal of Unmanned Vehicle Systems*, 3(3), pp.131-135.
- Fearnbach, H., Durban, J.W., Barrett-Lennard, L.G., Ellifrit, D.K. and Balcomb III, K.C., 2020. Evaluating the power of photogrammetry for monitoring killer whale body condition. *Marine Mammal Science*, 36(1), pp.359-364.
- Stewart, J.D., Durban, J.W., Fearnbach, H., Barrett-Lennard, L.G., Casler, P.K., Ward, E.J. and Dapp, D.R., 2021. Survival of the fattest: linking body condition to prey availability and survivorship of killer whales. *Ecosphere*, 12(8), p.e03660.