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Dyadic Interspecific Interaction Between a Harbour Seal (*Phoca vitulina*) and a Eurasian Otter (*Lutra lutra*)

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This paper documents an opportunistic observation of a dyadic interaction between a harbour seal (*Phoca vitulina*) and a Eurasian otter (*Lutra lutra*) within the southern remit of Aith Voe, Shetland, Scotland, United Kingdom, on 2 April 2022. The interaction occurred both on and within ~10 m of Aith Pier, a man-made public pier consisting mainly of rock armour (i.e., human-placed rock to protect shoreline structures), which juts northeast into the sheltered waters of Aith Voe (Figure 1). During the described encounter, the tide was rising (Low: 0615 h, 0.38 m; High: 1234 h, 2.18 m), and there was light southwesterly wind (4.5 km/h; Beaufort State 1). The interaction was recorded by an unmanned aerial system (UAS) (Mavic3, DJI Fly, *Firmware*, Version 1.5.10), which was launched at 0746 h from Aith Pier (60.286496, -1.3751324). The UAS collected 3 min 18 s of aerial video footage (the Supplementary Video for this paper is available in the "Supplemental Material" section of the *Aquatic Mammals* website: https://www.aquaticmammalsjournal.org/index.php?option=com_content&view=article&id=10&Itemid=147).

The harbour seal is first visible in the UAS video footage swimming ~1 m from the most northeasterly perimeter of the pier (60.287061, -1.3738901; Figure 1). The seal momentarily stopped and adopted a bottling position, with head up and out of the water, looking in the direction

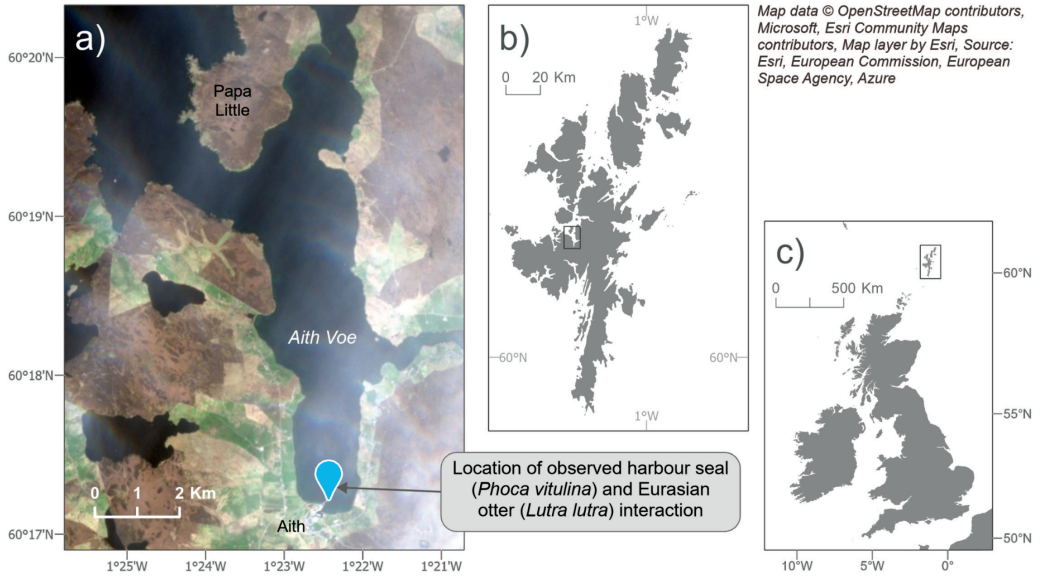

Figure 1. (a) Location of the observed harbour seal (*Phoca vitulina*) and Eurasian otter (*Lutra lutra*) interaction off Aith Pier, Shetland; (b) location of Aith Voe in relation to Shetland; dark box indicates observation location; and (c) location of Shetland Isles in the United Kingdom.

of the pier, before submerging and diving out of view of the UAS (to depth > ~8 m). As the seal dove, the otter became visible to the UAS as it emerged from the above-water rock armour infrastructure of the pier, climbed down the rocks, entered the water, and swam around the base of the pier towards the location the seal was last visible. Shortly after the otter entered the water (9 s), the seal ascended, and then logged, head up, facing directly towards the otter, which was ~3 m away. The otter then climbed out of the water and up the rock armour while the seal appeared to watch. As the otter climbed nearer the top of the rock armour, the seal swam around the base of the pier in the same direction as the otter, periodically stopping and appearing to look, head up, towards the direction of the otter.

The following video clip began 1 min later as both the harbour seal and otter swam parallel to the rocks, with the harbour seal about five (otter) body lengths behind the otter. After 10 s, the otter exited the water and disappeared into a gap within the rock armour. As the otter exited, the seal stopped swimming and was stationary, head up, facing the otter's path. Approximately 12 s after exiting the water, the otter peered head out from the rock armour at a higher position (~1 m) than its entry point and looked in the direction of the seal. As the otter retreated within the cavity of the rock armour, the seal slowly continued on its original path and left the UAS field of view. The otter briefly peered out of the rock armour again and then emerged, re-entered the water, and swam in the same direction in which the seal was last seen. As the UAS panned southwest, the seal re-entered the field of view and barrel-rolled (full rotations along its longitudinal axis) as it swam directly towards the otter (see Supplementary Video; https://www.aquaticmammalsjournal.org/index.php?option=com_content&view=article&id=10&Itemid=147). The otter continued along its trajectory, and the seal turned 180° to follow, and again spun horizontally, so at times it swam ventral side up (Figure 2a). As the seal caught up with the otter (to ~1 seal body length away), the otter stopped swimming and stood on a partially submerged piece of rock armour, at which point the seal immediately stopped swimming and oriented itself towards the otter. The seal turned away after 8 s and began to spiral through the water again, whereas the otter re-entered the water and began to swim parallel along the rock armour in the opposite direction to its previous trajectory. The seal immediately gave a few apparent hard rear flipper propulsions and pursued the otter, positioning itself to swim ~0.5 m behind the otter (half the seal body length) (Figure 2b). The otter then exited the water into the same area of rock armour it had exited and re-emerged previously. The seal slowed and placed its head into the rock armour in the area where the otter was last seen, and then appeared to turn away as the observation terminated.

Total body length measurements of both individuals were not available, though qualitative assessment suggests they are of comparative length and are both estimated at ~100 cm long (nose to end of tail). This is shorter than the asymptotic length of harbour seals at sexual maturity (> 140 cm) (Hall et al., 2019), and, thus, this seal is likely a juvenile. A lone otter of this length is likely an adult male (Kruuk, 2006).

Despite anecdotal reports of "otters in Shetland being in frequent contact" with harbour seals (Kruuk et al., 1989, p. 241), and anecdotal evidence of similar interspecific dyadic interactions in other coastal areas of Shetland (N. McCaffrey, unpub. data; R. Shucksmith, unpub. data), there are no direct observations reported within the published literature. As such, this observation provides insight into two charismatic coastal species, both of which have been subject to regional

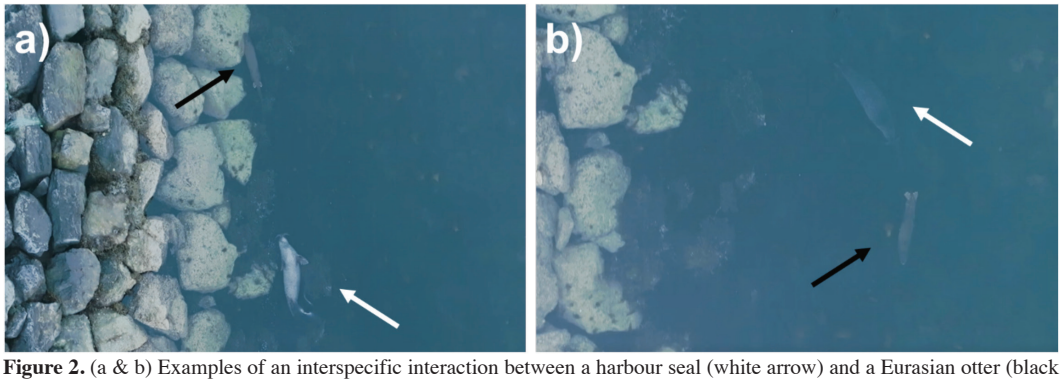

Figure 2. (a & b) Examples of an interspecific interaction between a harbour seal (white arrow) and a Eurasian otter (black arrow) observed alongside Aith Pier, Shetland

population declines in previous decades (Conroy & Chanin, 2000; Thompson et al., 2019). Two recorded phocine distemper virus (PDV) outbreaks in 1988 and 2002 severely affected UK harbour seal populations (Hall et al., 2006), with the effects on otters unknown. Indeed, the closed population of Shetland otters may be vulnerable to epizootic diseases carried by harbour seals, such as PDV, with close contact through direct interspecific interactions, as described here, potentially increasing the likelihood of disease transmission (Kruuk et al., 1989; García-Díaz, 2021). Other otter species, such as the northern sea otter (*Enhydra lutris kenyoni*), are known to be susceptible to and capable of transmitting PDV, which contributed to some sea otter mortalities in Kachemak Bay, Alaska (Goldstein et al., 2009).

Aside from potential disease transmission, the motivations, causes, and consequences of the described interaction are unknown. For example, potential drivers may be oriented towards sexual behaviour (e.g., Harris et al., 2010; Rohner et al., 2020), interspecific social play (e.g., Wilson, 1974; Sullivan, 1981; Renouf & Lawson, 1986, 1987; Harcourt, 1991a, 1991b; Burghardt, 2005; Quaglietta et al., 2014), inquisitive behaviour (e.g., Renouf & Lawson, 1987; Osinga et al., 2012; García-Díaz, 2021), intraguild predation (e.g., Elton & Miller, 1954; Levine, 1976; Brownlow et al., 2016), or interference competition (e.g., Erlinge, 1972; Kruuk & Moorhouse, 1990; Wilson & Hammond, 2019; Carter et al., 2020). Further collation of interspecific behavioural observations for both species are recommended to build an understanding of the motivation, causes, and potential consequences of the behaviour described in this paper.

Acknowledgments

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Literature Cited

Brownlow, A., Onoufriou, J., Bishop, A., Davison, N., & Thompson, D. (2016). Corkscrew seals: Grey seal (*Halichoerus grypus*) infanticide and cannibalism may indicate the cause of spiral lacerations in seals. *PLOS ONE*, *11*(6), e0156464. https://doi.org/10.1371/journal.pone.0156464

Burghardt, G. M. (2005). *The genesis of animal play: Testing the limits*. The MIT Press. https://doi.org/10.7551/mitpress/3229.001.0001

Carter, M. I., Boehme, L., Duck, C. D., Grecian, J., Hastie, G. D., McConnell, B. J., Miller, D. L., Morris, C., Moss, S., Thompson, D., Thompson, P., & Russell, D. (2020). *Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles* (Report to BEIS, OESEA-16-76, OESEA-17-78). Sea Mammal Research Unit, University of St Andrews. 74 pp. http://hdl.handle.net/10023/21558

Conroy, J. W., & Chanin, P. R. (2000). The status of the Eurasian otter (*Lutra lutra*) in Europe – A review. *Journal of the International Otter Survival Fund*, *1*, 7-28.

Elton, C. S., & Miller, R. S. (1954). The ecological survey of animal communities: With a practical system of classifying habitats by structural characters. *Journal of Ecology*, *42*(2), 460-496. https://doi.org/10.2307/2256872

Erlinge, S. (1972). Interspecific relations between otter *Lutra lutra* and mink *Mustella vison* in Sweden. *OIKOS*, *23*(3), 327-335. https://doi.org/10.2307/3543171

García-Díaz, P. (2021). Observación de una interacción entre un gato doméstico y un grupo de nutrias euroasiáticas en Aberdeen (Reino Unido) [Observation of an interaction between a domestic cat and a group of Eurasian otters in Aberdeen (UK)]. *Galemys*, *33*, 53-54. https://aura.abdn.ac.uk/bitstream/handle/2164/18062/Garc_a_D_az_G_Observation_Interaction_Between_VoR.pdf?sequence=1&isAllowed=y or https://aura.abdn.ac.uk/handle/2164/18062

Goldstein, T., Mazet, J. A., Gill, V. A., Doroff, A. M., Burek, K. A., & Hammond, J. A. (2009). Phocine distemper virus in northern sea otters in the Pacific Ocean, Alaska, USA. *Emerging Infectious Diseases*, *15*(6), 925. https://doi.org/10.3201/eid1506.090056

Hall, A. J., Jepson, P. D., Goodman, S. J., & Härkönen, T. (2006). Phocine distemper virus in the North and European Seas—Data and models, nature and nurture. *Biological Conservation*, *131*(2), 221-229. https://doi.org/10.1016/j.biocon.2006.04.008

Hall, A. J., Mackey, B., Kershaw, J. L., & Thompson, P. (2019). Age–length relationships in UK harbour seals during a period of population decline. *Aquatic Conservation: Marine and Freshwater Ecosystems*, *29*, 61-70. https://doi.org/10.1002/aqc.3104

Harcourt, R. (1991a). The development of play in the South American fur seal. *Ethology*, *88*(3), 191-202. https://doi.org/10.1111/j.1439-0310.1991.tb00274.x

Harcourt, R. (1991b). Survivorship costs of play in the South American fur seal. *Animal Behaviour*, *42*, 509-511. https://doi.org/10.1016/S0003-3472(05)80055-7

Harris, H. S., Oates, S. C., Staedler, M. M., Tinker, M. T., Jessup, D. A., Harvey, J. T., & Miller, M. A. (2010). Lesions and behavior associated with forced copulation of juvenile Pacific harbor seals (*Phoca vitulina richardsi*) by southern sea otters (*Enhydra lutris nereis*). *Aquatic Mammals*, *36*(4), 331-341. https://doi.org/10.1578/AM.36.4.2010.331

Kruuk, H. (2006). *Otters: Ecology, behaviour and conservation*. Oxford University Press.

Kruuk, H., & Moorhouse, A. (1990). Seasonal and spatial differences in food selection by otters (*Lutra lutra*) in Shetland. *Journal of Zoology*, *221*(4), 621-637. https://doi.org/10.1111/j.1469-7998.1990.tb04021.x

Kruuk, H., Moorhouse, A., Conroy, J. W. H., Durbin, L., & Frears, S. (1989). An estimate of numbers and habitat preferences of otters *Lutra lutra* in Shetland, UK. *Biological Conservation*, *49*(4), 241-254. https://doi.org/10.1016/0006-3207(89)90046-3

Levine, S. H. (1976). Competitive interactions in ecosystems. *The American Naturalist*, *110*(976), 903-910. https://doi.org/10.1086/283116

Osinga, N., Ferdous, M. S., Morick, D., Hartmann, M. G., Ulloa, J. A., Vedder, L., de Haes, H. U., Brakefield, P. M., Osterhaus, A. D. M. E., & Kuiken, T. (2012). Patterns of stranding and mortality in common seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) in The Netherlands between 1979 and 2008. *Journal of Comparative Pathology*, *147*(4), 550-565. https://doi.org/10.1016/j.jcpa.2012.04.001

Quaglietta, L., Fonseca, V. C., Mira, A., & Boitani, L. (2014). Sociospatial organization of a solitary carnivore, the Eurasian otter (*Lutra lutra*). *Journal of Mammalogy*, *95*(1), 140-150. https://doi.org/10.1644/13-MAMM-A-073.1

Renouf, D., & Lawson, J. W. (1986). Play in harbour seals (*Phoca vitulina*). *Journal of Zoology*, *208*(1), 73-82. https://doi.org/10.1111/j.1469-7998.1986.tb04710.x

Renouf, D., & Lawson, J. W. (1987). Quantitative aspects of harbour seal (*Phoca vitulina*) play. *Journal of Zoology*, *212*(2), 267-273. https://doi.org/10.1111/j.1469-7998.1987.tb05989.x

Rohner, S., Hülskötter, K., Gross, S., Wohlsein, P., Abdulmawjood, A., Plötz, M., Verspohl, J., Haas, L., & Siebert, U. (2020). Male grey seal commits fatal sexual interaction with adult female harbour seals in the German Wadden Sea. *Scientific Reports*, *10*(1), 1-11. https://doi.org/10.1038/s41598-020-69986-w

Sullivan, R. M. (1981). Aquatic displays and interactions in harbor seals, *Phoca vitulina*, with comments on mating systems. *Journal of Mammalogy*, *62*(4), 825-831. https://doi.org/10.2307/1380606

Thompson, D., Duck, C. D., Morris, C. D., & Russell, D. J. (2019). The status of harbour seals (*Phoca vitulina*) in the UK. *Aquatic Conservation: Marine and Freshwater Ecosystems*, *29*, 40-60. https://doi.org/10.1002/aqc.3110

Wilson, S. (1974). Juvenile play of the common seal *Phoca vitulina vitulina* with comparative notes on the grey seal *Halichoerus grypus*. *Behaviour*, *48*(1-4), 37-60. https://doi.org/10.1163/156853974X00246

Wilson, L. J., & Hammond, P. S. (2019). The diet of harbour and grey seals around Britain: Examining the role of prey as a potential cause of harbour seal declines. *Aquatic Conservation: Marine and Freshwater Ecosystems*, *29*, 71-85. https://doi.org/10.1002/aqc.3131