Lit Review 3: Topic Summary
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Topic Summary:

Sea otters (*Enhydra lutris)* are the smallest and most recently evolved marine mammals (Yeates et al., 2007). They are known to have diverse diets, foraging habitats, and a complex social system (Carrs, 1995). The foraging strategies of sea otters vary amongst individuals and are often influenced by factors of reproductive status (Esslinger et al., 2014, Thometz et al., 2016), prey availability (Ostfeld, 1982, Thometz et al, 2016), and energy budgets (Ostfeld, 1982, Yeates et al., 2007, Cortez et al., 2016).

The earliest scientific studies on the foraging behaviour of sea otters were conducted as observational field studies, in which foraging and feeding behaviours were observed through a telescope, using methods of continuous sampling of one focal individual (Ostfeld, 1982, Payne & Jameson, 1984, Carrs, 1995). Tagging of sea otters for reidentification was also a method used to correlate foraging behaviours to sea otter age (Payne & Jameson, 1984), analysing foraging dive patterns. In the early 2000's, the first uses of time-depth recorders (TDRs) were utilized to record simultaneous dive duration and depth of sea otters (Bodkin et al., 2004, Thometz et al., 2014), to examine energy expenditure as a constraint to various foraging techniques.

Sea otters are born incapable of swimming or foraging, until four to six weeks of age, unlike other marine mammals (Payne & Jameson, 1984, Cortez et al., 2016), leaving mothers the responsibility of providing continuous to their young until weaning (Ossterrieder & Davis, 2009, Thometz et al., 2014, Cortez et al., 2016, Thometz et al., 2016). Successful independent dives and soliciting of solid food is not present in pups until six weeks of age (Payne & Jameson, 1984, Cortez et al., 2016).

Foraging behaviour of all sea otter age groups engage in a spectrum of behaviour, ranging from physiological and developmental mechanisms to larger evolutionary mechanisms. Foraging behaviour exhibited by mothers is crucial for the survivorship of newborn young, who require the help of their mother for protection and feeding (Cortez et al., 2016) for at least the first six months postpartum (Osterrieder & Davis, 2009, Payne & Jameson, 1984). Females with pups often displayed a bimodal foraging strategy: mothers with young pups preferred shallow foraging depths, while mothers with larger pups preferred deeper foraging depths (Bodkin et al., 2004, Osterrieder & Davis, 2009). Additionally, females with pups did not dive as deep or as long to find food compared to males and females without pups, suggesting that pup care and maternal care acts as a constraint of foraging behaviour (Thometz et al., 2014, Thometz et al., 2016).

A large portion of research conducted on foraging behaviour in sea otters assesses mother-pup interactions during dependency periods analysing trade-offs between foraging for young and maximizing energy reserves (Ostfeld, 1982, Carss, 1995, Bodkin et al., 2004, Thometz et al., 2014). With increased foraging efforts, mothers will impose greater interaction with their external environment, increasing their vulnerability to predation (Esslinger et al., 2014, Cortez et al., 2016). Foraging techniques must be learned through intensive learning from the mother early in life, which helped explain the long periods of parental care in sea otters (Carss, 1995), suggestive of cognitive mechanisms that drive foraging behaviours that last a lifetime.

Future research could include quantifying available prey and caloric content with respect to water depth (Bodkin et al., 2004, Osterreider & Davis, 2009), to assess patterns of foraging

techniques. Additionally, the use of TDR technologies can be employed in future studies to develop models from dive attributes (Bodkin et al., 2004), to examine trends of foraging success and selection for prey type in sea otters.

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