

ZOOL 567 - Literature Review Assignment #3

Topic Summary

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Male humpback whales (*Megaptera novaeangliae*) frequently produce highly complex, specifically patterned vocalizations during the humpback whale breeding season (Payne and McVay, 1971). The breeding season typically runs from January through April, following an extensive period of humpback whale migration (Payne and McVay, 1971). While the purpose of these vocalizations (commonly referred to as 'songs') is still heavily debated, current research suggests that these songs likely play multiple roles in humpback whale mating practices (Herman, 2017).

Since humpback whales are migratory animals and seasonal breeders, most instances of humpback whale song are recorded in winter breeding grounds (Herman, 2017). During the breeding season, male humpback whales are frequently observed moving between dyads (pairs) and small social groups (Darling and Bérubé, 2001; Darling et al., 2006). Males have repeatedly shown a strong preference for singing alone and are often found several kilometers away from other whales while performing (Darling and Bérubé, 2001; Darling et al., 2006; Tyack, 1981). These songs can vary significantly in frequency and can be heard at significant distances underwater, with an audible radius of up to 10 kilometers (Herman, 2017). While humpback whale songs tend to be consistent over the course of a single breeding season, research has shown that variation between songs occurs on a year-to-year basis (Winn and Winn, 1978).

Current research suggests that humpback whale songs play multiple roles in humpback whale mating practices, due to their increased prevalence during breeding seasons (Herman, 2017). Both individual and evolutionary influences on these songs have been explored in the literature. There are three primary methods of studying humpback whale song and behaviours: photographic identification, behavioural observation, and theodolite (location-based) tracking (Helweg et al., 1992). Once song data has successfully been collected, it is further transcribed into spectrographs (transcribed sound recordings) that identify different wavelengths and patterns associated with humpback whale songs (Payne and McVay, 1971). All these methods are used in combination to research individual and evolutionary influences on humpback whale song.

Male humpback whales display a significant preference for solo singing (Darling and Bérubé, 2001; Darling et al., 2006; Tyack, 1981). When singing males interact with non-singing conspecifics, they immediately cease singing and only occasionally resume their song after the interaction has ended and the other whale has moved on (Darling and Bérubé, 2001; Darling et al., 2006; Tyack, 1981). Non-singing whales appear to recognize this desire for space, and have generally been observed moving away from pre-recorded whale songs when they are played nearby (Tyack, 1983). While the exact mechanisms and reasoning of this behaviour are

unknown, humpback whales are clearly able to modify their behavioural responses related to song: both as singers and as non-singers.

While only male humpback whales engage in song, both sexually mature and immature humpback whales are capable of producing these complex vocalizations (Herman et al., 2013). However, sexually immature humpback whales are observed singing less frequently than sexually mature humpback whales and hold slightly different social roles in winter breeding grounds (Herman et al., 2013). While the mechanisms of sexual maturity in humpback whales are only generally understood (Herman et al., 2013) it stands to reason that the onset of sexual maturity may have an influence on some aspects of song in male humpback whales.

Broader evolutionary influences on humpback whale song are poorly understood, as the purpose(s) of humpback whale song generally remain up for debate (Herman, 2017). However, sex is clearly a determining factor in song production (Darling and Bérubé, 2001; Darling et al., 2006; Tyack, 1981). While female humpback whales are also capable of making vocalizations, they specifically refrain from producing these characteristic songs (Helweg et al., 1992). The reasons for this sex differential still remain unclear. Since songs are most frequently observed in close proximity to breeding grounds during the breeding season, several researchers have hypothesized that increased reproductive fitness may support the existence and persistence of humpback whale song (Darling et al., 2006; Herman, 2017; Payne and McVay, 1971; Tyack, 1981).

Finally, while significant strides have clearly been made in this field, additional research is still needed to further clarify the purpose(s) of humpback whale song, the potential influence of reproductive fitness, and the apparent sex differentials in song vocalizations.

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