

Preliminary Documentation of Skin Lesions on Bottlenose Dolphin*Tursiops truncatus* off Cape May, New Jersey



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ABSTRACT



Bottlenose dolphins, *Tursiops truncatus*, are excellent sentinels of ecosystem and ultimately human health, as they bioaccumulate toxins and lipophilic pollutants from prey and the environment. Skin lesions observed in these animals may result from a variety of infectious causes as well as trauma. Assessment of the prevalence and nature of these lesions is important, as their underlying pathogenesis may be related to immune compromise via environmental degradation. No vessel-based studies to date have systematically documented skin lesions in bottlenose dolphins sighted off the coast of New Jersey. Photo-identification data of a semi-residential population of free-ranging bottlenose dolphins in Cape May, NJ was collected by the Cape May Whale Watch & Research Center from April to November 2019. Photos from this date range were visually screened for skin lesions and grouped by lesion appearance and photo quality. One or more categories of skin lesions were observed in 77% (n=403) of group sightings, with 53% (n=274) of these groups exhibiting at least two types of lesions. Thirteen categories of skin lesions were documented, with dark fringe, white fringe, and tattoo lesions being the three most prevalent types in this data set. Monitoring distinct lesions on catalogued individuals over time will assist in understanding the progression or regression of certain lesion types. Continued understanding of skin lesion occurrence in this population may further assist our knowledge of disease susceptibility and ecosystem health for future conservation efforts.

INTRODUCTION

- The health of bottlenose dolphins, *Tursiops truncatus*, is a direct reflection of the health of the environments in which they live; they biomagnify toxins that accumulate in sediment and prey, making them vulnerable to disease that may manifest as skin lesions.
- The Cape May population of *T. truncatus* is a part of the Northern Migratory (NM) Stock that occupies coastal waters from the Chesapeake Bay mouth to Long Island, New York during warm water months and coastal waters from Cape Lookout, North Carolina to the Virginia border in cold water months (Urian, 2016).
- Cape May is utilized as a birthing, nursing, and feeding ground.
- Visible skin lesions are an indicator of poor health and disease which have previously been linked to a wide range of viral, fungal, and traumatic causes (Hart et al., 2012).
- Viral infectious agents suspected to cause skin lesions may be transmitted via physical contact, sexual activity, and mechanical vectors (Van Bressem et al., 1999).
- A visual health assessment of skin lesions through photo-identification studies can give us further insight to population viability, disease susceptibility, and ecosystem health for future conservation efforts.

METHODS

- Opportunistic, photo-identification surveys were conducted during whale and dolphin watching trips on the 98ft *American Star* of the Cape May Whale Watch and Research Center (CMWWRC) from April-November in 2019. Some camera and GPS units were provided by the Whale and Dolphin Conservation (WDC).
- Surveys are ongoing from 2011-Present, but only 2019 data was analyzed for skin lesions at the time of this presentation.
- For 2019 data, 49,011 photos were sorted and screened for skin lesions and grouped by lesion appearance and photo quality. There were 842 *T. truncatus* sightings documented, but only 521 complete sightings were analyzed for this dataset.
- Sightings with images deemed poor quality (silhouette or insufficient resolution) were excluded from analysis along with 40 other sightings that had no photos due to weather or other causes. Individual dolphin identification was verified using FinFindR.
- Categorization of lesions were followed by using definitions of (Toms et al., 2020), (Hart et al., 2012), and (Bertulli, 2012).

RESULTS

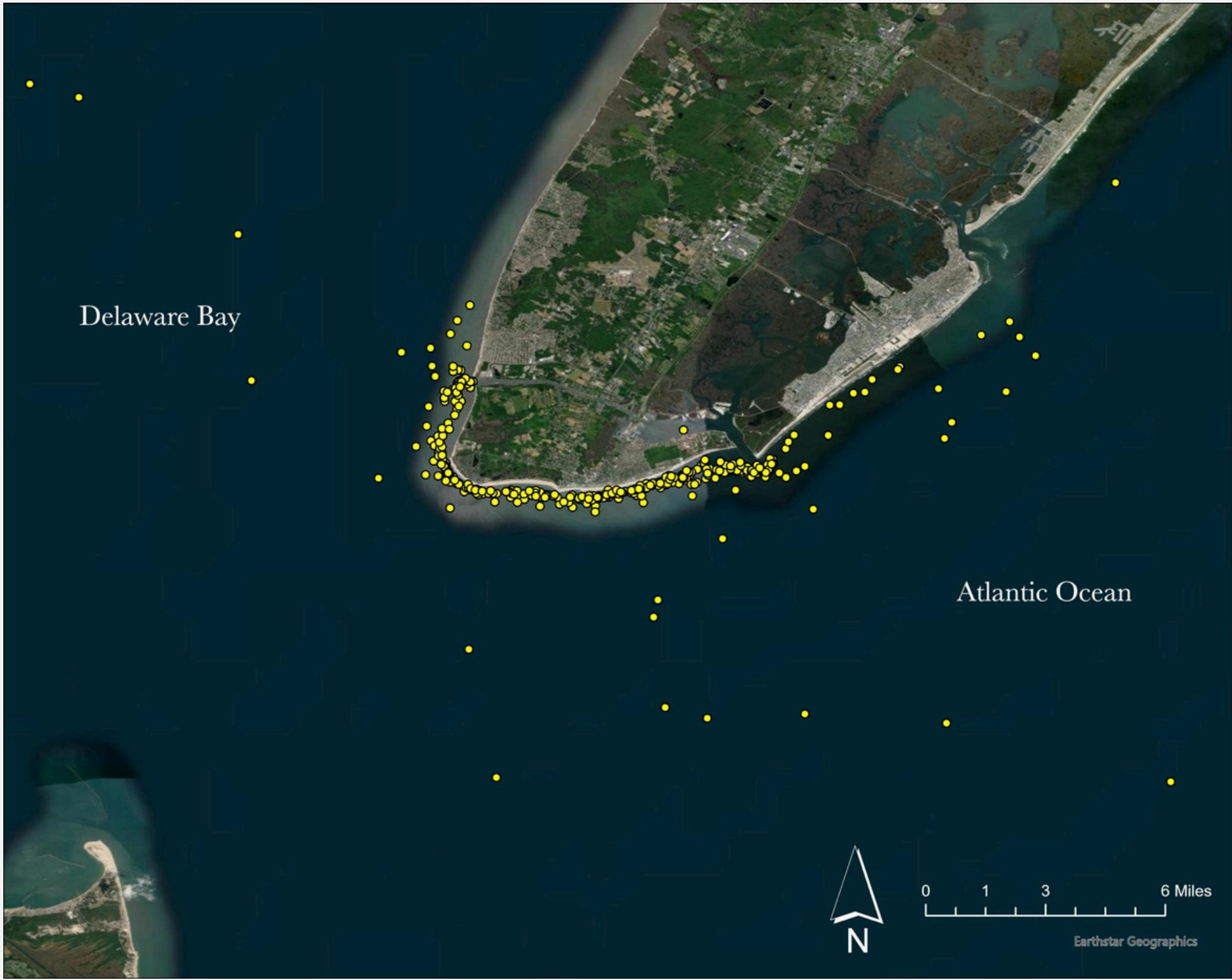


Figure 1: *T. truncatus* sightings (n=393) where skin lesions were observed off Cape May, New Jersey. Sightings greater than 12mi offshore in the Atlantic Ocean omitted from poster image.

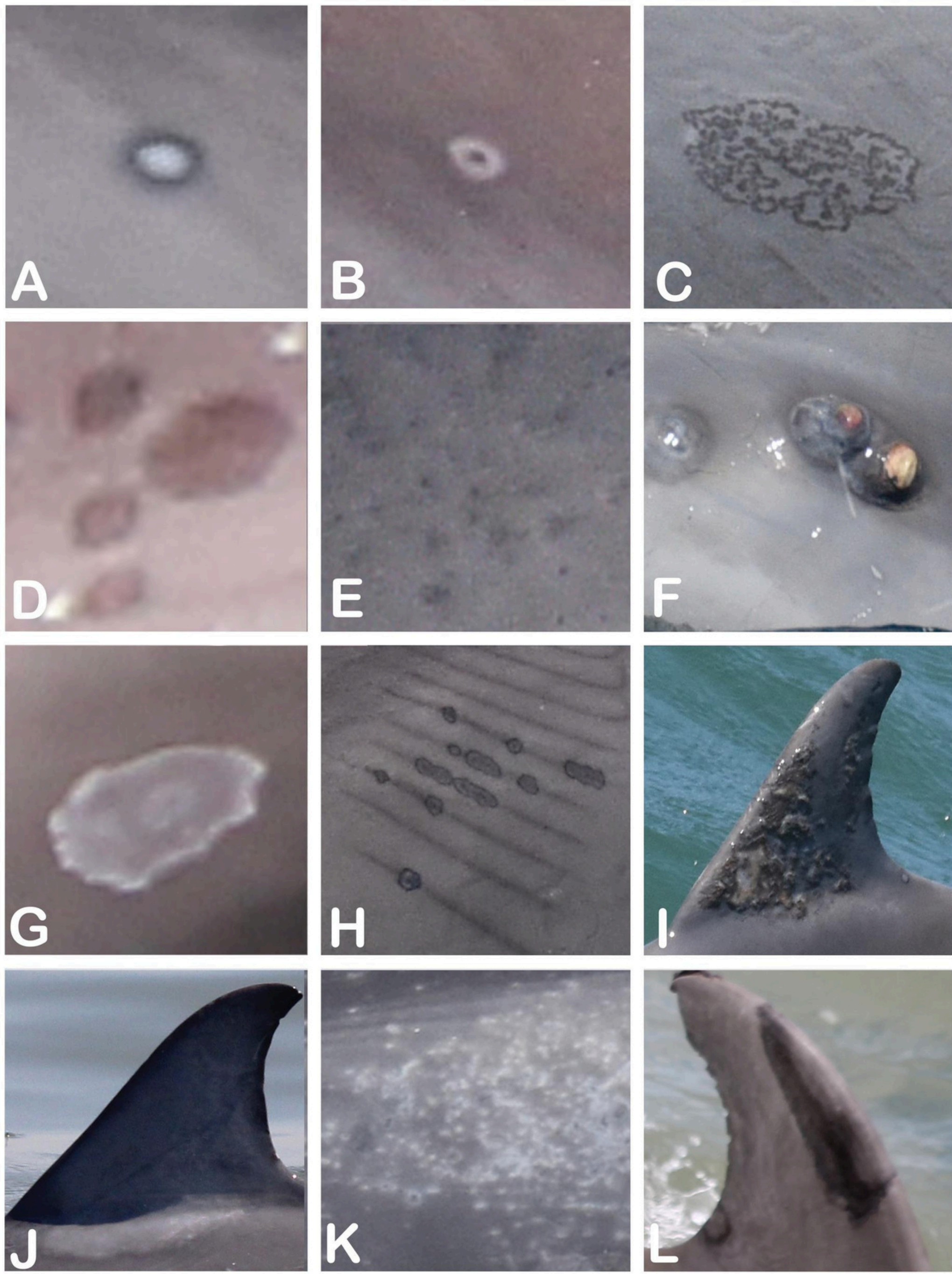


Figure 2: Documented skin lesion categories: A: Dark Fringe (potentially pathogenic), B: White Fringe (potentially pathogenic), C: Tattoo (potentially pathogenic), D: Hyper-Pigmentation - Dark Spots, E: Mottled, F: Vesicular (potentially pathogenic), G: Expansive Annual Lesion (EAL), H: Rake Mark-Associated (RMA), I: Lacaziosis-Like, J: Hypo-Pigmentation - White Amorphous, K: Spotted (potentially pathogenic), L: Hyper-Pigmentation - Black Amorphous. Categorization followed by using definitions of (Toms et al., 2020), (Hart et al., 2012), and (Bertulli, 2012).

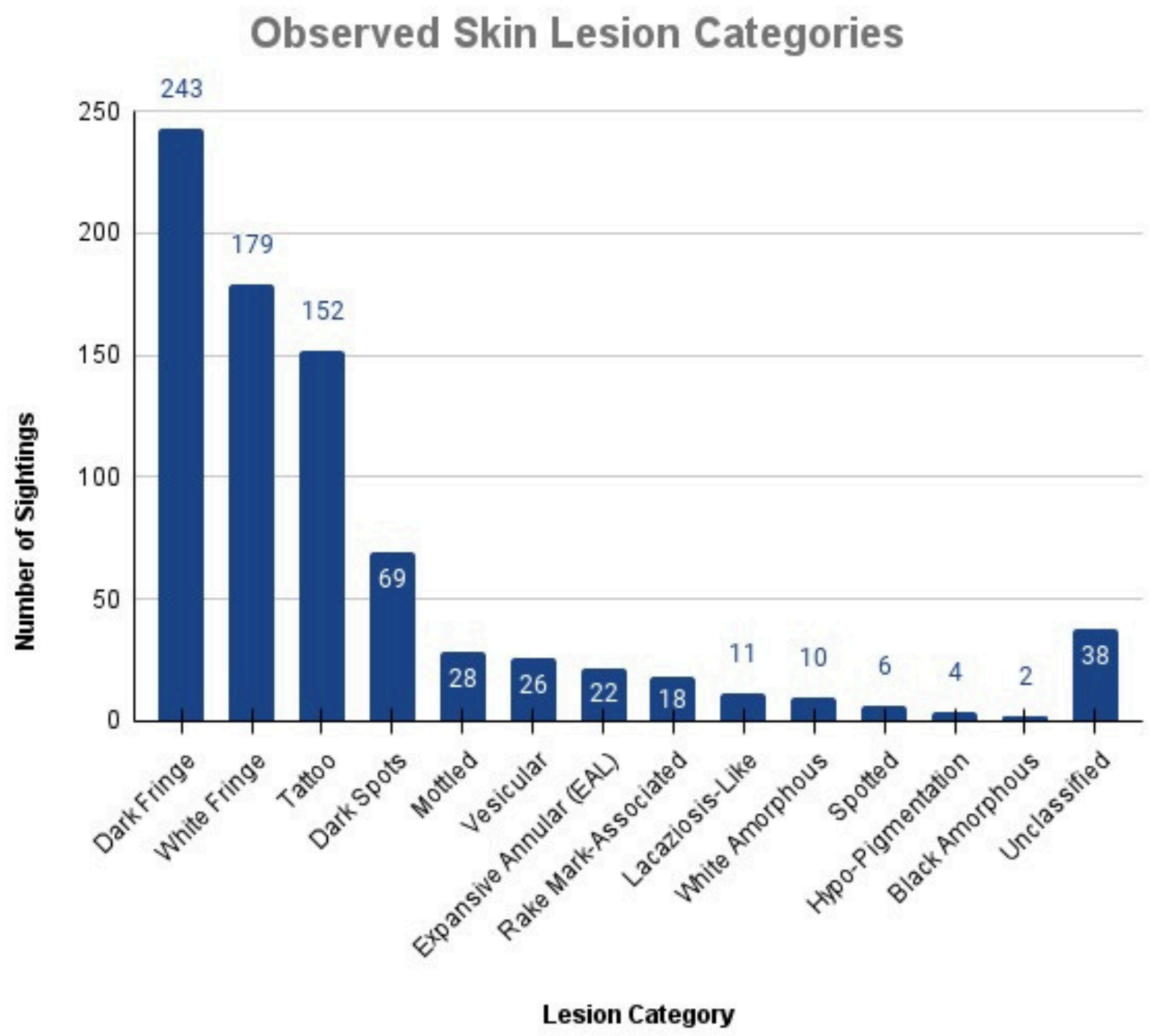


Figure 3: Prevalence of observed lesion categories following definitions by (Toms et al., 2020), (Hart et al., 2012), and (Bertulli, 2012). Four observations of hypo-pigmentation were kept as a broad category instead of classifying the suspected observations as White Freckles (Toms et al., 2020), due to the low number of observations.



Figure 4: Several skin lesions did not fit the category definitions of (Toms et al., 2020), (Hart et al., 2012), and (Bertulli, 2012).

DISCUSSION

- Our preliminary results represent the first account of skin lesion categories on bottlenose dolphins off Cape May, NJ. A total of 521 *T. truncatus* sightings were analyzed for skin lesions.
- One or more types of skin lesions were observed in 77% (n=403) of sightings and 53% (n=274) of pod sightings had at least two types of lesions documented.
- Twelve categories of skin lesions and one additional category of unclassified lesions were documented, among the sightings where skin lesions were present, the most prevalent were 60% (n=243) Dark Fringed, 44% (n=179) White Fringed, and 38% (n=152) Tattoo Lesions (Figure 2 & 3).
- Unclassified lesions were present in 9% (n=38) of sightings which could represent progressions or regressions of known lesion types. Many of these lesions resembled expansive annular lesions, but various characteristics of the lesions did not fit the current definitions. The example of an unclassified lesion (Figure 4) is visually similar to the expansive annular lesions associated with poor water quality (Van Bressem et al., 2015).
- The direct cause of most of these lesions is unknown. However, tattoo-like lesions or tattoo skin disease (TSD) are caused by poxviruses and often affect calves and juveniles without established immune systems, sometimes resulting in mortality (Bressem, 2015). Presence of TSD shown in adults could be caused by compromised immune systems due to a degraded environment.
- Dark fringed lesions as well as spotted lesions are thought to be potentially pathogenic, related to poxvirus. White Fringe lesions are also thought to be potentially pathogenic, related to herpes virus (Toms et. al., 2020).

FUTURE DIRECTIONS

- The data analyzed for this project is a part of an ongoing effort with CMWWRC. Monitoring skin lesions on individuals over time, by season, and analyzing past and future years of data for lesions may provide an insight to the progression and regression of various categories.
- Additional data may help to clarify the unclassified and broad categories of lesions found within this data set to increase the documented lesions to greater than thirteen categories off Cape May, New Jersey.
- Examining skin lesion types among mom-calf pairs in social networks may demonstrate the passing of disease or pollutants through gestation and lactation over time.
- Comparison of skin lesion prevalence among semi-residential, transient and pelagic populations.
- We cannot correlate our results alone with local environmental contaminant data due to the high mobility and extensive migration of the Northern Migratory Stock. Collaboration will be necessary to gain a better understanding of lesion progression and regression in the cold water months.

ACKNOWLEDGEMENTS

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