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Assessing social behaviour between baleen whales (Mysticeti) and dolphins (Delphinidae)

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Abstract
The dynamics and factors influencing interspecies interactions in the wild are not well understood, particularly among social marine animal species such as Mysticetes and Delphinadae. Baleen whales and various dolphin species have been observed interacting in ways that appear to involve foraging, agonistic and affiliative behavior. Interspecific social interaction might be more common than previously known. With increased use of unmanned aerial vehicles (UAV) and social media reports for cetaceans, interspecies interactions can be examined. Here, we describe instances of baleen whale and dolphin interaction involving 19 species in 199 separate and unrelated events documented by videos and photographs. The most common whale-dolphin interaction involved dolphins swimming near the whale's rostrum, akin to bow riding. Most observed behaviors can be described as mutual or one-sided playful interactions by dolphins. Understanding whale and dolphin interactions provides insight into their complex social structures and potential interspecies mutualism.

1 Introduction

Baleen whales (*Mysticeti*) and dolphins (*Delphinadae*) are widespread across all oceans [1] and have been observed together displaying a variety of behaviors [2]. Most studies of interspecific interactions involve delphinids [3–5]. They include a range of cetacean species such as Risso's dolphins (*Grampus griseus*) [6, 7], humpback (*Megaptera novaeangliae*), pilot (*Globicephala melas*) [8], and grey whales (*Eschrichtius robustus*). Interactions among cetacean species have been documented previously but are often limited to specific locations and species [3, 9]. The dynamics and drivers of such interspecies interactions in the wild are poorly understood and a broad assessment is missing, particularly those involving social animal species. The reason for mixed-species cetacean associations is complex and serves various functional roles. They may include direct predation on another cetacean species [10–12]; communal foraging (e.g. a joint feeding event on the same prey) [13–16]; harassment (actions from one species toward another that can trigger reactions that suggest discomfort, irritation, or distress, including alterations in movement, vocal chuffing, or physical percussive behaviors) [16–21];

sexual behavior [16, 22]; caregiving behavior [23, 24] or play (e.g. observed in groups with whales and dolphins) [9, 25, 26].

Play in animals has been a subject of interest to scholars for many years and is widely recognized as a key component of social and physical development in mammals [27] but there is ongoing debate about how to define play in animals [28–30]. Both baleen whales and dolphins have been observed engaging in various forms of play separately [9, 31, 32]. This playful behavior from baleen whales includes documented instances of playing with objects like logs [33], jellyfish [34], rope [9] and even sea turtles [35]. Wild dolphins have been observed playing with seaweed, pufferfish (*Tetradon* sp.) [36] or plastic [37]. When cetaceans engage in play, their behavior can generally be categorized into three main types: object play [38], locomotor play [39], and social play [40]. A less common form of social play is interspecific social play (ISP) [41], when individuals from two or more species interact in mutual play behavior showing affiliative behaviors like play signals, role reversals, or self-handicapping [42].

Free-ranging bottlenose dolphins (*Tursiops truncatus*), in particular, are notable for their engagement in a wide range of interspecific interactions including their association with baleen whales (e.g. 43). Deakos et al. [9] observed two instances of close interaction between humpback whales (*M. novaeangliae*) and bottlenose dolphins where the dolphins were lifted out of the water on the whale´s rostrum and the behaviour was repeated several times. Most interactions between bottlenose dolphins and humpback whales have been described as associative [6, 44] including communal or joint foraging [45], or featuring bow-riding on the pressure wave created in front of the whale's head as a form of play [26, 46]. Possible play interactions were also reported for dusky dolphins (*Lagenorhynchus obscurus*) and southern right whales (*Eubalaena australis*) [47]. Defining what play represents in animals remains a subject of ongoing debate [41]. Some studies have described the interaction between whales and dolphins as harassment or competitive. Koper and Plön [48] reported humpback whale and bottlenose dolphin behaviour in association with feeding events in Algoa Bay, South Africa. They concluded defence behaviour from the humpback whales toward the dolphins. Defensive behaviour (trumpeting on the surface) by humpback whales with different dolphin species (*T. truncatus, Steno bredanensis, Peponocephala electra*) was also reported from a study in Brazil [6, 38].

Collecting long-term datasets on interspecies interactions can be challenging due to logistical difficulties and the significant resources required to capture data. Social media can serve as a useful resource for studying species with limited data and provides a unique platform to involve a broad network of individuals capable of sharing observations and information [49, 50]. Brooks et al. [51] found a number of documented ISP for marine mammals utilizing video sharing platforms like YouTube. Leveraging data from social networking sites helps to fill knowledge and data gaps that traditional ecological monitoring efforts may miss [52–54]. However, ensuring the accuracy and reliability of social media observations requires thorough data validation processes, as the information is frequently subject to bias [55].

Here, we provide an overview and assessment of associations between baleen whales and dolphins. The function of the displayed behavior is further discussed in the context of interspecies social play, stimulation and socializing. Documenting these types

of interactions is relevant for an improved understanding of the species´ behavior and needs [56].

2 Materials and methods

A systematic search was performed across popular social media platforms (Facebook, Instagram, Flickr, TikTok, X and You Tube) to capture a snapshot of interactions between baleen whales and dolphins published until September 2024. The search utilized general keywords such as "whale and dolphin play," "whales and dolphin swim," and "whales and dolphin interaction." (Table A1 provides a list of search terms). For posts made up until September 1, 2024 dating back to 2004, the date, time, location, and source of each entry were collected for analysis.

Posts were included in the analysis only if they featured photos or videos clearly depicting baleen whales near dolphins. Each entry underwent verification to identify the species involved and confirm the interaction, based on the accompanying media independently by two researchers. To ensure accuracy, locations were cross-referenced to avoid duplicates, and entries with matching dates or identical visuals were excluded. This process aimed to retain only unique, original posts representing individual events at each location. For each social media post, multiple images per entry were assessed if available and multiple events per day at the same locations were possible. In addition, a set of videos were donated to the project from members of the public for visual assessments.

To gather the necessary data for analysis, we visually examined both photos (mostly underwater and aerial stills) and video entries, assessing the behavior of the whales and dolphins following a behavior scheme (Table A2). We extracted relevant information, including the species of the whale and dolphin, the date and time of the interaction, the location, the number of animals involved, the age class, and defined the relative position of the dolphins in relation to the whale´s main body parts. We focused on classifying the presence of behavioral categories (Table A2) of dolphins at different parts of the whales body (Fig. 1) and divided them into three main groups: rostrum, flank and fluke. For interactions captured in videos, we also assessed the duration of the encounters and the frequency. We defined and counted an interaction as any visible interaction between a whale and a dolphin, regardless of its duration or intensity. Depending on the length of the videos, multiple behaviors and dolphin positions to whales were therefore counted each time a whale or dolphin would change its behaviour category or position. The closest observed distance between whales and dolphins was defined as touching, less than one dolphin length, more than one dolphin length, and less than or more than a whale length.

Table 1 Dolphin presence at different whale body regions when dolphins were within a whale length from a whale for 377 whales and 1537 dolphins

Whale body part	HW	FW	BW	GW	NRW	SRW	Total
Rostrum	1468	78	54	520	18	242	2380
Flank	373	14	11	79	5	114	596
Fluke	125	4	1	15	–	61	206
Other***	11	–	–	–	–	–	11

HW Humpback whale (*M. novaeangliae*), *FW* Fin whale (*Balaenoptera physalus*), BW– Blue whale (*B. musculus*), *GW* Grey whale (*Eschrichtius robustus*), *NRW* North Atlantic right whale (*Eubalaena glacialis*), *SRW* Southern right whale (*E. australis*)

***e.g. pectoral fin, dorsal fin

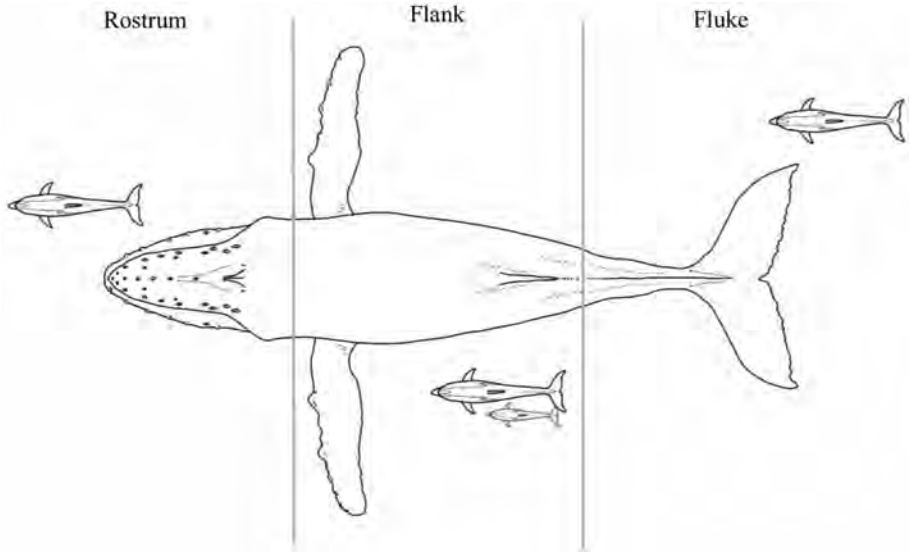

Fig. 1 Body sections of a whale and dolphin positions used to categorize whale and dolphin interaction

Interactions between whales and dolphins were assessed based on a set of 23 behavioral categories defined for whales and dolphins (Table A2). Baleen whale and dolphin ethograms were adopted from behavioral studies on whales and dolphins. The main behavior categories for baleen whales were rolling, pectoral, tail and head movements with a total of 12 categories [57–59] and for dolphins the main behavior categories were breach, bow riding, meandering, touring, rush, rubbing, tail slap and belly roll with a total of 11 broad categories [60, 61].

In addition, two events were added to the project that were previously documented using animal born videos. These interactions are providing a different and unique perspective compared to aerial or underwater footage from divers or swimmers [62]. The videos were derived from two tagged adult humpback whales between October 2021 and June 2023 from CATS (customized animal tracking solutions) suction cup tags (https://www.cats.is) [63] from the Gold Coast, Australia. The tags were fitted with 4 silicon suction cups; a magnesium release system; a VHF transmitter for retrieval and an integrated high-definition video (1920 × 1080 resolution). The tagged humpback whales were between 11 and 12 m in total length and were involved in competitive behaviour. We extracted the relevant sections and assessed the videos, counting and describing the type of visible behavior in the same method as for other videos available to the project.

3 Results

A total of 197 social media posts as well as 2 additional underwater videos from tag deployments were viewed for whale and dolphin interactions (Table A3). The majority of posts came from the Northern Hemisphere (N = 118) and mostly from the USA (N = 99) and in the Southern Hemisphere mostly from Australia (N = 62). Overall, observations came from a total of 17 different countries (Fig. 2).

Contributions were made by members of the public (N = 104), whale-watch companies (N = 74) and citizen scientists or research groups (N = 21) through 175 videos covering over 224 min and an additional 24 photographs predominantly underwater and aerial photos. In total the documented interactions included 425 baleen whales from

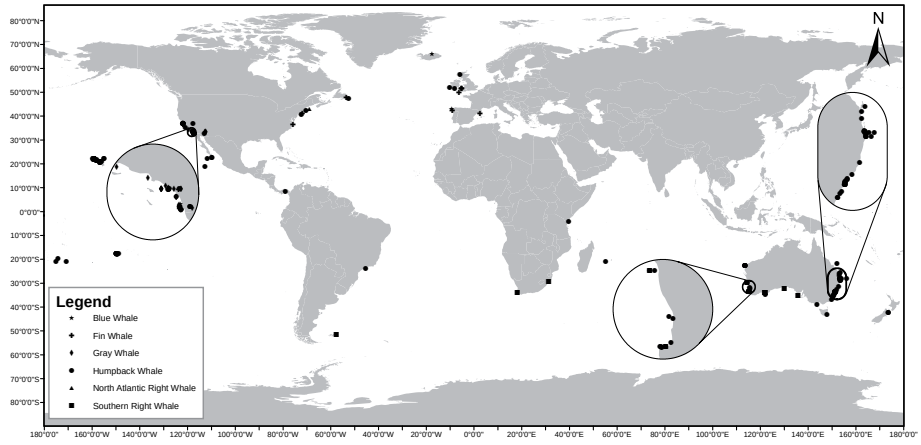

Fig. 2 Map of locations showing observations of different baleen whale and dolphin species interacting that were extracted from social media

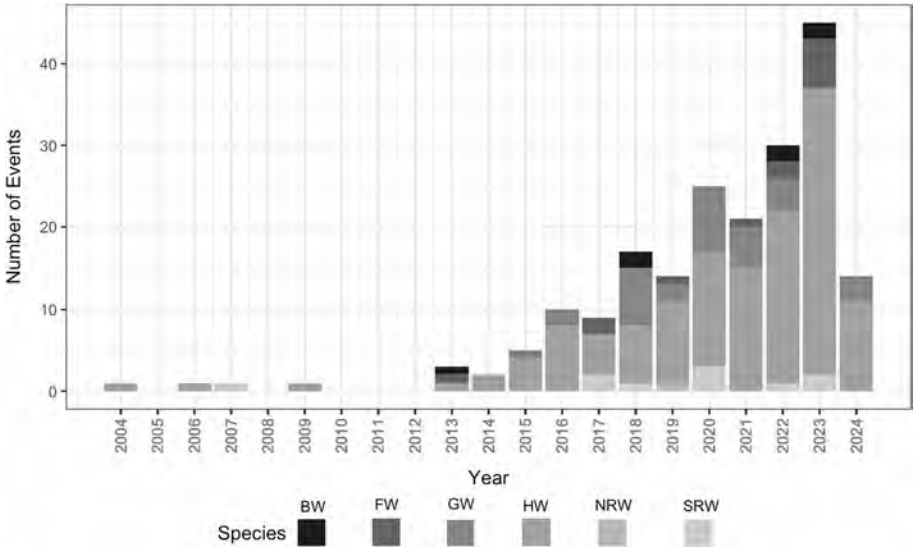

Fig. 3 Number of identified events from social media platforms over time and whale species between 2004 and 2024. *BW* blue whale, *FW* fin whale, *GW* grey whale; *HW* humpback whale, *NRW* northern right whale, *SRW* southern right whale

6 different species, with humpback whales dominating (68%) then grey whales (16%) and fin whales (7%). An estimated 1570 dolphins were observed from the material. We were able to identify 13 different dolphin species with bottlenose dolphins (*T. truncatus*) (51%), common dolphin (*Delphinus delphis)* (17%) and pacific wide-sided dolphins (*Lagenorhynchus obliquidens*) (15%) dominating. Adults formed the largest number of documented interactions (N = 102), however a whale calf was present in 44 events, and dolphin calf in 53 events. Both whale and dolphin calves were present in 21 occasions. The number of posts per year increased, in particularly within the past 5 years (Fig. 3).

3.1 Whale and dolphin interaction behavior derived from videos and photos

We counted 2516 behaviors for dolphins and 546 for baleen whales out of 199 analyzed events. In most of the analyzed events dolphins were undertaking forward movements (N = 119) in proximity to whales. In the other events dolphins were not moving in one

Fig. 4 Baleen whale and dolphin interactions showing different behavior categories. Bottlenose dolphin in proximity to a humpback whale rostrum bow riding near the Gold Coast, Australia (a, credit Roving Media); a surface rush by a bottle nose dolphin close to a pectoral fin of a humpback whale at Bermagui, Australia (b, credit WildLive. Media); petting or rubbing of a common dolphin on the rostrum of a fin whale in the Celtic Sea, England (c, credit Dan Abbott) and a group of bottlenose dolphins swimming alongside a southern right whale that is moving its fluke towards the dolphins in Esperance, Australia (d, credit Jaimen Hudson)

direction or indicating travel (N = 56) and the remaining events were documentations from photos. The predominant dolphin position toward the whale (independent of species) was the rostrum (80% or 2380 counts) (Table 1). Fast or aggressive behaviour categories such as jumps or breaches (55 counts), surface (27 counts) or underwater rush (55 counts) or tail slaps (26 counts) by dolphins made up the smaller number of behaviors, in contrast to slower or more gentle behavior categories such as bow riding (994 counts), meandering (958 counts), touring (217 counts), and belly roll (14 counts). In a few instances, rubbing (16 counts) or petting (1 count) was documented when dolphins purposely touched the whale on their rostrum (Fig. 4).

Baleen whale species responded each differently to the dolphin behavior. Humpback whales moved their pectoral fin toward the dolphins (172 counts) while grey whales were often rolling (56 counts) and southern right whales displayed pectoral slaps (5 counts out of 10 separate events). Fin, blue and northern right whales were either resting or swimming in the presence of dolphins showing limited or no interaction or response to the presence of dolphins (21 separate events).

Humpback whales also showed belly presentation, rolling and up-side down movements in the presence of dolphins. Combined these behavior categories accounted for 141 behavior counts (out of 420 behavior counts). Physical percussive behaviors that could indicate aggressive responses toward dolphins such as tail slaps (18 counts) or head slaps (none) were least observed for humpback whales.

3.2 Whale and dolphin behaviour derived from animal born videos

Two animal born videos from deployments on humpback whales were studied for whale and dolphin interaction at depth both involving humpback whale pods displaying chasing and competition between individual whales. One animal born video was derived from a tagged humpback whale (October 6th, 2021) that was part of a pod of six whales. The whale exhibited aggressive and competitive behaviors, such as pushing other whales

on the surface (motorboating) and making fast, close approaches toward others in an attempt to follow a mother-calf pair. The pod was visually observed from a vessel nearby for over two hours, during which dive durations ranged from 2 to 6 min. Additionally, the whale performed head lunges and over 27 tail slaps during the observation period. The average travel surface speed was 6 km/h.

At least 10 common dolphins were seen present on the surface during the focal follow. On the camera tag 4 common dolphins were observed interacting with the competing humpback whales through close approaches that included belly presentations and likely underwater contact (rubbing) at the rostrum, bow riding and touring (Table A2). The dolphins followed the humpback whales to the ocean floor and were visible in proximity to the humpback whales at depth. The humpback whales actively turned toward the dolphins in a slow but directed movement with one dolphin paying close attention to the whale's behavior and maintaining visual contact close to the whales' eye (Video S1).

Another camera tag from an adult humpback whale (June 22nd, 2023) accompanied by two adult humpback whales of similar size provided additional whale and dolphin interaction. The humpback whales were engaged in competitive behavior displaying head lunges and bubbling close to each other. They had an average surface speed of about 9 km/h over 30 min of visual observations with dive durations between 2 and 5 min. A single bottlenose dolphin was accompanying the whales with no other dolphins in sight during the observation period. The dolphin was undertaking surface and underwater rush as well as bow riding at the rostrum of the whale. When the whales moved to the bottom at 50 m depth, the dolphin followed moving sideways to maintain visual contact. It stayed below the whale's head, close to the ocean floor (Video S2).

4 Discussion

We established that baleen whale and dolphin interactions are a widespread phenomenon across different countries and species. Similar behavior categories have been documented and the frequency of interaction observed between baleen whales and dolphins, suggesting this to be a more common and complex interspecies interaction than previously thought involving a range of complex behaviors. By providing descriptions and summaries of the behavior, we were able to recognize different categories and establish patterns of the type of close encounters of baleen whales with dolphins that reoccurred.

We were able to demonstrate that a quarter of interactions from this study can be defined as a possible positive interaction. The form of interactions (e.g., play versus harassment) largely depends on the context in which the cetaceans meet. When baleen whales are feeding, there is also competitive behavior between whales and dolphins or harassment by dolphins possible [13, 15]. When baleen whales, such as humpback whales, were engaged in competitive behavior with each other, minimal behavioral response was noted toward the dolphins. However, alterations in movement away from dolphins, vocal chuffing, or physical percussive behaviors such as tail slaps were rarely documented in the events described in our study. The majority of events did not involve feeding (or communal foraging with feeding behavior or prey visible), which may explain less aggressive behavior by whales toward dolphins.

Based on the available videos and images close contact between baleen whales and dolphins occurred mostly near the rostrum of the whales with dolphins moving forward alongside the whales´ head or rostrum. Often the dolphins were less than one dolphin

length away from the whale (107 events) and the preferred position was near the head or rostrum of the whale with the fluke being the least preferred body part. The observed events may be described as locomotor play with bow-riding serving as an energy-efficient mode of locomotion and a form of one-sided play by dolphins.

However, in particular for humpback whales, we found that for one-third of the events the behavioral responses towards the dolphins can be described as positive. The humpback whales were rolling from side to side, undertaking belly presentation and other behavior categories that are associated with courtship behavior or friendly socializing. Whales also strategically moved slowly in the direction of the dolphins with their head and rostrum. Humpback whales are known for interspecific altruism showing affinity toward other species [64].

Sometimes deliberate short durations (seconds) of touching or rubbing occurred between whales and dolphins. In an extreme case a dolphin was slowly lifted into the air by a whale which was described as ISP or possible caregiving behavior and maybe a cross-species innovation [9, 38]. Animal born videos from our study showed that bottlenose dolphins followed humpback whales not only on the surface but also to the ocean floor where they continued engaging in close approaches including possible touching and social play. Only few touching or petting events between dolphins and whales have been documented to date. We were able to describe 8 separate events.

Social play generally takes place between individuals of the same species or with animals where one serves as a stand-in for a conspecific [41]. Dolphins interacting with other dolphin species is not uncommon and has been observed among dolphin species in the Bahamas and Australia [65–67]. While social play is often cooperative and reciprocal, it can occasionally be one-sided, with only one participant perceiving the interaction as playful, as seen in cases of teasing or harassment by dolphins [41]. Bottlenose and dusky dolphins have been documented engaging in behaviors that appear to influence large whales, including balaenids and sperm whales, to facilitate a bow wave surfing experience. This is achieved by positioning themselves near the whales' eyes, potentially eliciting a response [68]. Rossi-Santos et al. [6] reported on humpback whale interactions with different dolphin species from Brazil. Many times, the humpback whales were observed swimming in zigzag, breaching and tail slapping very close to the dolphins. However, while some of this behavior was displayed in the events, we reviewed the vast majority did not show such avoidance behavior. More so the opposite, when baleen whales were relaxed or socializing, they were seen swimming towards the dolphins and displaying rolling, belly presentation and slow, gentle movements.

During fierce competitive behavior between humpback whales, dolphins may be attracted by the vocalization and fast movements of humpback whales (pers. observation Meynecke). Pectoral fins were seen to be extended underwater when dolphins were near which could be a sign of agonistic behaviour similar to when competitors approach to keep them at distance [69]. However, defensive tail slaps or charging [70] were rarely observed (about 5% of the events) suggesting that humpback whales did not perceive dolphin presence as harassment during competitive behaviour. Other baleen species such as grey whales did not display avoidance behavior in the events we analyzed.

Observations recorded in the Abrolhos Bank, Brazil involving an interaction with humpback whales and rough-toothed dolphins (*Steno bredanensis*), suggested dolphins disturb whales to prey on remoras (*Echeneidae* spp.) attached to the whale's body [18].

However, the theory that dolphin's prey on remora from whales could not be substantiated from our analyses.

4.1 Play behavior in complex species

Burghardt [41] suggested a number of criteria to define play such as: voluntary and appearing to be enjoyable or rewarding to the individual (1); different from more serious behaviors when it is exaggerated or incomplete in nature (2); the cetaceans appear not to be stressed or hungry, and are in good health (3). Many of the behavior categories displayed during whale and dolphin interactions fulfilled these criteria. Play behavior in the events described in our study may facilitate an individual's ability to cultivate relationships, offer sensory stimulation and contributing to the overall well-being [60, 71, 72]. Creativity, a widely recognized characteristic of cetaceans [38], is also a potential driver of interspecies interaction. Dolphins maybe looking for ways to receive a stimulus or reciprocal response from whales.

However, inter-species interactions that could be defined as mutual play between cetaceans have rarely been investigated in much detail and we still have limited knowledge about the complexity of whale and dolphin culture [73]. For example, in our observations we also recognized behaviour that may be displayed during courtship from both baleen whales and dolphins during interactions such as belly presentation. It is difficult to determine the true intention behind some of the behavioral display.

4.2 Limitations of social media derived information

Documenting and observing interactions between whales and dolphins is difficult, but advances in technology, such as UAVs and the widespread use of social media, has resulted in an increase of reportings in the public domain. Videos, particularly those captured by UAVs, provide far more detailed insights compared to photographs taken from land or boats. Social media platforms like Facebook, Twitter, Instagram, and various online forums have become tools for sharing information about rare or underresearched animal behaviors. Citizen scientists, researchers, and enthusiasts use these platforms to share sightings, photographs, and other relevant information, contributing to the understanding of species with limited existing research. Other studies have highlighted the effectiveness of social media in documenting rare and elusive species by identifying new behaviors. For example, researchers have utilized social media to study ISP [51], study behavioral changes in humpback whales in response to tourism operations [74], and provide baseline data for marine wildlife presence to inform conservation [75].

Despite these benefits, social media-derived information comes with limitations. It often represents only a snapshot in time and is biased toward regions where social media platforms are widely used, potentially underrepresenting interactions in other areas where such platforms are less prevalent. Additionally, spatial biases and the lack of standardized data collection methods require careful quality control (Fig. 1). While social media posts cannot replace dedicated research projects, they are invaluable for identifying trends in data-deficient behaviors. The nature of social media information allows it to be used as a complementary resource to traditional research methods, offering valuable insights into the behavioral ecology of species and guide future research efforts [73].

5 Conclusions

Our documentation and analyses of whale and dolphin interactions revealed its occurrence across different species and populations showing similar behavior categories. We were able to define forms of play or positive interaction as well as harassment and agonistic behavior. The type of interaction among cetaceans depends on the context in which they meet, making it essential to exercise caution when drawing conclusions from observations without fully understanding the circumstance in which the species met. Extended use of UAVs can assist with observations providing additional information on the species and environmental conditions. Future studies should investigate the vocalization during whale and dolphin interactions, include more reports on less-sighted baleen whale species such as fin whales and blue whales, investigate if certain behaviors change with time and assess the duration of interactions from beginning to end (often only a fragment is being captured). Further investigating the context and potential drivers of these interactions will be critical to advance our understanding. Behavioral studies of marine mammals play a crucial role in enhancing our understanding of marine ecosystems and the interactions among marine species. They contribute to conservation efforts, promote public awareness and engagement in species protection.

Appendix A

The appendix provides an overview of the search terms used.

Appendix B

The appendix provides a summary of the behaviour categories used.

Appendix C

The appendix is a summary of all events analyzed.

Appendix D

The appendix shows underwater interaction between whales and dolphins from CATS camera tag.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1007/s44338-025-00099-2.

Supplementary file 1.

Supplementary file 2.

Supplementary file 3.

Supplementary file 4.

Supplementary file 5.

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Author contributions

Conceptualization, J.O.M.; methodology, J.O.M., O.C.; validation, J.O.M., O.C.; formal analysis, J.O.M; resources, J.O.M., O.C.; writing—original draft preparation, J.O.M.; writing—review and editing, J.O.M., O.C.; visualization, J.O.M.; O.C.; All authors have read and agreed to the published version of the manuscript.

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Data availability
Data is provided within the supplementary information files.

Materials availability
Not applicable.

Code availability
Not applicable.

Declarations

Ethics approval consent to participate
Material was sourced from social media. The animal study protocol was approved by the Ethics Committee of Griffith University (ENV/01/21/AEC). All research was undertaken under the permit of Queensland Permit WA0009070 and Commonwealth water permit C2016-0003 and CP2021.0002.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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