

Article

Going with the Flow: Assessing How Zoos and Aquariums Communicate Information About Marine Animals Without Faces (MAWFs)

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Abstract: Marine animals without faces (MAWFs), are some of the most important creatures maintaining the ecological balance in marine environments. How these animals are depicted across conservation organizations may impact public perceptions and conservation efforts. We assessed the online presentation of sea stars, jellies, and corals among all public websites of institutions accredited by the Association of Zoos and Aquariums (AZA) (N = 237). Among the organizations with an aquarium (n = 125), only 55 (44 percent) profiled at least one of the three animals, resulting in 89 total profiles. Five general approaches to characterizing these animals emerged: (1) scientific social distancing, (2) beautiful and eye-catching, (3) grotesque, otherworldly, and strange, (4) brainless beauties, and (5) objects of touch, entertainment, and experience. While some practices, like touch exhibits, can support empathy outcomes among visitors, online profile practices may contribute to the objectification of these animals among visitors, which could ultimately impact conservation attitudes, intentions, and behaviors.



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1. Introduction

Environmental communication regarding marine animals without faces is an important issue that has received little attention. For example, prior to 2013, sunflower sea stars (*Pycnopodia helianthoides*), with their abundant fanning arms and vibrant colors, were common predators in the waters of the Pacific Northwest. These invertebrates thrived in the intertidal zone, protecting and regulating areas such as kelp forests and rocky reefs. However, beginning in 2013, sea star wasting syndrome devastated at least 20 species of sea star from Alaska to Mexico, representing one of the largest marine epidemics ever recorded [1]. Because of the die-off, sunflower sea stars are now listed as critically endangered by the International Union for the Conservation of Nature and they have been added to the Association of Zoos and Aquariums (AZA) Saving Animals from Extinction (SAFE) program [2]. Conservation organizations have struggled to depict their stories along with other marine animals without faces. Sea stars—along with jellies and corals—can be described as marine animals without faces (MAWFs) and are the focus of this paper.

These are only three examples of highly recognizable MAWFs. In fact, over 90 percent of marine species are invertebrates [3], and many are MAWFs. Given their critical contributions to ecosystem functioning and their role in climate change mitigation [4,5], MAWF conservation is essential.

As some of the largest and most public-facing conservation organizations in the world, zoos and aquariums are positioned to play a vital role in shaping public conservation attitudes, especially with the acceleration of climate change [6]. Some studies indicate that going to zoos and aquariums can have a measurable impact on conservation attitudes among public visitors [7], but that this impact likely depends on people engaging in facilitated exhibits that are designed to enhance an emotional connection [8]. In contrast, Malamud et al. [9] argue that past studies lacked methodological rigor leading to false conclusions about the influence these institutions have on conservation attitudes. More recently, Kleespies and colleagues [10] found that even small, targeted programs like guided tours can have an impact on attitudes about conservation, and Greenwell et al. [11] assert that zoos and aquariums can directly and indirectly (positively and negatively) impact the people who visit them or live and work near them. The portrayal of animals within these organizations plays a crucial role in this impact, as it directly shapes public perceptions and can influence conservation behaviors and attitudes [12].

Studies assessing depictions of animals and conservation connections have largely focused on charismatic megafauna, such as tigers, polar bears, or pandas [8,13], with relatively few studies addressing depictions of less charismatic creatures like MAWFs [14]. The fact that MAWFs are rarely profiled makes it essential that we understand how depictions of MAWFs influence visitors and viewers. By evaluating how AZA-accredited organizations with aquatic habitats present MAWFs (specifically sea stars, jellies, and corals) we can begin to fill this gap in understanding.

2. Background

2.1. MAWFs, the Ecosystem, and the Need for Accurate Messaging

MAWFs are critical to ecosystems and human wellbeing. For example, sea stars are sea urchins' natural predators. Sea urchins, in turn, consume kelp [15,16], and kelp provides food and habitat for an array of species while also serving as a carbon dioxide sink [17]. For the past decade, sea star populations have declined, with some species virtually becoming extinct [18,19]. Due to climate change, kelp forests with low sea star populations can be decimated by urchins, limiting available habitat for small fish to take refuge from larger predators and reducing a vital food source in ways that lead to declining marine diversity [15]. Further, declining sea star populations and the resulting reductions in kelp forests will likely worsen climate change by reducing carbon sequestration [20,21]. Thus, the cascading effects of declining sea star populations underscore the importance of public support and funding for conservation efforts.

Similarly, in a balanced ecosystem, jellies help control marine populations by consuming eggs and larvae, and frequently serve as prey for larger creatures such as birds, turtles, octopuses, and crabs [22,23]. At the same time, warming water temperatures are driving jellyfish to propagate and jellyfish blooms to become an increasing problem that undermines marine biodiversity, causes human injury, and has the potential to reduce fish stocks [24,25]. Because of their simultaneous importance and precarious position for humans and ecosystems, careful messaging on these animals is essential [26]. Finally, corals provide unparalleled habitats for marine life, reduce erosion, protect coastlines from storms, and serve as hotbeds for marine diversity [27–29]. In addition, they provide an estimated \$375 billion each year in goods and services. In the US, many fisheries depend on corals, with an annual estimated value of over \$100 million. This number does not include

recreational or tourist activities related to coral reefs, which are a substantial economic benefit [30]. Like sea stars, there have been significant declines in coral reef populations, including mass die-offs from extreme ocean temperature increases. Over half of the world's coral reefs have died, largely due to bleaching caused by warming oceans. Coral organisms create foundational habitats from shallow reefs to deep-sea sanctuaries. This biodiversity enhances resilience to a changing climate and promotes adaptation. Public awareness and support for the conservation of these animals is imperative because of both their ecological importance and endangered status.

2.2. Research on MAWF Depictions and Public Sentiment

People generally undervalue MAWFs and in many cases show little concern for their wellbeing [31,32]. Perkins [33] outlines the factors that contribute to public indifference or antipathy toward invertebrates including a lack of knowledge regarding what healthy behaviors look like, a lack of understanding about the animals' cognitive abilities, familiarity bias for vertebrates, uncertainty about invertebrates' ability to feel pain, the animals' lack of anthropogenic features or faces, and uncertainty about whether they are animals or even alive. This has prompted many conservation and monitoring organizations like the National Oceanic and Atmospheric Administration to make explicit statements on their websites that these are animals [34]. While invertebrates are often overlooked, it is likely that MAWFs hold the lowest position given that they lack easily identifiable facial features like eyes and mouths.

2.3. From Critical to Strategic Anthropomorphism

Anthropomorphism is the practice of attributing human characteristics or behaviors to animals or other living or inanimate things. As Taylor [35] notes, anthropomorphism is unavoidable because humans are constantly giving the natural world and animals meaning based on emotions and experiences. Some argue that this approach can lead to an inaccurate understanding of animals, which could further endanger humans and animals [36]. However, a growing body of literature suggests that the problem is not necessarily anthropomorphism, but rather an inability on the part of humans to interpret animal emotion and behavior accurately. Critical anthropomorphism asks us to acknowledge that how we perceive and recognize animal behavior and emotion is filtered through human experience, and that these perceptions have implications for human–animal interactions and animal welfare [37]. Critical anthropomorphism is based on science or direct human–animal comparisons [38–40]. It is about seeing animal behavior through a lens of biological and ecological knowledge, as well as what we might know about individual characteristics like age, health, and social situation. Critical anthropomorphism centers scientific accuracy and animal wellbeing and is frequently used by zoos and aquariums to promote connection and caring among audiences, but it should be used cautiously. In considering the challenges of anthropomorphism, Rivas and Burghardt note that

Anthropomorphism by omission is the failure to consider that other animals have a different world than ours. We can, without realizing it, attribute human traits to other species by failing to consider that many species perceive the world in a different manner than do we. . . . An important component of this approach, though often understated, is to . . . consider the animal being studied as an active participant, with the researcher trying to put him or herself in the animal's situation. (pp. 11–12, [41]).

This approach relies on a balance between encouraging connection with non-human animals and ensuring that the subject's behaviors and emotions are portrayed accurately.

Embedded within critical anthropomorphism are various concepts that address the way people view and make connections with animals, some with a focus on optimizing viewer interpretation. This includes concepts like Taylor's [35] anthro-interpretivism, which is a call for the general public to engage in "seeing animals" differently not just for the wellbeing of the animal, but for the wellbeing of all creatures [35]. This is a human-centered approach, where the public is asked to psychologically place themselves into the perspective of the animal, a form of perspective-taking to enhance empathy. Similar, but distinct, is a practice termed strategic anthropomorphism which asks us to remain critical of our approach, but to also acknowledge the realities of how people see the world and to strategically capitalize on those perceptions (even if they are initially flawed). This becomes an iterative process, where conservation organizations and researchers use the perceptions (and sometimes misperceptions) of animal visuals and behaviors to help people perceive similarities and connections between humans and other animals and, by doing so, promote conservation. Within this idea, tactics like animal portraiture or anthropomorphized text are used to elicit emotion from the viewer or reader with the understanding that the public likely draws on more classical and less critical anthropomorphic techniques in viewing and reading anthropomorphized images and text depicting animals.

In this way, the conservationist or researcher cares less initially about the viewer or reader understanding the science correctly and more about establishing a connection between the viewer and animal so that education can occur. For instance, if there is an image of a dog with his head tilted down, people might interpret this image as the dog being sad or depressed. While this might be the case, animal ethologists might assert that this dog may be indicating a submissive stance or may feel relaxed. A strategic anthropomorphic approach might be to utilize this image to engage human connection recognizing that how people initially view the image may not be entirely accurate, but that by building curiosity and a relationship between the human viewer and the dog, organic education about the animal can occur. We define strategic anthropomorphism as a calculated decision by conservationists to present the shared qualities between human and non-human animals to evoke an emotional response, enhance educational opportunities, promote conservation, and reduce psychological social distancing between species.

In general, psychological social distance is defined as the extent to which people feel a connection or familiarity between themselves and those belonging to other identity groups. When applied to animals, it refers to the extent to which people feel a connection between themselves and non-human animals. The goal behind strategic anthropomorphism is to recognize the psychological social distance between species and to attempt to lessen the gap. Among social psychologists, one way the lessening of this gap that has been defined is connectedness to nature [42]; however, connectedness to nature is not limited to a connection of the self to non-human animals, as it also includes connection to other aspects of the natural environment and the broader concept of nature [43]. Recognizing the potential power that strategic anthropomorphic imagery and text have for encouraging animal empathy and conservation, zoos and aquariums have begun to implement this approach to depict animals in their care. However, most research on both the use and impacts of such imagery and text has been conducted in relation to mammals and charismatic species; very little is known about how MAWFs are profiled. This project seeks to take a first step in filling this gap by systematically evaluating how MAWFs are depicted in images and text on AZA zoo and aquarium websites. Establishing this baseline understanding should help provide insight into what is working and what could be improved in the depictions of these creatures among zoos and aquariums, with the recognition that online profiling is only one of the ways these animals are being depicted.

3. Materials and Methods

In this study, we assess how MAWFs are depicted on the websites of all AZA-accredited zoos and aquariums in the US in 2023 (N = 237). We focus on zoos and aquariums because they have direct contact with the public, often exposing visitors to knowledge and language that is rooted in conservation efforts. Websites were chosen for three reasons. First, time and monetary constraints make it impossible to assess the depiction of MAWFs on-site in every zoo and aquarium; websites provide an initial assessment that should allow for more targeted, in-person evaluation in future studies. Second, websites are easier to change than animal exhibits, meaning the opportunity to apply this research quickly is greater. Finally, websites have a broader audience than physical locations. For instance, more than 1.3 million people visit Woodland Park Zoo in Seattle, Washington, annually, while 1.5 million people visit the website, a difference of nearly 200,000 [44]. In part this reflects the fact that visiting zoos and aquariums can be geographically and/or cost-prohibitive; thus, websites offer a mechanism to minimize inequality by providing a more accessible place to connect with and learn about animals.

We conducted a qualitative content analysis to assess how different MAWFs are represented on the websites of the Association of Zoos and Aquariums (AZA)-accredited organization websites. We selected three well-known but taxonomically and symbolically distinct marine animals without faces (MAWFs) to focus on—sea stars, corals, and jellies. Data were collected between January and April 2023. We systematically reviewed all 237 AZA-accredited zoo and aquarium websites to determine the presence of aquatic exhibits. A total of 125 organizations (55.5 percent) had at least one substantial aquatic exhibit. From these, we identified and archived all publicly available animal profiles for sea stars, corals, and jellies. Each profile's text and accompanying imagery were compiled into a database and analyzed using ATLAS.ti version 25, a qualitative data analysis software.

We employed a two-phase coding strategy. First using a deductive coding frame informed by the existing literature on animal representation, we coded for the presence of scientific descriptors and makers of individuality (e.g., animal type, scientific name, pronoun, scientific description, the description of an individual, and unique anthropomorphic characteristics). Given the relatively low frequency of individualized portrayals, we then applied an inductive, thematic coding approach to capture emergent representational patterns across the dataset. Codes were not mutually exclusive, meaning that narratives could contain multiple themes. We identified the five prominent themes discussed below: scientific social distancing, beautiful and eye-catching, grotesque, otherworldly and strange, brainless beauties, and objects of entertainment.

To ensure methodological rigor, two researchers collaboratively developed the codebook and jointly coded an initial subset of 40 profiles (about 30 percent), refining categories through iterative discussion until consensus was achieved. Intercoder reliability was subsequently assessed by an independent third coder who applied the finalized codebook to a random sample of 20 narratives (about 15 percent of the dataset). Cohen's kappa coefficients for the primary categories ranged from 0.81 to 0.89. This indicates substantial agreement. These results support the reliability and reproducibility of our coding scheme. Validity was addressed through analyst triangulation during coding, enhancing the robustness and interpretive credibility of our findings.

4. Results

4.1. Descriptive Statistics

Of the 125 zoo and aquariums with aquatic exhibits, less than half or 44 percent (55 zoos and aquariums)—profiled sea stars, corals, or jellies on their websites. Some organizations depicted more than one type of MAWF, bringing our total sample to 89 profiles. Jellies

were profiled the most, making up 41 of the 89 profiles (approximately 46 percent). Sea stars were featured 27 times (approx. 30 percent). Despite facing the greatest conservation concern among the three selected animals, corals were profiled only 21 times (14 percent). These results are consistent with past research findings that less charismatic animals are less likely to be published in research, mentioned in media stories, and cared for by zoos and aquariums. Some of this difference has to do with the critical care needs of different animals, which may be unachievable for some organizations. Importantly, though perhaps predictably, their vital role in ecosystem survival and the current need for conservation efforts means that the limited depiction of MAWFs has significant potential repercussions. While MAWFs are both literally and figuratively providing the base of the ocean ecosystem, when they are depicted on zoo and aquarium websites, these animals are often discussed in ways that may limit empathy and conservation. In evaluating these depictions, five prominent, non-mutually exclusive themes emerged: scientific social distancing, beautiful and eye-catching, grotesque, otherworldly and strange, brainless beauties, and objects of entertainment. Below we discuss each theme with examples.

4.2. Theme 1: Scientific Social Distancing

How animals are profiled impacts the connections people feel to them and may impact whether people support conservation efforts. Interactive displays that highlight connections between humans and animals are best at engaging people and promoting conservation [45,46]. Importantly, stories about individual animals help build a sense of connection to the animal that promotes empathy and conservation [47], whereas scientific facts may enhance visitors' understanding of the species. All 89 profiles examined in this study (100 percent) emphasized scientific facts like scientific name, habitat, size, life span, and conservation status in lists or paragraph form. None included a story about a particular animal, though most had other types of text identified in the themes below. Six profiles (about 7 percent) exclusively discussed scientific facts. Figure 1 presents an example of what a list of facts might look like. We do not include organization names out of respect for the fact that many of these organizations are actively trying to create better connections with animals. Though we wish to bring attention to the types of coverage zoos and aquariums are providing, we do not want to "call out" individual organizations for fear that doing so could have negative implications for the organization. Instead, we present general information and quotes without direct attribution. The corresponding author can be contacted for details about the sample.

<p>Scientific name: Aurelia aurita Class: Invertebrate Length: 6 to 8 inches across (15 to 20 cm) Height: 3 inches (7.5 centimetres) Life span: Less than 1 year Conservation status: Least concern</p>
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Figure 1. Example of Scientific Facts in List Form.

Figure 1 provides an example of the scientific information about the Moon Jelly included in list form on one website. Like many others, this text offers important information about the species but lacks elements that would promote a meaningful connection for the reader. While people might find facts about animals interesting, it is unclear if facts alone help people to make connections to animals that promote conservation behaviors. Even when scientific information is fleshed out in paragraph form, like the example pro-

vided in Figure 2, it may be inadequate in terms of fostering an emotional connection and conservation concern.

“Sunflower Sea Star *Pycnopodia helianthoides*

The sunflower sea star is the largest of the sea stars and has the most arms. It may also be the fastest sea star. It is typically found in the eastern Pacific Ocean from Unalaska Island, Alaska, to Baja California, but less typically south of Monterey Bay. This soft-bodied sea star relies on fluid pressure to maintain its body form. It has fifteen to twenty-four arms and may weigh up to 13.4 pounds (5 kg). Colors vary from orange to pinkish to yellow, brown, and purplish with white spines. *Pycnopodia helianthoides* has over 15,000 tube feet that allow the sea star to either cling to rocks or move along a substrate.”

Figure 2. Example of Scientific Facts in Paragraph Form.

Ideally all descriptions should be rooted in fact; and while this paragraph provides more context, it lacks an individualized framing that would provide a point of connection between the reader and the animal. While facts are important, the focus on facts over individuals or storytelling may diminish viewer connection by unintentionally insinuating that these animals lack importance as individuals. In this way, facts without context may contribute to increased psychological distance between the viewer and the animal, where the viewer increasingly views the animal as “other” and not with shared qualities or characteristics to connect with. As will be discussed below, zoos and aquariums do seem to recognize the limitations of scientific facts and often include text to increase interest by emphasizing the species’ beauty, grotesque nature, and/or importance for entertainment.

4.3. Theme 2: Beautiful and Eye-Catching Animals and Exhibits

These animals’ inherent attractiveness was highlighted in 29 of the 89 profiles (32.58 percent), including 3 sea stars, 18 jellies, and 8 corals. These profiles describe the animals as being beautiful, colorful, or otherwise eye-catching, focusing on the animals as a group rather than as individuals. The websites often included an invitation connected to the quality of beauty, such as “Come see these beautiful animals up-close, as they drift gracefully through the water, bodies illuminated by the changing-colored lights.” Such statements encourage the observer to admire the creature for their beauty and as part of a collective, almost like you would admire a bouquet of flowers, where a singular flower is secondary to the group. Connections to individuals promote action over connections to groups. Paul Slovic [48] notes that we are drawn to the stories of individuals as helping an individual is more cognitively plausible than being able to help an entire group.

The previous statement, like the others we analyzed, tells the reader that organizations use lights as beauty-enhancing or strategic manipulation tools, potentially suggesting the animal is not sufficiently interesting on its own and that they primarily serve an esthetic function. In other words, the animals are something to be manipulated and enhanced for human consumption. Similarly, coral was often referred to as a beautiful habitat for animal residents. As in, “Explore the beauty and diversity of coral reefs and their animal residents. . .” By bringing attention to “animal residents,” this statement may inadvertently reinforce the misconception that corals are not animals, as we do not often discuss animals living in or on other animals. In neither case is a specific animal profiled nor is a distinction made among individuals. Although sea star profiles did not distinguish among individuals, in some cases they did discuss aspects of the animal that increased their attractiveness. For instance, a profile of a sunflower sea star read, “Soft skin in colors ranging from

purple to brown, orange to yellow adds to its beauty.” While emphasizing an animal’s beauty is unlikely to increase psychological social distancing between people and MAWFs, minimizing the individual to emphasize the group, discussing the tools the organization uses to increase interest, and emphasizing the human entertainment factor each have the potential to diminish attachment.

4.4. Theme 3: Grotesque, Otherworldly, and Strange

While 29 profiles highlighted the beauty of MAWFs, roughly the same number (27 or 30 percent) emphasized the grotesque, other-worldly, or strange nature of these animals. Sea stars (15 profiles) and jellies (12 profiles) were exclusively featured within this theme, with no discussion of corals. One profile depicting jellies noted, “The mouth is also the ewww! It’s true: a jelly’s mouth also serves as its anus.” The added commentary about the animal’s bodily functions draws attention to the grotesque. Another noted, “The sea star then will extend its stomach out through its mouth and into the clam! Digestion (via possible toxic juices) occurs inside the clamshell, turning the mollusk meat into a liquid that is guided into the sea star’s mouth by the cilia on its arms.” While being scientific without added commentary about the grotesque this profile highlights the strangeness of this animal. Both profiles feature information designed to elicit an emotional response highlighting strangeness or difference, instead of drawing attention to the similarities we share with these creatures. Feelings of intrigue mixed with disgust and repulsion may engage visitors, but it is unclear whether they generate connection and empathy. The remaining organizations situated these animals as distinctly different from humans and almost alien-like. For instance, a statement about jellies notes, “They have no bones, nervous system, brain or muscles, are 97% water, and nobody knows how they move!” These depictions seem designed to highlight animals’ otherness or difference from humans; while they may spark interest, the overall effect may be one of diminishing connection or concern. Future research should assess this hypothesis.

4.5. Theme 4: Brainless Beauties

At the intersection of the beautiful and the grotesque is the depiction of the brainless beauty. At least three depictions (7 percent) of jellies had the phrase “brainless beauties” as descriptors. For instance, one of the nation’s largest aquariums titles their jelly page “Brainless beauties.” They then describe jellies as “. . .one of mother nature’s strangest wonders.” Another aquarium describes jellies as “these brainless, boneless, bloodless beauties. . .” The Urban Dictionary defines “brainless beauty” as “. . .a very pretty female that is stupid or unintelligent” [49]. Language with distinct negative cultural and social connotations may inadvertently impact viewer perception and could be considered offensive [50]. Although perception of this phrase has not been tested. To better assess what people think of this phrase and if it might impact perceptions, we added two questions about the term to an IRB-approved MTurk (online crowdsourcing platform) survey used for another purpose. We collected 312 responses from across the US. First, we asked people to identify if “brainless beauties” is a positive or negative term on a 5-point scale from 1 = completely positive to 5 = completely negative. Roughly 92 percent of people said that it was a somewhat or completely negative term. In addition, we asked people to assess to what extent they felt comfortable hearing the term. A total of 89 percent of women said that they would feel somewhat or always uncomfortable with the term compared to 32 percent of men. Instead of using “brainless beauties,” one aquarium settled on “boneless beauties.” The use of “boneless” highlights differences between MAWFs and humans and may not hold the same derogatory or negative meaning that brainless beauty does. However, as it is like “brainless beauties”, it could initiate similar feelings. This has yet to be tested.

4.6. Theme 5: Objects of Touch, Entertainment, and Experience

Coinciding with the depiction of these animals as beautiful was an emphasis on their entertainment value. A total of 19 profiles (21 percent) fit this theme, with 4 sea stars, 12 jellies, and 3 corals. Zoos and aquariums used MAWFs to encourage visitor attendance, promoting a range of entertainment options like interactive touch exhibits and animal tanks as photo backdrops. This is not surprising given that websites are a communication tool designed to attract and entertain visitors, and there is some research that suggests that creating these types of environments for “photo ops” may reproduce and model ecocentric identities [51]. One organization wrote “Learn about the anatomy and behavior of the jellyfish and take photos of yourself and your family at this exhibit with the jellies.” All the websites in this group promoted habitats over a specific animal or species. These statements included things like, “The Aquarium’s moon jelly touch habitat, the only one of its kind in the [retracted for anonymity], is sure to wow kids and adults alike.” Or “Touch Experiences: Yellow stingrays, anemones, a sea star, and pencil urchins are among the natural wonders that inhabit the [retracted for anonymity] habitat with touch experiences for visitors.” It is important to note the distinction between MAWFs as backdrops versus touch exhibits.

While both are entertaining, hands-on experiences can foster empathy by showcasing an animal’s needs and agency [52]. Some scholars argue for the promotion of “slow swimming” practices where people swim or move in rhythmic motion with marine life to develop a more intimate connection [53]; such practices have not yet been promoted by zoos and aquariums. Beyond touch exhibits and immersive experiences, some websites simply focused on the array of colors and numbers of animals people would see in the exhibit. One noted that, “At the [retracted for anonymity] exhibit, you will be captivated by the kaleidoscopic colors galore as you watch the neon spectacle created by the jellyfish in what some call a ‘gelatinous groove’.” Once again, we see overlapping themes emerge, where the beauty and strangeness of these creatures is profiled. Among the profiles that mention touch exhibits, none discussed how this “touch” impacts the animals or what measures are being taken to support them, although this level of information is usually offered during the in-person experience with animal welfare being the central focus and a standard for AZA accreditation. This is interesting given that people are increasingly concerned about animal wellbeing specifically for animals displayed and used by entertainment venues [54]. Such an omission mixed with other references to MAWFs’ ‘strangeness’ and ‘beauty’ may signal to the public that these are animals to be considered as entertainment and not as living and complex creatures that need protection.

5. Discussion

Although marine animals without faces (MAWFs) are some of the most important animals in marine ecosystems, public engagement and empathy for these creatures is limited, when compared with that of charismatic megafauna. In fact, many people are not even sure whether these creatures are animals. This is unfortunate as MAWFs like sea stars and corals have experienced devastating population collapses in the past few decades [55,56]. AZA-accredited zoos and aquariums could be key to significantly altering how people engage with and think about MAWFs. Zoos and aquariums constitute one of the largest conservation organizations in the United States, and the third largest monetary contributor to wildlife conservation behind the Nature Conservancy and the World Wildlife Fund [57]. Unlike the Nature Conservancy and World Wildlife Fund, zoos and aquariums are institutions that see over 150 million visitors each year. This means that these institutions have significant potential to influence public perception of wildlife. Conservation organizations are increasingly interested in identifying how to foster empathy for animals, including animals who are not typically perceived as charismatic, to promote conservation

interest and behavior [58]. However, our research demonstrates that if AZA zoos and aquariums wish to do this for MAWFs, significant changes in how MAWFs are profiled might be necessary.

Data on how MAWFs are depicted and how these depictions affect engagement and empathy are scant. As a first step toward filling this gap, we evaluated how AZA-accredited institutions depict the three MAWFs most likely to be in marine habitats (jellies, sea stars, and corals) online. We recognize that this is only one way that these animals are being depicted and that in-person profiling also has a substantial impact. Our analysis revealed that over 56 percent of AZA-accredited institutions with aquatic exhibits had no profiles of their MAWFs online, which may signal to visitors that these animals are insignificant, unimportant, or simply backdrops or habitats for other more charismatic creatures. This omission has significant potential ramifications for public perceptions and conservation support. Corals, for example, were the least likely to be profiled but remain one of the greatest conservation concerns in the animal kingdom. Among those organizations that profiled MAWFs on their websites, five themes emerged: scientific social distancing, beautiful and eye-catching, grotesque, otherworldly and strange, brainless beauties, and objects of touch and entertainment. Collectively, the five themes, which were not mutually exclusive, emphasize how zoos and aquariums highlight differences between humans and MAWFs. This has the potential to increase psychological social distancing between people and MAWFs, which could limit empathy and the potential for the conservation of these creatures. Future research should investigate the relationship between MAWF depictions and visitor perceptions.

Very few profiles used any form of critical or strategic anthropomorphism to draw comparisons between humans and MAWFs. In fact, we only found three instances of semi-anthropomorphic descriptions such as “The upside-down jelly is very social and rarely found alone, flipping upside-down and laying on the ocean floor next to their buddies!” Another notes, “when two bat stars bump into each other they begin a slow-motion “arm wrestling” match. . .” In both instances, experiences recognized by humans “being with buddies” and “arm wrestling” could help draw connections of the familiar, hopefully diminishing psychological social distance between the individual and animal. The third example states, “. . .as something so alien looking actually senses, eats, interacts, moves just as we do.” This statement makes an explicit connection but starts with acknowledging the strangeness of this animal visually. None of the profiles named animals or told a story about a particular animal. All profiles were generic, meaning they could be connected to any animal; some were even replications of profiles and images from other sites. The images of the MAWFs lacked critical or strategic anthropomorphism as well, although the use of this approach has been shown to increase emotional response [37]. Future research should assess whether these slightly anthropomorphic depictions work better than the thematic presentations identified above so that zoos, aquariums, and other conservation organizations can best depict MAWFs and their conservation needs.

6. Conclusions

The findings from this study provide a wealth of information for zoos and aquariums as well as other conservation organizations to consider. As a first step, conservation organizations should assess whether and how the five identified themes map onto their depictions of MAWFs and evaluate how their depictions influence visitors’ social psychological distance with MAWFs. Given the limited research on how people interpret information about MAWFs, we do not assert that the themes identified in existing depictions are inherently problematic. For instance, it is perfectly reasonable to suggest that these animals are beautiful. The designation of beauty, for example, may become problematic

when it is the only characteristic featured or when the individuality or importance of the animal is diminished by exclusively highlighting collective beauty. Similar statements could be made for the other themes we identified, such that depicting these creatures as grotesque may create fascination, but not promote empathy. Future research should better assess how people respond to the use of critical or strategic anthropomorphized MAWFs and whether text and the associated images have any influence on perception and potential for conservation efforts. In this case, videos of MAWFs with anthropomorphized text might be particularly important. Newer technologies such as virtual reality and artificial intelligence may be important care technologies to foster relationships with MAWFs as well. While our understanding of how MAWFs should be profiled is limited, there are some mechanisms that institutions should consider avoiding. For instance, describing MAWFs as “brainless beauties” likely has negative implications for the perception of the species and perhaps the conservation efforts. More research should be conducted to assess what phrases work best at engaging visitors and enhancing empathy. Beyond offering guidance on practices to avoid, the Advancing Conservation through the Empathy for Wildlife (ACE) network provides extensive resources and collaboration for zoos, aquariums, and affiliated institutions to foster empathy toward a wide range of animal species [58]. The ACE network is also engaged in ongoing efforts to evaluate public perception and levels of empathy specifically toward MAWFs.

As with all studies, there are some limitations. First, we exclusively analyzed websites. Although websites are important organizational tools, they are not the only apparatus that conservation organizations are using to communicate information about animals. What is presented on the website may or may not interface with the signage and other features within the organizations, and there is limited space on organization websites, so space-saving measures could account for fewer MAWF profiles. By adding some questions to another survey, we were able to quickly assess perceptions of certain words used to describe these animals. However, the survey was not representative or focused on this task. More research should be conducted to assess the impact of the language being used to describe MAWFs. Additional studies should assess whether there is consistency in branding from websites to exhibits among conservation organizations. In addition, research should also address the unique challenges posed by animals that are not individually recognizable, such as coral. Further, while research on other species gives us reason to believe that individualized depictions of MAWFs would enhance perception, we did not assess this directly. Future work should identify ways that MAWFs could be profiled and how these different depictions impact visitor perceptions and behaviors.

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