SFU

Faculty of Education

Dr. D.B. Zandvliet
EDB 8642
Faculty of Education
8888 University Drive
Burnaby BC V5A 1S6

T: 778.782.5680
F: 778.782.4203
E: dbz@sfu.ca

www.educ.sfu.ca

Dr. John Nightingale
President & CEO, Vancouver Aquarium

Aaron Jasper
Chair of the Vancouver Parks Board

Malcolm Bromley
General Manager, Vancouver Board of Parks and Recreation

June 12, 2014

Today I am writing to you in support of the excellent programs and educational supports that your community-based institution has provided to British Columbia residents for many years. In my experience as an environmental educator, there is now an urgent need to connect people with oceans/nature and the aquarium is an important part of this equation.

Through its interactive exhibits and displays and other educational programs such as fieldtrip support, *AquaSchool* and *AquaCamps*, I believe there is great value in the work the Vancouver Aquarium is doing to connect people to the natural world – aquarium programs bring students closer to nature.

Now, like never before, we need to work together to achieve the goal of ocean literacy and I note that the aquarium has worked for many years with educational organizations (such as mine) from across BC. I'd also like to note that according to many of my colleagues, the Vancouver Aquarium is a well-respected marine science centre and a leader in the field.

In my honest opinion, the aquarium is a centre committed to education, research and action, and has played its part in educating well over a million students that have passed through its exhibits. As an educator, I look forward to my continued collaborations with the people and programs that form the heart of this important institution.

Yours in education,

David B. Zandvliet
Associate Professor, Director
Institute for Environmental Learning

Faculty of Education
Simon Fraser University

July 30, 2014

Park Board Commissioners
Vancouver Board of Parks and Recreation
2099 Beach Avenue
Vancouver, B.C.
V6G 1Z4

downtown vancouver BIA
BUSINESS IMPROVEMENT ASSOCIATION

Sent by e-mail only.

Subject: Reaffirmation of our support for The Vancouver Aquarium

Commissioners,

In the Fall of 2006, our association participated in the public discourse on whether or not the aquarium should revitalize and expand its facility that would include larger pools for cetaceans. After careful deliberation, the Board of Directors agreed to support the aquarium's proposal on the basis that it contributes significantly to the regional economy. Attached for your reference is a copy of our letter to you dated November 20, 2006.

Since that last written communication to you on this matter, the Vancouver Aquarium has secured the necessary approvals from the Parks Board and the City of Vancouver to proceed with the revitalization and expansion. It has also successfully raised the funds, including $25 million of senior government funding, to finance its $105 million project. About forty percent of this amount has already been spent.

In light of the renewed public discourse about the aquarium, the Board of Directors revisited its position of almost eight years ago at its regularly scheduled meeting held on July 29, 2014. The result: a unanimous reaffirmation of our support for the Vancouver Aquarium for these reasons:

1. It is a consistent contributor to the regional economy as reported by MNP LLP in its 2013 report entitled ***Economic and Social Contributions: Vancouver Aquarium***. According to MNP LLP, the economic impact of spending by all out-of-town visitors that can be attributed to the aquarium is pegged at $212 million annually.

2. It is a major employer in this market with 450 staff, 340 full-time equivalents. In fact, according to the Vancouver Economic Commission's ***2009 BIZMap Market Area Profiles*** on Downtown Vancouver, if the aquarium was listed, it would be classified as a large employer, 50-plus employees, and it would be in a very small group representing only 5% of the total employers based downtown. Micro employers (less than 5 employees) and small employers (5 to 20 employees) make up the majority of employers, 55% and 33% respectively.

SUITE 325 - 1130 WEST PENDER STREET, VANCOUVER, BC V6E 4A4
PH: 604.683.7811 FAX: 604.683.7812 WWW.DOWNTOWNVANCOUVERBIA.COM

Also noteworthy, a full 61% of businesses located downtown are retail or service businesses—15% and 46% respectively. This further underscores the important role that the Vancouver Aquarium plays in supporting many of these micro businesses.

3. It is the largest tourist attraction in the region, in excess of over 1,000,000 annual visitors.

In closing, we kindly request that you reaffirm your support for the Vancouver Aquarium so that it can grow and continue its role as a major contributor to the regional economy.

Sincerely,
DOWNTOWN VANCOUVER BUSINESS IMPROVEMENT ASSOCIATION

Charles Gauthier, MCP
President and CEO

c.c. Dr. John Nightingale, President and CEO, The Vancouver Aquarium
Mayor and Council, City of Vancouver

1 Attachment

a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

Department of Curriculum and Pedagogy
UBC Faculty of Education
2125 Main Mall
Vancouver, BC, Canada V6T 1Z4

Tel: 604-822-5337
Fax: 604-822-4714
www.edcp.educ.ubc.ca

Vancouver Board of Parks and Recreation
Administration Office
2099 Beach Avenue
Vancouver, BC V6G 1Z4

July 23, 2014

Dear Members of the Vancouver Parks Board,

I have been following the recent debate as to the housing of Cetaceans at the Vancouver Aquarium Marine Science Centre, and to this end, I wish to comment on the considerable education benefits and public understanding that housing of such Cetaceans provide. I do so as 1) an academic and research professor with more than 20 years professional experience in the field of informal science education, and 2) with backing of a plethora of peer-reviewed, published research studies that attest to such educational benefits and public understanding (c.f. Mann & Vernon, 2013). In crafting this letter of support I would like to preface two points from the outset, namely,

1. the knowledge gained through research at the aquarium is used to protect these animals in the wild and to rescue and rehabilitate them at the Aquarium's marine mammal rescue centre.
2. the aquarium is recognized as a leading institution in engaging people and connecting them to the natural world, of which whales are an important part.

The focus of my comment, however, pertains primarily toward the considerable educational benefits and public understanding and awareness that housing of the Cetaceans provide.

No one can argue against the established fact that our natural world and its oceans are in trouble because humankind has been, and is, increasingly disconnected (Kim, Anderson, & Scott, 2014) from them. Because of our disconnection from marine nature, the world faces huge issues of ocean pollution, marine debris, overfishing, and lack of knowledge! We need institutions like Vancouver Aquarium and alike that can provide experiential and educational opportunities for connectedness and understanding. Such mediation of positive experiences with nature, including those facilitated by Vancouver Aquarium are important because they increase our connected to nature. Indeed, connecting people to nature and marine life is the first step in helping them care about our environment and wanting to make it better. Furthermore, it is imperative that today's youth learn about the threats facing marine mammals in the wild. They are the ones who will be making future decisions that affect these species. Hence, it is through institutions such as the Vancouver Aquarium, that knowledge, understanding and caring effectively mediated.

A number of peer-reviewed, published research studies attest to the positive impact of aquarium visits on people and the learning (knowledge/attitudes/behaviours) that results. For example, in a study by Falk, et. al., (2007), which included 1,862 visitors over a three-year period, it was demonstrated that visits to accredited zoos and aquariums prompted many individuals (54%) to reconsider their role in environmental problems and conservation action, and to see themselves as part of the solution. Furthermore, a majority (57%) of visitors said that their visit experience strengthened their connection to nature. A study by Ballantyne, Packer, Hughes, and Dierking (2007), supports the fact that visitors' first hand encounters with real animals contribute significantly to conservation learning, including observing animals in their 'natural' environment; opportunities for close encounters with wildlife; opportunities to observe animal behaviour. Furthermore, engaging visitors emotionally; connecting with visitors' prior knowledge and experiences; using persuasive communication; linking conservation goals and everyday actions; and providing incentives and activities to support visitors' behaviour change – all of these pedagogies are employed by the Vancouver Aquarium's education programs, particularly in the programs concerning Cetaceans. It is because of this first hand encounter that visitor environmental attitudes and behavior change – connecting them more to our ocean environments, helping them care more about our environments, and helping them want to make a difference. While it is certainly possible to put together an effective educational program about marine mammals using biofacts, videos, and other tools, there is nothing more impressive, memorable, or transforming than encountering the live animals. Being able to directly observe animal care techniques, meet the marine mammal care professionals, and see these amazing animals up close are second to none when it comes to educational impact and transformation of attitudes and environmental behaviours.

As a professor of museum education at UBC, I can further attest to aquarium leadership in the education field and it works to support educators at all levels (K-12 Schools, Universities). For many years UBC's teacher education program has partnered with Vancouver Aquarium as a practicum venues for pre-service teachers to acquire pedagogical skill as educators they could not acquire in the classroom alone. The Cetaceans and associate program has been an instrumental training ground for teaching the next generation of teacher how to become effective educators, which in turn has beneficially affected 1000's of students in the science classroom of British Columbia.

I would urge you to continue to strongly support the Aquarium's mission to support the conservation of aquatic life through display, communication, public programming and education, research and direct action.

Yours sincerely,

Dr. David Anderson
Director – Master of Museum Education (MMEd) Program
Professor – Museum Education
Department of Curriculum and Pedagogy

Cited References

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Falk, J.H.; Reinhard, E.M.; Vernon, C.L.; Bronnenkant, K.; Deans, N.L.; Heimlich, J.E., (2007). Why Zoos & Aquariums Matter: Assessing the Impact of a Visit. Association of Zoos & Aquariums. Silver Spring, MD.

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dolphin COMMUNICATION PROJECT

DOLPHIN COMMUNICATION PROJECT
P.O. Box 714, Old Mystic, CT 06372-0711 • Tel: 860 511 4704

25 July 2014

Niki Sharma (Chair) niki.sharma@vancouver.ca;
Constance Barnes (Vice-Chair) constance.barnes@vancouver.ca; and
Park Board Commissioners (sarah.blyth@vancouver.ca, trevor.loke@vancouver.ca, Aaron.Jasper@vancouver.ca, Melissa.deGenova@vancouver.ca, john.coupar@vancouver.ca, mayorandcouncil@vancouver.ca, gregor.robertson@vancouver.ca

Dear Vancouver's Park Board Chair, Vice-Chair, and Board Commissioners,

I am writing with concern over the debate regarding maintaining cetaceans in human care at the Vancouver Aquarium. Animals at Vancouver Aquarium receive exceptional care, led by a world-renowned veterinarian who collaborates with vets and scientists from around the world to share knowledge.

I have 25+ years experience studying acoustics, behavior and communication of several delphinid species both in the wild and in captivity. I collect my data from the underwater perspective with support during the entirety of my career from eco-tourists. I have spent more than two decades studying wild Atlantic spotted dolphins (Bahamas) and Indo-Pacific bottlenose dolphins (Japan), and more than a dozen years in systematic comparative studies of three groups of captive bottlenose dolphins (Roatan Institute for Marine Sciences, Honduras; Dolphin Encounters at Blue Lagoon Island, Bahamas; Zoo Duisburg, Germany). Although some claim that research in zoological parks is not relevant to wild populations, I find significantly more similarities in behaviors and vocal cues between individuals in all groups than I do differences.

The Dolphin Communication Project (DCP) is the only organization to conduct direct comparative behavioral studies on both captive and wild dolphins – collecting our data via a focal follow, all occurrence sampling protocol in ***exactly*** the same manner at all of our field sites and then analyzing the data from all field sites also in ***exactly*** the same manner. We find no statistically significant differences between how dolphins exchange information – their signals as behaviors, postures, gestures or vocal cues, etc. – whether the dolphins are wild or captive. We have several papers published – see list below.

Specifically, my colleagues and I have examined whether individual dolphins from three wild and two captive groups exchange pectoral fin (aka flipper) contact in the same or different ways. Our results suggest that the messages dolphins share with each other via their pectoral fins (e.g., greetings via flipper to flipper touch, appeasement via flipper to body rubs, etc.) are conserved across dolphin species and study sites. The signals used and messages sent are roughly the same whether dolphins are wild or captive (natural lagoon or man-made pool), tropical or temperate in habitat.

Indeed, we are much closer to understanding dolphin cognitive comprehension precisely because of research with captive dolphins; Dr. Louis Herman and his colleagues at the Kewalo Basin Marine Mammal Laboratory in Hawaii spent several decades enlightening the scientific and public communities to the fact that dolphins can comprehend the

components of language (syntax, semantics), that they have body awareness, can understand abstract labels, gestural pointing and human gaze directions. Similarly, the professional teams at Vancouver Aquarium are at the forefront of best practices in animal care, ocean research and direct action programs. Vancouver's marine science centre is considered one of the top five in the world contributing to global knowledge on ocean conservation and science. As the only rescue centre in Canada with a team that can be mobilized to rescue cetaceans, Vancouver Aquarium's continued learning is vital to ocean and marine mammal conservation efforts.

Conservation is a key issue in protecting our planet – both terrestrial and aquatic habitats and species. Presenting charismatic megafauna (e.g., dolphins) allows a facility to capture the attention of millions of people who will never visit the oceans. Aquariums allow people to connect to the animals and systems that drive our ocean planet. It is precisely because of these displays that many folks will become passionate about the oceans and protecting them.

Our understanding of dolphin physiology, behavior, and biology has increased dramatically, even exponentially, since the first marine park opened more than 70 years ago. This increased knowledge led to technological innovations that allowed facilities to greatly improve their husbandry practices as well as their enrichment, research, and educational programs. In fact, I believe that our understanding of dolphins would be a mere shadow of our current knowledge and collective expertise if we'd not been able to observe, study, care for, and maintain dolphins in captivity. We would know next to nothing of their physiology nor have any real insight into their mind or cognitive abilities. All of these arguments are relevant for other delphinids. Without a keen understanding of a species at both the group and individual levels, how could we even make informed decisions about conservation or management issues that would also benefit wild populations?

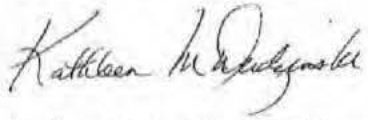
Our oceans are in peril. The number of people in cities greatly exceeds those in rural regions. These urbanites rarely get to interact with wild animals on land, much less visit the coastline or oceans. In fact, many residents of cities will only ever experience dolphins as a result of school trips or because of ready access to an aquarium. It would be the rare few who might ever see a wild dolphin or whale. Indeed, we have residents of cities join our eco-tours but we can accommodate 8-10 people per week program – and only are able to run a few programs each year to assist with our data collection field work! Yet, to protect these animals, the majority of the voices will come from cities and these people need a way to connect with these animals. They need an up-close and personal way to connect with our natural world and our oceans. Facilities like Vancouver Aquarium offer the personal connection to foster the next general of environmental stewards. Learning gained from working closely with cetaceans is used to help rescue, rehabilitate and release marine mammals.

There are multiple layers involved in understanding another species; research results fuel and encourage a greater connection for humans as environmental stewards. All of the captive animals I have studied are healthy, happy and enriched. The fact that captive and wild dolphin behaviors that I have studied are often statistically indistinguishable from each other supports my view. The benefits we gain from having these animals in human care, in captivity, are not just for research but also for conservation and education efforts.

In an effort to share what our community has learned from captive dolphins, John Anderson, Terramar Productions, and I produced a film titled *Understanding Dolphins*. Our film presents a fraction of what we have learned from studying captive dolphins. You can view this 26 minute film at the following link: https://vimeo.com/92797184

Thank you for your time and consideration. Please feel free to contact me with questions or comments.

Sincerely,



Kathleen M. Dudzinski, Ph.D.
Director, Dolphin Communication Project

cc.: Charlene Chiang, Vancouver Aquarium (publicrelations@vanaqua.org, webmaster@vanaqua.org)

Avaiable Files:

List of Scientific Publications – captive versus wild dolphin comparisons

Dudzinski, KM, Danaher-Garcia, N, Gregg, JD. 2013. Pectoral fin contact between dolphin dyads at Zoo Duisburg, with comparison to other dolphin study populations. Submitted to *Aquatic Mammals*. 39(4): 335-343

Dudzinski, KM, Gregg, JD, Melillo-Sweeting, K, Levengood, A, Seay, B., Kuczaj II, SA. 2012. Tactile contact exchanges between dolphins: self-rubbing versus inter-individual contact in three species from three geographies. *International Journal of Comparative Psychology – Special Symposium Issue* 25: 21-43

Greene, W, Melillo-Sweeting, K, Dudzinski, KM. 2011. Comparing object play in captive and wild dolphins. *International Journal of Comparative Psychology* 24(3), 292-306

Dudzinski, KM. 2010. Overlap between information gained from complimentary and comparative studies of captive and wild dolphin communication. *International Journal of Comparative Psychology* 23(4): 566-586.

Dudzinski, KM, Gregg, JD, Paulos, RD, Kuczaj, SA. 2010. A comparison of pectoral fin contact behaviour for three distinct dolphin populations. *Behavioural Processes* 84: 559-567.

Dudzinski, KM, Gregg, JD, Ribic, CA, Kuczaj, SA. 2009. Flipper's flipper – a comparison of how, where and why spotted and bottlenose dolphins use their pectoral fins to touch peers. *Behavioural Processes* 80: 182-190.

PDFs available on request, and some are available for free download from the publications page on the DCP web site at: http://dolphincommunicationproject.org/publications/scientific-publications.html

SUBJECT: **Presentation to the Parks Board meeting on captive cetaceans at the Vancouver Aquarium**

Dear members of the Board of Parks and Recreation (Vancouver):

My name is Dr Peter Ross, and I speak to you today as Director of the new Ocean Pollution Research Program at the Vancouver Aquarium. Unfortunately I am unable to present this in person because of a prior commitment on Monday July 28 (I was registered as speaker number 82).

I speak to you as a newcomer to the Vancouver Aquarium, having served as a scientist with the Canadian government for 17 years; one whose laboratory was shut down along with our country's entire national marine pollution research team in 2013. During my time at the DFO Institute of Ocean Sciences in Sidney (BC), I worked on PCBs in our beloved killer whales, flame retardants in harbor seals, and hydrocarbons in sea otters. I did so largely by working on wild populations, but I also gleaned important insight into pollutants and health using samples from captive marine mammals. These more controlled studies would simply not have been possible in wild whales.

I would like to be clear: science does not need whales in captivity, but science does benefit from access to such individuals. And the study of captive marine mammals has on countless occasions provided invaluable information to managers, regulators and conservationists on factors affecting the health of wild whales and their habitat.

In taking me and my program on, the Vancouver Aquarium took a courageous step in assuming responsibility for ocean science at a time when so many others have seemingly abandoned our oceans. I joined the Vancouver Aquarium because I believe that it represents the best place for me to continue my work on some of the most pressing conservation threats facing our ocean. This research will provide guidance to stakeholders and regulators on what steps we can take to reduce our impact on the ocean and ensure the survival of wild whales for future generations.

And this, in my view, is in fact central to today's discussion.

Because we are talking today about whales, their needs, their well-being, and what's right.

And as we ponder the future of captive cetaceans at the Vancouver Aquarium, I cannot be but profoundly concerned about the future of wild whales and the ocean. Over half a million marine mammals die each year in fishing nets around the world. Over 400 sea

lions are presently entangled in plastic packing straps on the west coast of Vancouver Island alone. Pesticides, industrial chemicals, flame retardants, pharmaceuticals and plastics enter our ocean through sewage, runoff, deliberate release or accident. Beluga whales in the arctic and the St Lawrence are threatened by oil, industrial chemicals, by underwater noise and by a changing environment.

In a perfect world, these issues would be an integral part of a prolonged and energized conversation with concerned citizens from Vancouver and elsewhere.

Ladies and gentlemen of the Parks Board, your mandate is to deliberate on the fate of the cetaceans at the Aquarium. I can only hope that your deliberations will consider the broader plight of wild whales, and our information needs from the best possible science, as we seek to protect them in a rapidly degrading ocean.

Thank you.

-Peter S. Ross, PhD
Director, Ocean Pollution Research Program, Vancouver Aquarium
And Adjunct Professor, University of Victoria

Department of Zoology
University of British Columbia

Dear Vancouver's Elected Officials,

We are a group of researchers that are writing this letter in support of the Vancouver Aquarium and their collection of cetaceans (whales, dolphins, and porpoises). Members of our group conduct respiratory and hearing anatomy and physiology research on wild belugas in the Western Arctic. Our research conducted on cetaceans at the Vancouver Aquarium provides us an essential comparative framework for these wild populations.

Vancouver Aquarium is not only a leading marine science centre in Canada but it is also recognized internationally for its high standards of animal care and important research that has direct conservation consequences for wild marine mammals. Our group of scientists are involved with them to study the respiratory physiology and to develop tools to perform lung function testing in captive and stranded cetaceans. Respiratory disease is a major cause of disease and mortality in both wild animals and those held under human care. The studies we are performing with the Vancouver Aquarium and their rehabilitation centre allows us access to determine what is normal versus diseased. These data can then be used to diagnose and determine the efficacy of clinical treatment for specific respiratory diseases. In addition, the tools can be used by stranding networks to triage animals on a beach to increase the success of release.

Moreover, part of our research also focuses on the effects of man-made underwater noise on cetaceans. We analyze the inner ear of stranded and harvested individuals to diagnose whether the animals have suffered present or past acoustic trauma. The hearing measurements that the Vancouver Aquarium is performing on their cetaceans are critical to build normal cochlear frequency maps of several cetacean species. This information is necessary so that when acoustic trauma is found in cetaceans they can then be overlaid onto the map and then the acoustic source(s) can then be extrapolated based on sound frequency level. Without the Vancouver Aquarium's research on hearing ability and cochlear mapping, we would not be able to track the source causing acoustic trauma in wild populations.

For the beluga whale, our research with the Vancouver Aquarium is vitally important as Canada's Arctic is facing increasing pressure and impacts due to human presence. Consequently, without marine science centres like the Vancouver Aquarium, this vital research cannot be performed and we will lose the ability to assess how man-made change affects their ecosystem and ability to survive. Thus, belugas at the Vancouver Aquarium provide critical research opportunities to protect wild populations. If the cetacean program is phased out, so will this vital research.

In addition, the marine mammal rehabilitation center at the Vancouver Aquarium is unique as they are among few places that have successfully rescued, treated and released harbor porpoises. This is a testament to the dedication and expertise that exist among their veterinary and care taker staff. If this facility is closed, not only will the ability to care for stranded, sick and injured marine mammals, including endangered killer whales, be lost entirely, but also the knowledge of how to care for, treat and rehabilitate these animals.

We understand you are reviewing best practices and this is an important process to assure that these animals are given the best care that is possible. As one of the top five marine science centres in the world, Vancouver Aquarium is the one setting those high standards of best practice and they are continuously striving to improve.

Sincerely,

Dr. Andreas Fahlman, Professor, Texas A&M
Marina Piscitelli, University of British Columbia
Dr. Maria Morell, University of British Columbia
Dr. Robert Shadwick, Canada Research Chair, Department of Zoology, University of British Columbia

17th July 2014

Aaron Jasper, Chair, Vancouver Board of Parks and Recreation
Malcolm Bromley, General Manager, Vancouver Board of Parks and Recreation
Park Board Commissioners
Vancouver Board of Parks and Recreation
2099 Beach Avenue
Vancouver, BC V6G 1Z4

Dear Mr. Jasper, Mr. Bromley and Park Board Commissioners:

I am writing to you today in support of the Vancouver Aquarium and its cetacean program.

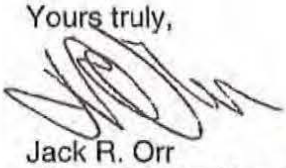
I am a marine mammal research technician working in the Central Arctic Region with the Department of Fisheries and Oceans. Part of my work involves stock assessment research on beluga, narwhal and walrus. For over 30 years I have been working alongside scientists largely on population assessment of Canadian Arctic odontocete cetaceans (belugas and narwhals), including hunter kill biological sampling, population census surveys and studies of movement and habitat use patterns using satellite tracking and time-depth recording. For the past 20 years I have been developing and perfecting field techniques related to the capture, handling and tagging of belugas and narwhals.

I have had a close working relationship with the professional animal management team at the Vancouver Aquarium since the early 90s. Arctic studies are critically important in the assessment and protection of wild stocks and we greatly value partnerships that enhance our ability to effectively conduct this scientific work. The belugas at the Vancouver Aquarium appear to be well cared for and very well trained. This condition allows for field scientists to test or pre-qualify non-intrusive attachments, equipment and techniques with the aquarium beluga collection prior to deployment in the field. The knowledge we gain from captive whale reactions can be invaluable at times. The Arctic is remote and the climate can be harsh and extreme making the field research efforts expensive and our particular work limited to a window of just a few months every year – having equipment and techniques calibrated before heading to the field can result in improved reliability, confidence and success. One such example is the use of flipper bands a simple noninvasive bracelet that we developed to specifically identify individual wild beluga. These passive identification bands were tested on Vancouver Aquarium belugas for comfort, durability, swimming and maneuverability impact, evaluation of potential physical trauma etc. and then when satisfied, successfully deployed on belugas in the wild.

The Vancouver Aquarium has also provided experts in the handling and care of cetaceans to assist directly in our Arctic field studies. Clint Wright the General Manager and Senior Vice President of Animal Operations has over 30-years hands-on

experience working with marine mammals. He has been a regularly participating field crew member over the last 20 years by providing invaluable support to our beluga tagging and science programs in the Western, Central and Eastern Arctic. For the last 5 years he has been providing that same support to our narwhal research program. The expertise that Clint has gained from routinely handling and caring for belugas and other cetaceans in aquariums is of great benefit to the care of the animals that we are studying in the Arctic. The crews consist of scientists, technicians, veterinarians and local Inuit support. It is always extremely important that the scientists can access the animals safely and conduct their work rapidly with minimum discomfort to the animals, so that they may be released as soon as we can. We have confidence in our animal handling operations and with experts like Clint improving handling techniques, providing health care support to the veterinarian and providing expert behavioural advice this is continually improving.

Yours truly,



Jack R. Orr
204 984-2187 | facsimile 204 984-2403
Jack.Orr@dfo-mpo.gc.ca
Marine Mammal Research
Arctic Research Division
Central & Arctic Region
Fisheries and Oceans Canada
501 University Crescent, Winnipeg, Manitoba, R3T 2N6
Government of Canada

cc: Dr. John Nightingale, Vancouver Aquarium
Clint Wright, Vancouver Aquarium

JAMES F. GESUALDI, P.C.
Attorney at Law
58 Wingam Drive
Islip, Long Island, New York 11751-4112
(631) 224-4801
Facsimile: (631) 224-1678
Jfges@aol.com

July 28, 2014

Mr. Aaron Jasper, Chair, Vancouver Board of Parks and Recreation
Mr. Malcolm Bromley, General Manager, Vancouver Board of Parks and Recreation
Park Board Commissioners
Vancouver Board of Parks and Recreation
2099 Beach Avenue
Vancouver, British Columbia V6G 1Z4

Re: Vancouver Aquarium

Dear Mr. Jasper and Mr. Bromley:

This is to thank you for the opportunity to comment upon the Vancouver community's leading edge efforts in cetacean conservation and welfare and the Park Board's review of the Vancouver Aquarium's (the "Aquarium") cetacean program.

The following comments are respectfully submitted, on my own behalf and not in any representative capacity, and are based upon twenty-five years' experience working on animal welfare and wildlife conservation matters in the marine mammal and broader zoological communities as well as within the field of Animal Law.[1] My efforts have been dedicated to making a difference for animals and people by bringing people together and working constructively to elevate consciousness about animal welfare.

The Cetacean Conversation

Vancouver is a diverse and dynamic world class community noted for its storied parks and environmental sensitivity, as well as for the Aquarium and its outstanding work on behalf of marine life throughout Canada and around the world. Vancouver has periodically been at the forefront of the global "cetacean conversation" and has through collaboration with the Aquarium

[1] Admitted to practice in New York State in the United States. I am not admitted to practice law in British Columbia or Canada but these comments are based upon animal welfare policy matters in the United States and several other countries.

elevated consciousness about cetaceans and enlightened means for their care, conservation and protection. This constructive action has extended beyond the Aquarium and Vancouver and has provided the world with a unique model worth emulating and one which allows the Aquarium to be even more influential within and outside the zoological community.

The Vancouver Model

The Vancouver community's full engagement with its beloved and respected Aquarium and the Park Board's judicious oversight appears to have challenged the Aquarium to higher standards beyond provincial and Canadian requirements as well as above even those of the professional organizations accrediting the Aquarium. This has heightened the Aquarium's extraordinary commitment to enhancing cetacean welfare and promoting cetacean conservation. It has also fueled continuous improvement while the Aquarium and its staff remain ever vigilant and sensitive as to the importance of serving the animals in their care, those in the wild, and others elsewhere that might benefit from further advances.

The Park Board Bylaw

The Park Board's Bylaw section 9(e) sets forth the limited circumstances where cetaceans may reside at the Aquarium. (See, http://vancouver.ca/files/cov/parks-control-bylaw-january-2008.pdf.) In essence, only those animals dependent upon human care, whether long term residents, born in human care, or rescued and rehabilitated animals deemed unsuitable for release. This protects both cetaceans in the wild and in human care. Cetaceans in the wild are to be maintained and conserved in their natural habitats, and those cetaceans residing at the Aquarium are there because their welfare and quite possibly their lives require the Aquarium staff's loving care.

The Aquarium's Cetacean Covenant

The Aquarium has further elevated its commitment to cetacean welfare and conservation via the Cetacean Covenant which expands upon the Vancouver Model. (See, http://www.aquablog.ca/2014/07/our-promise-for-marine-mammal-protection/.) The Cetacean Covenant advances the compassion, dignity and respect to be afforded cetaceans in the wild and in the Aquarium's care.

Excellence in Advancing Cetacean Welfare

The Park Board and the Aquarium have collaboratively advanced cetacean welfare and conservation through the Cetacean Conversation, the Park Board Bylaw and the Cetacean Covenant. The Vancouver Model provides the foundation for a further paradigm shift in terms of cetacean welfare and conservation where the Aquarium continues as a world leader and is better positioned to help cetaceans everywhere.

The following constructive measures are respectfully suggested:

1. The Aquarium Cetacean Covenant should be modified slightly as follows. Item 5 will be supplemented (or an item 6 will be added) to make clear what the Aquarium already does: **We will apply the knowledge we learn from our rescue, rehabilitation, release and research work with marine mammals in the wild to the animals in the Aquarium's care.** This simply memorializes what the Aquarium already does but makes clear that all activities also benefit and enhance the welfare of the cetaceans in the Aquarium's care.

2. Although current Aquarium staff may perform aspects of this function, the Aquarium shall establish an executive level Animal Welfare Officer whose primary focus and responsibility is the continuing enhancement of the welfare of the cetaceans and other animals in the Aquarium's care.

3. Through the Animal Welfare Officer the Aquarium will create and maintain an Animal Welfare Plan for the ongoing enhancement, assessment, validation and refinement of cetacean and animal welfare related measures at the Aquarium.

4. The Aquarium shall prepare and make available an Annual Report on animal welfare enhancements as well as on the direct and verifiable contributions of its many activities to enhancing animal welfare, promoting wildlife conservation, and educating and activating public action on behalf of aquatic life and aquatic environments. (This is somewhat broader than the recommendation in the July 23, 2014 Report to the Vancouver Board of Parks and Recreation entitled, "A review of the Vancouver Aquarium's current operations pertaining to cetaceans with comparison to other aquariums" by Joseph K. Gaydos, VMD, PhD and Sarah Bahan, MESc).

Thank you for your anticipated thoughtful consideration and your commitment to constructively advancing cetacean welfare and conservation.

Very truly yours,

James F. Gesualdi

JFG/pam

ccs: constance.barnes@vancouver.ca
sarah.blyth@vancouver.ca
trevor.loke@vancouver.ca
Aaron.Jasper@vancouver.ca
Melissa.deGenova@vancouver.ca
niki.sharma@vancouver.ca
john.coupar@vancouver.ca
mayorandcouncil@vancouver.ca
webmaster@vanaqua.org
publicrelations@vanaqua.org

James F. Gesualdi has dedicated himself to his work on legal, regulatory and related matters regarding animal welfare and wildlife conservation. He works extensively with the U.S. Animal Welfare Act and champions ways to improve its administration and enforcement, as well as engaging in consensus building on related policy matters. He is the author of the forthcoming book, *EXCELLENCE BEYOND COMPLIANCE: Enhancing Animal Welfare Through the Constructive Use of the Animal Welfare Act.*

Gesualdi's leadership experience includes serving as chair of the New York State Bar Association Committee on Animals and the Law; founding co-chair of the Suffolk County Bar Association Animal Law Committee; vice chair of the American Bar Association Young Lawyers Division Animal Protection Committee; and as a member (and an incoming General Vice Chair) of the American Bar Association Tort Trial and Insurance Practice Section Animal Law Committee, and the Section of Administrative Law and Regulatory Practice. He has served as special professor of law at Hofstra University School of Law, where he has taught Animal Law. He has also served on the faculty of the Association of Zoos and Aquariums' "Zoo School" for zoological professionals, where he taught courses on ethical considerations relating to animals.

He was special counsel to the marine mammal community's Working Group on the Reintroduction of Marine Mammals to the Wild, and participated in the U.S. Department of Agriculture Animal Plant and Health Inspection Service's Marine Mammal Negotiated Rulemaking, completing a voluminous "Analysis and Commentary" on this subject.

He earned his B.A. degree from St. Lawrence University where he graduated magna cum laude, Phi Beta Kappa, with highest honors in Government; his M.A. in Political Science (Public Affairs) from the State University of New York at Stony Brook; and his J.D. degree from the Hofstra University School of Law from which he graduated with Distinction and where he served as a Notes and Comments Editor of the Law Review. His work has been profiled in the American Bar Association Journal, The New York Times, The New York Law Journal, Newsday, Long Island Business News and in Careers in Animal Law.

Hon. John A. Fraser
P.C., O.C., O.B.C., C.D., Q.C. LL.D. (Hon.)
s.22(1) [redacted]

16 July 2014

Mr. Mayor and Council, City of Vancouver
Mr. Chair and Commissioners, Vancouver Board of Parks and Recreation
Mr. Malcolm Bromley, General Manager, Vancouver Board of Parks and Recreation

To Whom It May Concern:

I am writing to express my strong support for the Vancouver Aquarium Marine Science Centre. My career has been dedicated to bettering our great nation and our world, having been privileged to serve in the House of Commons from 1972 through 1993. During this time I held portfolios including Minister of Environment, Minister of Fisheries and Oceans and completed my political career as Speaker of the House of Commons. I was then appointed by the incoming Liberal government as Canadian Ambassador to the Environment.

I am a life-long conservationist. I have visited all corners of this country and some other countries and have learned much about the importance of the conservation of our natural world. There are few organizations that are as well regarded and have had such an important impact on the conservation of our natural world as has the Vancouver Aquarium.

I am not an advocate for catching animals from the wild. However, over my many years of working as a conservationist I have learned that without a doubt, the most impactful and effective way to connect and endear children and adults is through seeing live animals up close. In 1996, the Vancouver Aquarium took a leadership role by becoming the first aquarium in the world to commit to never again catch a wild whale or dolphin, and it has lived by this policy since that time. We Canadians should be very proud of this fact.

The animals in the care of the Aquarium are important ambassadors for the organization's work in conservation but are also vital to understanding these species. The world is changing. The knowledge and insight gained by the Aquarium in taking care of whales and dolphins is vital to understanding what the world needs to do to have a hope of maintaining populations in the wild. Scientists, policy makers and environmental strategists look to the Vancouver Aquarium for groundbreaking research on the impacts of the rapidly changing climate in the arctic.

This is not the time to be questioning the holding of cetaceans at the Vancouver Aquarium. This is the time to support this world-leading organization and the important work that it does in saving species and understanding the impacts of human actions on our natural world.

Sincerely,

John A. Fraser

cc: John Nightingale, Vancouver Aquarium

s.22(1) [redacted]

earth rangers | THE KIDS' CONSERVATION ORGANIZATION

June 13, 2014

Aaron Jasper
Chair
Vancouver Board of Parks and Recreation
2099 Beach Avenue
Vancouver, BC
V6G 1Z4

Dear Mr. Jasper,

My name is Peter Kendall and I am the Executive Director of Earth Rangers. I am writing you today to express our respect and support for the Vancouver Aquarium and its programs.

Earth Rangers is the kids' conservation organization, we are dedicated to educating children and their families about biodiversity, inspiring them to adopt more sustainable behaviors and empowering them to become directly involved in protecting animals and their habitats. Each year we visit over 550 schools across Canada delivering interactive school-wide assemblies and hands-on classroom experiments focused on biodiversity and environmental science. Our programs feature our live animal ambassadors who demonstrate their natural behaviors like our eagles, hawks and owls that soar over an audience of students. After participating in our assembly program, or seeing our PSA's on YTV, children are inspired to join Earth Rangers online to help protect wildlife by fundraising to support conservation projects across the country and by accepting animal saving missions to protect animals in their own backyard. Our membership program currently features 30,000 members and averages over 250 new members per day.

While we agree with Dr. Jane Goodall that it's important for wild animals to live in their natural habitats, the reality is that many species face dire threats in the wild and require human led conservation measures to ensure their survival. Animals born into certified and approved captive breeding programs not only help to bring back endangered species through specialized, controlled and monitored breeding , but as we at Earth Rangers' experience firsthand, also provide educational opportunities for children and families to experience wildlife first hand so they can be inspired to take action.

An example of how effective captive breeding and education can be is Earth Rangers' and the Vancouver Aquarium's Oregon spotted frog conservation project. From September 2012 to August 2013, over 5,000 kids signed up to protect the most endangered amphibian in Canada, Oregon spotted frogs. Funds raised supported the construction of a state-of-the-art tadpole breeding facility at the Aquarium and wetland restoration in Aldergrove Lake Regional Park, B.C. which enabled Earth Rangers and the Vancouver Aquarium to re-introduce this species back into the wild to help natural populations. A total of 8,105 Oregon spotted frog tadpoles were released into the restored habitat. This new habitat is also near other important wildlife areas, so as the wetland is restored it will not

only help Oregon spotted frog populations but will also provide a home for other species including endangered fish.

The Vancouver Aquarium is a well-respected marine science centre – a centre that's led with critical research and direct action on numerous important species to Canada. They have educated tens of millions of people all around the world about the importance of biodiversity. It is not only disrespectful but grossly incorrect to publicly compare them to entertainment organizations like Seaworld.

Please do not hesitate to contact me with any questions or concerns.

Best regards,

Peter Kendall
Executive Director
pkendall@earthrangers.com
905-417-3082

cc. Dr. John Nightingale

Vancouver Parks Board Commissioners

Dear Commissioners,

I am a retired research scientist from the Department of Fisheries and Oceans, where I had a 30 year career, working on the population biology and conservation of wild belugas in the Canadian Arctic. My colleagues and I have had very successful collaborations with the Vancouver Aquarium on several projects over the years.

I have heard that you will soon be reviewing the case for maintaining or not cetacean exhibits at the Vancouver Aquarium. I would like to share with you my opinion on the matter, particularly with regards to the belugas exhibited at the Aquarium.

First, I must say that I have been and continue to be impressed by the high standards of husbandry and care of those belugas and the valuable public education programs that have been put together by the Aquarium staff on the biology and ecology of beluga (and its relative the narwhal). We collaborated with several of your education coordinators.

In addition, we collaborated over the years with Vancouver Aquarium staff and researcher associates on research both at the Aquarium and in the wild. In 2007, an international workshop on beluga whale research, husbandry and management in Valencia (Spain) highlighted the science needs for the conservation and management of the world's beluga populations. It was quite evident that some of those science needs could not be achieved in the wild and there were several areas for research collaboration that were already being achieved and others that could be achieved by studying aquarium belugas.

For example, thanks to Clint Wright, our program tested some mark-recapture bands on Aquarium belugas, which were later used on wild belugas. In addition, we collaborated with Valeria Vergara who was able to confirm that parts of the vocal repertoire found in aquarium belugas was indeed used by wild beluga in Hudson Bay. These observations validate the behavioral context of vocalizations that are observed in aquaria, but would be impossible to correlate in the wild. An understanding of the behavioral context of beluga vocalizations will lead to a better understanding of behavioral responses to man-made disturbances to wild belugas. These two examples are one of several areas for research collaborations with aquaria highlighted by the Valencia workshop.

I know that many object to having cetaceans in captivity. I truly think that this view is born from an unrealistic understanding of their life in the wild and an over-inflated view of their intelligence and consequently environmental needs. Much hay also has been made about the death of aquarium-born neonate belugas.

Contrary to that idyllic vision, life in the wild is a constant struggle and many belugas do not live to be very old. In fact, many neonates in the wild are likely to die in the first weeks of their life. And, yes, they are intelligent and social marine mammals but, like dolphins and their peers, there is little to suggest that they are any more intelligent or social than canids (dogs) - not to diminish the latter's intelligence, by the way! I think that, like dogs, the beluga is a species that adapts quite well to regular interaction with benevolent keepers and, as long as they have sufficient stimulation from those keepers and from other captive belugas, they do well in an aquarium setting. The Vancouver Aquarium is a good example of a place where those conditions are available to belugas.

I sincerely hope that you will consider keeping the beluga exhibits at the Vancouver Aquarium and will continue to support its valuable education and research efforts.

Feel free to contact me if you have any questions.

Sincerely,

s.22(1)

Winnipeg, MB, Canada
R3L 1A9
s.22(1)

Reference

Gregg, Justin. 2013. Are Dolphins Really Smart?: The mammal behind the myth. Oxford University Press. (http://justingregg.com/are-dolphins-really-smart/)

GREMM

GROUPE DE RECHERCHE ET D'ÉDUCATION SUR LES MAMMIFÈRES MARINS
108, de la Cale sèche, Tadoussac (Québec) Canada G0T 2A0 • Tél.: (418) 235-4701 / Téléc.: (418) 235-4325 / www.gremm.

Québec, July 22nd 2014

Vancouver Board of Parks
and Recreation Administration
Office 2099 Beach Avenue
Vancouver, BC
V6G 1Z4

Dear Vancouver's elected officials,

I have heard that intense and emotional discussions have been going on in Vancouver over the last months about the fate of the belugas at the Vancouver Aquarium. I also understand you are about to take a decision on this delicate issue. I have spent the last 30 years of my life studying belugas in the St. Lawrence Estuary, Quebec, trying to understand this small isolated and endangered population, hoping what we learn will help to save them. Please allow me to share with you some of my thoughts and mixed feelings.

First, having spent thousands of hours spying on wild belugas, I have to admit that it feels awkward to observe them in an aquarium. There is no question that taking an animal such as a beluga from the wild to place it in an artificial environment is a quite dramatic intrusion into its life, and most probably into the lives of their relatives and companions left behind. Belugas, as several other species of cetaceans and mammals, are highly social animals. Even the best care and sophisticated enrichment programs can be not match to their complex social lives in the wild.

However, I have to admit that in my endeavour to "better understand to better protect" the St. Lawrence belugas, I rely, as most of my colleagues studying wild belugas and other whales and dolphins, on precious information learned over the last decades from research and observations on their captive counterparts. Some of this information helps us unveil fascinating aspects of their biology; some is also critical to our understanding and ability to protect these animals in the wild.

I recognize it is difficult to put these two appreciations in balance to decide whether we as a society want to maintain our tradition of keeping animals in captivity.

It is clear to me however that if we do keep them in captivity, we then have a great and challenging responsibility to provide the best possible care to the animals, to develop effective and needed outreach programs and to contribute through high quality science programs to the conservation of the species.

In 2007-2008, I was a visiting scientist at the Vancouver Aquarium. Not being a specialist in animal husbandry I was nevertheless able to appreciate the dedication of the animal care team. I was also impressed by the outreach programs of the education team, but even more so by the impact and fascination that the whales had on my three kids, even if they had had the chance to spend part of their summers on the water with me and wild belugas. It made me appreciate what it can do to kids that did not have the same opportunity! Finally, what I have learned from my observations of the belugas at the Aquarium during that year and from my ongoing collaboration with the Aquarium team have already been applied in our current conservation efforts to save the St. Lawrence belugas.

Again I don't know how this adds up in the balance but I have no doubt the value of what we have learned and continue to learn to conservation is real.

I hope you find these thoughts useful to your own reflection on the topic of the future of belugas at the Vancouver Aquarium.

Sincerely,

Robert Michaud
Président et directeur de la recherche
Groupe de recherche et d'éducation sur les mammifères marins, GREMM
Coordonnateur du Réseau québécois d'urgences pour les mammifères marins
T. 418 525 7779
C. 418 473 8974
rmichaud@gremm.org

Letter of Support for Vancouver Aquarium cetacean conservation, display, and research.

This is a time when fishing kills about 600,000 marine mammals each year. Is this a time to prevent citizens from seeing these mammals so all people (even those who cannot go out to sea) can appreciate them and their environment? Canadian citizens kill several hundred belugas each year. Is this a time to prevent other citizens from seeing them and appreciating them up close?

Activists claim that captive whales and dolphins are suffering. Professionals caring for captive cetaceans watch for those rare instances when they are suffering and can provide remedies. I have worked with captive cetaceans for 52 years. Care of captive cetaceans is light years ahead of where it was even 25 years ago. Twenty-five years ago nearly all captures from the wild stopped in North America. Births sustained the populations. Only a few rescued, non-releasable, cetaceans such as the dolphins and porpoises at Vancouver were added. When sick, suffering mammals come ashore, most citizens appreciate that professionals can come to help.

Cetaceans in the wild suffer from natural predators, parasites, and disease, and from many human causes. Hungry animals come ashore stuffed with plastic garbage. Killer whales from the region that includes Vancouver have the highest tissue pollutant loads detected. Such pollution affects many marine mammals. We know these things because professionals have worked with both captive and wild marine mammals to help conserve them. Scientists must have access to captive as well as wild animals if we want to conserve them. Let me give just one example. Many activists fantasize that captive cetaceans cannot echolocate. In fact, echolocation was discovered from captive animals. The great majority of knowledge on cognition, echolocation, hearing, and sound production required trained cooperating cetaceans.

We have much to learn from captive marine mammals that can help in ocean conservation. Activists milk emotions while bombarding us with a delusion that all captive cetaceans are suffering all the time. Responsible citizens should look beyond the false claims and support Vancouver Aquarium.

Sam Ridgway

Sam Ridgway DVM, PhD

Sam.ridgway@cantab.net

July 23, 2014

Dear Vancouver Parks Board Commissioners,

As an anthropologist who has lived and worked in the high Arctic for the s.22(1) , I would like to offer you some viewpoints on why many people in the Arctic support the Vancouver Aquarium to have beluga whales in its care, and help you to see that the importance of these whales is not only a Vancouver issue, but one that is ultimately critical to maintaining health wild populations across the Arctic.

I am sure that you are very aware of the reasons that the belugas are at the Aquarium, but perhaps you are unaware of how vital these whales are to the future of the Arctic. Releasing the Aquarium's belugas does nothing to protect and preserve those in the wild – in fact, they have a stronger role in preserving their species by remaining at the Aquarium. The research that the Vancouver Aquarium is doing on whale vocalization is likely to prove critical to monitoring and preserving wild populations of both beluga and narwhal that are currently under stress from climate change, shipping, resource development and seismic testing in Arctic waters. People living in the small communities in the High Arctic depend on healthy marine mammal populations, and the research being conducted at the Aquarium will undoubtedly be one of the few tools that we will have to protect the wild populations and ensure a healthy ecosystem. I cannot begin to tell you how Inuit fear the loss of the precious animals through factors that are beyond their control, and how grateful we are as Northerners that institutions like the Vancouver Aquarium are as passionate as we are to ensure the survival of these species.

As an instructor of the s.22(1) program in Pond Inlet, Nunavut, I was privileged to bring 13 young Inuit men and two Elders to Vancouver to work with the Aquarium on Arctic issues. For this group, who are so keenly aware of the issues facing the Arctic, it was clear that the belugas were an "entry point" for educating and creating awareness of the Arctic among visitors to the Aquarium. Love and respect for the belugas were the common ground, and the students and Elders were duly impressed by the obvious care, love and concern that the staff and volunteers had for the animals.

To say that Inuit, who rely on healthy populations of whales for their subsistence, were impressed by the Vancouver Aquarium speaks volumes as Inuit generally frown upon any animals, including pets, in human care. One of the most meaningful interactions came when my students noticed the look of amazement and wonder on the kid's faces as they watched the whales, and it occurred to the Inuit that this was truly how "southern" people formed their ideas about animals and the importance of conservation. Without a doubt, the whales at the Vancouver Aquarium are prompting the next generation of scientists, researchers and conservationists to become passionate about preserving these special animals.

I understand that this is an issue that will be presented to you in a way designed to get an emotional reaction, but please let the facts speak for themselves. Well-meaning, but uniformed people should never be allowed to emotionally manipulate you into making a decision that will most likely result in harm to the whales that are currently at the Vancouver Aquarium. They cannot survive in the wild and I am absolutely convinced that there is no place that will take better care for these animals than the

Vancouver Aquarium. And please remember if your ultimate goal is to do what is best for the whales, that they have an additional role and value in helping to provide understanding that can be used to preserve wild populations. Above all, please notice what my s.22(1) students and their Elders noticed: the simple joy of children and families as the belugas opened their eyes to the importance of the ocean and the animals that live in it. I may not live in Vancouver, but I can guarantee that the belguas at the Vancouver Aquarium are well cared-for, among your best ambassadors, a fantastic way to connect your citizens to the issues of a bigger world outside your city, and Vancouver's contribution to the preservation of a critical species in the North.

Kind regards,

s.22(1)

s.22(1)
Pond Inlet, Nunavut
X0A-0S0
s.22(1)

TOURISM
VANCOUVER

The Metro Vancouver Convention
& Visitors Bureau

Suite 210 - 200 Burrard Street
Vancouver, BC Canada V6C 3L6
P 604.682.2222
tourismvancouver.com

July 10, 2014

Mr. Aaron Jasper, Chair
Mr. Malcolm Bromley, General Manager

Vancouver Board of Parks and Recreation
2099 Beach Avenue
Vancouver, BC V6G 1Z4

Dear Mr. Jasper & Mr. Bromley:

The Vancouver Aquarium Marine Science Centre has been a valued member of Tourism Vancouver for some 30 years and is a vital part of our sales and marketing activities. In fact, our meeting planner and tour operator clients view the Aquarium as one of the top venues and experiences for their delegates and clients respectively. What's more, Aquarium passes are among the top three attractions products sold at Tourism Vancouver's Visitor Centre downtown.

As you know, the Aquarium is the largest attraction in Vancouver annually drawing hundreds of thousands of out-of-town visitors. Combined with Stanley Park, the Aquarium is one of the reasons visitors decide to spend more time in the city, ultimately benefitting businesses and the community alike. Vancouver's ability to sustain a vibrant tourism industry well into the future requires institutions like the Aquarium to enhance its offerings and manage its facilities to accommodate growth with a keen eye to benefits for both residents and visitors alike.

Tourism Vancouver whole-heartedly believes in the Aquarium's mission and long-terms plans that include cetaceans. It is why we actively participated in the Aquarium's review and public consultation process, presented at Park Board meetings, and supported the management and staff on various initiatives including the recent expansion. This outstanding renovation enhances the Aquarium's appeal for all customer groups and exceeds expectations on all counts.

Aside from the importance of the Aquarium as a visitor attraction, Tourism Vancouver supports the Centre's role in the conservation of the aquatic world. From animal rehabilitation and the Ocean Wise sustainable seafood initiative, to research and community engagement, the Aquarium is essential to a healthy city and planet, and contributes significantly to Vancouver's Green City goals.

We also want to acknowledge the Aquarium's Board, staff and volunteers who have managed their institution in a way that has achieved a remarkable symbiotic relationship with its host community, Stanley Park. The Park provides a world-class setting that has greatly enhanced the 'aquarium experience.' The Park, as a place to experience nature, has also benefited from generations of locals and visitors who have come to the Aquarium and discovered a 'wilderness experience.'

.... 2

TOURISM
VANCOUVER

Based on the information provided as part of the public review process, related discussions and previous approvals by all levels of government for the Aquarium's expansion, we strongly encourage the Commissioners of Vancouver's Board of Parks and Recreation to continue to support the Aquarium's mission including its display and important conservation and research work with cetaceans.

Sincerely,

Bob Lindsay
Chair of the Board of Directors, Tourism Vancouver

cc: John Nightingale, Vancouver Aquarium

The Vancouver Board of Trade

President and CEO

July 22, 2014

Dear Parks Board Members (via email),

Re: The Vancouver Board of Trade's support for the Vancouver Aquarium

The Vancouver Aquarium Marine Science Centre is a unique facility in Canada, renowned for its rich mixture of conservation, education and scientific programming embedded within a world-leading visitor attraction. It has been a civic and conservation leader for more than 58 years, serving Vancouverites, British Columbians and visitors from across Canada and abroad.

As a self-supporting not-for-profit organization, the Vancouver Aquarium has an annual operating budget of just over $30 million, 85 per cent of which is supported by visitor experience revenues — making it the only large, cultural organization in Canada that operates without subsidy from any level of government. The organization's collection of more than 50,000 animals plays an integral role in the attraction and engagement of its visitors, while providing support for important research, specialized skill development and marine mammal rescue programs.

In its review of the economic and social contributions of the Vancouver Aquarium in July 2013, MNP LLP reported that the Aquarium generates:

- More than $43 million in direct and indirect annual economic output;
- $59 million from out-of-town visitors directly attributable to the Aquarium;
- $8.7 million in annual tax revenue;
- More than $1 million in direct net annual revenue to the City.

The Vancouver Aquarium employs 450 staff, equating to 340 FTEs — a number that has doubled over the past 10 years. In addition, with more than one million visitors annually, 75,000+ members, as well as 1,000 volunteers who donate more than 130,000 hours per year, the Vancouver Aquarium plays a significant role in the economic engine of our city and this province. As the first LEED Gold and ISO 14001 certified cultural institution in Canada, the Vancouver Aquarium is also an important contributor to the City of Vancouver's goal to become the greenest city in the world.

With recent capital investments by both the federal and provincial governments of $15 million and $10 million respectively, its own cash reserves of more than $5 million, as well as support from a number of local institutions and donors such as Teck, RBC, BMO, the Molson Foundation and others, the Vancouver Aquarium has just completed the first of three phases of its $100-million revitalization — the single largest and most extensive investment in the organization's history.

An extensive planning, consultation and permitting process was undertaken for this project over the past six years, which included a majority vote of the Parks Board to grant the additional land within Stanley Park. That process included consultation with more than 4,000 Vancouverites and included public hearings. To date, the Aquarium has spent more than $45 million of the total $100-million budget.

The current process of review, initiated by the Parks Board, runs the risk of negatively impacting the Aquarium's future ability to continue to operate in a self-supporting manner and to conduct important work in ocean conservation, research and education. Further, the likely negative social and economic impact of this review to the city and province cannot be ignored.

For 127 years, The Vancouver Board of Trade has worked on behalf of our region's business community to promote prosperity through commerce, trade, and free enterprise. As Western Canada's most active and most engaged business

The Vancouver Board of Trade
Suite 500, 999 Canada Place
Vancouver, B.C. Canada V6E 3E1
Phone: 604-681-2111 Fax: 604-681-0437

President and CEO
Iain J.S. Black

E-mail: contactus@boardoftrade.com
www.boardoftrade.com

organization, The Vancouver Board of Trade strives to enable and empower its members to succeed, grow and prosper in the global economy.

In this light, The Vancouver Board of Trade strongly supports the Vancouver Aquarium as a leading cultural institution in Vancouver and the organization's current business model, as it clearly bodes well for its successful operation and the important role the Aquarium plays in supporting the economic, cultural and green positioning of this city and province.

To be clear, given our understanding that the Vancouver Aquarium has a long-standing policy of no wild capture of cetaceans — that for 18 years no cetaceans have been captured unless for medical assistance — and that those currently in captivity are incapable of surviving in the wild, ***The Vancouver Board of Trade does not object to the current cetacean policy of the Vancouver Aquarium***. Moreover, we are concerned that key scientific research and advances (specifically in the area of climate change impacts on the Arctic) might otherwise be lost by either releasing existing cetaceans, or by no longer coming to aid of cetaceans in need (per the current policy) in the years to come.

Yours truly,

Iain J.S. Black
President and CEO, The Vancouver Board of Trade

THE WEST END

Three great streets.
One amazing neighbourhood.
DAVIE. DENMAN. ROBSON.

July 9, 2014

Aaron Jasper,
Chair,
Vancouver Board of Parks and Recreation
&
Malcolm Bromley,
General Manager,
Vancouver Board of Parks and Recreation
2099 Beach Avenue
Vancouver, BC V6G 1Z4
Canada

Re: Support for the continuation of Vancouver Aquarium best practices in managing cetaceans

Dear Messrs. Jasper and Bromley,

The West End Business Improvement Association (WEBIA) represents over 500 businesses and 197 commercial property owners on the commercial streets of Davie, Denman and Robson. The Board of the WEBIA had a recent discussion about the merits of the Vancouver Aquarium's conservation, research and education programs.

Specifically, there was an acknowledgment that they are a leader in managing cetaceans like belugas and dolphins. We understand that after 1996 the Aquarium would only support in their care whales and dolphins that were either captured before 1996, were born in an aquarium or were rescued from the wild but unable to be released under protocols established by government.

Their leadership also extends into the business community. More than a facility that supports research and education, it is an economic driver for the entire area. The Vancouver Aquarium is a popular institution within beloved Stanley Park. With over a million guests going through the facility each year, many West End businesses play a multiplier role in providing services ranging from transportation (eg bike rental) to food and accommodation.

The expansion plans for the Aquarium align wonderfully in scale and timing with the revitalization of the West End's commercial streets through the West End Community Plan (passed November 2013). There is optimism that the commercial streets of Davie, Denman and Robson will see new development to ensure it has a vibrant and dynamic mix of businesses and residents. We want the Aquarium to complete its expansion and revitalization,

THE WEST END BUSINESS IMPROVEMENT ASSOCIATION
411 – 1033 Davie Street
Vancouver, BC V6E 1M7
phone: 604.696.0144
fax: 604.669.3323
Facebook.com/WestEndBIA
Twitter.com/WestEndBIA

which includes a Canada's Artic Habitat for the beluga whales, so that together we can help the West End live up to its potential as one of the most iconic neighborhoods in Vancouver and an important driver of the local economy.

In summary, it was generally felt and understood that not only is the Aquarium a leader in many ways but that an expanded Aquarium would be a great partner in the community as we strive to revitalize the West End.

If you have any questions or would like to follow up directly, please do not hesitate to contact us directly.

Best Regards,

Stephen Regan,
Executive Director

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The contribution of zoos and aquaria to Aichi Biodiversity Target 12: A case study of Canadian zoos

Andrea Olive [a,*], Katrina Jansen [b,1]

[a] Departments of Political Science and Geography, University of Toronto Mississauga, 3264 Davis Building, Mississauga, Ontario, L5L1C6, Canada

[b] Education and Community Engagement Coordinator, Alberta Institute for Wildlife Conservation, Canada

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ABSTRACT

The purpose of Aichi Biodiversity Target 12 is to prevent extinction of known threaten species, and improve the decline of the world's most imperiled species. Governments and NGOs around the world are actively working toward this goal. This article examines the role of zoos and aquaria in the conservation of species at risk through an in-depth examination of four accredited Canadian zoos and aquaria. Through site visits, interviews with staff, and research into the programs at each institution, this paper demonstrates that captive breeding, reintroductions, and headstarting projects are each a large component of conservation efforts. Interviews with zoo staff reveal strong consensus that zoo offer two critical components for species at risk conservation: space and expertise. Overall, this article calls for greater attention to the types of conservation actives occurring and the ways in which zoos are working together to protect and recover global biodiversity.

1. Introduction

Human activities have catastrophic ramifications for the world's biodiversity, with habitat loss, overhunting, pollution, climate change, and other factors leading to the current imperilment of over 23,250 species around the world (IUCN, 2015). To mitigate this global crisis it is necessary that species be protected from further harm. Governments have recognized this need and signatories to the United Nations Convention on Biological Diversity have committed to a Strategic Plan for Biodiversity 2011–2020. There are 5 broad strategic goals and 20 targets, which are known as the Aichi Biodiversity Targets (https://www.cbd.int/sp/targets). Numerous countries have species at risk legislation, and 183 countries now endorse the global Convention on the International Trade in Endangered Species of Wild Fauna and Flora. However, government action alone will not be enough. There is a need for civil society and non-governmental organizations to actively assist with preservation of species at risk.

This paper turns attention to the role that zoos and aquaria (hereafter "zoos") play in the conservation of species at risk. Moss et al., (2015) argue that zoos contribute to Aichi Target 1 through enhancing awareness of biodiversity (see also Conde et al., 2015; Gusset et al., 2014). Here it is argued that zoos also have a significant role to play in other Aichi Biodiversity Targets, specifically Target 12, which states, "by 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained" (https://www.cbd.int/sp/targets). Research conducted inside four Canadian zoos suggests potential for zoos to engage not only in the prevention of extinction, but also in the protection and recovery of imperiled species.

* Corresponding author.
E-mail addresses: andrea.olive@utoronto.ca (A. Olive), katrina.jansen@aiwc.ca (K. Jansen).
[1] Prior Affiliation: Graduate Student, Master of Arts, Department of Geography, University of Toronto, Canada.

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2. Literature review

Human beings have kept animals in captivity for thousands of years, with the earliest known zoo being a menagerie from 3500 BC in the ancient city of Hierakonpolis, Egypt (Rose, 2010; Patrick and Tunnicliffe, 2013). Captive animals during this time were seen as evidence of an individual's wealth and power. The first "modern zoo" open to the public was the Schönbrunn Zoo in Vienna, Austria, which was originally established as a private park by the Holy Roman Emperor Maximillian in 1569. Emperor Joseph II decided to make the zoo available to the public in 1765, beginning a chain of events that saw many formerly private zoos turn public, and new public zoological institutions come into being (Patrick and Tunnicliffe, 2013). Entertainment was the highest priority of these new public facilities.

Throughout the 20th century, many zoos began another evolution, shifting from an entertainment focus to one of scientific research and conservation (Hallman and Benbow, 2006; Patrick and Tunnicliffe, 2013; Rees, 2011). This shift was exemplified by the International Union of Directors of Zoological Gardens (IUDZG) 1993 World Zoo Conservation Strategy, which set out goals for zoos around the world, and asked that these institutions dedicate their efforts toward conserving nature (IUDZG/CBSG, 1993).

Today, it is widely known that zoos keep animals in captivity and that some zoos breed animals. In fact, this is often a source of public scrutiny and criticism, and, ironically, it can also be the source of increased visitation to zoos as baby animals can draw large crowds. Influential animal rights organizations, such as People for the Ethical Treatment of Animals (PETA), question the ethics of keeping animals in captivity, and characterize zoos as de-facto "prisons" for the animals on display (PETA, 2016). The treatment of zoo animals is also a matter of widespread public concern. In recent years, questions regarding improper exhibit maintenance, unsafe conditions for humans and animals, and enclosures too small for the animals have all been raised (Kirby, 2013; Mehaffrey, 2016; Walters, 2016). This type of criticism puts zoos in a difficult position in terms of animal captivity and breeding, which are two activities central to the conservation mission of many zoo organizations.

Historically public zoos purchased most of their animals; when breeding in captivity did take place, it was generally for the purposes of increasing the number of animals on exhibit, or to sell excess animals to other zoos (Rees, 2011). However, today captive breeding is considered an important tool to maintain genetic diversity for small populations and avoid the extinction of critically at-risk animals (Conde et al., 2015; Lacy et al., 2013; Owen and Wilkinson, 2014). Indeed, one of the first conservation initiatives promoted by zoos was captive breeding, where rare or threatened animals are bred for the purpose of reintroducing their descendants back into the wild (Barrows, 1997). Captive breeding can also be used to create assurance populations, which maintain genetic diversity through *ex situ* populations in case of a catastrophic event severely depleting the wild populations (Conde et al., 2015; Grant and Hudson, 2015; Taylor-Holzer et al., 2013). Other motivations for captive breeding include a desire to reduce the number of wild-caught animals in zoos and to provide research opportunities that would be impossible to conduct on wild animals (Fa et al., 2011; Pfaff, 2010).

Often captive breeding is paired with either a reintroduction program or a headstarting program. With the former, a species is bred in captivity for the purpose of releasing it into the wild. Conversely, headstarting is defined as "a conservation technique for improving survival of species with high juvenile mortality" and involves taking eggs or young animals from the wild, overwintering them during their first year when mortality levels are generally highest, and then reintroducing them back into the wild once that high mortality period has passed (Sacerdote-Velat et al., 2014, 1). In both cases – reintroduction and headstarting – zoos are contributing to the conservation of wild populations. However, come criticisms of these practices exist. For example, it has been argued that the removal of wild animals for captive breeding only harms the wild population more, reducing its ability to recover on its own (McCleery et al., 2014). Zoo captivity is also thought to be detrimental to the health of animals, leading to abnormal behavioral development (Morin, 2015), and resulting in animals being unfit for reintroduction (McPhee, 2003, Robert, 2009). While new styles of exhibit design endeavor to address this problem through making zoo enclosures feel more natural (Fa et al., 2011), it remains difficult to train a captive-bred animal for life in the wild (Banks et al., 2002; Carbyn et al., 1994; Griffin et al., 2000; Jule et al., 2008). Fortunately, many recent reintroduction efforts are taking steps to improve captive-bred animal behavior through special conditioning programs prior to reintroduction (Jachowski and Lokhart, 2009; Reading et al., 2013; Vilhunen, 2006).

It is important to note that captive breeding with reintroductions is not the only ways zoo participate in conservation. Instead, zoo organizations participate in education and training programs, habitat protection projects, research, and species protection, both *ex situ* and *in situ* (Gusset and Dick, 2010). Worldwide there is an estimated 700 million visitors to zoos each year (Gusset and Dick, 2011). As a result, the potential for zoos to educate and promote conservation is often seen as the most important role that zoos can play in conservation (Moss et al. 2015; Packer and Ballantyne, 2010). Indeed, there is significant literature examining education programs at zoos, including the relationship between zoo visits and attitudes toward zoos, animals, and conservation (see, for example, Carr and Cohen, 2011; Moss et al., 2015; Roe et al., 2014; Schultz and Joordens, 2014; Tribe and Booth, 2003).

However, there is less academic research into the ways zoos engage in species at risk conservation, especially in Canada. According to Gusset and Dick (2011), the world zoo community spent (at least) an estimated $350 million USD in 2008 on wildlife conservation. Many zoos spend conservation dollars on *in situ* and *ex situ* conservation projects (see Gusset and Dick, 2010). There is growing attention to the need for zoos to provide these projects to prevent biodiversity loss across the globe. Lacy et al. (2013) point out that zoos "have an expanding role and responsibility to contribute to species conservation amid this biodiversity crisis" (10). They argue that zoos must focus on both assurance populations at the zoo as well sustainable wild environments and populations for reintroduction programs (Lacy et al., 2013). There is no existing literature that

Table 1
Description of case studies; year of establishment and year of AZA accreditation.

Zoo	Date established	Date of AZA accreditation
Assiniboine Park Zoo	1904[a]	2014
Calgary Zoo	1929	1978
Toronto Zoo	1888[b]	1980[c]
Vancouver Aquarium	1956	1975

[a] Established in 1904 as the Winnipeg Zoo and became the Assiniboine Park Zoo in 2008.
[b] Established as the Riverdale Zoo in 1888 and became the Metro Toronto Zoo in 1974.
[c] The Metro Toronto Zoo held AZA accreditation from 1980 and 2012, but then lost that accreditation because the zoo's Board of Management voted to send zoo's elephants to a non-AZA accredited facility (Pagliano 2016). In 2016 the zoo was formally re-accredited by AZA.

specifically addresses Canadian zoos participation in biodiversity conservation. Thus, this paper asks two related questions: First, *how* do Canadian zoos engage in species at risk (native and non-native) conservation through wildlife management practices? And second, *why* are Canadian zoos engaging in conservation of species at risk? If countries are serious about achieving their Aichi Targets, such as target 12, then more attention must be paid to the myriad of ways that the extinction of known threatened species can be prevented, and ways that the population of those species most in decline can be improved and sustained.

3. Methods

The World Association of Zoos and Aquariums (WAZA) is a global federation of accredited zoos. The goals of WAZA include promoting inter-zoo cooperation as well as encouraging "the highest standards of animal welfare and husbandry" within their member zoos (WAZA, 2016). More than 330 zoo and aquaria organizations from over 50 countries are WAZA members (WAZA, 2016). North American zoos have a more specialized governing organization, the Association for Zoos and Aquariums (AZA). Similar to WAZA, AZA dedicates most of its energy to ensuring high standards in animal care/management, conservation, and educational opportunities offered through its member zoos (AZA, 2016a,b). Of the 233 facilities accredited by AZA, only seven are located in Canada.[2] This paper presents research and interview data from four of these institutions: Assiniboine Park Zoo, Calgary Zoo, Toronto Zoo, and the Vancouver Aquarium. These are largest and oldest zoos and aquaria in Canada.[3] In total, there are about 100 zoos operating in Canada, but many of these are small wildlife collections (see Canadian Federation of Humane Societies N.d., 2017). There are 35 members of Canada's Accredited Zoos and Aquarium (CAZA) organization, which is a private charity operating in Canada since 1975 (see Canadian Association of Zoos & Aquariums, CASA, 2016). While the four case study zoos are not intended to be representative of all zoos in Canada, they are meant to provide an in-depth examination of CAZA and AZA accredited zoos in the country.

Canada was one of the first signatories to the United Nation's Convention on Biological Diversity in 1992, and the federal government ratified the treaty in 1993. There is a national Species at Risk Act, passed in 2002, that protects endangered, threatened, and special concern species throughout their range in Canada. An independent body of scientists, known as the Committee on the Status of Endangered Wildlife in Canada, assesses all native species to determine listing status. Today, there are over 500 species listed on the Species at Risk Act (see Canada, 2016). In 2010, Canada did commit to the United Nations Strategic Plan for Biodiversity 2011–2020, and is actively working toward the 20 Aichi Targets (see biodivcanada.ca). This is the first study to look at the role that Canadian zoos play in the conservation of species at risk, and it is also the first study to examine Canadian zoos from the inside – including site visits, interviews with zoo staff, and the collection of data on species at risk program occurring beyond the public eye (see Table 1).

A site visit was made to each zoo, which included interviews with zoo staff. Interviewees were contacted in a variety of ways. One co-author had previously worked at the Calgary Zoo and was able to directly contact the head of the conservation research department, who then arranged interviewees. At the Vancouver Aquarium and the Toronto Zoo, an email was sent to a known zoo researcher who helped arrange interviews. The Assiniboine Park Zoo requires researchers to go through the zoo's research review board, who evaluates the project and then determine participation. During the visits to the four different zoos, twenty-four interviews were conducted. The number of staff interviewed at each location was fairly consistent: seven at the Calgary Zoo, six at each Assiniboine and Vancouver, and five at the Toronto Zoo. The interviews lasted between twenty minutes to sixty minutes and each began with several general questions, as recommended by the pyramid method (Dunn, 2010). These questions were related to how long the individual had worked for the zoo, what their role

[2] Assiniboine Park Zoo, Calgary Zoo, Granby Zoo, Montreal Biodome, Toronto Zoo, Ripley's Aquarium of Canada, and the Vancouver Aquarium.

[3] The zoos in Quebec were excluded in this study because of language barriers, but future research will examine the role that Granby Zoo and Montreal Biodome play in the conservation of species at risk. Also, the Ripley's Aquarium of Canada was excluded because it was only established in 2015.

Table 2
Description of case study institutions species collection.

Zoo	Total species	Number of Canadian species	Number of at-risk species	Number of at-risk Canadian species
Assiniboine Park Zoo	200	34	23	6
Calgary Zoo	130	29	29	10
Toronto Zoo	460	44	82	15
Vancouver Aquarium	935	712	Data unavailable	Data unavailable

was there, and how conservation came into their job. Questions then focused more on the role of the institution in general, followed by inquiries into the current protections for species at risk in Canada. (In the next section, interviews are referenced and/or cited with a short designation for each zoo. AZ is the Assiniboine Zoo, CZ is the Calgary Zoo, TZ is the Toronto Zoo, and VZ is the Vancouver Zoo. The number following the abbreviation indicates which interview is referenced, such that, for example, AZ-3 denotes interviewee 3 at the Assiniboine Zoo. In some instances, follow-up phone calls or emails were sent to the interviewees in regard to a specific detail or clarification. These are cited as "personal communications" throughout the paper.)

The site visits also included participation observation of species-at-risk exhibits and the collection of promotional materials accessible at the zoos. If available, we obtained annual reports and budget information from zoo staff. This information was also found through zoo websites, which were carefully analyzed for information about the zoo collection, especially species at risk, as well as information about the structure and organization (governing) of each zoo. While there is little existing literature about Canadian zoos, we analyzed reports produced by AZA, CAZA, and the four case study zoos to verify and support interviewee data.

4. Results and discussion

The four institutions vary in species collection size. As Table 2 illustrates, the Calgary Zoo is the smallest, with only about 130 total species. In terms of the number of native species, the Vancouver Aquarium dwarfs the other zoos with a total of 712 Canadian species inside its collection. Unfortunately, data on the number of International Union for Conservation of Nature (IUNC) listed species at risk and Canadian listed species at risk was not available for the Vancouver Aquarium. On its website, the Vancouver Aquarium features its conservation mission and explains its "animal protection program" for endangered species, namely the Oregon Spotted Frogs, Leatherback turtles, Killer whales, and rockfish (see Vancouver Aquarium N.d., 2017). And the website also features information about the research conducted at the zoo in relation to vulnerable and at-risk populations. Thus, while the exact number of at-risk species housed at the zoo is unknown, it is clear (from interviews and grey literature), that the Vancouver Aquarium collection does include Canadian at-risk populations. As Table 2 illustrations, the other institutions are home to numerous at risk species, and each also contain between six and fifteen Canadian (federally or provincially) listed species at risk.

Through the interview process and data collection, we learned that each institution is engaged in hands-on conservation of species at risk in three main ways: captive breeding, reintroduction, and headstarting programs. The results are organized into these subsections. While these zoos are also involved in education and research in relation to biodiversity conservation, that is not the main focus of this paper. The last subsection investigates why zoos participate in wildlife management for conservation of species at risk from the perspective of staff working at the four institutions.

4.1. Captive breeding

Since the earliest days of publicly exhibited captive animals, zoos have been breeding species in order to maintain their zoological collections (Rees, 2011, Interview CZ-7). While the practice of breeding animals for exhibit maintenance and education is still certainly occurring (InterviewVZ-4), these four zoos appear to be moving toward restricting their captive breeding activities to focus on breeding animals for conservation (Interview CZ-7). Conservation-aligned captive breeding programs at the four study institutions are coordinated by outside organizations, mainly through international AZA Species Survival Plans (SSPs), the European Endangered Species Program (EEP), or through local government initiatives. Both the SSPs and EEP coordinate breeding efforts across multiple zoos through the use of studbooks, which keep track of parentage and determine the best breeding partners for individuals in a given species. Table 3 illustrates zoo participation in breeding, reintroduction, and headstarting programs. In the case of breeding programs, these refer to programs managed by either the SSP or EEP.

Beyond international breeding initiatives, all four zoos are playing a part in federally-based species at risk recovery efforts. In total, there are 33 federally listed species at risk in Canada whose current recovery strategy or management plan references the involvement of zoos. Of these 33 documents, six of them include a current captive breeding component[4] and two other recovery documents mention the potential of captive breeding to assist in the recovery of the species[5]. Habitat protection is

[4] Whooping crane (*Grus Americana*), Oregon spotted frog (*Rana pretiosa*), Blanding's turtle (*Emydoidea blandingii*), Massasauga rattlesnake (*Sistrurus catenatus*), swift fox (*Vuples velox*), black footed ferret.

[5] Sand darter (*Ammocrypta pellucida*) and Greater sage grouse (*Centrocercus urophasianus*).

Table 3
Zoo participation in breeding, reintroduction, and headstarting programs.

Zoo	Total species	Number of species in breeding programs	Number of reintroduction programs	Number of headstarting programs
Assiniboine Park Zoo	200	50	1	1
Calgary Zoo	130	45	5	1
Toronto Zoo	460	122	8	2
Vancouver Aquarium	935	8	2	0

usually the first objective in federal recovery strategies; indeed, the identification of critical habitat and mitigation of threats to it are mandatory components to species recovery in Canada (Canada, 2016). In cases like the six aforementioned species, populations in the wild were so low that simply conserving habitat and encouraging natural breeding in the wild would not be enough. The Vancouver Island marmot,[6] for instance, experienced a 50% decline in its wild population from 1997–2007, 80% of which was caused by predation events (Canada, 2016). These dramatic decreases in the wild population spurred the need to begin a captive breeding and reintroduction program. Presently the Calgary Zoo and the Toronto Zoo continue to provide such programs (Interview TZ-3). In 2015 it was estimated that 250–300 marmots live in a handful of colonies on 28 mountains in British Columbia as a result of zoo-led recovery efforts (Marmot Recovery Foundation N.d., 2017).

Provincial recovery efforts are also beginning to recognize the potential of captive breeding in restoring species with extremely low populations. Seven of Ontario's published provincial recovery strategies or management plans include captive breeding. For two of these plans (piping plover[7] and peregrine falcon[8]), captive breeding efforts have already been used to successfully increase population numbers, with the Toronto Zoo taking an active role in breeding peregrine falcons (Kirk, 2013; Ontario Peregrine Falcon Recovery Team, 2010). Five other recovery plans mention the need to evaluate whether captive breeding is possible for the species, and how it could be accomplished, (Morris, 2010, 2011; Ontario Ministry of Natural Resources, 2013a,b,c).

In Alberta, there are four current recovery strategies that include a captive breeding component[9] (Alberta Environment and Sustainable Resource Development, 2012, 2013; Alberta Peregrine Falcon Recovery Team, 2005, Alberta Swift Fox Recovery Team, 2007). All four of these strategies have received input and participation from the Calgary Zoo, although the zoo itself is not currently involved in the breeding of northern leopard frogs (Interview CZ-2). However, the Vancouver Aquarium is the primary breeding facility for northern leopard frogs, and works with the Calgary Zoo on the northern leopard frog project in both Alberta and British Columbia (Interview CZ-2). While it is too early to judge the success of this program, the Vancouver Aquarium has successfully produced tadpoles and released thousands into the wild (Mangione, 2016).

Like Alberta, the government of British Columbia also has four provincial recovery documents that mention captive breeding[10] (British Columbia Invertebrates Recovery Team, 2008, Canadian Oregon Spotted Frog Recovery Team, 2014, Northern Leopard Frog Recovery Team, 2012, Vancouver Island Marmot Recovery Team, 2008). Though the Puget Oregonian snail recovery team is still in the process of determining whether captive breeding is a viable strategy for this species (British Columbia Invertebrates Recovery Team, 2008), the other three species have current captive breeding programs occurring at the Vancouver Aquarium, the Calgary Zoo, and Toronto Zoo (Interview VA-3, VA-4, CZ-1, TZ-3).

While three of the four provinces in which the zoos are located have their own recovery strategy procedures, Manitoba does not. Manitoba introduced legislation mandating the development of provincial local recovery plans in 2012 (Manitoba Wildlife Branch, pers. comm., May 9 2016). However, due to the recent nature of this legislation and the time intensive process required to develop full recovery plan, the government of Manitoba has not yet been able to formally publish any recovery strategies, save for woodland caribou (Manitoba Wildlife Branch, pers. comm., May 9 2016). As they work on developing new recovery strategies, the provincial government has continued their former practice of adopting the federal recovery plans for any species occurring in the province (Manitoba Wildlife Branch, pers. comm., May 9 2016). Of these, two (the burrowing owl and peregrine falcon) include captive breeding components (Environment Canada 2012, 2015). The Assiniboine Park Zoo currently is assisting the provincial government with the burrowing owl captive breeding program by providing genetic analysis to recommend pairings and housing the owls during the breeding process (Interview AZ-5).

4.2. Captive breeding with reintroduction

While captive breeding is an important part of the role of Canadian zoos in species at risk protection and recovery efforts, most interviewees ($n = 20$) felt that zoos should also be involved in reintroduction efforts, and that "putting animals back" into the wild was a good fit for zoos (Interview CZ-6). All four of the case study institutions are involved in reintroduction programs (see Table 3), which focus almost exclusively on native species; as several interviewees stated,

6 *Marmota vancouverensis.*

7 *Charadrius melodus.*

8 *Falco peregrinus.*

9 The leopard frog (*Lithobates pipiens*), greater sage grouse, peregrine falcon, and swift fox.

10 Puget Oregonian snail (*Cryptomastrix devia*), Oregon spotted frog, the northern leopard frog, and the Vancouver Island Marmot.

Table 4
Current reintroduction programs at the case study institutions.

Assiniboine Park Zoo	Calgary Zoo	Toronto Zoo	Vancouver Aquarium
Burrowing Owl	Whooping Crane	Puerto Rican Crested Toad	Oregon Spotted Frog
	Vancouver Island Marmot	Eastern Loggerhead Shrike	Rockfish
	Greater Sage Grouse	Vancouver Island Marmot	Northern leopard frog
	Burrowing Owl	Black-footed Ferret	
	Swift Fox	Trumpeter Swan	
		Blanding's Turtle	
		Wood Turtle	
		Oregon Spotted Frog	

there is a local species focus for reintroductions due to the need to protect what is in their own backyards (Interview CZ-2, AZ-1), and because focusing on local conservation efforts is a more efficient use of resources (Interview CZ-2, TZ-1). For example, Vancouver's "protecting animal program" mentioned above includes only species native to Canada and includes reintroduction programs for 3 of these species (Vancouver Aquarium nd.). The one notable exception to the native species focus is the Puerto Rican Crested Toad[11] program at the Toronto Zoo, which not only involves breeding and reintroductions, but also a large amount of community outreach and education in Puerto Rico (Interview TZ-2). Table 4 illustrates the active reintroduction-based programs at the case study institutions.

The Calgary Zoo runs a high-profile whooping crane project. It is the only Canadian breeding facility and works in conjunction with US breeding facilities. Crane numbers hit their lowest point in 1941, with just 15 wild individuals found (Canada, 2016). Today, there are four wild flocks (Kelly Swan, pers. comm. May 10 2016) spread across the United States and Canada, three of which are now reproducing in the wild. The Wood Buffalo and Eastern Migratory flocks have both increased in population, to 329 and 105 individuals respectively (Buttler and Harrell, 2016, Whooping Crane Eastern Partnership, 2016). The Louisiana flock, which is fully made up of reintroduced individuals, sits at an estimated 46 individuals (Kelly Swan, pers. comm. May 10 2016); this year also saw the first crane chicks born in the wild in Louisiana since 1939 (McConnaughey, 2016). Without the participation of the Calgary Zoo it is not clear if the Whooping Crane story would be such an overwhelming success.

The Calgary Zoo also participates in an ongoing and successful swift fox project. Native to Alberta, Saskatchewan, and Northern Montana, the swift fox experienced rapid population declines following the settlement of the North American prairies, leading to their eventual extirpation from Canada in 1978 (Pruss et al., 2008). After reintroductions began in the 1980s, the swift fox was down-listed from "extirpated" to "endangered" in 1998 (COSEWIC, 2011). Further reintroductions and monitoring by the Swift Fox Recovery Team, of which the Calgary Zoo is a member, resulted in the swift fox being further down-listed to "threatened" in 2009 (COSEWIC, 2011). A search of the COSEWIC Species at Risk database found that the swift fox is one of only six species in Canada to have ever been down-listed; a direct result of successful reintroduction efforts (Interview: CZ-1).

Both the Calgary Zoo and the Vancouver Aquarium participate in the northern-leopard frog reintroduction project in British Columbia (CZ-2, VZ-3, VZ-4). In 2014, over 2000 captive bred tadpoles were reintroduced to the wild (Kootenay Conservation Program, 2014); however, monitoring the introduced populations will continue to occur for several more years before the program can be declared a success or not (Kootenay Conservation Program, 2014). The Vancouver Island marmot (Calgary Zoo and Toronto Zoo), Blanding's turtle (Toronto Zoo), and burrowing owl (Assiniboine Park Zoo) projects are all in similar situations; although some reintroductions have occurred, it is still too early to tell whether or not those efforts have been successful.

Not all reintroduction programs offered by these zoos have been success stories. The black-footed ferret reintroduction program in Grasslands National Park (Saskatchewan) carried out by the Toronto Zoo was one such effort. Formally thought to be extinct, a small population of black-footed ferrets was found in Wyoming in 1981 (Jachowski and Lokhart, 2009). The wild ferrets were then brought into captivity, bred in several facilities (including the Toronto Zoo) and successfully reintroduced to several different sites in the United States and Mexico (Jachowski and Lokhart, 2009). However, efforts to restore black-footed ferrets to Canada experienced some serious complications (Interview TZ-3). One year after the original group of ferrets was introduced to Grasslands National Park in 2009, plague arrived at the reintroduction site, devastating the prairie dog populations in the area (Interview TZ-3). The black-footed ferret diet is almost exclusively (87%–91%) black-tailed prairie dogs[12] (Barrows, 1997); thus, the dramatic decrease in the prairie dog populations led to the assumed demise of all of the reintroduced ferrets (Interview: TZ-3). Although staff from the Calgary Zoo, Toronto Zoo, and Parks Canada continue to survey the area for ferrets, none have been sighted since 2013 (Interview: TZ-3).

In other cases, even though a captive breeding program may be designed with a reintroduction component in mind, it is not always possible to restore the species to its native habitat. For instance, the widespread distribution of chytrid fungus, which releases a pathogen that destroys an amphibian's ability to respire through their skin (Skerrat et al., 2007), now covers

[11] *Bufo lemur.*

[12] *Cynomys ludovicianus.*

the entirety of the native range for the Panamanian Golden Frog[13] (Interview VA-4). Both the Vancouver Aquarium and the Toronto Zoo are breeding populations of Panamanian golden frogs; however, the continued presence of the chytrid fungus in the animal's range means that no reintroductions of the species can take place until this threat has been mitigated (Toronto Zoo, 2016a,b). Although reintroductions may not always be possible using a captive-bred population, 25% of interviewees ($n = 6$) mentioned that it was still worthwhile for zoos to breed animals, as the captive assurance populations provide a reserve of genetic material in case of a catastrophic event in the wild populations.

4.3. Headstarting

While conducting the interviews, many of the participants ($n = 10$) explained how their zoo was involved in headstarting programs (see Table 3). The Toronto Zoo focuses their headstarting efforts on Blanding's turtles in the Rouge Valley National Park and wood turtles[14] in other parts of Ontario (Interview TZ-2). Both of the Toronto Zoo headstarting programs involve partnering with other agencies, including Parks Canada and the Ontario Ministry of Natural Resources, to remove eggs from the wild, hatch and raise the young at the zoo, and then release the young turtles into protected sites (Interview TZ-2). In the case of the Blanding's turtle, headstarting was a high priority, as there were only an estimated six turtles remaining in the Rouge Valley area prior to the establishment of the headstarting program (Toronto Zoo, 2016b). The first headstarted Blanding's turtles were collected as eggs from stable populations in other parts of Ontario (Toronto Zoo, 2016b). After being hatched, the juvenile turtles spent two years in captivity while they grew to a large enough size to reduce the risk of predation (Toronto Zoo, 2016c). The first round of 10 headstarted turtles was released in the Rouge Valley park in 2014, and this project is anticipated to continue until 2024, with several more rounds of reintroductions planned and a monitoring program already in place to evaluate the success of the headstarting project (Jivov, 2014, Interview: TZ-2).

The Calgary Zoo and Assiniboine Park Zoo are both involved in headstarting efforts for burrowing owls in British Columbia and Manitoba respectively (Interview CZ-3, CZ-5, AZ-2, AZ-5). Though the Calgary Zoo's burrowing owl headstarting program is still in the planning stages, the Assiniboine Park Zoo has been involved with burrowing owl recovery since 2010, and is a founding member of the Manitoba Burrowing Owl Recovery Program (MBORP) (Assiniboine Park Zoo, 2016). The Assiniboine Park Zoo is responsible for housing the owls (in a non-public area) over the winter, in addition to conducting all of the genetic testing and deciding which headstarted owls should be paired together in order to foster the greatest possible genetic diversity (Assiniboine Park Zoo, 2016 , Interview AZ-5). Unfortunately, the Manitoba burrowing owl project has experienced some setbacks since headstarting began, including several years where flooding wiped out the nest site areas (Interview: AZ-5). The relatively small number of possible reintroduction sites in the province is also an issue; if something happens to the existing reintroduction sites, there are few other places where it would be appropriate to release the owls (Interview: AZ-5).

4.4. Why participate –opportunities & challenges

Over the course of the interviews, the zoo staff members were asked why they thought their institution was participating in captive breeding/reintroduction programs. Responses to this question were generally in agreement with the idea that zoos have the space and the expertise to do so, as discussed by over half ($n = 13$) of the participants. In particular, staff from the Calgary Zoo brought up the existence of the zoo's Devonian Wildlife Conservation Centre (DWCC) (Interview CZ-2, CZ-5, CZ-7), which is located in a rural area outside of the city and is not open to the public (Calgary Zoo, 2015). This space is exclusively used for breeding animals for the zoo's conservation programs (Interview CZ-5, CZ-7), including animals that require large amounts of space, such as the zoo's herd of Przewalski's horses (Calgary Zoo, 2015). The existence of the DWCC increases the Calgary Zoo's ability to participate in breeding programs, and the amount of non-public space dedicated to conservation helps to distinguish them from other organizations (Interview: CZ-7).

Expertise was also felt to be a major advantage for zoos, many respondents ($n = 15$) citing experience with keeping and breeding animals as one of the most important factors to why zoos were involved with breeding and reintroduction programs. When captive breeding programs become necessary for the recovery of a species, it follows that the people in charge of coordinating the breeding program be experts on keeping animals in captivity. However, even though the people coordinating zoo captive breeding programs are experts, there are challenges associated with zoo-led breeding and reintroduction efforts that can affect the success of the programs.

First, a lack of space was felt to be a challenge by staff members from two of the case study institutions (Interview VZ-3, VZ-4, TZ-4). In particular, the non-exhibit space at the Vancouver Aquarium is quite restricted, and limits the ability of the facility to participate in large-scale breeding or reintroduction programs (Interview VZ-3, VZ-4). The institution's response to the restricted space problem has been to concentrate breeding efforts on smaller species (amphibians in particular) that are more easily housed; however, even these species programs are limited by space. While the aquarium is currently breeding both northern leopard frogs and Oregon spotted frogs, the facility staff would like to see the frogs kept for a longer period of time instead of being released as soon as they reach the tadpole morph (VZ-3, VZ-4). Tadpoles have a much higher mortality rate than adult frogs, mainly due to higher predation levels at the tadpole stage (Berven, 1990) and increased exposure to

[13] *Atelopus zeteki.*

[14] *Glyptemys insculpta.*

pesticide runoff, which can have detrimental effects on their development and behavior (Bridges, 2000). By holding off on the release of individuals until they had fully metamorphosed, survival rates would likely be much higher; nevertheless, the aquarium simply does not have the space or the resources to support large numbers of adult frogs (Interview VZ-3, VZ-4).

A second challenge is the need to address two contradictory components: the need to keep animals away from humans so that they do not become habituated (Griffin et al., 2000), and yet encourage the public to see conservation programs in action so that they are more inclined to support them (Interview: CZ-2, TZ-1). For instance, although the Calgary Zoo is the only Canadian breeding facility for whooping cranes, few members of the public are aware of this, as the whooping crane breeding takes place at the non-public DWCC. Whooping cranes can imprint on humans, which makes it very difficult to raise them in captivity while ensuring that they are still able to be successfully reintroduced. To combat this, whooping cranes at breeding centers such as the Calgary Zoo's DWCC are kept away from humans; the only contact they have with keepers is when the staff are dressed in crane costumes, a technique called "costume-rearing" (Urbanek et al., 2010).

Third, zoos that have the space and the expertise cannot save species at risk through headstarting or reintroductions if there is not habitat protect in the wild. Zoos have demonstrated that headstarting can be a valuable tool to increase the populations of species with high juvenile mortality rates, but equal emphasis must be placed on habitat preservation if the program is to succeed long-term (Heppell et al., 1996). Lastly, zoos are continually challenged by a lack of stable funding. Funding for conservation and research projects in general is a serious limitation for all four case study institutions. The interviews with zoo staff suggest that without more long-term funding from secure sources, it is highly unlikely that the case study institutions will be able to expand their involvement in conservation programs.

5. Conclusion and future research

Aichi Target 12 addresses the critical need to prevent the extinction of biodiversity and reverse population declines so that imperiled species can be sustained if not improved. This paper sought to examine how and why four AZA accredited Canadian zoos engage in wildlife management for the purposes of species at risk conservation. Using a case study approach and going inside the zoos to conduct research and interviews, we found that captive breeding, reintroductions, and headstarting projects are all a large component of conservation programming at the zoos. Each zoo is participating in 8–50 species breeding programs. These efforts are contributing to international breeding initiatives, such as the AZA Species Survival Plans and the European Endangered Species Programs, which coordinate breeding to maintain species' genetic diversity. The zoos, with the exception of the Assiniboine Zoo, are also participating in breeding efforts for listed Canadian species at risk. At both the federal level and the provincial level, governments are working with zoos to breed endangered and threatened species in zoos. This is a significant and understudied finding with regard to both species at risk policy and zoo conservation in the country.

All four zoos are also breeding wildlife for the purposes of reintroducing individuals into the wild — in hopes of increasing the wild population of the species. In total, the zoos participate in programs for 15 Canadian species at risk and 1 non-native species at risk. Zoos in Canada are working collaboratively across provincial and federal borders, engaging with governments and non-governmental organizations outside of their home provinces to protect and recover Canadian species. The successes of the whooping crane and swift fox reintroduction programs suggest that zoos could make a significant and critical contribution to the survival of wild native species in Canada, and should continue their involvement in captive breeding efforts for the sake of species recovery. Lastly, headstarting programs exist at the four zoos and are experiencing some success at reversing population declines in the wild. For example, the Blanding Turtle in Ontario may be brought back from critically endangered numbers by the Toronto Zoo's headstarting program (run in collaboration with Parks Canada and the Ontario government).

When zoos staff were asked why their zoo participates in conservation activities, there was strong consensus that zoos can offer two critical components: space and expertise. Many zoos have space on or off site to breed wild animals and/or keep them away from human beings such that human-imprinting does not occur during the headstarting process. Moreover, zoos are also staffed by wildlife experts who are able to assist in the breeding and reintroduction of animals. In this way zoos offer a unique setting for both the study and practice of wildlife conservation.

This paper has examined only four Canadian zoos. More research is needed to examine other zoos in Canada as well as other zoos throughout the world. It not clear the extent to which other accredited zoos in Canada, including the 31 other members of CAZA, are involved in biodiversity conservation, and comparative data would be beneficial to global the conservation society. There are 330 WAZA zoos globally –in countries like Columbia, France, Japan, Australia, Dubai, and Chile, for example. These zoos have committed to the conservation of biodiversity. It is likely that similar to Canadian zoos, these other WAZA member institutions are engaging in a myriad of critical conservation programs for native and non-native species at risk (see Gusset and Dick, 2010). We need a better understanding of the types of conservation activities occurring, and the ways in which zoos are working independently and together to protect and recover global biodiversity.

It has been noted that despite research into zoo's contribution to research and education, "zoos are still seen by some as being superficial, expensive, ineffective, and, therefore, indefensible" (Tribe and Booth, 2003, 66). This paper argues to the contrary. There can be little doubt that accredited zoos in Canada play a vital role in the recovery of species at risk. The work zoos are doing with captive breeding, reintroduction, and headstarting is expensive, but not superficial or ineffective. The Aichi Targets remain an ambitious achievement. The world is more than half way through the United Nations "decade on biodiversity", which was set as 2011–2020. Globally, governments and civil society must recognize that "zoo work still remains a grossly underutilized resource for the conservation of endangered species" (Mallinson, 2003).

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Scientist Statement Supporting Research in Marine Mammal Facilities

April 8, 2016

We, the undersigned members of the scientific community, wish to acknowledge the importance of marine mammals in zoos, aquariums, and marine mammal facilities, and express our support for research conducted at these facilities. We know that critical research findings have come from studies of dolphins and related species in managed care environments, which have provided the vast majority of what is known about their perception, physiology, and cognition. This includes both basic facts about these animals (e.g., echolocation and how it works[1], diving physiology[2], energetics[3], gestation period[4], hearing range[5], signature whistles[6], and so forth) and applied information such as how they react to environmental stressors[7] and how to diagnose and treat their diseases.[8]

The benefits of such research extend well beyond the animals in zoological facilities. The interpretation of data from field studies is directly informed by what we have learned about the cognition and physiology of these animals in managed care settings. Moreover, because science is inherently a collaborative endeavor, research findings from these animals contribute to our collective understanding across the animal kingdom. Finally, research in managed care settings impacts conservation efforts by: (a) providing the baseline information necessary to inform conservation plans and practices (e.g., typical respiration rates, metabolic rates, gestation length, hearing range and thresholds, etc.), (b) documenting physiological and behavioral responses to environmental stressors such as sound and contaminants[7] to inform population managers, and (c) developing and testing techniques and tools for assessing animals in the field.[9]

The advances that have come from research in marine mammal facilities could not have come from studies of animals in the wild. Field studies are crucial, however, many research questions are unsuited to discovery at a distance. Studies of pregnancy, birth, and fine-scale calf development require the type of close and consistent observation that is only possible in zoological settings. The hypothesis testing required for questions about cognition, perception, and physiology requires the ability to present animals with specific situations and challenges utilizing the necessary controls, consistency, and repetition that are impossible to achieve in the wild. Indeed, as with research in any discipline, a comprehensive understanding of these animals requires a combination of both in-situ and ex-situ studies; studies based in the wild and in zoological settings. This idea is neither new nor specific to marine mammals, but is critical to the way scientific discovery works.

Sincerely,

Francisco Aboitiz, PhD, Pontificia Universidad Católica de Chile
José Fco. Zamorano Abramson, PhD, Pontificia Universidad Católica de Chile
Michael Adkesson, DVM, Dipl ACZM, Chicago Zoological Society / Brookfield Zoo
Javier Almunia, PhD, Loro Parque Fundación
Richard Bates, PhD, University of St. Andrews
Gordon B. Bauer, PhD, New College of Florida
Don R. Bergfelt, PhD, Ross University, School of Veterinary Medicine
Gregory D. Bossart, VMD, PhD, Georgia Aquarium
Ann E. Bowles, PhD, Hubbs-SeaWorld Research Institute
David Brammer, DVM, DACLAM, University of Houston
Micah Brodsky, VMD, V.M.D. Consulting
Jason N. Bruck, PhD, University of St. Andrews, School of Biology, Sea Mammal Research Unit

Josep Call, PhD, University of St Andrews
Susan Carey, PhD, Harvard University
Tonya Clauss, DVM, Georgia Aquarium
Fernando Colmenares, PhD, Universidad Complutense de Madrid
Richard C. Connor, PhD, University of Massachusetts Dartmouth
Boris Culik, PhD, F3
Leslie M. Dalton, DVM, SeaWorld San Antonio
Fabienne Delfour, PhD, L.E.E.C., Paris 13 University
Alistair D.M. Dove, PhD, Georgia Aquarium
Samuel Dover, DVM, Channel Islands Marine & Wildlife Institute
Kathleen M. Dudzinski, PhD, Dolphin Communication Project; Managing Editor, Aquatic Mammals Journal
Holli Eskelinen, PhD, Dolphins Plus
Andreas Fahlman, PhD, Texas A&M- Corpus Christi
Antonio Jesús Fernández Rodríguez, DVM, PhD, Veterinary School University of Las Palmas de Gran Canaria
Vanessa Fravel, DVM, Six Flags Discovery Kingdom
Steven J.M. Gans, MD, St. Jansdal Hospital
Joseph Gaspard, PhD, Pittsburgh Zoo & PPG Aquarium
William G. Gilmartin, President, Hawai`i Wildlife Fund
Heidi E. Harley, PhD, New College of Florida
Martin Haulena, DVM, MSc, DACZM, Vancouver Aquarium Marine Science Centre
Basilio Valladares Hernández, PhD, Universidad de La Laguna
Susan Hespos, PhD, Northwestern University
Heather M. Hill, PhD, St. Mary's University
Matthias Hoffmann-Kuhnt, PhD, Tropical Marine Science Institute, National University of Singapore
Bradley Scott Houser, DVM, Wildlife World Zoo and Aquarium
Marina Ivančić, DVM, DACVR, AquaVetRad
Kelly Jaakkola, PhD, Dolphin Research Center
Frants H. Jensen, PhD, Aarhus University
Allison B. Kaufman, PhD, University of Connecticut, Avery Point
Robin Kelleher Davis, PhD, Harvard Medical School & Schepens Eye Research Institute
Stephanie L. King, PhD, Centre for Evolutionary Biology, University of Western Australia
Stan Kuczaj, PhD, University of Southern Mississippi
Robert C. Lacy, PhD, Chicago Zoological Society
Jef Lamoureux, PhD, Boston College
Gregg Levine, DVM
Klaus Lucke, PhD, Centre for Marine Science & Technology, Curtin University
Heidi Lyn, PhD, University of Southern Mississippi
Radhika Makecha, PhD, Eastern Kentucky University
Katherine McHugh, PhD, Chicago Zoological Society
Eduardo Mercado III, PhD, University at Buffalo, SUNY
Lance Miller, PhD, Chicago Zoological Society / Brookfield Zoo
Paul Nachtigall, PhD, Hawaii Institute of Marine Biology, University of Hawaii
Shawn R Noren, PhD, Institute of Marine Science, University of California, Santa Cruz
Steven Pinker, PhD, Harvard University
Stephen Raverty, DVM, PhD, University of British Columbia
Michael S. Renner, DVM, Marine Mammal Veterinary Consulting Practice
Jill Richardson, PhD, Rosenstiel School of Marine and Atmospheric Science
Fernando Rosa, PhD, Universidad de La Laguna

James A. Russell, PhD, Boston College
Steve Shippee, PhD, Marine Wildlife Response
K. Alex Shorter, PhD, University of Michigan
Mark S. Sklansky, MD, David Geffen School of Medicine at UCLA
Brandon Southall, PhD, University of California, Santa Cruz
Judy St. Leger, DVM, DACVP, SeaWorld
Grey Stafford, PhD, Aquatic Mammals Editorial Board
Jeffrey L. Stott, PhD, University of California, Davis
Francys Subiaul, PhD, The George Washington University
Alex Taylor, PhD, University of Auckland
Roger K. R. Thompson, PhD, Franklin & Marshall College
Walter R. Threlfall, DVM, PhD, DACT, The Ohio State University
Dietmar Todt, PhD, Free University of Berlin
Michael Tomasello, PhD, Max Planck Institute for Evolutionary Anthropology
Forrest Townsend Jr, DVM, Gulfarium Marine Adventure Park
Marie Trone, PhD, Valencia College
Jennifer Vonk, PhD, Oakland University
David A. Washburn, PhD, Georgia State University
Rebecca Wells, DVM, Gulfarium Marine Adventure Park
Randall Wells, PhD, Chicago Zoological Society
Nathan P. Wiederhold, Pharm.D, FCCP, University of Texas Health Science Center at San Antonio
Daniel Wilkes, PhD, Centre for Marine Science and Technology, Curtin University
Clive D. L. Wynne, PhD, Arizona State University
Pamela K. Yochem, DVM, PhD, Hubbs-SeaWorld Research Institute

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#11

the Jane Goodall Institute

WWW.JANEGOODALL.ORG

Vancouver Board of Parks and Recreation
Administration Office
2099 Beach Avenue
Vancouver, BC V6G 1Z4

May 13, 2014
Dear Park Board Chairman and Commissioners,

The capture, breeding and keeping of cetaceans world-wide has come under increasing public scrutiny due to recent high-profile stories being released from industry insiders. The scientific community is also responding to the captivity of these highly social and intelligent species as we now know more than ever, about the complex environments such species require to thrive and achieve good welfare. Those of us who have had the fortunate opportunity to study wild animals in their natural settings where family, community structure and communication form a foundation for these animals' existence, know the implications of captivity on such species.

I understand the Vancouver Park Board and the Vancouver Aquarium became industry leaders in 1996, when an agreement was made to not allow the keeping of cetaceans caught from the wild after September 16thof that year (with the exception of endangered species or rehabilitation animals that could not be released). However, the current permission of Vancouver Aquarium cetacean breeding programs on-site, and at SeaWorld with belugas on loan, is no longer defensible by science. This is demonstrated by the high mortality rates evident in these breeding programs and by the ongoing use of these animals in interactive shows as entertainment. The idea that certain cetaceans "do better" in captivity than others is also misleading, as belugas, dolphins and porpoises are highly social animals which can travel in large pods and migrate long distances. In captivity, these highly vocal and complex communicators are forced to live in a low-sensory environment, which is unable to fully meet the needs of their physical and emotional worlds.

As society at large and the scientific community now reflect on the keeping of highly cognitive species like primates, elephants, and cetaceans in entertainment and research, I ask the Vancouver Park Board and the Vancouver Aquarium to do the same. The phasing out of such cetacean programs is the natural progression of human-kind's evolving view of our non-human animal kin. I hope the Vancouver Park Board and the Vancouver Aquarium will be a leader in compassionate conservation on this issue, as you have done before.

Sincerely,

Jane Goodall

Jane Goodall, Ph.D., DBE
Founder, the Jane Goodall Institute &
UN Messenger of Peace

#7

Enright, Danielle

From: s.22(1)
Sent: Wednesday, March 08, 2017 6:46 PM
To: Park Board Meetings
Subject: MY FINAL VPB DRAFT

Good evening, Mr. Chairman and Park Board Commissioners. My name is s.22(1)

I'm nervous. NOT because of some fear of public speaking NOR because of any fear of being in the newspaper, on the radio or on TV.

I'm nervous because the fate of potentially dozens, even hundreds of cetaceans, WHO CAN'T SPEAK FOR THEMSELVES, rests with the ability of myself, as well as all of my colleagues (especially those in attendance here tonight), to persuade you -- in 3/5 short minutes, each -- that the captivity of whales, dolphins and porpoises at the Vancouver Aquarium is WRONG. Extremely tragic as the deaths of the last 2 belugas at Vancouver Aquarium last November were, that loss can -- and should -- make your decision to end the captivity of cetaceans at Vancouver Aquarium somewhat easier, since ZERO BELUGAS is, currently, the new 'status quo'.

How many of you have seen BLACKFISH? How many of you have seen THE COVE? How many of you have seen VANCOUVER AQUARIUM UNCOVERED? Damning of the entire captivity industry as all of those excellent films are, thoroughly covering the greedy, money-hungry brutality of the industry from the international level right down to the local level -- and everything in between -- perhaps the most damning evidence of all came from the Vancouver Aquarium's own beluga pool cam. I can't imagine how anyone -- whether they be a first time visitor to the Vancouver Aquarium's #1 cheerleader, John Nightingale -- could possibly watch that beluga pool cam for more than about 5 minutes...and say, "Yup, captivity is a wonderful thing!"

I have no clue about 'jurisdictional' matters but, whether it's the Vancouver Park Board, Vancouver City Council or, ideally, both, we need...

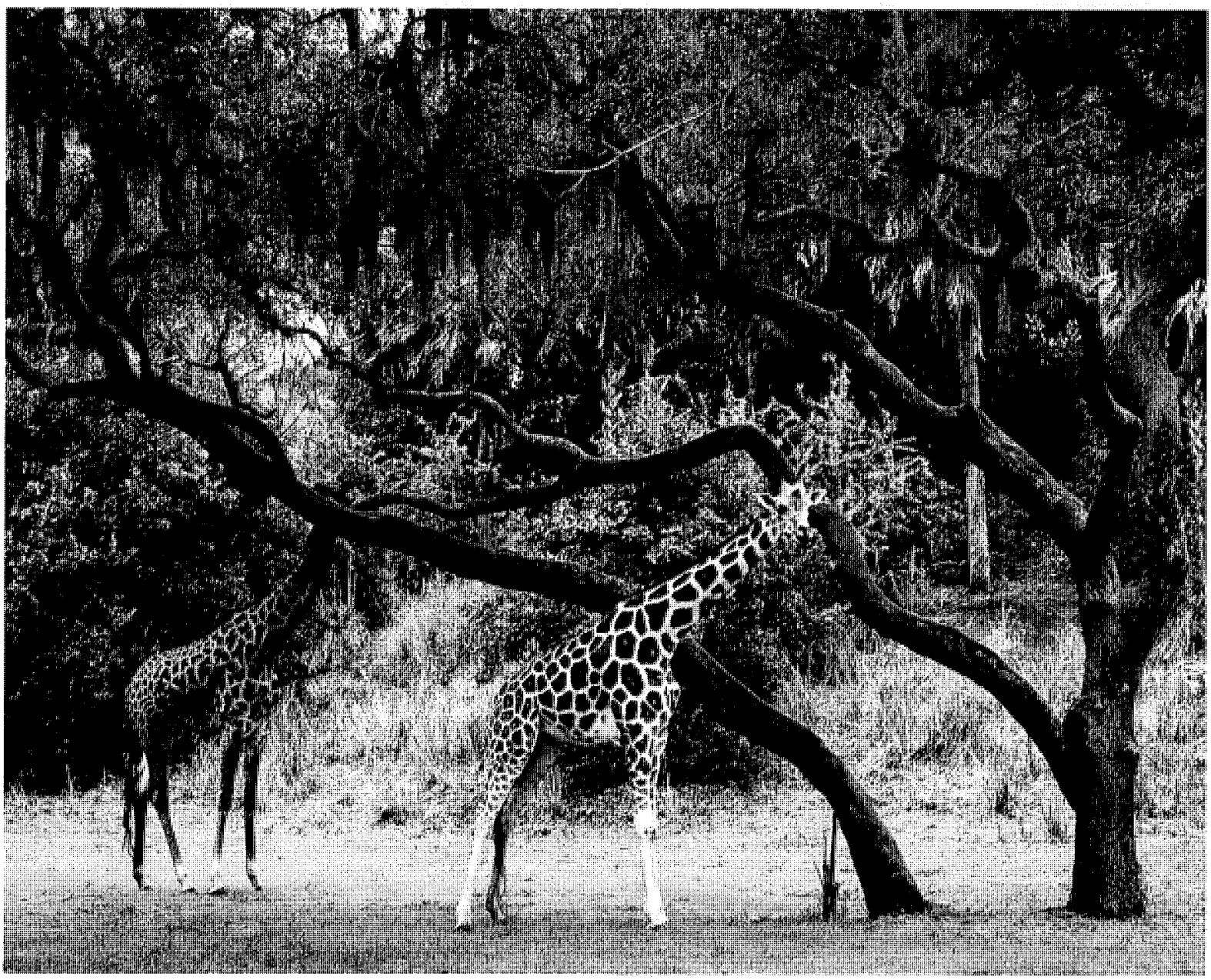
1. An immediate cease and desist order, regarding the construction of bigger concrete bathtubs for whales, dolphins and porpoises at the Vancouver Aquarium;

2. An immediate moratorium on the importation/deportation/transfer of any and all cetaceans to and from the Vancouver Aquarium, whether for performing purposes or not...the one and only exception to that rule, possibly, being IF the Vancouver Aquarium deems that any of its current cetaceans are eligible for release back into the wild;

3. An immediate moratorium on the breeding of any and all Vancouver Aquarium-owned cetaceans, regardless of where those cetaceans are currently (i.e., SeaWorld);

4. An immediate amendment to the "License Agreement"/"Lease"/"Cetacean Bylaw" (between the Vancouver Park Board and the Vancouver Aquarium), reflecting items numbered 1, 2 and 3, above; and

5. All of the above remains in effect until a **BINDING** plebiscite/referendum on the issue is conducted.



ARKS OF HOPE

AMBASSADORS FOR ANIMALS

The Pivotal Position of Zoos and Aquariums and Next Steps in Ensuring the Welfare of Animals in Human Care

HUMANE CERTIFIED

AMERICAN HUMANE ASSOCIATION

HUMANE CERTIFIED

ARKS OF HOPE
AMBASSADORS FOR ANIMALS

The Pivotal Position of Zoos and Aquariums and Next Steps in Ensuring the Welfare of Animals in Human Care

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ARKS OF HOPE
AMBASSADORS FOR ANIMALS

EXECUTIVE SUMMARY

The world is in the middle of what experts believe is a sixth mass extinction, with a rate eight to 100 times higher than expected since 1900.[1,2] While the previous five die-offs were driven by natural events such as the one that brought about the end of the dinosaurs (and also exterminated 75 percent of all species on the planet), the current mass extinction is driven by humans. An ever-expanding human population—which is expected to increase to 10 billion in the coming decades—has meant that there are fewer and fewer truly "wild" places left. This in turn has put pressure on both habitats and conservation efforts.

Animals enrich our planet, and our lives, and humanity has a moral obligation to preserve wild and endangered animals. In response to these challenges and duties, zoos and aquariums have become modern day arks of hope for many species. Zoos and aquariums not only fund thousands of conservation projects, but they are vessels themselves to safely house and help sustain populations of critically endangered animals.

People won't protect what they don't love and they can't love what they don't know. Zoos and aquariums are the ambassadors between wildlife and humans. According to the Association of Zoos and Aquariums, over 181 million people visit U.S. zoos and aquariums it accredits every year, which is more people than go to NFL, NHL, NBA, and MLB games combined.[3] Globally, 700 million people visit zoos and aquariums every year, or about 10 percent of the world population.[4] Zoos and aquariums are positioned today not only to take a leading role in conservation, but to educate the next generations about the importance of Earth's animals.

Zoos and aquariums don't just help us appreciate animals that we might otherwise never see in person. They also provide vital research that helps these animals continue to exist on the planet and contribute to jobs and economies across the world.

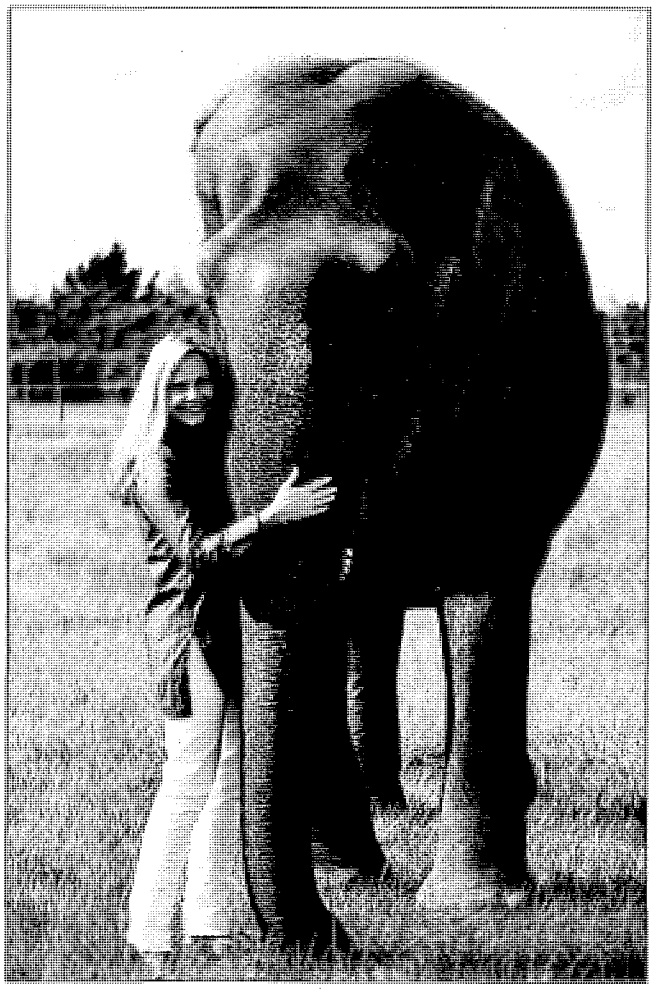
Of the estimated 10,000-12,000 zoos and animal parks in the world, only an estimated 2.3 percent or less were accredited or recognized as of 2008.[5] As we face 21st Century challenges in caring for the Earth and its creatures, zoos and aquariums—especially those accredited to meet professional standards—will play critical roles at every step. We must make sure that the outstanding work already being done by many facilities is recognized, that substandard institutions are improved or closed, and that more institutions worldwide are brought to the highest level for animal welfare.

While there are accreditation programs for zoos and aquariums, there has not been an effort devoted solely to verifying the welfare of animals in human care. Furthermore, in today's society where the public is skeptical and demands independent certifications, accreditation programs are based on older models such as those offered by trade membership associations where independence is certainly not assured nor guaranteed.

In contrast, American Humane Association's new Humane Conservation program offers an improved model that allows for independent, third-party certification of the humane treatment of animals in human care, based on rigorous science and evidence-based practices. Humane Conservation audit teams are independent from the institution, and the focus is solely on the humane treatment of the animals, and not other factors outside of animal welfare. With more and more Americans concerned about the treatment of animals, Humane Conservation certification standards are 100 percent focused on animal welfare, and have been developed by leading scientists and ethicists. It is the first program of its kind —the new gold standard for animals in zoos, aquariums, dolphinariums, and in human care.

ARKS OF HOPE
AMBASSADORS FOR ANIMALS

To ensure the humane treatment of animals, we must bring new welfare certification systems into being that focus solely on the treatment and well-being of animals in our vital global network of zoos, aquariums, dolphinariums, and conservation centers. This task, as well as an in-depth examination of the value of the institutions that play the greatest role in preserving the world's disappearing species, is the subject of this paper.



Robin R. Ganzert, PhD
President and CEO, American Humane Association

BENEFITS

Animal Welfare

Zoos and aquariums care both about the animals in their care and broader populations through conservation. All animals should be treated humanely, whether they are in zoos and aquariums, households, on farms, performing service to law enforcement or the military, or anywhere else. Animal welfare is more than simply access to food, water, and shelter—these are just the basics. The "Five Freedoms," the internationally accepted social contract with animals adopted by the Royal Society for the Prevention of Cruelty to Animals and animal welfare professionals worldwide, outline a more comprehensive consideration for animal welfare: Freedom from pain, freedom from hunger and thirst, freedom from discomfort, freedom to express normal behavior, and freedom from fear and distress.[6]

For zoo animals, "the truly important step is ensuring that conditions exist so each animal...has the potential to experience great welfare."[7] More than just meeting basic life needs, the emotional well-being of zoo (and aquarium) animals is paramount to animal welfare. Animals should be able to make choices: Where to spend their time, how to engage with environmental enrichments, and when to spend time with other animals.

In this context, zoos have developed handling programs and exhibits that provide for animals' needs, changing in the past few decades to provide better habitats. The very first zoos provided barren environments for the animals. Many larger animals were kept in concrete enclosures with bars and little environmental enrichment. In these earlier generations of zoos, the focus was on the satisfaction of visitors, meaning "[t]he human field of vision became the standards measure...Small enclosures and cages may have robbed animals of a normal physiological and psychological life and provoked stress and high mortality rates, but they ensured spectators a quick and certain sighting."[8] Beginning in the 20th Century, some environmental enrichments such as flora and rocks were used in enclosures.[9] But even these environments left something to be desired.

Today, zoos try to mimic natural environments for the animals. Vegetation and open areas, combined with toys, climbing areas, and scent trails provide enrichment for the animals and an opportunity for visitors to see the animals engage in natural behaviors. Some zoos and aquariums use shows and public feeding demonstrations as attractions to engage animals and visitors.

Examples of environmental enrichment for zoo animals are many. The National Zoo in Washington, D.C. has the O-Line, a nearly 500-foot long, 50-foot high cable that allows orangutans to swing and walk between towers and the zoo's Great Ape House.[10] The Bronx Zoo has the Congo Gorilla Forest, a 6.5-acre area mimicking a Central African rainforest complete with more than 15,000 tropical plants. The Dallas Zoo's Wilds of Africa is a 25-acre area with several different habitats, from bush to woodlands. The Mystic Aquarium in Connecticut has one of the largest habitats for beluga whales in the world.

In addition to providing animals rich lives, zoos and aquariums have also improved the health care for and medical treatment of animals. Zoos are living longer, and animals are provided preventive health plans that include prescriptions and procedures such as those afforded to humans, including CT scans and anti-inflammatory medication.[12] As a result, animals can live longer, healthier lives than their forebears did in the wild. For instance, Shedd Aquarium in Chicago has an 85-year-old Queensland lung fish named "Granddad."

Looking forward, researchers have encouraged some changes to benefit the animals. Strengthening the existing relationship between zoos and aquariums and university graduate departments and behavioral analysts can promote animal welfare improvements by increasing our understanding of species behavior. This can be especially helpful as behavioral problems may result from animal welfare problems.[13] Meanwhile, a researcher with the Zoological Society of London, noting that marine mammals such as dolphins and sea lions have cognitive skills close or equal to great apes, has suggested cognitive challenges such as obstacle courses be introduced to help stimulate animals in aquariums and provide further enrichment.[14]

Researchers with the Detroit Zoological Society's Center for Zoo Animal Welfare have outlined the framework for zoos to consider animal welfare.[15] The framework includes institutional philosophy and policy, or an institution's goal to ensure animals are thriving, not just surviving; programmatic structure and resources; execution of the framework; and evaluation, or a means from within or without an institution to evaluate animal well-being using science-based criteria.

In building on this framework, we believe one thing must be emphasized: Third-party evaluation. As discussed below, the public yearns for transparency, whether in consumer products, food production, or governance. The same is true with animals in human care.

Conservation and Research

Wild animals face threats to their habitats and to their existence. Today, there are very few "natural" places left. Antarctica and small parts of Africa and the Amazon basin are the only true wild places, meaning they are generally untouched by human activity, remaining on Earth.

As humanity's numbers have grown to more than 7 billion —and are expected to keeping growing to 10 billion in the coming decades—people are increasingly encroaching on wild spaces to the detriment of wild animals. Tiger habitat has been lost to rice fields and aluminum mining;[16] lions and other big mammals face pressure from agricultural expansion in Africa.

A major purpose of zoos and aquariums is to promote the conservation of animals. To this end, these institutions conduct major, global research efforts that span everything from biological sciences such as genetics to in-the-field research to research of institutions' effectiveness at educating its constituents.[17] Zoos and aquariums may sponsor research or fund journals; hold symposiums to disseminate research; or conduct research internally with or without partners. There are five academic journals dedicated to zoos and aquariums: *Zoo Biology, Journal of Zoo and Aquarium Research, Der Zoologische Garten (the official journal of the World Association of Zoos and Aquariums), Journal of Zoo and Wildlife Medicine, and International Zoo Yearbook.*

Conservation

The International Species Information System estimates that 82 percent of all new mammals, 64 percent of birds, and a majority of reptiles are born in captivity. "The survival of many of the world's species," it notes "rely on their ability to reproduce in captivity – for some, zoo populations may be all we have left." [18]

Institutions accredited by the Association of Zoos and Aquariums—which only account for 230 out of over 10,000 zoos, aquariums, and animal parks in the world—contributed $160 million to 2,650 conservation projects in 130 countries in 2013.[19] For butterfly conservation alone, a partnership of zoos spent $2 million between 2010 and 2013.[20] Zoos are also involved in collaborative breeding programs.

The programs are science-based and rigorous. Zoos share genetics, ancestry, and other information on individual animals in order to have the most robust program for breeding.

Zoos are responsible for a number of programs to reintroduce species to the wild, using breeding to build up a healthy population of animals. The Phoenix Zoo, with funding from the World Wildlife Fund, successfully reintroduced the Arabian Oryx to the wild. Breeding is being used to bolster wild populations of the Whooping Crane; one of the three primary facilities is the Calgary Zoo.[21] The Black-Footed Ferret and California Condor have been reintroduced into the wild through a partnership between state and federal U.S. agencies, zoos, and other non-governmental organizations.[22,23] Meanwhile, the National Zoo helped lead reintroduction of the golden lion tamarin, which has helped increased the wild population from 100 in 1991 to 1,000 in 2012.[24]

Other success stories include Partula snails, the European bison, Przewalski's horse, the red wolf, and the Oregon spotted frog.[25,26]

Zoos and aquariums have also built centers for research and propagation of species. The Pittsburgh Zoo & PPG Aquarium created the International Conservation Center (ICC), a 724-acre facility in Somerset County, Pennsylvania and will provide an opportunity for research and breeding of elephants.[27] The ICC eventually plans to add cheetahs, zebras and rhinos.[28] The Houston Zoo founded the El Valle Amphibian Conservation Center in Panama, which works to conserve local amphibian species that have been disappearing at an alarming rate.[29]

Broadly, the International Species Information System is a network of close to 1,000 zoos and aquariums in 90 countries that share information about animals in their care, including medical and husbandry records. This information-sharing allows institutions to control the genetic makeup of their facilities and find appropriate breeding animals to propagate species while maintaining genetic diversity. It also allows zoos and aquariums to connect with other institutions that have experience raising or studying certain animals. Over 40 years, the International Species Information System has shared data on 6.8 million animals covering 21,000 species. Nearly a quarter (about 23 percent) of the species in zoos that are a part of the International Species Information System network are threatened.

Along with hands-on work, zoos and aquariums are frequent contributors to the literature on conservation. A review of published articles in Conservation Biology found that nearly one in ten (8.3 percent) had an author with a zoo or aquarium affiliation.

Other Research

Zoos also provide a base of operations for research into infectious and zoonotic diseases, and other matters. Zoo research, according to the St. Louis Zoo, provides opportunities for scientists to:

- *Conduct clinical, nutritional, pathological and epidemiological studies of diseases of conservation concern*
- *Monitor diseases in free-living wild animals where they interface with domestic animals and humans*
- *Perform studies that contribute to the field of comparative medicine and the discovery of life forms, from invertebrates and vertebrate species to parasites and pathogens*

The St. Louis Zoo established the Institute for Conservation Medicine (ICM) in 2011. The role of the ICM is to

help scientists "study the origin, movement and risk factors associated with diseases so they can better understand the impact of diseases on the conservation of wildlife populations; the links between the health of zoo animals and free-living wildlife populations; and the movement of diseases between wildlife, domestic animals and humans."[33] Zoonotic diseases have accounted for 75 percent of all emerging infectious diseases among humans over the last few decades, according to ICM's director, making the center's work vital to both animals and people. [34]

Research can yield benefits to humans, as well as to our wild neighbors. The St. Louis Zoo and the University of Missouri's College of Veterinary Medicine examined the health benefits of zoos to people, including reduced stress, lower blood pressure, and increased energy. [35]

One major frontier in zoo research is the area of intelligence. The Think Tank at the Smithsonian National Zoo in Washington, D.C. provides an exhibit for visitors to discuss the intricacies of what defines intelligence and thinking. The Think Tank also conducts research on memory in orangutans and cognition and emotional state in apes. [36]

Zoo Atlanta supports research at its facility as well as at zoos in China to learn more about Great Pandas, including that on reproductive behavior, the effects of transporting pandas from China to the United States, and foraging behavior. The zoo also runs the Great Ape Heart Project, aimed at studying the cardiovascular health of gorillas, orangutans, chimpanzees and bonobos. [37]

Zoonotic diseases including West Nile virus, salmonella, and Lyme disease are the subjects of numerous zoo research projects. The San Diego Zoo has a staff of nearly 20 dedicated to combatting wildlife disease and removing it as a barrier to conservation. The Cleveland Metroparks Zoo has researched treatments for iron-storage disease in Egyptian bats and monitored disease in the deer herds that frequent the park. The Zoological Society of London is developing methods to assess the risk of disease occurrence during relocation and reintroduction of animals to the wild. [38]

Looking Forward

Zoos and aquariums can help with a number of key problems in the future. Issues include diseases and biosecurity; global water shortages and food insecurity; markets for wildlife products; the need for simultaneous and integrated management of animals in the wild and in human care; the impact of political instability and human conflict on wild animal populations; and the need for animal preserves. [39]

Zoos and aquariums are already addressing some of these issues. Pittsburgh Zoo and Aquarium's development of a reserve for elephants in Pennsylvania will serve as a tool to promote conservation breeding. This reserve could also serve as a refuge for imperiled elephants in the wild, such as those in Swaziland, where there are too many elephants for the amount of land, and where the government has offered to ship elephants to American zoos. [40]

Freshwater fish also face challenges, according to researchers affiliated with the International Union for the Conservation of Nature. Only 0.3 percent of the available water in the world is in lakes, ponds, rivers, fresh water estuaries, and wetlands, yet these areas support about 50 percent of all fish species. Freshwater areas face threats from pollution, overfishing, invasive species, and habitat loss and modification. Public aquariums can help educate the general public and visitors through their marketing and exhibit materials; help develop conservation policies that involve many stakeholders; encourage the application and enforcement of conserva-

tion laws; support breeding in facilities; and support habitat restoration and species reintroductions in the wild. [41]

Zoos and aquariums are vital and necessary partners for multi-stakeholder programs benefitting conservation and biodiversity

Economic Impact

We believe animals improve and enrich our lives physically, emotionally, spiritually, and in many other ways. In fact, zoos have often been an important part of civilization and modern urban development. For centuries in Europe, "zoological gardens often formed part of the urban renovation programmes being implemented...and characterized by the creation of broader streets, boulevards, squares and embankments to ease the movement of people and good, to open out horizons, to encourage people to wander a little and look at monuments, and to improve air circulation and the general quality of life."[42] These parks were often established in wealthy areas of cities, and when established on the outskirts of town accelerated or drove those areas to become residential zones for aristocracy and bourgeoisie. While many facilities restricted admittance to the wealthy, over time, zoological gardens became more accessible to other classes starting in the second half of the 19th Century.

Today, zoos and aquariums are important assets to their communities—of all economic stripes. They serve not only as educational opportunities, but in many cities, as huge economic boons. **A study of AZA members calculated that they support 142,436 jobs in the U.S. and 10,840 internationally (for only 11 international members). In 2012, nearly 170 million people visited zoos and aquariums in the United States – that's more attendance than the NFL, NHL and MLB combined. Together, zoos and aquariums contributed almost $20 billion to the U.S. economy in 2012.** [43]

Worldwide, more than 700 million people visit zoos and aquariums every year.[44] There are more than 300 substantial public aquariums across the globe, with more than 100 opening since the early 1990s. The expansion of aquariums is "often associated with the multi-million dollar regeneration of cities, docklands and other run-down, previously industrial areas. Such large-scale investments bring about highly beneficial economic, employment and social impacts." [45]

Tourism Dollars

In more than a few cities, zoos and aquariums serve as the main driver of tourism dollars, bringing people into town, who then spend money at other establishments. According to a study commissioned by the Association of American Zoos and Aquariums (AZA), **people who visited zoos and aquariums spent an additional $2.4 billion before and after their visit at surrounding businesses**. In Memphis, for example, two-thirds of out-of-town visitors – more than 300,000 – went to the city primarily to visit the Memphis Zoo, according to a University of Memphis study.[46]

Similarly, the National Aquarium in Baltimore (NAIB) has helped to revitalize the city's downtown area by attracting more than 1.5 million visitors annually, according to an economic impact study conducted by Sage Policy Group. Maryland Governor Martin O'Malley called the aquarium "a driving force for our state's economic engine." [47] Baltimore Mayor Stephanie Rawlings-Blake said the aquarium "is an institution that has helped the city grow and thrive." [48]

Almost 90 percent of NAIB visitors cited the aquarium as their primary reason for visiting the city. The average tourist on a day-trip to the aquarium spent $109.80, while an overnight visitor spent $372.18 per trip.[49] The researchers estimate that visitors to the NAIB spend more than $205 million per year on things like food, lodging and transportation.

The Tennessee Aquarium in Chattanooga has been credited as the driving force behind the downtown area's revitalization over the last two decades. When the world-class aquarium was being built in the early 1990s, it was seen by residents and tourists alike as a beacon of hope for the economically struggling city.[50] The aquarium continues to fuel growth in the city's downtown, contributing a more than $101 in million annual impact.[51] In 2014, the aquarium drew 710,513 out-of-town visitors to Chattanooga, with the average family spending $710 for an overnight stay. Area businesses see an increase of $67.7 million as a direct result of goods and services purchased by aquarium visitors. One paper calculated an economic benefit of aquariums by studying day trips, and determined these trips brought economic activity that otherwise would not have occurred. [52]

The Phoenix Zoo has also played a significant role in bolstering the economy of Arizona since it opened its doors in 1962. In 2012, the zoo contributed an additional $92 million to economic activity in the local area.[1] In 2012, 183,000 people visited the Lincoln Children's Zoo in Nebraska, pumping an additional $6.31 million into the local economy. [53] The Vancouver Aquarium contributes $43 million in economic output annually. [54] The Brookfield Zoo in Chicago generates $150 million in economic activity every year and supports 2,000 jobs. [55] And the Georgia Aquarium has contributed $1.9 billion to the state's gross domestic product and has helped drive $1.7 billion in new investment in Atlanta since 2005, drawing more than 1 million visitors from out of state annually.[56]

Employment Opportunities

Zoos and aquariums are very large operations, and as such, require large staffs with diverse skillsets to keep them up and running. Aside from day-to-day operations, construction crews are also needed to build and expand operations. Each year, according to the AZA study, **zoos and aquariums in America generate personal earnings upwards of $6.4 billion and support 193,986 jobs.** [57]

The size and complexity of zoo and aquarium operations require the services of both full- and part-time workers. The NAIB directly employs 2,257 full- and part-time employees, and also supports another 279 jobs throughout the city through the purchase of services provided by area businesses to support aquarium operations. The aquarium supports an additional 378 jobs in Baltimore City by enhancing spending in the local economy, according to the Sage study.[58]

The Minnesota Zoo is in the process of completing a five-year expansion project that will completely transform many of its exhibits and create several new ones. According to a study conducted by researchers at the University of Minnesota, the new construction will create 680 temporary jobs at a cost of $103.4 million.[59]

Between 2000 and 2007, Louisville's nature attractions saw an increase in payroll expenses of 49 percent – due primarily to the Louisville Zoo, which had a 16 percent increase in earned revenue.[60]

Reliable Tax Base

The sheer size of zoos and aquariums and the permanence of their structures make them a reliable tax base for the municipalities they call home. The NAIB contributes $11.7 million in annual tax revenue to the state of Maryland and an additional $5.9 million to the city of Baltimore. Similarly, the Magnetic Hill Zoo in Canada's New Brunswick province contributes $1 million in tax revenue to the federal government and another $800,000 to the provincial government.[61] Each year, the Chattanooga Aquarium contributes $6.3 million in tax revenue for the city of Chattanooga and Hamilton County. [62]

In so many ways, these institutions, which are significant investments in the care and future of the world's animals, also pay handsome dividends to the communities in which they reside.

Education

Zoos and aquariums draw 181 million visitors a year in the United States, which is over half the population, and an estimated 700 million worldwide. According to the AZA, **most U.S. visitors are between the ages of 25 and 35, a prime demographic. Not only are these people future leaders of the country in promoting conservation, but they are often parents who can teach the next generation about the value of conservation**. Two-thirds of adults who visit zoos do so with children, as do half of adults who visit aquariums.

It's not just foot traffic that zoos attract. In August 2015, the National Zoo's "Panda cam" drew 868,000 views in one weekend after a panda gave birth to twins.[63] Visitors to the zoo also increased by 15 percent the year a panda was born.[64] While pandas are an iconic image of zoos—and the importance of conservation—they aren't the only draw. A general increase in interest in exotic animals is correlated to an increase in the number of zoos.[65]

Zoos also are able to educate visitors about the threats to species. As understanding of threats increase, visitor attitudes towards these species improve.[66] In fact, "visits to zoos and aquariums almost always result in enhanced scientific understanding and strengthened beliefs in the value of nature conservation."[67]

How zoos do this is a matter of study and ongoing refinement. The National Zoo, for instance, has a tug-of-war game that visitors can play with an orangutan. But it's also important to make sure these enrichments are improving the educational experience for visitors.

One study examined visitors to Zoo Atlanta viewing an animal training exercise with otters, performed by zoo staff with interpretations for the audience. The research concluded that exposing audiences to animal training increased visitor satisfaction and the amount of time they spend at exhibits.[68] The Edinburgh Zoo provides an opportunity for visitors to watch ongoing primate research. A review of this design found that it increased visitor engagement. [69]

Good zoos and aquariums are more than just places where animals are on display. They are places where animals and humans can engage.

Efficacy

How effective are zoos and aquariums at educating the public? The AZA conducted a three-year study in the United States to determine the impacts of visiting zoos and aquariums.[70] Conducting surveys of thousands of visitors, they were able to determine that zoos and aquariums help reinforce visitors' values and attitudes and cause visitors to see themselves as part of the solution to environmental and conservation issues. Importantly, the benefits lasted. Months after their visit, 61 percent of visitors questioned by researchers were able to talk about what they learned from their visit, and 35 percent said their visit reinforced beliefs about the importance of animals and conservation.

Research also indicates that visitors to zoo and aquariums value these institutions more and more for the education and conservation benefits, rather than solely as a place for entertainment. For most

visitors, learning was one of the top reasons for visiting a zoo or aquarium, and animal welfare—knowing that animals were well cared for and kept in enriched environments—as well as experiential factors contributed most greatly to their satisfaction with a visit. Seventy-four percent of respondents indicated that an institution's role in promoting conservation and environmental issues was at least as or more important than an institution's role in providing a fun time.[71]

British researchers, in conjunction with the World Association of Zoos and Aquariums (WAZA), examined the effectiveness globally of zoos and aquariums in contributing to visitor understanding of biodiversity—a goal laid out in the United Nations' Aichi Biodiversity Targets. After surveying more than 5,600 visitors in 19 countries, they measured a significant increase in understanding of biodiversity and actions they could take as individuals to protect biodiversity.[72]

Aquariums also engage and encourage individuals to use their purchasing power to effect change in a way that benefits endangered species. Aquariums around the country are promoting campaigns to support "sustainable seafood." These initiatives are intended to address overfishing, water pollution, and other environmental issues that arise from seafood cultivation and harvesting. Due to the wide range of problems they're meant to solve, sustainable seafood initiatives are often multifaceted in nature.

The Monterey Bay Aquarium in California, for example, runs a program called "Seafood Watch," which rates seafood and sushi on a three-tier scale: "Best Choices," "Good Alternatives," and "Avoid." The best are those "caught or farmed in ways that cause little harm to habitats or other wildlife," while the worst involve species that are overfished or caught/farmed in harmful ways.[73] These seafood ratings are released to influence consumers in the store. Since 1999, the aquarium has distributed more than 56 million consumer guides featuring its ratings and launched an app that has been downloaded more than 1.5 million times. Through "Seafood Watch," the aquarium has partnered with more than 400 aquariums, nonprofit organizations, and food suppliers to promote sustainable seafood harvesting and consumption.[74]

They are not alone. Shedd Aquarium in Illinois is known for its "Right Bite" program, the leading sustainable seafood program in the Midwest. It involves research projects on Great Lakes fisheries, regular conferences with restaurant and food service professionals, and Fish of the Month recipe promotions among other initiatives. The aquarium is also one of Monterey Bay Aquarium's most vocal partners. New England Aquarium is another: It promotes sustainable seafood on its website, offering "ocean-friendly" seafood options, recipes, and events at local restaurants.[75]

Aquariums also have opportunities to promote sustainability in the pet fish trade, which in turn promotes the health and conservation of populations in an industry that trades in more than 1,000 species and imports 190 million animals annually. Writing in *Zoo Biology*, authors from the New England Aquarium and other institutions argue that public aquariums are in a unique position to promote sustainability in several fields. As nonprofits, aquariums are more likely to be trusted than businesses in the aquatic pet trade; as such, they can develop social media campaigns or market-based initiatives to help ensure best practices are used by businesses. Aquariums have the technical and scientific expertise to suggest improvements in the transportation and breeding of fish. And finally,

aquariums can also offer an educational message to their own visitors—many of whom are interested in keeping pet fish.[76]

Culture

Zoos and aquariums are important institutions in American culture. Far from the private menageries of exotic animals of the past that were showpieces of the upper class, today's organizations have a role that serves both society and animals. These institutions "encourage visitors to care for natural resources, maintain local habitats for wildlife and participate in local community-based efforts to restore and protect the environment." [77]

Zoos also provide for bonding in families and development of children. One study of zoo visitors found that parents, even if they don't like zoos that much, appreciate the time they allow them to spend with their children. Zoos also provide a way for urban parents to take their kids to see animals firsthand while living in an environment with limited access to the natural world. Visiting a zoo provides an opportunity to develop a child's moral compass by teaching children how to be "good citizens of the world." The benefits aren't limited to children: Parents who had personal issues with abandonment benefited from appreciating the "family" groups of zoo animals. [78]

Zoos benefit not just visitors but those who work there. Volunteering at zoos provides an important outlet for people who view conservation as part of their personal identity.[79] Zoos and aquariums as institutions provide opportunities for people with similar values to meet and collaborate.

Zoos also bring cultures together. International collaboration on conservation projects is regular, especially as zoos and aquariums focus on *in situ*, or in the wild, work such as habitat preservation or restoration. Cross-cultural collaboration is a necessary result of the global effort to protect species.

Such efforts increase tourism, as well. The Ninoy Aquino Park and Wildlife Center, which operates a "mini-zoo," receives 400,000 tourists a year, whose payments for admission and parking help fund the Center's work.[80] Zoo tourism can bring local zoos together with international partners, can raise funds for zoos, and can bring benefits for conservation by involving breeding and reintroduction of animals to the wild for tourists to see.[81]

The Need for Accreditation and Animal Welfare Certification

Zoos and aquariums do worlds of good for global conservation. Yet, AZA-accredited institutions only amount to 230 out of more than 10,000 zoos and animal parks worldwide—or just 2.3 percent. In an age when consumers demand transparency and third-party verification, most zoos and aquariums are lagging behind the times.

Unfortunately, the lack of common accreditation opens the door for those who would remove animals from our lives to paint a misleading picture of zoos and aquariums with a broad and ill-informed brush. People for the Ethical Treatment of Animals (PETA), for instance, refers to zoos and aquariums as "prisons" and calls for their closure. Certainly there are examples of zoos and aquariums that fail to maintain high standards. Zoos in conflict areas face the dangers of violence and under-funding. The Kiev Zoo was expelled from the European Association of Zoos and Aquaria in 2007 over poor conditions for animals and has been linked to financial malfeasance. In the United States, so-called "roadside" zoos may lack resources and proper environmental enrichments for their animals.

However, as this paper lays out in detail, zoos and aquariums provide vital roles. Researchers believe that the world is in the midst of a sixth mass extinction. According to the World Wildlife Fund, global populations of vertebrates dropped 50 percent between 1970 and 2010.[82] According to the IUCN, nearly 25,000 species globally were considered threatened in 2015. Moreover, the trends are not encouraging. Mammals, birds, and amphibians have all been faring worse on the IUCN Red List index of species survival. Without zoos and aquariums, a number of species that are success stories—such as the California condor, the European bison, Przewalski's horse, and the red wolf—might instead be history.

While groups such as PETA have an ideological opposition to animals living in any institution or even in individual human care as pets, this dogma ignores key realities. Most zoo animals are born in zoos. They don't have the means to live successfully in the wild, but they do have the ability to sustain their species under human care.

Keeping some animals in zoos and aquariums serves to help the entire species. Therefore, we should support the best actors and encourage other institutions to meet best standards.

Importance of Third-Party Certification

Third-party certification can make the difference between consumers trusting a product or service and forcing them to look for alternatives. For instance, according to a 2011 survey from the Food and Drug Administration and other government agencies, consumers have a "high positive attitude" toward certified food products. The national survey found that a majority of Americans believe they are safer than their non-certified counterparts.[84]

One reason is the public's general skepticism, especially of business. According to Edelman's most recent Global Trust Barometer, only 53 percent of people across the globe trust business leaders, with more than two-thirds claiming CEOs focus too much on short-term financial results compared to other objectives.[85] Meanwhile, a 2015 Gallup poll is even more striking: Fewer than nine percent of Americans trust corporations a "great deal," while a mere 12 percent trust Big Business "quite a lot."[86]

Consider also the characteristics of millennials. Pew found that only 19 percent of millennials say most people can be trusted. And polling from Harvard discovered that a significant majority of millennials expressed distrust of the press (88%), Wall Street (86%), the federal government (74%); and so on for other institutions.

Third-party validation by a trusted organization with verifiable and impartial science-based systems can do much to earn and deserve the confidence that an institution is meeting the humane standards rightly demanded by the public. American Humane Association, a 140-year-old humane organization that has been at the forefront of virtually every major advance in the protection of children and animals, and is the largest certifier of animals in working environments, has taken it upon itself to develop strong, science-based standards for the humane conservation of animals in humane care at zoos, aquariums, dolphinariums, and conservation parks. Developed by

independent, respected veterinarians and experts in the fields of animal welfare, animal science, zoology, and ethics, these standards will serve as a benchmark of humane care to which institutions can aspire, providing verification of good practices at deserving zoos and aquariums, and long-overdue assurances that the public can support in good conscience as those of us who love animals seek to enjoy and preserve the rich web of life essential to the survival of Mankind – and all the creatures of the Earth.

Conclusion

Far from being the private menageries of the past, which captured wildlife for private viewing and pleasure, today's zoos and aquariums operate for the benefit of the public and the animals for which they care. Animal welfare, conservation, research and education are the missions of these institutions, and many are succeeding in their goals, but there still is a long way to go, with room for change and growth, in solving the challenges faced by Earth's creatures.

The American Humane Association launched the Humane Conservation certification program for zoos and aquariums to drive improvement among these institutions. The Humane Conservation Certification Program is the only certification program focused 100 percent on animal welfare administered by independent third-party auditors. American Humane Association is the oldest national animal welfare group in the United States, and its expertise and independence will be a powerful force in the future success of zoos and aquariums – one that will provide benefits to both animals and people.

WHAT THE EXPERTS SAY

"WWF has long supported the legitimate role of zoos in conservation, education, and research. Captive breeding programmes managed by zoos can provide positive benefits for species conservation if designed and used appropriately, and if they are part of a science-based conservation management plan for the species. Such programmes may act as a platform for zoologists, veterinarians and others to conduct research designed to enhance understanding of the biology of the species."
–World Wildlife Fund position statement

"[M]ost kids first learn about wildlife from their local zoo. The very best zoos not only focus on wildlife education, but conservation of endangered species via captive breeding and responsible re-introduction programs."
–Joan Embery, animal and environmental advocate

"Every aquarium and zoo I work with believes its mission includes raising awareness about the challenges faced by animals around the world. We know animals have the power to touch our hearts, and when this happens, it opens the door to education that can inspire people to participate in protecting animals and conserving their environments."
–Jack Hanna

"All in all with the ongoing global threats to the environment it's hard for me to see zoos as anything other than being essential to the long-term survival of numerous species. Not just in terms of protecting them and breeding them for reintroduction, but to learn about them to aid those still in the wild, as well as to educate and inform the public about these animals and their world."
–Dr. Dave Hone, paleontologist

"Zoos have an essential role in conservation."
–Christina Russo, Ph.D.

LEADING EXPERT ENDORSEMENTS

"Beginning in the 1970s, society became increasingly aware of the ethical issues arising in animal use. Matters never even considered in the past have achieved major prominence. These issues range from the use of animals in food production and scientific research to their use in entertainment. American Humane Association pioneered assuring the well-being of animals used in cinema production. Now the organization is turning its attention to animals kept in zoos and aquaria, an area that has again elicited major social concern. The auditing standards developed by American Humane Association represent a robust and salubrious beginning to regulating these operations."
—Bernard E. Rollin, PhD, University Distinguished Professor, Colorado State University

"I endorse the American Humane Association's Humane Conservation certification program. This is entirely aligned with the veterinary profession's mission to be certain that animals used for the purposes of benefitting animalkind and humankind are treated with highest levels of humane welfare care and health care. No entity has done more to reduce suffering and inhumane treatment or prevent and treat disease than the veterinary profession and American Humane Association."
—Joe M. Howell, DVM, Past President and Chairman of Board, American Veterinary Medical Association, and Current President, Western Veterinary Conference

ARKS OF HOPE
AMBASSADORS FOR ANIMALS

"I applaud American Humane Association for this tremendous program to certify the humane treatment of animals in our zoos and aquariums nationwide. This unique program is especially exciting as accreditation programs run by membership organizations are peer-reviewed and can often be influenced by politics and favoritism. The American Humane Association program is unique in that it offers the first third-party, independent review and certification. This is definitely needed in our industry, as we all work to improve the level of care of animals."

—Barbara Baker, DVM, President & CEO, Pittsburgh Zoo & PPG Aquarium

"The Chicago Zoological Society/Brookfield Zoo fully endorses the American Humane Association Humane Conservation program. The world's zoos and aquariums lead the efforts to develop the highest standards of welfare for animals under professional care through science based research. Having the most honored and prestigious humane organization in the world act independently to evaluate and certify those efforts and results will tremendously aid in bringing about a renewed confidence by the public in our work and relevancy as centers of education and conservation."

—Stuart D. Strahl, Ph.D., President and CEO, Chicago Zoological Society/Brookfield Zoo

"I have been associated with domestic and exotic animals since the 1960's and professionally for the past 45 years. I am continually impressed by the commitment of the American Humane Association and their dedication to ensure the humane treatment of animals in the care of humans. Their staff is talented, passionate and absolutely dedicated to providing the highest levels of science-based animal management in the design of their certification programs. I express my respect and gratitude to American Humane Association for their leadership and scientific approach in the development of this new Humane Conservation initiative for animals in the world's zoos and centers of conservation."

—David R. Blasko, Director of Animal Care, The Mirage Hotel and Casino

"Every animal in a zoo, aquarium or marine park deserves humane treatment and care. American Humane Association's exciting Humane Conservation Initiative, with its independent audits, science- and evidence-based standards, and the organization's more than a century of experience provides added assurance of the humane treatment and welfare of animals in zoological settings throughout the world."

—Kathleen Dezio, President & CEO, Alliance of Marine Mammal Parks & Aquariums

"The American Humane Association Humane Conservation certification program ensures the highest standards of animal welfare for animals in professional care at zoos and aquariums. This lays the foundation for continued and future efforts for zoos and aquariums to learn as much about the animals in their care as possible through research in order to help conserve species in the wild, and to educate and engage the public in conservation of species and their habitats."

—Tracy Romano, Ph.D., Chief Scientist & Vice President of Research, Mystic Aquarium

ARKS OF HOPE
AMBASSADORS FOR ANIMALS

"I fully endorse the American Humane Association Humane Conservation program. Animal welfare should be apriority for modern zoos and aquaria, and the American Humane Association program, which is based on science and best practice, will make an important contribution to develop and implement animal welfare standards in zoological institutions. This will in turn help them realize their education and conservation roles."

—Xavier Manteca, Ph.D., Professor, School of Veterinary Science, Autonomous University of Barcelona, Spain

"Zoos and aquaria offer people the opportunity to meet a variety of animals up close and personal. These animals are true ambassadors for their species in nature. Human beings will only protect what they love, and they will only love what they know. They will only know what they are taught: Zoos and aquaria teach people about animals, their needs and the need for their conservation. The fact that American Humane Association is willing to champion a program to assess the welfare of animals who call zoos and aquaria home is a testament to the importance of these facilities and their required survival."

—Kathleen Dudzinski, Ph.D., Director, Dolphin Communication Project

"The new Humane Conservation program is a unique and bold initiative for ensuring animal welfare in zoological institutions. This program will honor institutions that consider animal welfare and humane practices as a fundamental part of their daily operations and existence, while raising the bar of expectations for all zoological institutions. Wildlife and the humans who care for them will inevitably benefit from this program and the humane standards that it establishes."

—David S. Miller, DVM, Ph:D., DACZM, Consultant

"I think it is fantastic news that American Humane Association, one of the most highly recognized animal welfare advocates in the world, has launched the Humane Conservation certification program. As Mahatma Gandhi said, 'The greatness of a nation can be judged by the way its animals are treated,' and it is great news that the American Humane Association has decided to support another great step forward with this program and provide tools to recognize excellence and the best animal care standards in selected zoos and aquaria. This new animal welfare certification audit is dedicated to verifying humane and ethical treatment for all animals maintained in zoos and aquaria. American Humane Association's commitment to fighting for animals and ensuring professional care for animals is a welcome addition to our existing efforts. American Humane Association will provide tools to evaluate and assess the best animal care practices and procedures and we are grateful for their efforts and commitment to develop this incredibly important initiative. A key component of this new accreditation program is a focus on the well-being of each individual rather than other indirect indicators of welfare. We believe in any case, it is critical to use scientifically validated criteria to determine animal welfare rather than impressions or opinion. The professionals involved in this new Humane Conservation Scientific Advisory Committee are animal care experts putting all together over 500 years of experience in the zoo and aquarium fields."

—Daniel García Párraga, DVM, DECAAH, DECZM (Zoo Health Management), Director of Animal Health, Oceanogràfic Valencia

ARKS OF HOPE
AMBASSADORS FOR ANIMALS

"I wholeheartedly endorse the American Humane Association's Humane Conservation certification program. This program will assure the humane treatment and welfare of animal's living in our zoos and aquaria."
—Jim McBain, DVM, Veterinarian Consultant

"Kudos to American Humane Association for initiating a program to assure the well-being of animals in managed-care conservation venues. In private practice my husband and I provided veterinary care for animals ranging from gerbils to elephants. We have been able to offer our children and grandchildren unique opportunities to interact with a myriad of species. The American Humane Association Humane Conservation program is designed to assure future generations that the animals they care about are experiencing good welfare in their respective zoos and aquariums."
—Linda Reeve Peddie, DVM

"American Humane Association's Humane Conservation certification audit is the first professional assessment of its kind to evaluate the welfare of zoological species from the perspective of the animals. As such, this evidencebased, landmark program complements other well-established, highly regarded, and science-based professional accreditation programs by the leading trade associations representing zoological facilities and animal care and training professionals alike."
—Grey Stafford, Ph.D., Incoming President of the International Marine Animal Trainers' Association, and author of the book on reward-based training: ZOOmility: Keeper Tales of Training with Positive Reinforcement

"I am pleased to wholeheartedly endorse American Humane Association's Humane Conservation certification program for zoos and aquariums. Providing an objective third-party auditing program from an organization with the long history of the protection of animals as the American Humane Association has can only help position zoos and aquariums for the future."
—Tom Otten, Principal, Reef Experience, LLC

"Today, more than ever, it has become clearly evident that humanity must turn its knowledge and resources to a better and deeper understanding and care of our environment and the species that inhabit this unique and wonderful planet we call home. For decades zoos and aquariums and the people behind them have dedicated their lives to conservation, research and education, and together with governments and citizens from all parts of the world, these experts must lead the way towards sustainability in an ever-evolving and development-driven society. The Humane Certified program of American Humane Association is a breakthrough in the unbreakable and developing bond that has and will always exist between animals and human beings. The AMHMAR proudly supports these efforts and achievements by American Humane Association and all the professional and ethical people and institutions behind the program."
—Rodrigo Constandse Córdova, President, AMHMAR / Mexican Association of Habitats for the Protection and Interaction with Marine Mammals

ARKS OF HOPE
AMBASSADORS FOR ANIMALS

"Having had a career spanning 50+ years which included being a veterinarian who treated all species of animals, an educator for a nationally known program which focused on the humane care of all species of animals and caring for all species of animals used by the entertainment industry, I have observed a major shift in public opinion regarding animal welfare. Welfare standards for pets, livestock and other farm animals have kept pace with these societal changes, but one major group of animals has until now not been formally addressed. These are the animals kept for public display. With the introduction of the American Humane Association Humane Conservation program, a science-based platform for the systematic evaluation of an animal's welfare from the animal's perspective now exists. This program was developed utilizing an international pool of talent including animal scientists, zoo and aquarium professionals, veterinarians, behaviorists and ethicists. The results of their efforts can be applied to any facility housing non-domestic animal life. The sole intent of this cornerstone program is to improve the care of animal life and thereby assure the public that this facility and its staff has been evaluated by a third party and has been graded with respect to the welfare needs of it's animal collection. I fully and completely support this American Humane Association's program and applaud this organization's courage and determination to develop and offer this flagship program."

—James F. Peddie, D.V.M. Distinguished Faculty Chair, Exotic Animal Training and Management program, Moorpark College, retired

American Humane Association is the most highly regarded and longest-running animal welfare organization in North America. Its leadership and oversight in protecting the health and welfare of animals is increasingly important to the conservation of species and natural ecosystems. There has never been a time when humans have needed to connect more deeply to animals, to care and to take steps to protect species at risk. Established with a stringent set of science-based standards, the Humane Conservation certification upholds those who bear its name to the highest level of animal welfare in the continent.

—John Nightingale, PhD, President and CEO, Vancouver Aquarium Marine Science Centre

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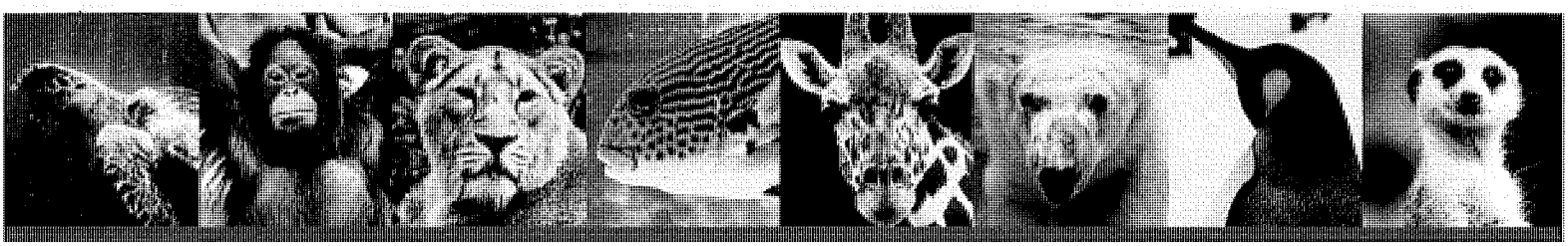

HUMANE CERTIFIED
A PROGRAM OF AMERICAN HUMANE ASSOCIATION

American Humane Association Humane Conservation™ program

Animal Welfare Certification for Zoos, Aquariums and Conservation Centers

American Humane Association is the country's first national humane organization and the world's largest certifier of the welfare and humane treatment of animals in working, entertainment and other environments. Founded in 1877, the historic American Humane Association has been at the forefront of virtually every major advance in the protection of animals from abuse and neglect, and today oversees the humane treatment of well over a billion animals.

As the world leader in certification of the humane treatment of animals, American Humane Association's animal welfare certification programs are built on the foundation of science- and evidence-based practices, with independent third-party leading experts, scientists, behaviorists and ethicists determining what practices are indeed humane. The commitment to science in determining the standards remains at the very core of existing certification programs, including the iconic No Animals Were Harmed® animal welfare certification in the American Humane Hollywood program and American Humane Certified™ farm animal certification in the American Humane Heartland program. Since 1940, American Humane Association has overseen the safety and humane treatment of animals in film and television production. Its No Animals Were Harmed certification program monitors some 100,000 animal actors on more than 1,000 sets each year with an extraordinarily high safety rate and, for more than 75 years, has been the gold standard for the proper use of animals in filmed media. The American Humane Certified™ farm animal welfare certification program is the nation's first, largest and fastest-growing independent third-party monitoring and audit program dedicated to the humane treatment of farm animals. Many of the world's largest producers, retailers, food services and major restaurant chains work with our program, including Unilever, Taco Bell, Peet's Coffee, Caribou Coffee, Einstein Bros. Bagels, and Butterball turkey.

New Endeavor: American Humane Association's Humane Conservation™ program

American Humane Association Humane Conservation certification program, launching in June 2016, is the newest effort by American Humane Association to build a better world for the Earth's creatures. As habitats disappear and environments change, leaving animals to face what scientists are calling a "Sixth Mass Extinction," with species disappearing at a rate eight to 100 times higher than expected, zoos, aquariums and conservation centers have become modern arks of hope for many creatures, playing a more vital role than ever before.

The Challenge

As the world's zoos, aquariums and conservation parks go about the invaluable work of preserving the extraordinary species with whom we share the world, increasing numbers of people are also rightly demanding that the welfare and treatment of these animals in human care be ensured and importantly verified. Only 2.3 percent of these institutions worldwide are currently accredited and although the Association of Zoos and Aquariums and others provide programs for such overall, covering facilities, management and the like, there has been no independent third-party certification effort solely devoted to the welfare of animals in their care – until now.

The Humane Solution

To fill this vital need, American Humane Association has developed the first-ever independent, scientific and evidence-based third-party humane certification standards focusing on the animals living in these institutions. Created and backed by the most well-respected, iconic names in science, animal welfare, and the conservation field, these new standards will help ensure the welfare and humane treatment of the animals in human care at the world's zoos, aquariums and conservation centers. Adding another level of rigor, the implementation of these comprehensive standards will be verified by independent auditors.

Humane Conservation Certification Audit

The Humane Conservation certification audit has two overarching components: the Pre-Audit Application and the On-Site Audit of a facility's animal collection.

Both the Pre-Audit and On-Site Audit are designed to apply to zoos, aquaria, nature centers, museums and private collections of any size.

1) Pre-Audit Application

The Pre-Audit Application is completed by an organization that is requesting consideration of an American Humane Association's on-site Humane Conservation certification audit. The Pre-Audit Application allows the organization to provide detailed information regarding the animal collection, husbandry and animal care teams, environmental quality processes, physical operations and more.

The Pre-Audit Application must be completed prior to any On-Site Audit of the animal collection of an organization.

2) On-Site Audit

The On-Site Audit is focused on assessing the welfare of individual animals and groups of animals housed together. Extensive examinations based on core principles set the stage for the assessment, followed by a set of detailed questions aimed at confirming that the animals are not only in good condition physically and socially, but have good welfare overall.

The focus of this program is on the welfare of the animals. To assess this as rigorously as possible, the audit consists of two elements:

1) **Direct observation of the individual animals**, in both the institution's public exhibits and behind the scenes, examining key welfare indicators, including, among other issues, such factors as:

- Good health
- Good housing
- Good feeding
- Good management
- Appropriate behaviors, including:
  - Ø The display of natural behaviors at the individual and group levels
  - Ø The lack of abnormal behaviors at the individual and group levels
  - Ø Social interactions between animals and the ability to self-separate
  - Ø Positive, healthy and humane interactions between animals and handlers
- Physiology/biological samples
- Activity levels
- Use of space
- Appetite/food motivation/body score
- Disease
- Mortality
- Meeting of federal and state regulations
- Thermoregulation
- Lighting/shading needs

2) **Indirect indicators** to include vital, in-depth background information on the animals, their health, habitat, environmental quality issues, staff knowledge and training, veterinary, operational procedures and other factors:

- Animal husbandry procedures
- Environmental enrichments/choices/multiple options for animals
- Safety measures
- Nutritional needs
- Food quality
- Food safety
- Air quality
- Water quality
- Appropriate sound levels for animal life
- Consideration of diurnal/seasonal patterns
- Medical records
- Appropriate veterinary/health plan

- Plan to recognize adverse medical trends
- Treatment protocols/management plan for emergency medical situations (injuries, escapes, etc.)
- Animal husbandry protocols
- Training of staff interacting with animals
- Use of positive reinforcement in any animal husbandry/training programs
- Transparency and openness of daily operations and animal care

The On-Site Audit is designed to be species-specific. The overarching summary provides a guiding process for all animals in a collection to be assessed during an audit.

Audit: Mandatory Pass Checklist

In addition to examining the key indicators of animal welfare, the program includes three essential, non-negotiable criteria that must be met in order to pass the audit. The essential criteria are scored higher than other questions, and underlie the entire audit process.

Failure to meet these non-negotiable requirements will result in failure of the audit.

1) **No Animal Abuse**

Willful acts or signs of abuse by any person at the facility (staff or visitor) are unacceptable. Observation of such acts will automatically result in failure of the audit.

If failure occurs, auditor will note observations on audit form.

Animal Abuse
☐ PASS
☐ FAIL

2) **Appropriate Health Plan (i.e., care of sick, injured animals) and Implementation**

The Pre-Audit application packet will identify whether an organization/facility has an appropriate veterinary/health plan (i.e., treatment and preventive medicine plan) in effect. If one does not exist, whether with an on-staff veterinarian or an on-call veterinarian (or similarly trained individuals), one should be developed and implemented prior to an On-Site Audit.

Health Plan
☐ PASS
☐ FAIL

Review of the plan and discussion with the staff that such a plan exists is required once an auditor is on-site. Failure to provide such documentation and confirmation of a health plan will result in failure of the audit.

No observations of unattended/untreated, obviously sick or injured individuals due to abuse or neglect are acceptable. Observation of such conditions will automatically result in failure of the audit. If failure occurs, auditor will note observations on the On-Site Audit form (Section II).

3) **Staff Conduct that Promotes Animal Welfare**

Staff should be aware of the facility's protocols and procedures as well as conduct themselves in a manner that promotes animal welfare. Failure to do so, or observations of blatant abuse (see #1 above) will result in failure of the audit.

If failure occurs, auditor will note specific observations on the audit form.

Staff Conduct
☐ PASS
☐ FAIL

Organizations certified as humane with good animal welfare in the American Humane Association Humane Conservation certification program are expected to maintain high welfare standards throughout the term of their certification. If it is determined after an audit that an organization in the Humane Conservation program has fallen out of compliance, that organization will be immediately suspended from the program. Suspended organizations must verify correction of the non-conformances and pass a new audit before being reinstated. ***American Humane Association reserves the right to perform spot checks at any time during the certification period.***

American Humane Association's Humane Conservation standards are written to cover facilities in varying geographic and temperature regions. These facilities can be zoos and/or aquaria or private collections for performance/display and may have terrestrial, aquatic, avian or a combination of these habitat types for the species in their care. Therefore, not all questions/sections in these standards apply to every facility. Each organization must also comply with any local, state or federal mandates for handling and maintenance of animals (non-endangered, endangered and threatened species included) that might affect the environment or safety of their animals.

All animal exhibits and all animal care staff areas must be accessible to the auditor(s) during an assessment visit. If there are quarantine areas, care must be taken to adhere to the established protocols and policy for such a space (e.g. if re-admittance to animal habitats/exhibits is not allowed, then scheduling for access should be considered).

#58

Select list of papers involving cetaceans in human care with an impact on conservation

Title	Author(s)	Impact(s) on conservation	Involvement of cetaceans in human care
Energy requirements of Pacific White-sided dolphins (*Lagenorhynchus obliquidens*) as predicted by a bioenergetic model	Erin U. Rechsteiner, David A. S. Rosen, and Andrew W. Trites Marine Mammal Research Unit, Fisheries Centre, University of British Columbia.	Determining how much energy, and therefore how much food, is required by a Pacific White-sided dolphin. This information can allow policy makers to determine the amount of food required by PWSD in the Pacific Ocean, enabling us to ensure there is sufficient food by managing fishing and other pressures.	Metabolic rates (energy used) calculated from dolphins at Vancouver Aquarium
What can Captive Whales tell us About their Wild Counterparts? Identification, Usage, and Ontogeny of Contact Calls in Belugas (*Delphinapterus leucas*)	Valeria Vergara University of British Columbia, Robert Michaud Group for Research and Education on Marine Mammals, Lance Barrett-Lennard Cetacean Research Lab	Identified "contact calls" used by mother and calf belugas to locate one another and maintain group cohesion. Enables researchers to locate calving and rearing areas more easily and effectively. If key locations can be identified, policy makers will be able to make an informed decision on protecting them.	Belugas at the Vancouver Aquarium were observed and listened to in order to identify which sounds were "contact calls", and which were used for other reasons. In the Arctic or St Lawrence it is not possible to view and record animals with enough certainty to definitively associate particular sounds with particular behaviors.
Growth and maturity of belugas (*Delphinapterus leucas*) in Cumberland Sound, Canada, and in captivity: evidence for two growth layer groups (GLGs) per year in teeth	P. Brodie Balaena Dynamics Ltd. Halifax, K. Ramirez VP Animal Care and Training Shedd Aquarium, Chicago and M. Haulena Staff Veterinarian, Vancouver Aquarium, Vancouver.	Definitively determined a method for identifying the age of belugas. Identifying the age of individuals can give us more information on how a population is changing and how it may change in the future. It is also key information for producing computer models and assessing changes in the future.	Adult belugas in the ocean are of unknown age. In the past, the two methods of determining age in these animals gave wildly different results. The Vancouver Aquarium and other institutions have enabled a re-examination of information dating back to the 1950s and identified the most accurate measurement tool to determine the age of belugas. This was possible by the Vancouver Aquarium knowing the age of our belugas.

Resting Metabolic Rate of a Mature Male Beluga Whale (*Delphinapterus leucas*)	David A. S. Rosen and Andrew W. Trites Marine Mammal Research Unit, Fisheries Centre, University of British Columbia,	Determined the resting metabolic rate for a beluga. Resting metabolic rate is the most basic measure of energy consumption and enables researcher and policy makers to determine how much food an animal needs to consume in order to be healthy.	The beluga who participated lived at the Vancouver Aquarium and was trained for four months prior to participating. The training is essential as this type of testing is ineffective if the animals are not in a resting state. These tests have been done on animals in the ocean, but they are less reliable due to the inherent stress associated with chasing and capturing. Animals participating voluntarily provide the most accurate data.
Seasonal Resting Metabolic Rate and Food Intake of Captive Pacific White-Sided Dolphins (Lagenorhynchus obliquidens)	Erin U. Rechsteiner, David A. S. Rosen, and Andrew W. Trites Department of Zoology and Marine Mammal Research Unit, Fisheries Centre, The University of British Columbia	Establishing a baseline for tracking changes in metabolism and food intake throughout a 12-month period in PWSD, with the goal of determining the cause and effect relationships at play. As it is impossible to track the resting metabolism of individual dolphins in the ocean over this time (if at all), the use of dolphins at VA enabled researchers to explore the seasonal changes in dolphin's bodies.	VA dolphins formed the study group, as this study would not be possible to conduct on dolphins outside of a controlled, trained environment. Important to note that the researchers end by saying that more information and data points are needed from other dolphins in human care.
Masked hearing thresholds of a beluga whale (Delphinapterus leucas) in icebreaker noise	Christine Erbe Curtin University D.M. Farmer	Establishing the levels at which belugas can no longer make out typical vocalizations (i.e.: contact calls between mother and calf). Knowing a safe limit on volume can help policy makers involved in regulating the shipping industry establish safe speeds, distances, and other policies to protect beluga nursery areas.	The belugas at VA indicated when they could or could not hear using a "go/no-go" system, enabling researchers to specifically observe under what conditions the whales were no longer able to properly hear vocalizations. In the ocean it is not possible to isolate individual whale behavior in response to the environment in this manner.
Vocal Development in a Beluga Calf (Delphinapterus leucas)	Valeria Vergara1 and Lance G. Barrett-Lennard2 1Department of Zoology, University of	Tracking development of vocal patterns in a young beluga. With killer whales in B.C., researchers have developed a library of sounds and can identify individual whale groups by sound as well as by sight.	Associating individual sounds with individual animals and behaviours in this way is not possible in the ocean due to the inherent difficulty in figuring out

	British Columbia, #6270 University Boulevard, Vancouver, BC, Canada, V6T 1Z4; E-mail: vergara@zoology.ubc.ca 2 Cetacean Research Lab	Figuring out how belugas learn their sounds is this first step to determining whether or not a similar system can exist for belugas. This can have direct rehabilitation impacts, as in the case of killer whale Springer who was reunited with her pod in large part due to the ability of VA and colleagues to identify which pod she was a member of.	which animal is making noise, especially when multiple calves and mothers are present. Being able to identify which sounds belong to which group of whales has helped us understand the populations of killer whales in B.C. and directly helped rehabilitation efforts.

Papers addressing health and welfare of cetaceans in human care

Title	Author(s)	Content	Impact on Vancouver Aquarium
Arks of Hope Ambassadors for Animals The Pivotal Position of Zoos and Aquariums and Next Steps in Ensuring the Welfare of Animals in Human Care	American Humane Association	Developed and laid out a framework for assessing animal welfare in zoos and aquariums. Includes direct observation of the individual animals and indirect indicators through both remote and in-person examinations. Declares that zoos and aquariums are "vessels themselves to safely house and help sustain populations of critically endangered animals".	Vancouver Aquarium was assessed to these standards and accredited by the American Humane Association as a "Humane Certified" facility.
Adaptive Changes in Hematologic and Plasma Chemical Constituents in Captive Beluga Whales, *Delphinapterus leucas*	D. I. St. Aubin and J. R. Ceraci Department of Pathology, Ontario Veterinary College	Researchers collected blood samples from 42 belugas. Stress hormone levels increased immediately after capture/restraint but returned to normal within approximately seven days of living in a temporary enclosure.	While the animals studied were not at the Vancouver Aquarium it does provide information about how belugas' stress levels can respond to human care.
A systematic review of cortisol levels in wild and captive Atlantic	Shelby Proie	A literature review of all published data on cortisol (stress hormone) levels in three species of cetacean. This includes a comparison of stress horomone levels between cetaceans in human care versus	This paper suggests that cetaceans in human care seem to experience similar stress levels to their counterparts in the ocean.

Bottlenose Dolphin (*Tursiops truncates*), Killer Whale (*Orcinus orca*), and Beluga Whale (*Delphinapterus leucas*)		in the ocean. The author found no appreciable difference between the stress levels of cetaceans in the ocean versus in human care when the same sampling methods were used.	

Papers addressing impact on visitors of directly experiencing cetaceans

Title	Author(s)	Content	Impact on Vancouver Aquarium
Charisma and conservation: charismatic megafauna's influence on safari and zoo tourists' pro-conservation behaviors	Jeffrey C. Skibins, Robert B. Powell, Jeffrey C. Hallo	Analyzed impacts on both attitudes and conservation actions taken by visitors to zoos and safari parks. Established that experiencing charismatic megafauna (such as cetaceans) had a measurable impact on peoples' attitudes and pro-conservation behaviours. Established that this impact was comparable between *in situ* and *ex situ* situations (i.e.: whether a zoo or park).	Viewing charismatic megafauna in an Aquarium produces comparable behavioural impacts to viewing them in a field setting. In the conclusion of the paper the authors suggest that increasing opportunities for individuals to experience charismatic megafauna would likely have positive conservation results.
Harris Poll (no official title found)	Harris Interactive®	American survey of 2113 adults (total) conducted in 2005 and 2012. Key findings include: • 94 percent believe the people who care for the animals at marine life parks, aquariums and zoos are committed to the welfare of the animals. • 89 percent agree that children learn more about marine mammals at an aquarium or zoo than in a school classroom • 88 percent agree that you can learn about animals at marine parks in a way	Although this is an American survey it is likely that there are similar levels of support for these programs locally.

		that can't be replicated by watching film or TV programs. • 91 percent agree that seeing a marine mammal at these facilities fosters a connection to the animal.	
Dolphin Shows and Interaction Programs: Benefits for Conservation Education?	L.J. Miller, V. Zeigler-Hill, J. Mellen, J. Koeppel, T. Greer, and S. Kuczaj	Examined short term and long term impact on members of the public who had attended a dolphin program at one of six facilities. Reported increase in knowledge (short term) and retention of this knowledge over the long term. Reported increase in pro-conservation activities. Found that visitors who had attended more dolphin programs in the past were more likely to engage in pro-conservation activities.	Provides definitive evidence that the approach used by the Vancouver Aquarium does have a direct impact on both the knowledge levels and actions taken by visitors.
Conservation Caring: Measuring the Influence of Zoo Visitors' Connection to Wildlife on Pro-Conservation Behaviors	Jeffrey C. Skibins and Robert B. Powell	Measured visitor attitudes and actions pre and post visit to a zoological facility.	Similar to the megafauna study cited first in this section, authors say that "Results support the role zoos can play in fostering a connection to wildlife and stimulating pro-conservation behaviors."

ALLIANCE
of Marine Mammal Parks & Aquariums

FOR IMMEDIATE RELEASE
July 16, 2012

MEDIA CONTACT:
Sarah Dietze, PCI
312-558-1770
sdietze@pcipr.com

Public Confirms Overwhelming Support for Important Conservation Education Missions of Marine Parks, Aquariums and Zoos

National Poll Finds Marine Parks, Aquariums and Zoos Best Places for Children to Learn About, Connect with Marine Mammals

CHICAGO - A new review of data from two separate national opinion polls demonstrates there is consistent and overwhelming public support for marine mammal facilities and their role in conservation education.

Ninety-seven percent of people agree that marine life parks, aquariums and zoos are important because they educate children about marine mammals – animals that children might not have the opportunity to see in the wild.

The Alliance of Marine Mammal Parks and Aquariums commissioned Harris Interactive® to conduct online polls released in 2005 and 2012 that evaluated public attitudes toward marine mammals in public display facilities. The overwhelmingly high percentage of support – 97 percent – remained consistent in both polls.

In addition, many continue to feel that people are more likely to be concerned about animals if they learn about them at marine life parks, aquariums and zoos. In both 2012 and 2005, 93 percent agreed with this statement.

"People feel that being able to connect with dolphins, killer whales, beluga whales and other marine mammals in facilities is important for education and conservation," said Marilee Menard, executive director of the Alliance. "This is clear not only from the consistent support over time, as demonstrated by the two polls, but by the 45 million people who visit Alliance-accredited marine life parks, aquariums and zoos every year."

-more-

Data from the 2012 poll shows that 94 percent of those polled agree that children are more likely to be concerned about animals if they learn about them at marine life parks, aquariums and zoos, and that visiting these facilities can inspire conservation action that can help marine mammals and their ocean environments.

The 2012 poll also found that 94 percent of people agree that zoological parks and aquariums offer valuable information about the importance of oceans, ocean environments and the animals that live there.

Additionally, the latest poll found that 89 percent agree that children learn more about marine mammals at an aquarium or zoo than in a school classroom, and 88 percent agree that you can learn about animals at marine parks in a way that can't be replicated by watching film or TV programs. Some 91 percent agree that seeing a marine mammal at these facilities fosters a connection to the animal.

"When children – and adults – see and experience the excitement of being close to marine mammals such as whales, dolphins, and sea lions, it resonates in ways that even the most vividly illustrated book or video cannot. It is an emotionally enriching experience that fosters a sense of caring for these animals and their ocean environments," said Menard, whose Alliance membership represents 55 accredited facilities that account for the greatest body of experience and knowledge about marine mammal care and husbandry in the world.

Other findings from the latest public attitude survey include:

- 94 percent believe the people who care for the animals at marine life parks, aquariums and zoos are committed to the welfare of the animals.
- 97 percent (ages 18-24) would be interested in swimming with dolphins.
- 93 percent believe that many of the successes to save endangered or declining species are at least in part a result of work done in marine life parks, aquariums and zoos.
- 90 percent agree that species in the wild benefit when their biology and physiology is studied in marine life parks, aquariums and zoos.
- 40 percent of Americans (about 125 million people) have visited a marine park, aquarium or zoo in the last 12 months, including 56 percent of households with children (about 20 million households).
- 90 percent believe that interacting with dolphins in a marine life park, aquarium or zoo offers people a deeper understanding and appreciation of this mammal.

-more-

"We pride ourselves on providing an educational and enjoyable experience for families," Menard said. "Professionals at Alliance member institutions work every day to inspire guests of all ages to share their commitment to marine mammals, the need to protect them in the wild and to conserve ocean habitats."

Methodology

Harris Interactive® conducted the studies online within the United States on behalf of the Alliance of Marine Mammal Parks and Aquariums among adults age 18 and older. The 2004 study was conducted between Sept. 15-21, 2004 among 1,102 qualified respondents, and the 2011 study was conducted between August 29 and September 6, 2011 among 1,011 qualified respondents. The data were weighted where necessary to be representative of the total U.S. adult population on the basis of age, sex, race/ethnicity, education, region and household income. The propensity score weighting was also used to adjust for respondents' propensity to be online.

The Alliance of Marine Mammal Parks and Aquariums is an international association of marine life parks, aquariums, zoos, research facilities, and professional organizations dedicated to the highest standards of care for marine mammals and to their conservation in the wild through public education, scientific study, and wildlife presentations.

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*** EDITOR'S NOTE: View a summary of the latest Harris poll at http://www.ammpa.org/_docs/120209HarrisReportData.pdf

ALLIANCE
of Marine Mammal Parks & Aquariums

An international organization dedicated to conservation through public display, education, and research

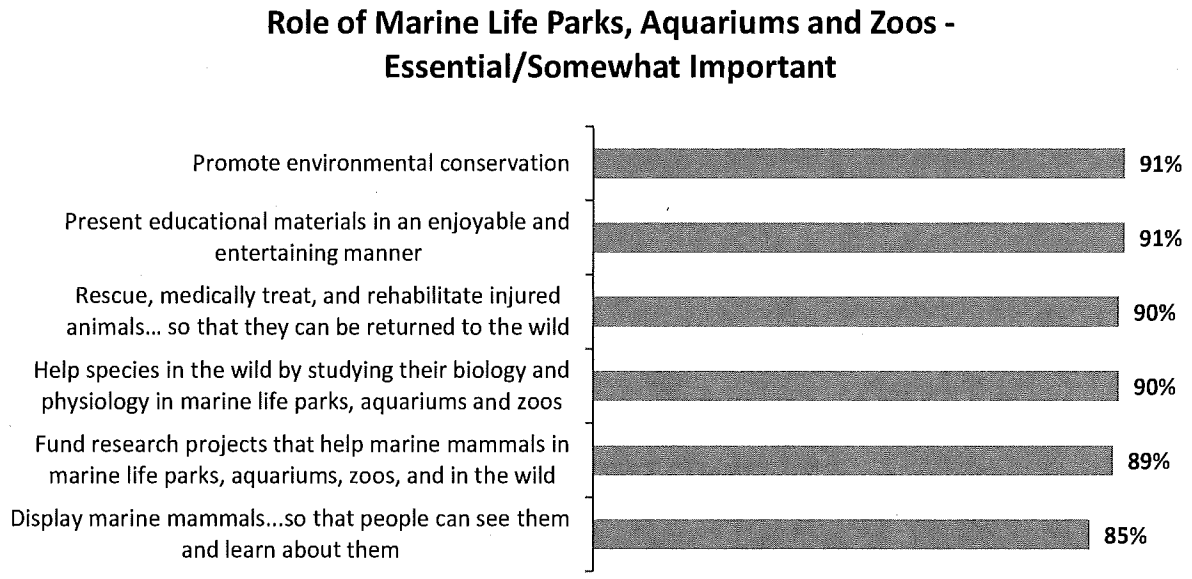
HARRIS INTERACTIVE®

MARINE MAMMAL POLL

February 2012

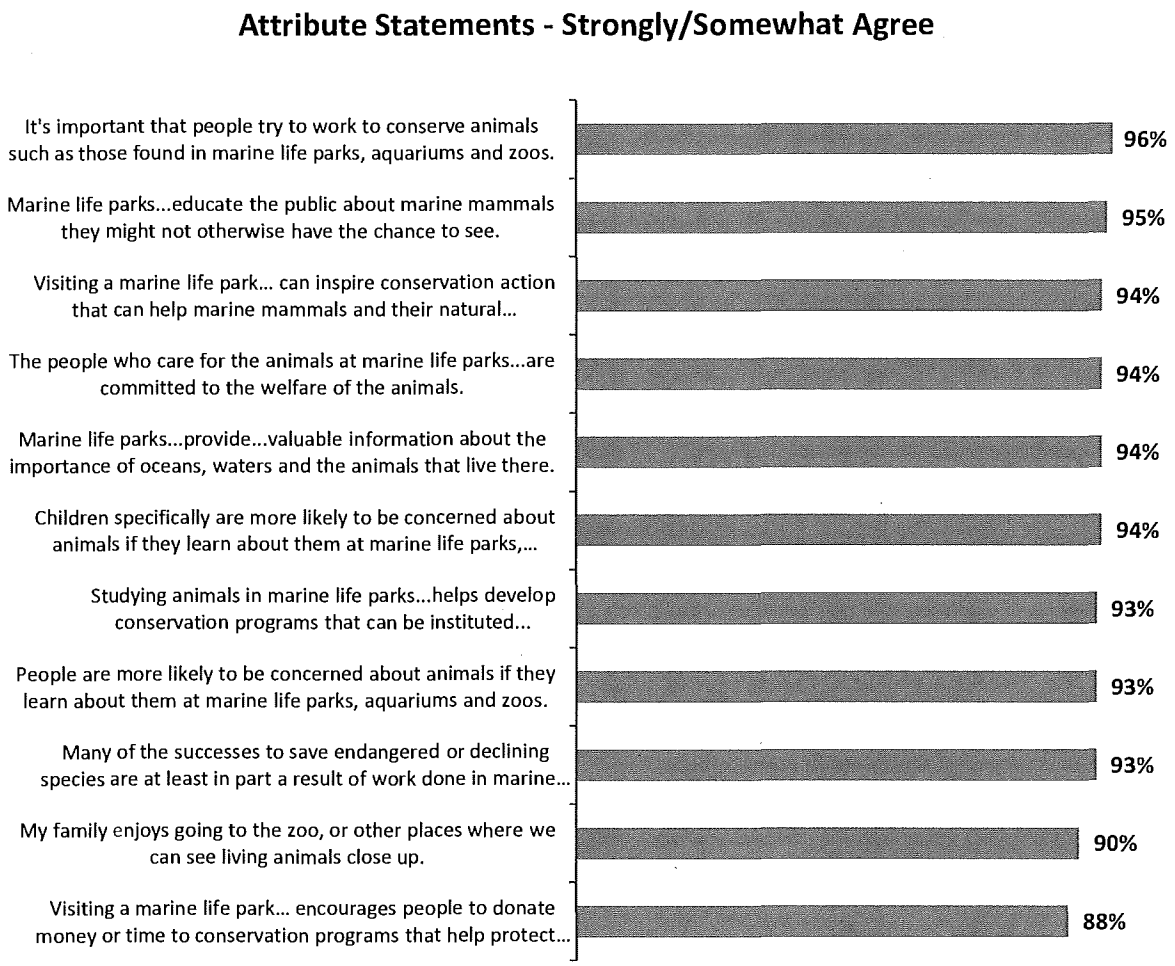
Key Findings – Role of Marine Life Parks, Aquariums, and Zoos

Large majorities of Americans feel believe that it is essential/somewhat important for marine life parks, aquariums and zoos to do the following:

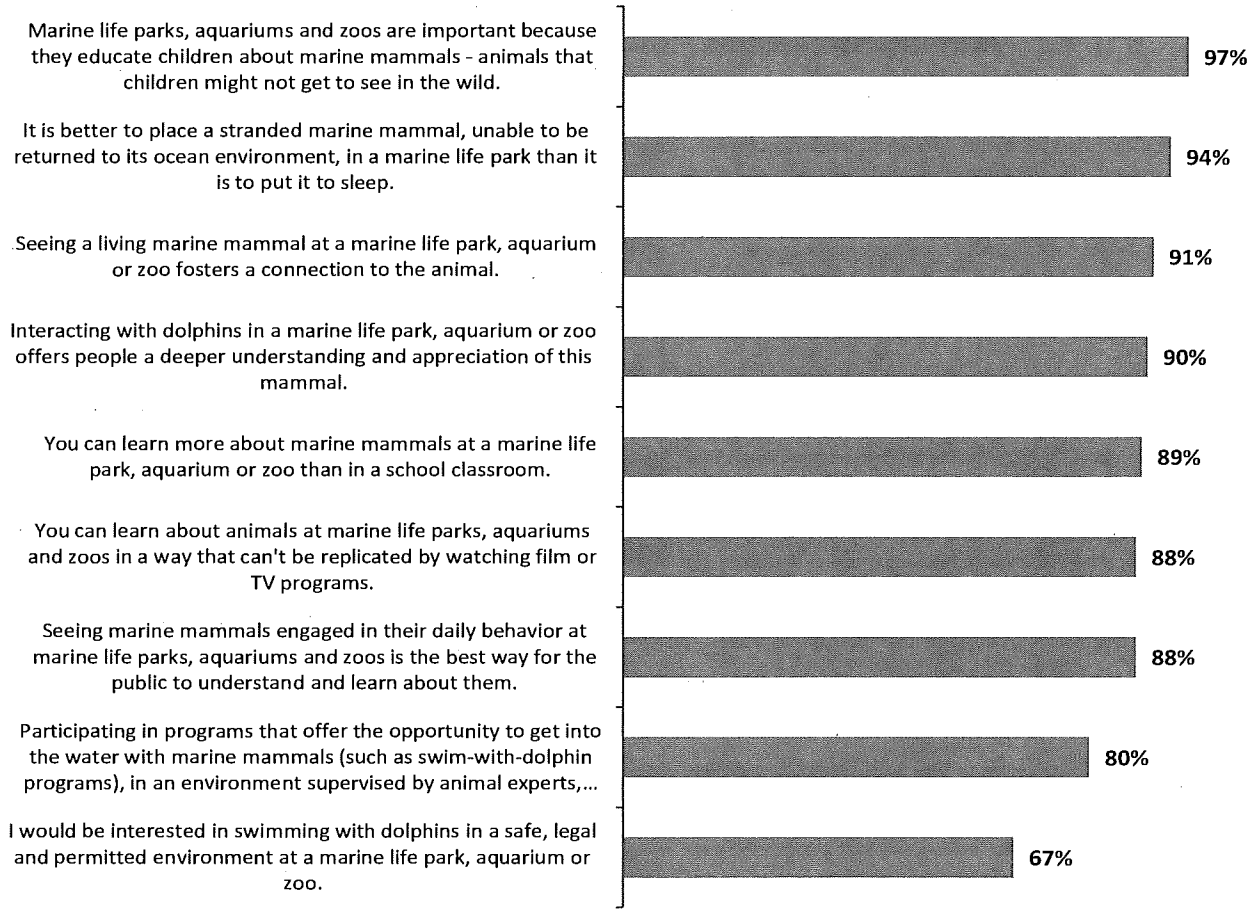


Key Findings – Attribute Statements about Marine Life Parks, Aquariums, and Zoos

Vast majorities of Americans agree with the following statements about marine life parks, aquariums, and zoos that maintain marine mammals:



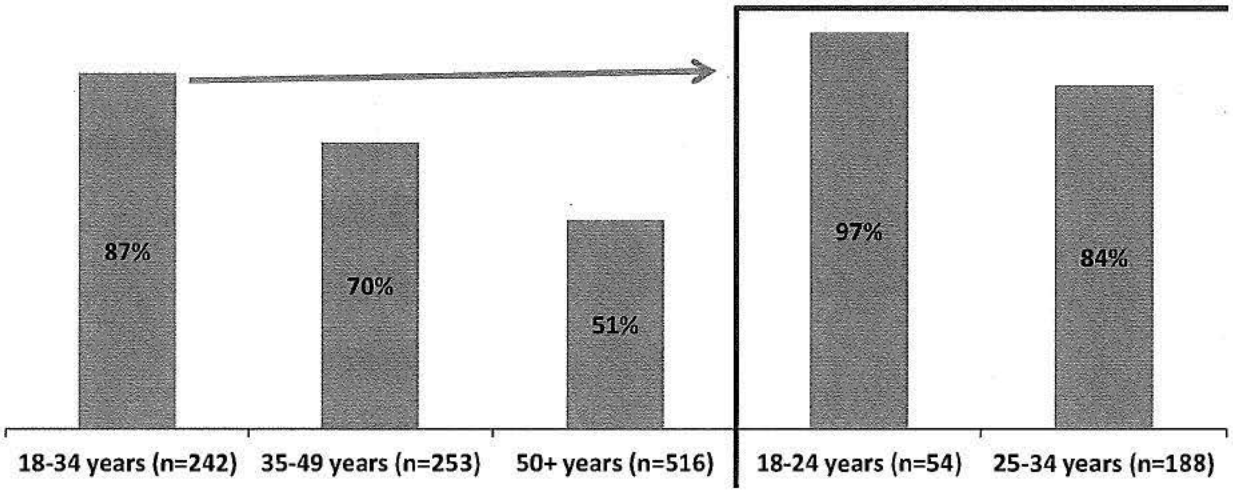
Attribute Statements - Strongly/Somewhat Agree



- 97%* of young adults 18-24 year olds would be interested in swimming with dolphins.
- 87% of Americans age 18-34 would be interested in swimming with dolphins, while 70% of those age 35-49 and 51% of those age 50+ would.
- 94% of 18-34 year olds agree that these programs are an effective way to learn about animals, while 80% of 35-49 year olds and 70% of those age 50+ do.
    - 90%* of 18-24 year olds and 95%* of 25-34 year olds feel this way.
- 87% of Americans with children in the household agree that these programs are an effective way to learn about animals.

- 78% of Americans with children in the household would be interested in swimming with dolphins.
- Participating in programs that offer the opportunity to get into the water with marine mammals (such as swim-with-dolphin programs), in an environment supervised by animal experts, is an effective way to learn about animals. (80%)

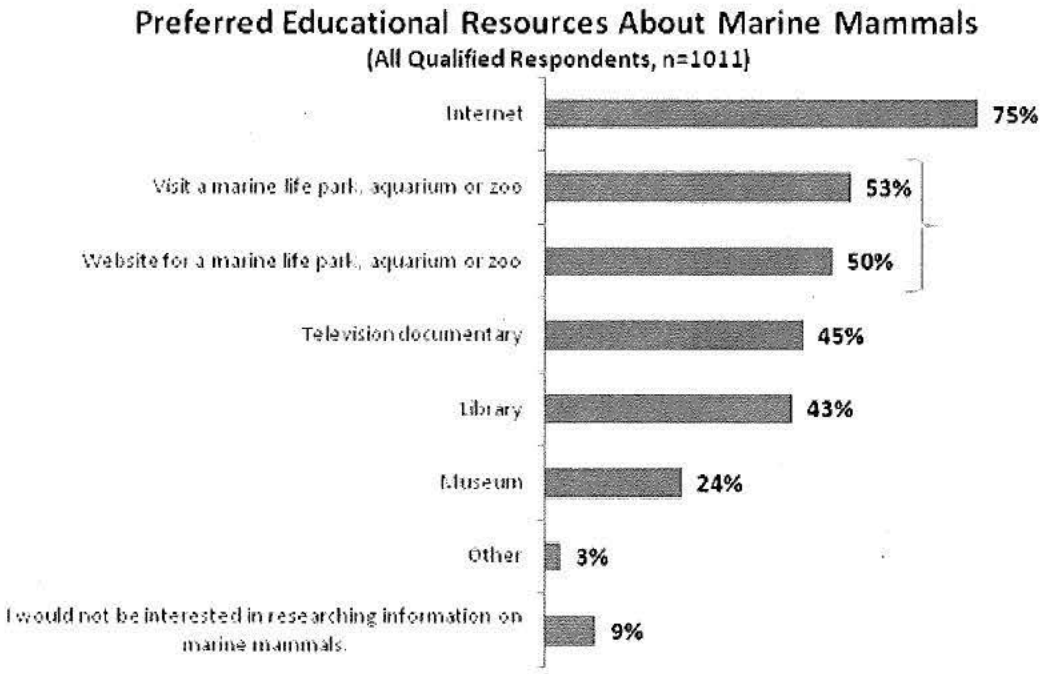
"I would be interested in swimming with dolphins in a safe, legal and permitted environment at a marine life park, aquarium or zoo." - Strongly/Somewhat Agree, By Age



Key Findings – Educational Resources

The Internet (75%) is the top choice by Americans when looking for an educational resource to learn about marine mammals. This is followed by visiting a marine life park, aquarium or zoo (53%), a website for a marine life park, aquarium or zoo (50%), television documentary (45%), library (43%), museum (24%), or other (3%). A combined 65% of adults would seek information from a marine life park, aquarium or zoo, either by visiting one in person or by accessing a website for the organization.

- Fifty-nine percent of females and 45% of males would visit a marine life park, aquarium or zoo to learn about marine mammals.
- Sixty-one percent of those who consider themselves extremely/very concerned about marine mammals would visit a marine life park, aquarium or zoo to learn about marine mammals.



Key Findings – Visitation to a Marine Life Park, Aquarium, or Zoo in the Past 12 Months

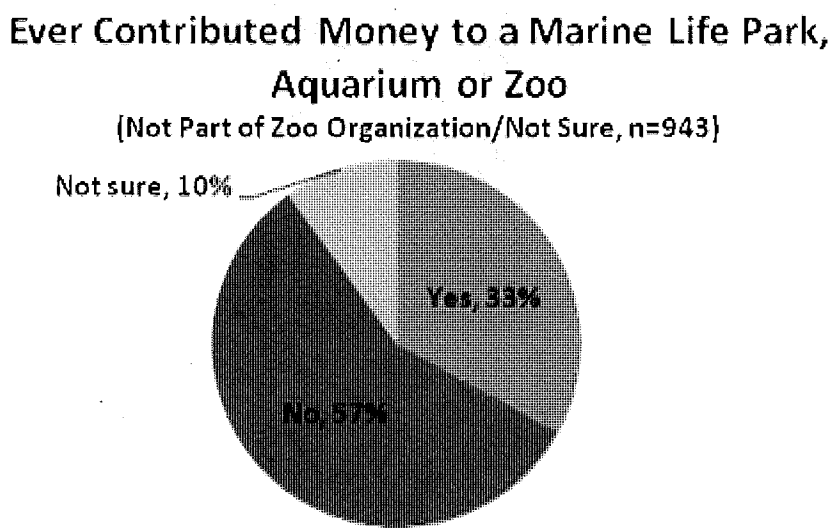
Two fifths (40%) of Americans have visited a marine life park, aquarium or zoo in the past 12 months.

- Larger percentages of Americans age 18-34 (56%) have done so than those age 35-49 (44%) or age 50+ (26%).
    - Forty-three percent* of 18-24 year olds and 62%* of 25-34 year olds have visited in the past year.
- Households with children (56%) are more likely to have visited than those without children (33%).

Key Findings – Charitable Contributions

Thirty-three percent of Americans who are not part of a zoo organization have ever contributed money to a marine life park, aquarium or zoo.

- Forty-eight percent of those who had visited a marine park, aquarium or zoo in the past year but are not part of a zoo organization have ever contributed money.
- Among those who consider themselves extremely/very concerned about animals, 40% have contributed to these types of organizations. Similarly, 39% of those extremely/very concerned about marine mammals have contributed.

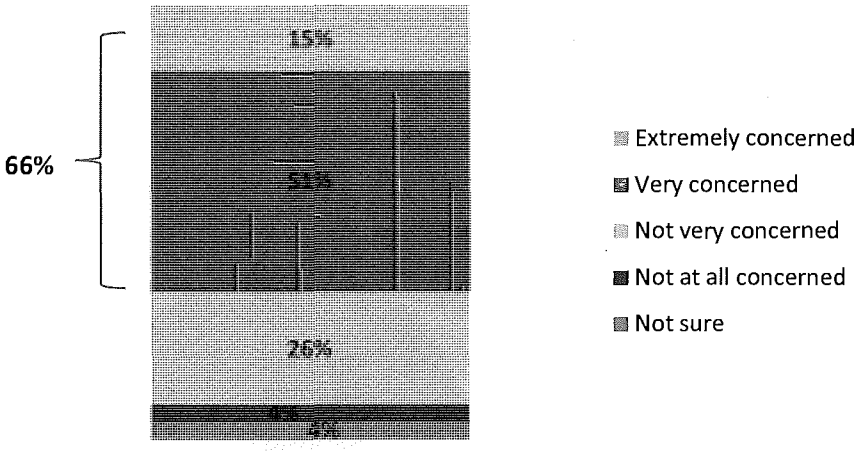


Key Findings – Concern for the Protection of Animals and Wildlife

66 percent of Americans consider themselves extremely/very concerned about the protection of animals and wildlife.

- Although majorities of males and females describe themselves as extremely/very concerned, females (72%) are more likely than males (59%) to feel this way.
- While a majority of younger Americans age 18-34 (56%) consider themselves extremely/very concerned, their older counterparts age 35-49 (72%) and 50+ (70%) are more likely to feel this way.
    - Forty-six percent* of Americans age 18-24 and 60%* age 25-34 are extremely/very concerned about the protection of animals and wildlife.

Concern for the Protection of Wildlife

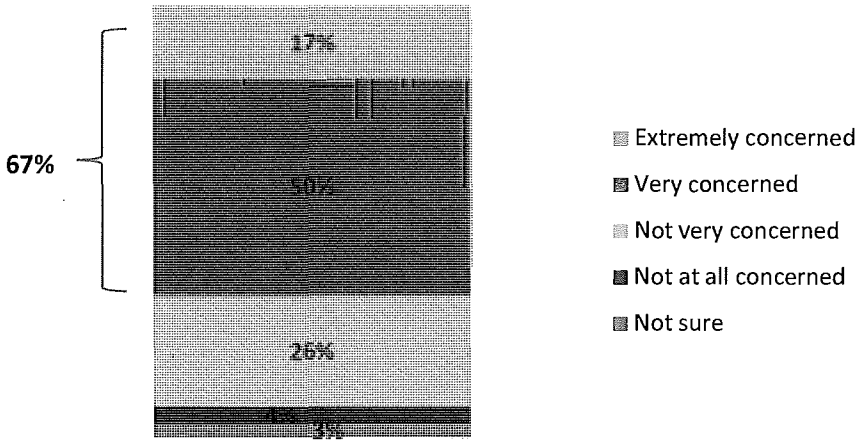


Key Findings – Concern for the Protection of Marine Mammals

In line with the protection of animals and wildlife, about two-thirds (67%) of Americans consider themselves extremely/very concerned about the protection of marine mammals.

- While majorities of males and females describe themselves as extremely/very concerned, females (73%) are more likely than males (60%) to feel this way.
- Although a majority of younger Americans age 18-34 (56%) consider themselves extremely/very concerned, their older counterparts age 35-49 (73%) and 50+ (70%) are more likely to feel this way.
    - Forty-two percent* of Americans age 18-24 and 62%* age 25-34 are extremely/very concerned about the protection of marine mammals.

Concern for the Protection of Marine Mammals



Methodology

- Conducted by Harris Interactive on behalf of Alliance of Marine Mammal Parks and Aquariums
- Field period: August 29 – September 6, 2011
- Online 15 minute nationally representative quantitative survey
- Respondents recruited from Harris Interactive proprietary panel
  - Sample Size: 1,011
  - Age 18+
  - U.S. Residents
  - Figures for age, sex, race/ethnicity, education, region, and household income were weighted where necessary to bring them into line with their actual proportions in the population. Propensity score weighting was also used to adjust for respondents' propensity to be online.

**Note: Findings derived from small base sizes (less than 100 respondents) are marked with an asterisk.*

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ORIGINAL PAPER

Charisma and conservation: charismatic megafauna's influence on safari and zoo tourists' pro-conservation behaviors

Jeffrey C. Skibins · Robert B. Powell · Jeffrey C. Hallo

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Abstract Annually, millions of tourists go on safari and visit zoos primarily to view large charismatic wildlife. These venues rely on the inherent appeal of these animals to increase visitation and anchor conservation efforts. In conservation campaigns, flagship species are used to stimulate a connection to a species and promote pro-conservation behaviors. However, empirical support for behavioral outcomes associated with flagships is lacking. Nor is it known how a connection to a species influences behaviors. This study explored (a) how tourists connect to wildlife, how this relationship is influenced by the on-site experience, and how these factors interact to influence behavior, and (b) how the experiences between safari and zoo venues differed. A model was developed using interactional theory and analyzed with structural equation modeling. Data were obtained from 416 tourists to Tanzanian parks and protected areas and 452 tourists to two U.S. zoos and one aquarium. An existing connection to wildlife and experiential factors directly influenced tourists' connection to a species, but not behaviors. Tourists' connection to a species had a significant positive influence on pro-conservation behaviors for individual species and general biodiversity. The influence of the experience was equivalent across safari and zoo venues. Results support the ability of safari and zoo wildlife tourism to produce conservation outcomes.

Keywords Charismatic megafauna · Connection to wildlife · Flagship species · Pro-conservation behaviors · Structural equation modeling · Wildlife tourism

Introduction

Does viewing wildlife, in wild or captive settings, stimulate tourists to care about species and actively support their conservation? Advocates for wildlife tourism suggest that

J. C. Skibins · R. B. Powell · J. C. Hallo
Department of Parks, Recreation and Tourism Management, Clemson University, Clemson, SC, USA

J. C. Skibins (✉)
7022 Hawthorne Lane, Hanover Park, IL 60133, USA
e-mail: jeffreyskibins@gmail.com

viewing charismatic species can increase tourists' awareness and participation in pro-conservation behaviors, such as philanthropy, which support the sustainability of tourism activities. Additionally, these benefits are purported to outweigh the costs of potential disturbances to wild populations and the use of captive populations in zoos. However, few studies have investigated how the wildlife viewing experience is linked to enhancing visitors' connection to wildlife and pro-conservation behaviors such as philanthropy, volunteering, and activism.

Wildlife tourism is defined as tourism activities that provide encounters with non-domesticated animals in wild (in situ) or captive (ex situ) settings (Higginbottom 2004a). Most education and conservation initiatives associated with wildlife tourism are designed to enhance visitors' attitudes and behaviors associated with species of interest. Research suggests that encounters with wildlife can facilitate a connection to nature (Clayton and Myers 2009). To that end, in situ and ex situ wildlife tourism venues have relied on charismatic megafauna (CMF) to anchor visitor supported conservation initiatives.

CMF are usually large vertebrates such as bears, great apes, big cats, and elephants. Such species are the cornerstone of the wildlife tourism industry and a rallying point for conservationists. CMF based wildlife tourism has been shown to be financially viable, highly popular, and capable of raising awareness of threats to the species of concern (Kerley et al. 2003; Lemelin et al. 2008; Lindsey et al. 2007; Lukas and Ross 2005; Matt and Aumiller 2002; Stoinski et al. 2008). Tourists have been shown to develop a strong connection to individual animals observed in wild and captive settings, and this connection has been shown to extend to the species as a whole (Curtin 2006; Schanzel and McIntosh 2000). Wildlife tourism sites that have CMF enjoy the added benefits of greater financial revenues; higher public profiles; and more volunteers than sites without CMF (Green and Higginbottom 2000; Higginbottom 2004a, b Higginbottom, et al. 2003; Preston and Fuggle 1987).

Studies have linked visitor responses such as: satisfaction (Obua and Harding 1996; Skibins et al. 2012a); understanding (Lukas and Ross 2005); concern (Bruni et al. 2008); and awareness (Peake et al. 2009) to in situ and ex situ CMF viewing experiences. Additionally, wildlife viewing experiences as a whole can increase a connection to nature (Beaumont 2001; Lindsey et al. 2007). For example, Cousins et al. (2009) reported that after observing in situ lion behavior, volunteers express a deep sense of wonder, awe and a connection with nature. Curtin (2006) found that following dolphin encounters, tourists related peak experiences and a state of euphoria. However, few studies have investigated the relationship between the CMF viewing experience and visitors' willingness to engage in pro-conservation behaviors (Schultz and Tabanico 2007). Furthermore, the links between attraction, awareness, and action purported by conservationists, have been challenged (Waylen et al. 2009).

This study explored the relationship between existing connections to wildlife, experience characteristics, caring, and pro-conservation behavioral intentions (hereafter pro-conservation behaviors) using interactional theory (Fig. 1) and structural equation modeling (Fig. 2) by examining in situ (Tanzanian parks and protected areas) and ex situ (U.S. zoos and aquariums, hereafter zoos) experiences. Interactional theory proposes that behavior is influenced by an interaction between the individual, and the social and physical environments (Altman and Rogoff 1987; Archer and Wearing 2003; Chan and Baum 2007; Ham 2010), and is particularly useful when the nature of proposed relationships is primarily exploratory. Additionally, interactional theory is more suited for studying suites of behaviors versus single behaviors (e.g. not littering). This study also investigated the differences between the in situ and ex situ experiences on conservation outcomes.

Additionally, the pathways between experience characteristics, caring, and behaviors were analyzed to understand how different CMF might serve as flagship species.

Wildlife tourism

Generalized concepts of sustainable nature-based tourism are recognized in the literature as early as 1965 and reference dimensions presented in the Brundtland Report (Blamey 2001). In an early article proposing a "symbiotic relationship" between tourism and conservation, Budowski (1976) states, "Tourism helps by lending support to those conservation programmes which will develop educational, scientific, and recreational resources, with the objective that they in turn will attract more, and different kinds of, tourists" (p. 29). There are examples of successful sustainable tourism for a variety of species, including lion tamarins (Dietz et al. 1994), bats (Pennisi et al. 2004), sea turtles and whales (Wilson and Tisdell 2003), and giant tortoises (Powell and Ham 2008).

Wildlife tourism, a distinct category of nature-based tourism, does not by definition need to meet sustainability metrics. In fact, the popularity of wildlife viewing can produce negative impacts due to poorly managed visitation (Sims-Castley et al. 2005). Examples of tourist induced negative impacts include: disease transmission to mountain gorillas (*Gorilla beringei beringei*) (Sandbrook and Semple 2006); increased habituation in brown bears (*Ursus arctos*) (Herrero et al. 2005); and food provisioning for wildlife in general (Orams 2002).

Poorly managed visitation may also compromise the effectiveness of on-site wildlife management plans. For example, to enhance viewing options, management strategies have been skewed to favor CMF populations at the expense of other species (Higginbottom 2004b; Lindsey et al. 2007). This may diminish visitors' interest in other species within the park or zoo. CMF are also often the most difficult and expensive species to manage (Lindsey et al. 2007), and the rush to capitalize on their presence may cause areas in greater need of conservation, or lacking CMF, to be overlooked, and financial resources to be diverted from underfinanced protected areas (Wilkie and Carpenter 1999).

The rapid and continued growth of the wildlife tourism industry has brought tourists and tour operators to the table as de facto stakeholders in the management of parks and protected areas (Goodwin and Leader-Williams 2000). Managers must balance the

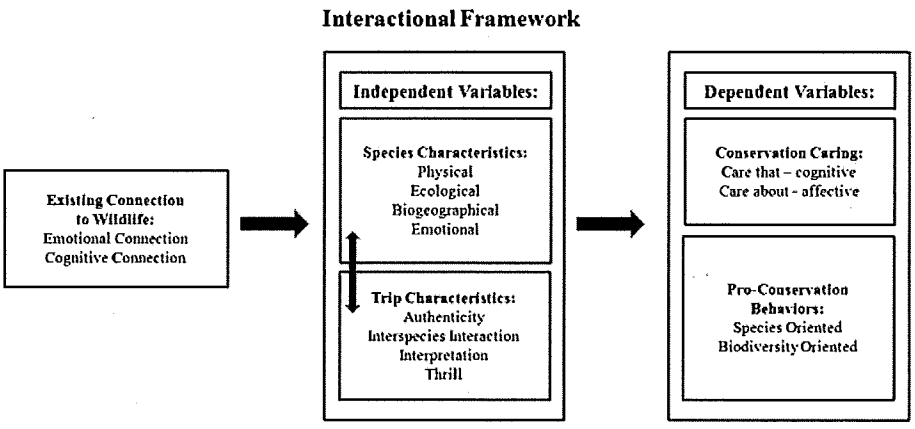

Fig. 1 Interactional framework of CMF viewing experience; adapted from Powell et al. (2009)

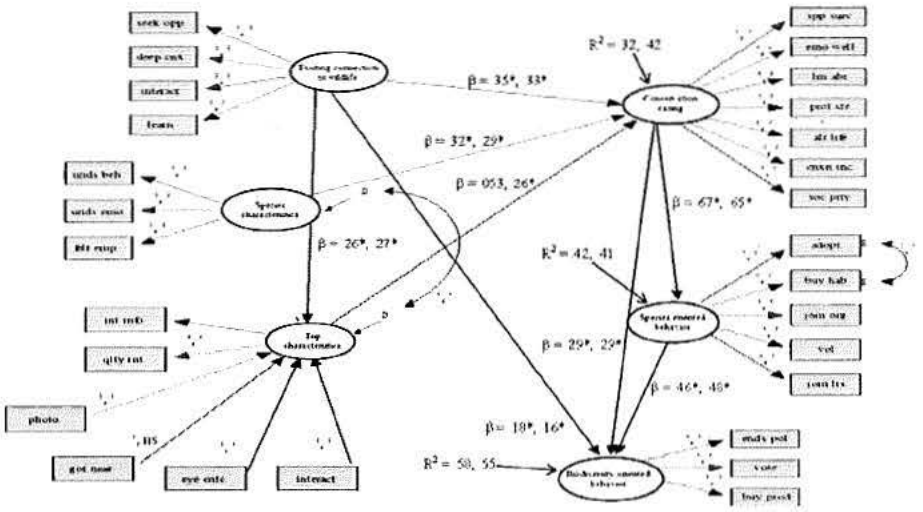

Fig. 2 Final structural model predicting pro-conservation behavioral intent. *Notes* Values reported for safari, zoo, respectively; all measurements robust; * $p < .05$; β = standardized parameter estimates; R^2 = explained variance. *CFI* .90, *NNFI* .89, *SRMR* .11, *RMSEA* .068, *SB*χ^2 (*df*) 1869.94 (702), $p < .05$

demands of visitor viewing preferences against impacts to the resource (Semeniuk et al. 2009; Wright 1998). Overly restricting tourists can diminish viewing opportunities, which could decrease funding and public support for conservation associated with CMF. Additionally, zoos that focus too heavily on CMF may do so at the expense of committing resources to in situ support. Managers also face the challenge of how to extend the wonder and respect for CMF to "biophilically challenged" taxa, such as snakes (Myers et al. 2004), and biodiversity as a whole (Czech et al. 1998; Kerley et al. 2003).

Despite these challenges, CMF have been cited as a primary factor for conservation successes in wildlife tourism (Kruger 2005). They can also positively enhance attitudes and awareness, which Waylen et al. (2009) point out is not a benefit derived from many other conservation programs. However, the role of the viewing experience in fostering pro-conservation behaviors has received little attention in the literature.

Charismatic megafauna

A consistent trend among wildlife tourists is the desire to see large, potentially deadly vertebrates in wild (Goodwin and Leader-Williams 2000; Matt and Aumiller 2002; Okello et al. 2008) and captive settings (Balmford et al. 1995; Christie 2007; Ryder 1995). Studies have shown which characteristics make species more appealing to humans (Curtin 2005; Woods 2000); contribute to viewers' emotional affinity for species (Ballantyne et al. 2010); and contribute to the overall emotional appeal of species (Myers et al. 2004). Other research suggests charisma can be applied broadly (Lorimer 2007) and can be found in species as divergent as the flightless dung beetle (*Circellium bacchus*) (Kerley et al. 2003) and kapok tree (*Ceiba pentandra*) (Bowen-Jones and Entwistle 2002).

So, while there is research that investigates charismatic characteristics, little work links those characteristics to visitors' caring and willingness to support pro-conservation behavior. Furthermore, the differences between in situ and ex situ CMF viewing, and their influence on conservation outcomes are poorly understood (Ballantyne et al. 2007).

A species' ability to stimulate pro-conservation awareness and behavior is the basis of the flagship species concept. Any species that raises awareness of conservation issues and stimulates pro-conservation behavior, via a purposeful campaign, may qualify as a flagship species (Simberloff 1998). Ballantyne et al. (2007) found that observing species' natural behavior has the potential to increase visitors' understanding and foster a positive attitude toward conservation. Direct and indirect exposure to species used as flagships has also been shown to influence affective responses in viewers (Smith and Sutton 2008; Waylen et al. 2009; Wright 1998; Zinn et al. 2008).

CMF-based wildlife tourism provides fertile ground to investigate the flagship species concept. Myers et al. (2004) found that zoo visitors who observed gorillas and okapis (*Okapia johnstoni*) expressed increased levels of care and a strong desire to see them preserved in the wild. Ballantyne et al. (2010) found visitors expressed an emotional affinity for dolphins in captive and wild settings, and this affinity could transcend to biodiversity as a whole. These findings support the notion that any CMF could be stimuli for pro-conservation behaviors, and thus be considered for flagship status.

One reason for the success of CMF-based tourism is tourists' formation of a connection to nature that is derived from encounters with wildlife (Saunders 2003). Bentrupperbäumer (2005) recommends investigating species' attributes as one way of unraveling visitor preferences and conservation benefits. However, it is unknown if or what elements of a wildlife tourism experience may foster adoption of behaviors (Ballantyne et al. 2011).

Interactional theory

Interactional theory is a holistic framework intended to capture the complexity of phenomena by simultaneously considering psychological processes, environmental settings, and contextual factors (Archer and Wearing 2003; Altman and Rogoff 1987). This framework has been used to investigate the role of environmental and visitor characteristics, and education on behavior outcomes (Patterson et al. 1998; Powell et al. 2009; Werner et al. 2002).

Other behavior theories, such as the Theory of Planned Behavior (TPB) (Ajzen 1991) and Value-Belief-Norm (VBN) Theory (Stern 2000), have recognized that people rarely exist in behavioral vacuums and that the context of the behavior matters. Therefore, it is recommended that models incorporate experience characteristics in order to clarify relationships and increase the accuracy of predicting behavioral modification (Stern 2000; Stern et al. 1999). However, TPB and VBN are not designed to account for the role of the experience. Schultz (2000) implies interactional frameworks are the preferred method to investigate a connection to nature.

Using interaction theory as a guiding framework, this study investigated the influence of the CMF viewing experience on tourists' connection to a species (operationalized as Conservation Caring, see Methods) and pro-conservation behavior. Figure 1 represents how interaction theory was used to conceptualize the relationship between variables. This model is adapted from Powell et al. (2009) who found an interactional framework was successful for modeling the influence of nature-based tourism characteristics on behavioral intentions.

In this study, the interaction between the individual and contextual factors is modeled by the interaction between Existing Connection to Wildlife, and Species and Trip Characteristics. These in turn are hypothesized to have a direct positive influence on Conservation Caring and pro-conservation behaviors. More specifically, Conservation Caring is hypothesized as an intermediate dependent variable to behaviors.

Study sites

The goals of this study were based on tourists forming a connection with an animal during the experience. Tourists were allowed to self-describe the animal they connected with rather than select from a predefined list. Therefore, study sites were selected on the basis of their diversity of wildlife and the presence of several recognized CMF. All zoo sites are accredited members of the Association of Zoos and Aquariums.

In situ sites

The northern circuit of Tanzania was chosen for the consistent diversity and density of wildlife found at each park and protected area. Furthermore, most tourists use guides and thus have the potential for a basic exposure to interpretation. The northern circuit consists of the following national parks: Mt. Kilimanjaro, Arusha, Serengeti, Lake Manyara, Mkomazi, and Tarangire. Additionally, the Ngorongoro Crater is considered part of the northern circuit, although it is not a Tanzanian National Park.

Arguably, the most popular of these sites are Serengeti National Park (SNP) and the Ngorongoro Crater. Established as a game reserve in 1929 and a national park in 1951, SNP is the oldest and second largest (5700 mi^2/14,763 km^2) national park in Tanzania. It is home to over one million wildebeest, 300,000 Thomson's gazelle, 200,000 zebra and 32 other plains species. All 'Big 5' species (elephant, rhino, water buffalo, lion, and leopard) are present, as well as other CMF such as hippo, giraffe, and cheetah. Additionally, there are several mesofauna present such as hyenas, jackals, aardwolf, and servals, and 500 bird species. SNP is also the site of one of the great biological phenomena, the wildebeest migration. Due to these and other features, SNP has been designated a world heritage site biosphere reserve (Tanzania National Parks, n.d.; Tanzania Tourist Board, n.d.).

The Ngorongoro Crater is located in the Ngorongoro Conservation Area (NCA) and is administered by the Ngorongoro Conservation Area Authority. NCA is adjacent to SNP. Established in 1959, the NCA is 3200 mi^2 (8292 km^2) and is a designated multiple use area. NCA is a Man and Biosphere Reserve and World Heritage Site. The Ngorongoro Crater is a large (100 mi^2/260 km^2) unbroken caldera. All visitors to the crater floor must be accompanied by a guide. The crater itself is home to 7,000 wildebeests, 4,000 zebra, 3,000 eland, and 3,000 Grant's and Thomson's gazelles. All 'Big 5' species are also present, as well as wild dogs, and 500 bird species including greater and lesser flamingo (Ngorongoro Crater, n.d.).

Ex situ sites

Brookfield Zoo, located in Brookfield, Illinois—a suburb of Chicago—receives more than 2,000,000 visitors annually. Founded in 1934, the 216-acre zoo is home to 450 different species and eleven multi-species habitat recreation exhibits. It has taken a leadership role in advancing the field of conservation psychology and is home to the Conservation Leadership Center and Center for the Science of Animal Welfare. The zoo is involved in 35 in situ conservation projects and houses 44 species that are part of a species survival plan (Chicago Zoological Society, n.d.).

The Shedd Aquarium is located on the shore of Lake Michigan in Chicago, Illinois. When the facility opened in 1930 it was the world's largest aquarium, and today it receives more than 2,000,000 visitors annually. The aquarium has expanded since its opening and now has four multi-species habitat recreation exhibits, and 32,500 animals representing 1500 species. Some of the more notable animals include whales, dolphins, otters, sharks,

and rays. The Shedd is involved in eight large-scale local and global in situ conservation projects (Shedd Aquarium, n.d.).

Zoo Atlanta was founded in 1889 and has become a nationally recognized leader in zoo-based conservation. The 40 acre site receives 700,000 annual visitors and is home to 900 animals, one of which is the giant panda. The zoo has the nation's largest gorilla and orangutan collection and three multi-species habitat recreation exhibits. The zoo also has several state-of-the-art interpretive exhibits linking in situ conservation to on-site exhibits. Additionally, Zoo Atlanta participates in 30 species survival plans and seventeen in situ projects around the world (Zoo Atlanta, n.d.).

Methods

Survey instrument development

Factors were developed and modified following DeVellis (2003). A pilot test ($N = 178$, 75 % response rate) was conducted at Brookfield Zoo, in July 2011, to identify construct validity and item clarity issues. The final survey instrument contained six factors, and 56 items (Table 1). All construct items were measured using 9 point Likert type scales; 1 = strongly disagree, 9 = strongly agree; 1 = extremely unlikely, 9 = extremely likely.

Existing connection to wildlife

This factor was adapted from Nature Relatedness (NR) (Nisbet et al. 2009) and Emotional Affinity to Nature (EAN) scales (Kals et al. 1999). These scales were selected based on their ability to distinguish the emotional and cognitive components of an individual's connection to CMF. The NR scale has been shown to measure the link between an individual's connection to nature and environmentally responsible behavior. In this study, items were designed to represent the 'self', 'perspective', and 'experience' sub-dimensions of NR. The EAN scale has been used to examine the relationship between an individual's emotional affinity toward nature and nature-protective behavior. Items in this study were designed to represent the cognitive and affective interest in nature, and emotional indignation over insufficient protection of nature sub-dimensions.

Species characteristics

Species Characteristics items encompass physical, ecological, biogeographical, and emotional attributes, which have been recognized to influence charisma (Bowen-Jones and Entwistle 2002; Clucas et al. 2008; Jacobs 2009; Kellert et al. 1996; Lorimer 2007; Rolston 1987; Sitas et al. 2009; Woods 2000). Physical attributes included general morphological features. Ecological attributes dealt with how the species behaved in its habitat. Biogeographical attributes consisted of symbolic roles of wildlife. Emotional attributes addressed the tourists' ability to understand and identify with emotional states of the animal.

Trip characteristics

Trip characteristics items were selected from experiential elements recognized for influencing awareness and behaviors. Those are, authenticity, interspecies interaction, interpretation, and thrill (Ballantyne et al. 2010; Beardsworth and Bryman 2001; Cousins et al.

Table 1 Initial factor loadings and item means

Factor and items[a, b]	Safari tourists ($N = 362$)		Zoo tourists ($N = 369$)	
	Mean (SD)	λ	Mean (SD)	λ
Existing connection to wildlife				
I actively seek opportunities to view wildlife	7.10 ± 1.95	.54	7.09 ± 1.83	.55
I feel a deep connection to wildlife	6.69 ± 1.93	.76	6.54 ± 1.93	.76
I am highly motivated by the need to interact with wildlife	6.26 ± 2.07	.73	6.13 ± 2.05	.76
I enjoy viewing all types of wildlife*	7.98 ± 1.24	.30	7.98 ± 1.46	.36
I spend a lot of time learning about wildlife	5.55 ± 2.11	.54	5.99 ± 2.02	.57
I have a responsibility to do all I can to protect wildlife*	7.18 ± 1.86	.41	7.10 ± 1.82	.50
Species characteristics				
I understood this animal's behaviors	6.09 ± 1.85	.50	6.15 ± 2.00	.56
I understood this animal's emotions	5.36 ± 2.18	.93	5.50 ± 2.14	.81
I felt empathy for this animal because of its emotions	5.47 ± 2.31	.64	5.74 ± 2.11	.76
This animal displayed human qualities*	5.07 ± 2.40	.30	5.81 ± 2.31	.43
This animal was intelligent*	6.79 ± 2.05	NS	6.90 ± 1.97	.41
Trip characteristics (reflective items only)				
I shared the experience with people who are important to me*	7.10 ± 2.18	.24	7.44 ± 2.05	.11
Seeing this animal makes me think of its habitat*	7.08 ± 1.90	.28	6.88 ± 2.09	.21
Information obtained from education materials/signs*	4.95 ± 2.28	.16	6.27 ± 2.35	.50
Information obtained from Interpreters/Park Rangers	6.45 ± 2.34	.85	4.92 ± 2.68	.64
The quality of interpretation was exceptionally high	6.28 ± 2.29	.76	5.77 ± 2.34	.80
Conservation caring				
My level of compassion for this species has dramatically increased because of my visit*	5.80 ± 2.00	.18	5.81 ± 1.96	.43
I am deeply concerned about the care and well-being of this animal at this site*	6.33 ± 2.02	.37	6.25 ± 2.16	.36
This species has as much right to exist as any human being*	7.35 ± 2.19	.23	7.52 ± 2.02	.31
Ensuring this species' survival is my highest priority	5.15 ± 2.27	.68	5.51 ± 2.30	.70
My emotional sense of well-being will be severely diminished by the extinction of this species	6.08 ± 2.27	.48	5.88 ± 2.38	.66
I need to learn everything I can about this species	5.01 ± 2.22	.63	5.23 ± 2.16	.76
I would protest this site if I learned of the mistreatment of this animal	6.27 ± 2.19	.48	6.45 ± 2.52	.46
I will alter my lifestyle to help protect this species	4.78 ± 2.20	.58	5.18 ± 2.31	.62
My connection to this animal has increased my connection to the species as a whole	5.82 ± 2.15	.53	5.66 ± 2.08	.72
Wildlife protection must be society's highest priority	5.95 ± 2.42	.54	5.68 ± 2.42	.64
Behavior—species oriented				
I would support entrance fees at this site being $10 - $25 higher, if the extra money were used for the care and survival of this species*	6.11 ± 2.32	.29	4.46 ± 2.48	.46
I will donate up to $75 to "adopt" this animal at this site	4.34 ± 2.54	.63	3.95 ± 2.44	.78
I will make a charitable contribution up to $150 to help purchase habitat in the wild for this species	4.11 ± 2.42	.70	3.57 ± 2.80	.75

Table 1 continued

Factor and items[a, b]	Safari tourists ($N = 362$)		Zoo tourists ($N = 369$)	
	Mean (SD)	λ	Mean (SD)	λ
I will become a member of an organization committed to protecting this species, within the next 6 months	3.61 ± 2.23	.72	3.84 ± 2.40	.73
I will volunteer at an event designed to help the conservation of this species, within the next 6 months	3.41 ± 2.29	.52	3.68 ± 2.36	.67
Before my visit is over, I will sign up for a mailing/email to receive updates about the care and conservation of this animal	3.20 ± 2.29	.51	3.74 ± 2.48	.64
I would write a letter/sign a petition to a government official supporting the protection of this species*	4.51 ± 2.70	.38	4.76 ± 2.72	.45
Behavior—biodiversity oriented				
Even if I never return, I will provide on going financial support to this site*	3.34 ± 2.17	.43	3.74 ± 2.35	.53
If asked, I would donate as much as $50 to help protect a species I've never heard of*	3.49 ± 2.32	.43	3.36 ± 2.23	.53
I will endorse public policy that severely restricts future growth and development in order to protect wildlife	5.42 ± 2.50	.68	5.03 ± 2.64	.76
Elected officials' views on wildlife will be a major factor in my voting	5.08 ± 2.41	.73	4.81 ± 2.51	.73
Even when they are more expensive or harder to find, I will buy groceries and products that support wildlife conservation	5.88 ± 2.23	.58	5.18 ± 2.49	.71

λ = standardized factor loading; * item not retained

[a] Rated as agreement on 9 point Likert scale (1 strongly disagree, 9 completely agree)

[b] Robust statistics

2009; Curtin 2005, 2006; DeMares and Krycka 1998; Kerley et al. 2003; Myers et al. 2004; Reynolds and Braithwaite 2001; Schanzel and McIntosh 2000; Russell and Ankenman 1996; Ryan et al. 2000; Sims-Castley et al. 2005). Authenticity addressed the overall feel of the tour and included items such as proximity and diversity of wildlife. Interspecies interaction related to how wildlife responded to individual tourists. Interpretation dealt with the overall quality and quantity of interpretive experiences. Lastly, thrill incorporated elements of species rarity and mystery, and perceived levels of risk.

Conservation caring

An individual's connection to a species is represented by the factor Conservation Caring, adapted from Rabb and Saunders (2005), and includes the dimensions care *'that'*, which are cognitive items, and care *'about'*, which are affective items. Care for a species relates to how individuals think, feel, and act towards that species. Such items are designed to be expressions of concern and not simple reflections of attitudes (Rabb and Saunders 2005). Inclusion of these items allows this factor to address issues of the individuals' relationship to the natural world and the influence of the experience under investigation (Saunders 2003).

Using these dimensions makes this factor more in line with empathy rather than knowledge. Empathy has been shown to be a better predictor than knowledge, of helping behavior, within the context of environmental issues (Ballantyne et al. 2010; Myers et al.

2004; Schultz 2000), and is more aligned with understanding how individuals care for a species (Saunders 2003; Vining 2003). Additionally, an individual's ability to empathize with a species implies the individual is able to identify an animal's emotions and cognitions as parallel to one's own. This has been suggested as a strategy to enhance conservation behaviors (Clayton et al. 2011).

Species and biodiversity oriented behaviors

Behavioral intent was separated into two factors on the basis of how actions pertain to an individual species, or biodiversity as a whole (Table 1). Individual species behaviors included donating money to "adopt" or purchase habitat for a particular species, and volunteering. Biodiversity oriented behaviors included support for sustainability policies and purchasing wildlife friendly products. Both factors were adapted from Stern (2000) and included the dimensions: non-activist public sphere, behavior in organizations, activism, and private sphere. These dimensions are supported in the literature as being well representative of pro-conservation behaviors (Kaiser et al. 2005; Schultz 2000; Stern et al. 1999). They also align well with conservation behaviors typically associated with individual species or species cohorts (Pennisi et al. 2004; Swanagan 2000; Walpole and Leader-Williams 2002; Waylen et al. 2009). One criticism of some models is that items are too general. Items in this study focused on highly site-specific behaviors, such as donating money directly to the site for the purposes of conserving the species; donating money to purchase habitat for the species; volunteering for and becoming a member of an organization devoted to the conservation of the species, and registering for updates from the site regarding the status of the species. Making items specific to a site has been shown to improve model explanatory capabilities (Powell and Ham 2008; Stern 2000).

Survey sites and sampling procedure

In situ surveys were administered at the Kilimanjaro International Airport, Moshi, Tanzania. This site was selected because it serves as the principal entry/exit point for tourists visiting parks and protected areas within the northern circuit of Tanzania. Surveys were collected daily from October 29–November 3 2011 using a census approach. Tourists were intercepted upon their arrival in the international departure lounge of Kilimanjaro International Airport. Tourists were first asked if they spoke English, as the survey was only available in English. Those who spoke English were asked if they had participated in a wildlife viewing activity, in a natural area, while in Africa. Those who responded 'yes' were asked to complete a survey. A total of 416 surveys were collected, with a 98 % response rate.

Ex situ surveys were collected from visitors at two zoos and one aquarium. Brookfield Zoo (Chicago, Illinois, USA), Zoo Atlanta (Atlanta, Georgia, USA), and Shedd Aquarium (Chicago, Illinois, USA) were chosen for their high visitation rates, presence of African wildlife, immersive exhibits, and levels of interpretation.

Surveys were collected September 3–November 27 2011. Using a systematic sampling approach, visitors to Brookfield Zoo ($n = 162$) and Zoo Atlanta ($n = 87$) were intercepted by a survey team member at the central picnic grounds. Visitors to the Shedd Aquarium ($n = 203$) were intercepted at the Caribbean Reef exhibit. Surveys were only available in English. Visitors who indicated they had been on site for three hours or more were asked to participate in the survey. A total of 452 visitors were surveyed, with an 89 % response rate.

Analyses

Data were screened for missing values. Cases exhibiting missing values for more than 50 % of items per factor were removed. A total of 108 cases were removed. Data were screened for univariate and multivariate outliers following Tabachnick and Fidell (2007). No univariate outliers (±3 SD) were detected. A total of 27 cases were removed for exceeding the criterion Mahalanobis Distance value (χ^2 (*43*) = 77.38, $p < .001$). The final sample size was N = 353 for safari tourists, and N = 360 for zoo tourists.

Test for metric invariance

Establishing metric invariance provides a statistical benchmark for accepting differences between populations due to true score differences in the factors as opposed to inconsistent psychometric properties. Tests for metric invariance followed the hierarchical tests for configural, metric and structural invariance consistent with Byrne (2008). These tests were used to confirm both the fit and invariance of the measurement model of the CMF viewing experience. Metric invariance was assessed across zoo sites to provide statistical support for pooling the three independent sample sites. Next, metric invariance was assessed across safari and zoo tourist samples.

Once the measurement model was confirmed for acceptable fit and invariance, the structural model was tested with the same set of hierarchical invariance tests. This was done in order to confirm fit and uncover causal pathway differences in the model between populations. The structural model varied from the measurement model in that it also included formative items for Trip Characteristics. A factor may contain both formative and reflective items (Jarvis et al. 2003). However, formative items should not be included for measurement metric invariance testing.

Results

Survey sample description

The safari tourist sample was 47 % male, 48 % female (5 % no response); mean age was 46; 87 % reported completing at least four years of college; 22 % listed the United States of America as their country of residence, 15 % listed the United Kingdom, and 10 % listed France. Demographics for the zoo tourist sample were as follows: 35 % male, 56 % female (9 % no response); mean age was 38; 63 % reported completing at least four years of college; 96 % listed the United States of America as their country of residence.

Preliminary measurement model

In structural equation modeling, measurement models are used to assess how well individual items reflect a factor. Ideally, items should only reflect and load on one factor. A factor loading is the correlation coefficient between the factor and the item. Factor loadings range from 0–1, and the higher the value, the stronger the relationship between item and factor. Measurement models may also be used to assess the validity of items in factor or scale development. A measurement model may be tested across multiple samples. The initial model generated for multi-sample comparisons is referred to as the baseline configural model.

A baseline configural model was analyzed for in situ and ex situ samples to screen for low loading and cross loading items, factor reliability, and discriminant validity. No cross loadings were detected. Thirteen items were removed for poor performance (Little et al. 1999) (Table 1). Two items were removed from Existing Connection to Wildlife, Species Characteristics, Trip Characteristics, Species Oriented Behavior, and Biodiversity Oriented Behavior. Three items were removed from Conservation Caring. Fit indices supported the model as an acceptable representation of the data (Safari: Satorra–Bentler χ^2 449.89 (236) $p < .05$; CFI = .96; RMSEA = .051, Zoo: Satorra-Bentler χ^2 416.36 (236) $p < .05$; CFI = .97; RMSEA = .046) (Byrne 2008).

Support for pooling zoo samples

To support pooling data from the three zoo sites, the following tests were performed. The configural baseline model was tested on each zoo sample site to check for group invariance. Fit indices were acceptable for each sample site (Table 2) supporting the use of the configural model to test for group invariance. Based on the hierarchical models of constraints, zoo sample sites displayed measurement and structural invariance ($\Delta SB\chi^2$ $p > .05$, respectively). As factor loadings and parameter estimates were deemed equivalent across sample sites, zoo samples were pooled and treated as a single sample (Byrne 2008).

Testing the measurement model in safari and zoo samples

The following tests were performed to support using the same measurement model for safari and zoo samples. The baseline configural model was tested on safari and zoo tourists to check for group invariance of the measurement model (Table 3). The configural model fit the data well (CFI = .96; RMSEA = .049) and was deemed an acceptable representation of the factorial structure. The test for measurement invariance revealed a decrease in fit relative to the configural model ($\Delta SB\chi^2 = 37.68$ (*19*); $p < .01$). Two measurements were unequal across tourist samples. One was the error covariance between the species oriented behavior items 'donating $75 to adopt animal' and 'contribute $150 to purchase habitat'. The second was the factor loading for the biodiversity oriented behavior item, 'purchase products that support wildlife conservation'. These constraints were released and the model re-tested. The $\Delta SB\chi^2$ was acceptable ($p < .05$), and no additional constraints were released.

The test for structural invariance revealed no harm in fit relative to the configural model ($\Delta SB\chi^2$ $p > .05$) (Table 3); parameter estimates were deemed equivalent across groups. These data support partial measurement invariance and factorial invariance across groups. The model is an acceptable representation of the data for each sample and analysis of the structural model is supported.

Testing the structural model in safari and zoo samples

In structural equation modeling, structural regression models are used to assess causal relationships between factors. These differ from measurement models, which assess relationships between items and factors. In structural regression models, beta weights reflect the effect size of the predictor factor on the dependent factor. As with measurement models, a baseline structural model can be tested across multiple samples.

The following tests were performed to support using the same structural regression model in safari and zoo samples. A baseline structural model was generated to represent the proposed relations of the theoretical model in Fig. 1. Fit indices indicated a reasonably

Table 2 Fit indices and testing outcomes for metric invariance of measurement model across zoo sampling sites

Model	CFI[a]	NNFI[a]	SRMR	RMSEA[a]	SBχ^2 (*df*)[a]	Δ SBχ^2 (Δ *df*)[b]
Preliminary CFA measurement model						
Brookfield Zoo	.95	.94	.057	.057	331.92* (236)	
Shedd Aquarium	.97	.96	.043	.052	341.34* (236)	
Zoo Atlanta	.90	.88	.066	.088	363.07* (236)	
Configural model	.94	.94	.057	.065	1022.38* (708)	
Measurement invariance	.94	.94	.064	.063	1060.53* (746)	34.58 (38) $p > .05$
Structural invariance	.95	.94	.11	.061	1083.96* (774)	53.38 (77) $p > .05$

* $p < .05$

CFI Comparative Fit Index, *NNFI* non-normed fit index, *SRMR* standardized root mean squared residual, *RMSEA* root mean square error of approximation, *SB*χ^2 Satorra–Bentler Scaled Chi square, *df* degrees of freedom

[a] Robust statistics

[b] Difference calculated using the Satorra–Bentler Scaled Chi square adjusted difference test (Satorra and Bentler 2001)

well fitting model (CFI = .90; RMSEA = .070) (Byrne 2008; Kline 2005). The measurement invariance model did not differ significantly from the baseline model ($\Delta SB\chi^2$ $p > .05$) supporting measurement invariance between safari and zoo tourists (Table 3).

The test for structural invariance revealed that four constraints ($p < .05$) were not equal across groups. The first was the structural path between trip characteristics and conservation caring, the second is the factor loading of 'I understood this animal's behavior', the third is the error covariance between the species oriented behavior items 'donating $75 to adopt animal' and 'contribute $150 to purchase habitat', and the fourth is the factor loading of 'I was able to get very close to this animal'. These constraints were released and the model re-tested. The respecified structural model fit the data well (CFI = .90; RMSEA = .068) and revealed no harm in fit relative to the configural model ($\Delta SB\chi^2$ $p > .05$) (Table 3). These data support measurement invariance and partial structural invariance across groups for the structural model. With the exception of the previous four constraints, the proposed model (Fig. 2, Table 3) predicting wildlife tourists' intention to engage in pro-conservation behavior is an acceptable representation of the data and is equivalent across safari and zoo tourists.

Influence of the CMF viewing experience on conservation caring and pro-conservation behaviors

The following results pertain to the first research question: does viewing CMF, in situ or ex situ, influence tourist-supported conservation outcomes. Fit indices for the model ($SB\chi^2 = 1869.94$ (*702*), $p < .05$; CFI = .90; NNFI = .89; SRMR = .11; RMSEA = .068) indicated the model is an acceptable representation of the relationships present in the data (Byrne 2008; Kline 2005; Marsh et al. 2004). The model in Fig. 2 (also see Table 3 and 4) represents how the factors of an Existing Connection to Wildlife, Species Characteristics, and Trip Characteristics predict an intention to engage in pro-conservation behaviors.

Table 3 Fit indices and testing outcomes for metric invariance, structural invariance, and latent mean differences across safari and zoo tourists

Model	CFI[a]	NNFI[a]	SRMR	RMSEA[a]	SBχ^2 (*df*)[a]	Δ SBχ^2 (Δ *df*)[b]
Measurement model						
Configural model	.96	.96	.043	.049	868.94* (472)	
Measurement invariance	.96	.96	.046	.049	906.24* (491)	37.68 (19) $p < .01$
w/2 constraints released	.96	.96	.045	.048	892.31* (489)	21.84 (17) $p > .05$
Structural invariance	.96	.96	.058	.048	910.31* (504)	39.20 (32) $p > .05$
Structural model						
Configural model	.90	.89	.10	.070	1834.21* (668)	
Measurement invariance	.90	.89	.11	.069	1863.40* (686)	27.02 (18) $p > .05$
Structural invariance	.90	.89	.11	.069	1897.07* (706)	62.07 (38) $p < .01$
w/4 constraints released	.90	.89	.11	.068	1869.94* (702)	32.04 (34) $p > .05$
Latent means differences						
Measurement model w/zoo as ref. group	.96	.95	.047	.051	1102.64* (508)	

* $p < .05$

CFI comparative fit index, *NNFI* non-normed fit index, *SRMR* standardized root mean squared residual, *RMSEA* root mean square error of approximation, *SB*χ^2 Satorra–Bentler Scaled Chi square, *df* degrees of freedom

[a] Robust statistics

[b] Difference calculated using the Satorra–Bentler Scaled Chi square adjusted difference test (Satorra and Bentler 2001)

Conservation caring

An Existing Connection to Wildlife (safari $\beta = .35$, $p < .05$; zoo $\beta = .33$, $p < .05$) and Species Characteristics (safari $\beta = .32$, $p < .05$; zoo $\beta = .29$, $p < .05$) were moderate predictors of Conservation Caring. Tests constraining both direct effects across samples revealed no significant differences in β values. The factor, Trip Characteristics, was a significant predictor of Conservation Caring only in the zoo sample ($\beta = .26$, $p < .05$). This corresponds with the significant difference in parameter estimates across samples revealed in the test of causal invariance. The model accounted for 32 % (R^2 safari) and 42 % (R^2 zoo) of the variance in Conservation Caring.

Pro-conservation behaviors—species oriented behavior

Conservation Caring was the only significant predictor of Species Oriented Behavior, and was very strong (safari $\beta = .67$, $p < .05$; zoo $\beta = .65$, $p < .05$). The model accounted for 42 % (R^2 safari) and 41 % (R^2 zoo) of the variance in Species Oriented Behavior.

Pro-conservation behaviors—biodiversity oriented behavior

An Existing Connection to Wildlife was a weak predictor of Biodiversity Oriented Behaviors (safari $\beta = .18$, $p < .05$; zoo $\beta = .16$, $p < .05$). Conservation Caring was a weak predictor of Biodiversity Oriented Behavior (safari $\beta = .29$, $p < .05$; zoo $\beta = .29$, $p < .05$). Species Oriented Behavior is a moderate predictor of Biodiversity Oriented Behavior (safari $\beta = .46$, $p < .05$; zoo $\beta = .48$, $p < .05$). Tests constraining all direct effects across samples revealed no significant differences in β values. The model accounted for 58 % (R^2 safari) and 55 % (R^2 zoo) of the variance in Biodiversity Oriented Behavior.

Mean differences between factors

These results relate to the second research question: are there differences between in situ and ex situ CMF viewing experiences. The test for latent mean differences was performed with the zoo tourist sample as the reference group. Analyses revealed only two factors had means that were significantly different between safari and zoo tourists. Safari tourists scored .93 points higher on the factor Species Characteristics ($p < .05$), and .36 points higher on the factor Biodiversity Oriented Behaviors ($p < .05$) than did zoo tourists. It is important to note these are relative differences and not absolute values (Byrne 2008).

Tests constraining the disturbances of Conservation Caring, Species Oriented Behavior and Biodiversity Oriented Behavior across samples revealed R^2 values were not significantly different. The R^2 values were relatively high, and provide support for the predictive validity of the model (Kline 2005; Noar 2003).

Discussion

This study had two main goals. The first was to investigate how the CMF viewing experience influenced tourists' Conservation Caring (i.e. affective and cognitive connection to a species) and pro-conservation behaviors. The second goal was to explore how experiential elements interacted to influence outcomes, and if tourist-based conservation outcomes differed by type of experience. Survey responses were based on the animal with

Table 4 Item means, factor loadings and fit indices of final structural model predicting pro-conservation behavioral intent

Factor and items[a]	Safari tourists ($N = 353$)		Zoo tourists ($N = 360$)	
	Mean (SD)	λ	Mean (SD)	λ
Existing connection to wildlife				
I actively seek opportunities to view wildlife.	7.08 (1.95)	.71	7.12 (1.80)	.74
I feel a deep connection to wildlife.	6.69 (1.90)	.88	6.56 (1.91)	.88
I am highly motivated by the need to interact with wildlife.	6.26 (2.06)	.87	6.16 (2.02)	.88
I spend a lot of time learning about wildlife.	5.55 (2.10)	.72	6.03 (2.00)	.74
Species characteristics				
I understood this animal's behaviors.	6.08 (1.80)	.70	6.16 (1.98)	.75
I understood this animal's emotions.	5.36 (2.11)	.95	5.52 (2.12)	.92
I felt empathy for this animal because of its emotions.	5.49 (2.29)	.79	5.77 (2.08)	.83
Trip characteristics (reflective and formative items)				
I was able to photograph this animal.	7.77 (1.92)	.11	6.86 (2.25)	.13
I was able to get very close to this animal.	7.40 (2.04)	.13	6.57 (1.98)	.022
I made eye contact with this animal.	5.21 (3.02)	.15	4.85 (2.63)	.14
I directly interacted with this animal.	3.43 (2.51)	.12	3.71 (2.48)	.12
Information obtained from Interpreters/ Park Rangers.	6.44 (2.32)	.85	4.96 (2.66)	.76
The quality of interpretation was exceptionally high.	6.28 (2.28)	.96	5.78 (2.33)	.94
Conservation caring				
Ensuring this species' survival is my highest priority.	5.16 (2.28)	.79	5.55 (2.26)	.82
My emotional sense of well-being will be severely diminished by the extinction of this species.	6.08 (2.25)	.71	5.94 (2.32)	.78
I need to learn everything I can about this species.	5.00 (2.23)	.80	5.29 (2.11)	.86
I would protest this site if I learned of the mistreatment of this animal.	6.25 (2.20)	.70	6.44 (2.50)	.66
I will alter my lifestyle to help protect this species.	4.79 (2.20)	.77	5.21 (2.28)	.79
My connection to this animal has increased my connection to the species as a whole.	5.86 (2.14)	.75	5.64 (2.06)	.87
Wildlife protection must be society's highest priority.	5.91 (2.44)	.74	5.70 (2.40)	.79
Behavior—species oriented				
I will donate up to $75 to "adopt" this animal at this site.	4.33 (2.53)	.68	3.95 (2.41)	.80

Table 4 continued

Factor and items[a]	Safari tourists ($N = 353$)		Zoo tourists ($N = 360$)	
	Mean (SD)	λ	Mean (SD)	λ
I will make a charitable contribution up to $150 to help purchase habitat in the wild for this species.	4.10 (2.39)	.73	3.60 (2.39)	.80
I will become a member of an organization committed to protecting this species, within the next 6 months.	3.62 (2.24)	.89	3.87 (2.39)	.88
I will volunteer at an event designed to help the conservation of this species, within the next 6 months.	3.42 (2.28)	.82	3.72 (2.34)	.85
Before my visit is over, I will sign up for a mailing/email to receive updates about the care and conservation of this animal.	3.21 (2.29)	.79	3.74 (2.45)	.82
Behavior—biodiversity oriented				
I will endorse public policy that severely restricts future growth and development in order to protect wildlife.	5.44 (2.47)	.85	5.05 (2.61)	.87
Elected officials' views on wildlife will be a major factor in my voting.	5.09 (2.39)	.89	4.83 (2.49)	.91
Even when they are more expensive or harder to find, I will buy groceries and products that support wildlife conservation.	5.85 (2.28)	.79	5.19 (2.47)	.83
Fit indices[b]				
SBχ^2 (*df*)	1869.94* (702)			
CFI	.90			
NNFI	.89			
SRMR	.11			
RMSEA	.068			

* $p < .05$

SBχ^2 Satorra–Bentler Scaled Chi square, *df* degrees of freedom, *CFI* comparative fit index, *NNFI* non-normed fit index, *SRMR* standardized root mean squared residual, *RMSEA* root mean square error of approximation

[a] Rated as agreement on 9 point Likert scale (1 = strongly disagree, 9 = completely agree)

[b] Robust statistics, λ = standardized factor loading

which tourists formed the strongest connection. According to Manfredo and coworkers (2008) "...from an applied perspective, it is important to realize that emotional responses are at the heart of human attraction to, and conflict over, wildlife" (p. 51).

Influence of the CMF viewing experience on tourist-based conservation outcomes

The model, as represented in Fig. 2, demonstrates that in situ and ex situ wildlife viewing had a significant positive effect on the tourist-based conservation outcomes of Conservation Caring (i.e., a connection to a species) and pro-conservation behavioral intentions.

This is one of the first attempts to measure Conservation Caring, and doing so fills a widely recognized gap in the literature (Ballantyne et al. 2011; Cousins et al. 2009; Myers et al. 2004; Saunders 2003). Data support this factor being a successful representation of the construct (Table 4), and corroborate its role as an intermediate step to behavior (Ballantyne et al. 2007; Peake et al. 2009; Stern 2000). Additional support comes from the significant direct paths from Conservation Caring to both behavior factors, as well as very high R^2 values (Fig. 2).

Data from this study suggests that the CMF viewing experience significantly and positively impacts Conservation Caring. In this model, Conservation Caring was the only significant predictor of Species Oriented Behavior, and accounted for 42 % of the explained variance. Additionally, the path from Conservation Caring to Biodiversity Oriented Behavior was significant, although not as strong as the path to species behaviors. Wildlife tourism venues wishing to cultivate pro-conservation behaviors among visitors, should find ways to stimulate levels of Conservation Caring. One approach is to provide interpretation that employs techniques such as affective messaging and persuasive communication (e.g. Powell and Ham 2008; Skibins et al. 2012b).

In this model, pro-conservation behavior is represented by the factors Species Oriented Behavior and Biodiversity Oriented Behavior (Table 4). Species Oriented Behavior included philanthropy, volunteerism, and activism. Biodiversity Oriented Behaviors included voting behaviors and consumer habits. Data supported both factors being successful representations of their respective constructs. Additional support for the validity of the factors comes from the large amount of variance (Table 4, Fig. 2). One reason for the strong performance of both factors is the specificity of the items. In previous studies, the poor performance of factors has often been attributed to the over-generalized nature of the behaviors, and the lack of linkages between the behaviors investigated and those that are sought (Ballantyne et al. 2007; Bamberg 2003; Smith and Sutton 2008).

It is worth noting that although the model demonstrates a strong predictive ability for pro-conservation behavioral intent following a CMF viewing experience, individual item responses are still relatively low. This adds to the argument that although wildlife tourists may enter an experience with relatively high levels of a connection to wildlife, venues still have many opportunities to stimulate pro-conservation behavior intentions and performance (Beaumont 2001; Orams 1997).

Wildlife tourism venues may also benefit from providing direct opportunities for pro-conservation behaviors throughout the experience. Providing tourists with immediate opportunities to participate in a pro-conservation behaviors has been shown to successfully convert intent to action (Gwynne 2007; Powell and Ham 2008;). Given the positive influence of the CMF viewing experience on Conservation Caring, and its subsequent strong correlations to behavioral intent, it would seem advantageous to offer tourists such opportunities. This study found support for direct financial contributions on site and an interest in sustainable products. Both in situ and ex situ sites could improve conservation outcomes by providing more opportunities for tourists to make donations, while in the experience, as well as offering a wider array of wildlife friendly products and souvenirs.

Role of existing connection to wildlife on conservation outcomes

Tourists' Existing Connection to Wildlife was a moderate predictor of Conservation Caring. However, it was not a significant predictor of Species Oriented behaviors, and only a weak predictor of Biodiversity Oriented behaviors. This has interesting implications when addressing the argument of 'preaching to the choir' (Ballantyne et al. 2011).

For example, tourists' Existing Connection to Wildlife was as important a predictor of Conservation Caring as experiential elements (see below). This supports the argument that safari and zoo tourists' existing emotional attachment to wildlife was as important as the experience, and thus wildlife tourism is reinforcing and building tourists' caring.

However, Existing Connection to Wildlife was not a significant predictor of Species Oriented Behavior; and only weak at best in predicting Biodiversity Oriented Behavior (e.g. support for sustainability legislation, purchasing sustainable products). If wildlife tourists are 'the choir', one might reasonably expect a direct influence of an existing emotional attachment on intentions to engage in behaviors aimed at preserving a specific animal as well as biodiversity. However, this study found no direct support for Species Oriented Behavior and only weak support for biodiversity behaviors based on entering levels of Existing Connection to Wildlife. Thus, assuming wildlife tourists are 'the choir' and are pre-disposed to engage in pro-conservation behaviors appears unsupported by these results.

Role of experiential factors on conservation outcomes

The factor Trip Characteristics was a significant predictor only for Conservation Caring, and only for zoo tourists. The lack of a significant path to any dependent variable for safari tourists may be explained, in part, by the myriad of features composing a safari experience that were not measured in this study.

Another difference between safari and zoo tourists was the importance of proximity to the animal, as demonstrated by structural invariance constraints. This was a significant item for safari tourists, but not zoo tourists. This stands to reason as zoo tourists assume the experience will contain more direct interactions. Most zoo exhibits are designed to facilitate this experience, thus meeting the expectation. As such, a close proximity to the animal is a 'normal' experience for zoo-goers. However, part of the thrill for safari tourists is the ability to be very close to the animals (Curtin 2010) which is supported by the significance of this item.

The Species Characteristics factor also produced mixed results. The factor functioned as hypothesized in that it was a significant, albeit moderate, predictor of Conservation Caring. However, it was not a significant predictor of behavioral intent. The lack of a direct path to Biodiversity Oriented Behavior is understandable in that this factor was specific to one taxon. However, the lack of a significant path to Species Oriented Behavior is unexpected and runs contrary to previous studies (Myers et al. 2004). In this model, the factor only directly influences Conservation Caring, which in turn influences behavior. The implications of these findings for flagship species recognition are discussed below.

Comparison of experiential factors and conservation outcomes between in situ and ex situ tourists

Despite the debate regarding the potential value of in situ and ex situ wildlife viewing venues, both appear to positively influence tourists' caring and intentions to perform both species specific and general biodiversity behaviors. From an applied perspective, there were no meaningful differences between factor latent mean scores for safari and zoo tourists. Differences that are statistically significant are minor, and provide more information relevant for future studies than managerial implications. For example, safari tourists scored slightly higher on the factor Species Characteristics. This may be due to the greater diversity of animals present in a zoo, thus diluting zoo visitor responses.

Alternatively, it is possible that safari tourists are able to empathize with an animal more so than zoo tourists. However, this study was incapable of ascertaining why this occurred.

Safari tourists also scored slightly higher for intention to engage in biodiversity oriented behaviors. This may be attributable to safari tourists being more sensitized to the interconnectedness of ecosystems after an immersive safari experience (Markwell 2001; Ryan et al. 2000), and as such, are more prone to recognizing the value of biodiversity over one species. However, this explanation is speculative and not assessed by this study.

Implications for designating flagship species

Both in situ and ex situ CMF viewing is shown to positively influence caring and behaviors, thus indirectly supporting the flagship concept. However, flagships are not only expected to raise awareness and action for their own species, but for biodiversity as a whole. To that end, this study supports the notion that many CMF inspire intentions to act for both the species and biodiversity.

As shown in Fig. 2, an intention to engage in species and biodiversity oriented behaviors are strongly supported by the high R^2 values. Additionally, Species Oriented Behavior is a strong predictor of Biodiversity Oriented Behavior. This supports the notion that the CMF observed in this study could be successfully employed as flagship species. Furthermore, these results are not specific to any one species, as tourists were allowed to select the species to which they formed the strongest connection. This is highly encouraging for sites where traditional CMF are not present.

What emerged as important in forming a connection, regardless of taxon, were the emotional components of species characteristics (Table 4 and Fig. 2). This supports the ability to enlist a broad range of species as flagships, on the basis of emotional relatability and not traditional 'cute and cuddly' characteristics. This can benefit in situ sites without 'Big 5' species, and ex situ sites enhancing conservation efforts for lesser known species.

Several limitations temper the generalizability of the findings. First, tourists were asked which species they connected with during the experience. As such, responses were restricted to observed species. Viewing different species may alter results. Second, behavioral intentions and not actual behaviors were assessed. Therefore, results represent tourists' *intention to perform behaviors* and not actual behavior performance. Third, the experience was measured at a very coarse level. A more detailed comparison may reveal significant differences not detected by this survey instrument.

Conclusion

Direct exposure to wildlife, whether in situ or ex situ, appears to have the potential to be a powerful force to stimulate caring toward species of interest and pro-conservation behaviors for individual species and biodiversity as a whole. The emergence of Conservation Caring as a significant outcome and predictor of behavioral intent provides managers and practitioners empirical support for designing viewing experiences and interpretation to strengthen an emotional connection with an animal. Such experiences could focus on species' behavioral and emotional responses to environmental stimuli, as these emerged as strongly influencing Conservation Caring. For example, observing or interpreting how adults care for young or how sub-adult groups establish internal hierarchies could demonstrate understandable behaviors and emotions.

Additionally, providing opportunities for tourists to perform specific behaviors during their visit can improve conservation outcomes. Results from this study imply that tourists may be inclined to financially support species care and habitat preservation, as well as purchase wildlife friendly products. Wildlife tourism is ideally positioned to capitalize on such behavioral intentions. For example, philanthropic actions that are linked to specific animals or locations may have greater success than generic calls for support (e.g., Powell and Ham 2008). Gift shops could also present interpretation around sustainable products demonstrating the benefits communities and species receive from the purchase of such products.

This study has provided evidence for a more homogeneous treatment of wildlife tourists. The lack of differences in the results observed between safari and zoo tourists supports the strengthening of partnerships between in situ and ex situ locations to synergistically build on tourists' intention to perform pro-conservation behaviors. In fact, a more appropriate phrasing may be, 'the high degree of similarity in outcomes across safari and zoo tourists.' Partnering opportunities could include cultivating relationships between local businesses and ex situ locations, and facilitating trips and developing consistent interpretive themes between in situ and ex situ sites.

Future research may include further refinement of factors and specific attitudes, in order to pinpoint more exact differences between in situ and ex situ wildlife tourists. As protected areas struggle to justify their existence, and ex situ sites wrestle with being relevant to conservation, treating tourists, at either site, as one population provides a powerful new framework to address conservation messaging and outcomes.

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RESEARCH ARTICLE

Dolphin Shows and Interaction Programs: Benefits for Conservation Education?

L.J. Miller,[1,2]* V. Zeigler-Hill,[1] J. Mellen,[3] J. Koeppel,[1] T. Greer,[1] and S. Kuczaj[1]

[1]*Department of Psychology, The University of Southern Mississippi, Hattiesburg, Mississippi*
[2]*Institute for Conservation Research, San Diego Zoo Global, Escondido, California*
[3]*Disney's Animal Kingdom, Lake Buena Vista, Florida*

Dolphin shows and dolphin interaction programs are two types of education programs within zoological institutions used to educate visitors about dolphins and the marine environment. The current study examined the short- and long-term effects of these programs on visitors' conservation-related knowledge, attitude, and behavior. Participants of both dolphin shows and interaction programs demonstrated a significant short-term increase in knowledge, attitudes, and behavioral intentions. Three months following the experience, participants of both dolphin shows and interaction programs retained the knowledge learned during their experience and reported engaging in more conservation-related behaviors. Additionally, the number of dolphin shows attended in the past was a significant predictor of recent conservation-related behavior suggesting that repetition of these types of experiences may be important in inspiring people to conservation action. These results suggest that both dolphin shows and dolphin interaction programs can be an important part of a conservation education program for visitors of zoological facilities. Zoo Biol 32:45–53, 2013.

Keywords: conservation education; bottlenose dolphins; swim-with programs; interaction programs; dolphin shows

INTRODUCTION

Atlantic bottlenose dolphins (*Tursiops truncatus*) are found throughout coastal and offshore waters. Many of the threats to these animals are anthropogenic factors including interactions with boats [Miller et al., 2008], pollution or chemical runoff [Fair et al., 2007], and overfishing [Politi et al., 2000]. Educating the public about these threats and how they can change their behavior to alleviate these threats could be a key component in management plans to help conserve dolphins and many other marine species. Although there are many different ways to educate the public (e.g., books, movies, television shows) about threats to dolphins and the environment in which they live, zoos and aquariums offer an opportunity to educate large audiences throughout the world. It is estimated that over 175 million people visited an accredited zoological institution in the United States during 2008 [AZA, 2011].

Although research on the impact of visits to zoos and aquariums has recently increased in frequency [Ogden and Heimlich, 2009], there is a lack of information on the effectiveness of zoos and aquariums in educating the public [Dierking et al., 2002]. While some believe dolphin shows and interaction programs (swim-with programs) can benefit wild dolphins by educating visitors and inspiring them to conservation action, some question the conservation value of these types of programs [Rose et al., 2006]. Currently, there is little information available on the effects of dolphin shows and interaction programs on visitors' conservation-related knowledge, attitude, and behavior to support either claim. Roper Starch [1998] reported that visitors to facilities of the Alliance of Marine Mammal Parks and Aquariums indicated their experience had some degree of impact on their knowledge and appreciation of animals. Visitors who had a chance to interact with marine mammals reported a greater impact on their knowledge and appreciation of the animals. However, little is known about the effects of individual pro-

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*Correspondence to: Lance J. Miller, Institute for Conservation Research, San Diego Zoo Global, 15600 San Pasqual Valley Road, Escondido, CA 92027. E-mail: lmiller@sandiegozoo.org

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grams or exhibits at these institutions. Moreover, reporting that an experience is educational does not demonstrate retention of knowledge gained from the experience.

Studies examining dolphin shows and interaction programs have been limited in scope and small sample sizes make generalization across institutions difficult. For example, Curtin [2006] found that people who participated in interaction programs both in zoological facilities and in the wild enjoyed the overall experience. However, interviews were only conducted with 14 participants and questions were open-ended with potential for observer bias. Similarly, a survey conducted by the New York Wildlife Conservation Society examined the experiences of 48 spectators of dolphin shows [Sickler et al., 2006]. Participants reported having an overall positive attitude towards dolphins. However, participants reported remembering "tricks", training and physical ability following their experience rather than the cognitive abilities of the animals. While this study provides some insight into the perceptions of dolphins and the effects of some programs, more information is clearly needed.

The process of learning within a zoo or aquarium is referred to as informal learning. Because of this, zoological institutions are in a situation of free choice where visitors are free to choose which information they pay attention to and which of the staff members they engage in conversation. This is significant because any information that is learned results from their choices. The manner in which information is presented to the audience could be one of the primary influences on attention to specific information. Increased animal activity and animal shows can hold audience attention longer than graphic displays [Altman, 1998; Bitgood et al., 1986; Jackson, 1994; Swanagan, 2000]. Because of this, dolphin shows and interaction programs might be important tools for zoological institutions to educate a large number of visitors.

With the challenges facing dolphins and other marine organisms throughout the world, it is important to gain a better understanding of dolphin shows and interaction programs as tools for educating the public. The goal of the current study was to examine the effects of dolphin shows and interaction programs on visitors' conservation-related knowledge, attitude, and behavior. Little information is currently available on the effects of these programs and the information that is available has mostly been through studies that are difficult to generalize across facilities. The current study is the first quantitative multi-institutional study examining the effects of these programs. Determining the types of experiences that will have beneficial long-term effects is critical to ensuring the conservation of dolphins and the marine environment.

METHODS

The current study was comprised of three separate experiments; (1) examining the effects of dolphin shows, (2) examining the effects of interaction programs, and (3) examining the effects of viewing dolphins in an aquarium-type display. Additionally, information collected from participants of dolphin shows and interaction programs was used to examine the effects of demographics and previous experiences on entry levels of conservation-related knowledge, attitude, and behavior.

Participants

The participants of the study included adult visitors, over the age of 18, at six zoological institutions throughout the United States. The six institutions included the Minnesota Zoo (Apple Valley, MN), Brookfield Zoo (Brookfield, IL), Indianapolis Zoo (Indianapolis, IN), Texas State Aquarium (Corpus Christi, TX), Disney's The Seas (Lake Buena Vista, FL), and Dolphin Connection (Duck Key, FL). Four of the six facilities offered dolphin shows, and five of the six facilities offered dolphin interaction programs. The resulting sample sizes included 462 participants attending dolphin shows and 331 participants attending interaction programs. A subset of the sample from dolphin shows ($n = 164$) and interaction programs ($n = 128$) also participated in a follow-up survey approximately 3 months after the initial experience ($M = 109.5$ days; range 90–159). Additionally, adult visitors at Disney's The Seas were selected for visitors who had seen dolphins within the aquarium ($n = 100$) and a comparison group who did not view dolphins ($n = 100$).

Data Collection

All data were collected between September 2007 and July 2008. Visitors attending dolphin shows were selected to participate in a survey using a continual ask approach by choosing every nth visitor. Counting of visitors for selection discontinued while discussing the survey with a potential survey respondent and resumed after handing the clipboard with a survey to the respondent. Due to smaller attendance figures, all visitors participating in interaction programs were asked to participate in the survey. All participants that declined to take the survey were recorded with the reason for declining to determine a success rate and ensure adequate unbiased sampling.

The survey consisted of a repeated measures design where participants were surveyed before (entry), directly after (exit) and approximately 3 months following (follow-up) their experience. The entry questionnaire consisted of 48 Likert-type scale items related to conservation of dolphins and the marine environment [Adelman et al., 2000; Dierking et al., 2004; Dunlap & Van Liere, 1978; Dunlap et al., 2000; Likert, 1932] . These items consisted of 10 questions to examine conservation-related knowledge (Table 1), 17 questions to examine conservation-related attitude (Table 2), and 21 questions to examine interest in conservation-related behaviors (Table 3). It is important to note that the knowledge questions utilized in the current survey explore a person's level of perceptual knowledge and allows for exploring the degree to which people were aware of the correct response. The choice for using this format of question potentially allowed for more variability in response to explore changes

TABLE 1. Knowledge-Based Questions Utilized for the Survey

Questions
Dolphins are an intelligent and complex species
Feeding and/or interacting with a dolphin in the wild could be harmful for the animal
People that live near the coast (for example Florida, Georgia or South Carolina) can affect the waters where dolphins live
Humans and dolphins depend on some of the same resources
People that live away from the coast (for example Illinois, Arizona, or North Dakota) can affect the waters where dolphins live
It is illegal to feed a dolphin in the wild
Marine debris in the ocean is not a serious problem
Humans are severely abusing the oceans
Overfishing is a serious problem that can affect dolphins
Swimming with a dolphin in the wild is safe for you and the dolphin

in knowledge within these programs. The exit and follow-up questionnaires consisted of the original 48 Likert-type scale items with five additional Likert-type scale items (Table 4). Items were chosen to be representative of the geographic locations represented by the institutions and the issues related to marine conservation in each of those areas. Knowledge and attitude scale items were based on a five-point scale with responses ranging from 1 (strongly disagree) to 5 (strongly agree). Behavioral scale items were also based on a five-point scale ranging from 1 (not interested) to 5 (planning on doing). Dichotomous responses were also indicated by visitors as to which of the behaviors they had engaged in within the previous 3 months (recent behavior) and anytime in the past (anytime behavior). Additionally, the entry questionnaire examined previous participation in 21 conservation-related behaviors (Table 3) during the previous 3 months and anytime in the past. The follow-up questionnaire examined participation in 21 conservation-related behaviors during the 3 months between the exit and follow-up questionnaires.

TABLE 2. Attitude-Based Questions Utilized for the Survey

Questions
I care about the well-being of dolphins in a zoo or aquarium
Dolphins do not need to be protected from humans
Humans have the right to modify the oceans to suit their needs
I would be willing to decrease my standard of living to protect the oceans
Human ingenuity will ensure that we do not make the oceans unlivable
I would be willing to pay much higher prices for common household items to protect the oceans
I have an emotional connection to dolphins in the wild
Humans were meant to rule over the oceans
Dolphins are just another animal
I have an emotional connection to dolphins in a zoo or aquarium
Dolphins have as much right as humans to exist
Humans will eventually learn enough about the ocean to be able to control it
I care about the well-being of dolphins in the wild
It is too difficult for someone like me to help protect the oceans
I would be willing to pay much higher taxes to protect the oceans
When humans interfere with the ocean it often has disastrous consequences
There is no point in doing what I can for the oceans unless others do the same

TABLE 3. Behaviors/Activities Utilized for the Survey

Questions
Become a member of a marine environmental organization
Buy or check out a book from the library about dolphins
Buy or check out a book from the library about the oceans
Contact a state or government agency to get information about the oceans
Donate money to a marine conservation organization
Donate money to help conserve wild dolphins
Point out behavior to friends that could harm the marine environment
Feed a dolphin in the wild
Recycle plastic grocery bags
Purchase products that are marine environmentally friendly
Spend time in nature viewing wild dolphins
Sort glass or aluminum cans for recycling
Use chemical insecticides or pesticides
Talk with friends about marine environmental problems
Visit a zoo or aquarium
Use fertilizers in the yard
Vote for political candidates based on marine environmental issues
Volunteer for a marine conservation organization
Watch a television show about the oceans
Watch a television show about dolphins
Write a letter to politicians about marine environmental issues

Demographic information including sex, age, number of people with the participant, race/ethnicity, and educational background was collected from all participants. Additionally, information on the reason for attending or participating in the current show or program and past experiences with dolphin tours in the wild, dolphin shows, and dolphin interaction programs were recorded. The name, email address, phone number, and information on the best time to contact the participant were collected to conduct follow-up surveys for all participants who provided consent. Follow-up surveys occurred approximately 3 months after participation either through a website or phone interviews depending on visitor preference.

In addition to examining the effects of dolphin shows and interaction programs on conservation-related knowledge, attitude, and behavior, a selection of visitors at one facility

TABLE 4. Additional Questions Utilized on the Exit and Follow-Up Surveys

Questions
This experience was entertaining
This experience was educational
This experience increased my interest in learning more about dolphins and the ocean
This experience increased my caring for dolphins and the ocean
This was one of the best experiences of my life

were selected to examine effects of viewing dolphins vs. a comparison group (did not see a dolphin) using only the entry survey questions. Participants were selected by using a continual ask approach choosing the *n*th visitor entering a queue line at one of the attractions at Disney's The Seas. Participants were grouped based on viewing or not viewing dolphins before completion of the survey. Information on previous experiences and reasons for visiting were also collected.

Questionnaire Validation

Reliability analysis (n = 118) was conducted to examine properties of the measurement scales, and identify problem items to be removed from the questionnaire. The final version of the questionnaire resulted in an alpha level of 0.701 (knowledge), 0.823 (attitude), and 0.874 (behavioral intentions). Survey questions from the final version were analyzed for document reading level and analysis resulted in a Flesch–Kincaid Grade level of 7.52 with a Flesch Reading Ease level of 58.12.

Data Analysis

All information collected was analyzed to examine the distribution of the data and ensure assumptions were met for any parametric statistics including regression analysis. Due to a skew in the distribution of data on the number of dolphin shows previously attended by visitors, the data were divided into six categories with approximately an equal number of responses in each category. The resulting categories included zero dolphin shows in the past, one dolphin show in the past, two to four dolphin shows in the past, five to nine dolphin shows in the past, and 10 or more dolphin shows in the past. Additionally, education level was also coded to create a dichotomous variable based on those who had or had not received a college degree. Demographic information was analyzed to determine the characteristics of the sample. χ^2 tests of significance were used to examine differences between dolphin show/interaction program participants and dolphin viewing/comparison groups. Standardized residuals were used to determine where significant differences existed for any significant result.

Any negative Likert-type scale items (e.g., "Swimming with a dolphin in the wild is safe for you and the dolphin") were recoded to match positive responses by reversing the scale. A paired samples t-test was used to examine short-term changes in knowledge, attitude, and intended behavior between the entry survey and exit surveys for participants of both dolphin shows and interaction programs. A paired samples t-test was also used to examine long-term changes in knowledge, attitude, reported behavior and intended behavior between the entry survey and follow-up surveys for participants of both dolphin shows and interaction programs. For all results examining differences between conditions, effect scores (Cohen's d) were calculated to determine magnitude of the difference. Information collected from participants viewing dolphins on conservation-related knowledge, attitude, and behavior was compared to participants of the comparison group who did not view dolphins using an independent samples t-test.

Multiple regression analysis was used to examine the effect of demographics (sex and education level), previous experiences and participant type (dolphin show or interaction program) on knowledge, attitude, recent behavior, behavior anytime in the past, and behavioral intentions recorded from the entry survey.

RESULTS

A summary of the demographic information collected from participants of dolphin shows and interaction programs is presented in Table 5. Participants of both types of programs were more likely to be female (DS: $z = 7.51, P < 0.01$; IP: $z = 6.16$, $P < 0.01$), were more likely to be Caucasian (DS: $z = 32.35$, $P < 0.01$; IP: $z = 32.76$, $P < 0.05$), were more likely to have attended at least some college (DS: $z = 15.03$, $P < 0.01$; IP: $z = 11.98$, $P < 0.01$), and were more likely from the United States (DS: $z = 20.05$, $P < 0.01$; IP: $z = 14.61$, $P < 0.01$).

The differences between participants of dolphin shows and interaction programs included age ($\chi^2 = 30.03$, $P < 0.01$), race ($\chi^2 = 24.28$, $P < 0.01$), visit reason ($\chi^2 = 334.81$, $P < 0.01$) and location ($\chi^2 = 17.33$, $P < 0.01$). Participants of dolphin shows had a higher percentage of participants between the ages of 25 and 34 ($z = 2.46$, $P < 0.01$), a higher percentage of people of Hispanic origin ($z = 2.56$, $P < 0.01$), a higher percentage were visiting for social or family reasons ($z = 8.00$, $P < 0.01$), and a lower percentage of international visitors ($z = -2.54$, $P < 0.01$). Participants of interaction programs had a higher percentage of participants between the ages of 45 and 54 ($z = 2.46$, $P < 0.01$), were visiting for a new or unique experience ($z = 9.77$, $P < 0.01$), and had a higher percentage of international visitors compared to participants of dolphin shows ($z = 2.94$, $P < 0.01$). Table 6 includes the demographic information for participants that had viewed dolphins and the comparison group (had not viewed dolphins). There were no significant differences in demographic information between these two samples.

Table 7 presents the results examining short- and long-term changes in knowledge, attitude, behavioral intentions, and reported behavior for participants of dolphin shows and interaction programs. There were significant short-term increases in conservation-related knowledge (DS: $t = -2.73$, $P < 0.01$; IP: $t = -12.12$, $P < 0.01$), attitude (DS: $t = -2.05$, $P < 0.05$; IP: $t = -12.33$, $P < 0.01$), and behavioral intentions (DS: $t = -11.23$, $P < 0.01$; IP: $t = -13.84$, $P < 0.01$) in the short-term. Three months following their experiences, knowledge was significantly higher than what was reported during the entry survey for participants of both types of programs (DS: $t = -2.56$, $P < 0.05$; IP: $t = -8.10$, $P < 0.01$). Participants of interaction programs also showed significantly higher levels of attitudes ($t = -2.10$, $P < 0.05$) and behavioral intentions ($t = -3.13$, $P < 0.01$) during the follow-up when compared to entry survey levels. Additionally, reported

TABLE 5. Demographic Information for Participants of Dolphin Shows and Interaction Programs

		Dolphin show		Interaction program		
Demographic	Category	Percentage	*N*	Percentage	*N*	χ^2
Sex	Male	32%	149	33%	109	0.02
	Female	68%	311	67%	222	
Age	18–24	14%	65	12%	41	30.03*
	25–34	34%	153	19%	63	
	35–44	27%	125	28%	92	
	45–54	14%	63	24%	78	
	55–64	8%	38	13%	42	
	65+	3%	12	4%	13	
Race	White	81%	368	92%	304	24.28*
	Asian	2%	10	2%	7	
	African American	2%	11	1%	3	
	Hispanic	13%	57	4%	13	
	Other	2%	10	1%	2	
Education	Grade school	0%	1	1%	3	8.48
	Some high school	2%	10	4%	13	
	High school graduate	12%	57	12%	39	
	Some college	29%	132	24%	80	
	College graduate	31%	144	37%	122	
	Technology school graduate	6%	26	5%	15	
	Some graduate school	4%	19	3%	10	
	Graduate degree	15%	70	14%	46	
Visit Reason	New experience	12%	55	67%	221	334.81*
	Social experience	77%	354	14%	46	
	Learning experience	6%	27	15%	51	
	Other	5%	23	4%	14	
Location	United States	97%	447	90%	308	17.33*
	International	3%	15	10%	36	

Note. *$P < 0.01$.

TABLE 6. Demographic Information for Participants who had Viewed Dolphins and the Comparison Group (who had not Viewed Dolphins)

		Dolphin View		Comparison		
Demographic	Category	%	*N*	%	*N*	χ^2
Sex	Male	42%	42	40%	40	1.13
	Female	58%	57	60%	60	
Age	18–24	5%	5	6%	6	0.93
	25–34	28%	28	26%	26	
	35–44	43%	43	46%	46	
	45–54	11%	11	13%	13	
	55–64	11%	11	8%	8	
	65+	1%	1	1%	1	
Race	White	87%	87	90%	90	3.05
	Asian	4%	4	2%	2	
	African American	1%	1	0%	0	
	Hispanic	5%	5	7%	7	
	Other	3%	3	1%	1	
Education	Grade school	0%	0	0%	0	10.02
	Some high school	0%	0	2%	2	
	High school graduate	6%	6	6%	6	
	Some college	21%	20	15%	15	
	College graduate	43%	42	38%	38	
	Tech. School Graduate	1%	1	6%	6	
	Some graduate school	7%	7	7%	7	
	Graduate degree	22%	21	26%	26	
Visit Reason	New experience	11%	11	13%	13	0.85
	Social experience	83%	81	81%	80	
	Learning experience	4%	4	3%	3	
	Other	2%	2	3%	3	
Location	United States	95%	92	90%	89	0.52
	International	5%	5	10%	10	

TABLE 7. Short and Long-Term Effects of Dolphin Shows and Interaction Programs on Conservation-Related Knowledge, Attitude, and Behavior

	Dolphin Show							Interaction Program						
	Entry		Exit/ Follow-up					Entry		Exit/ Follow-up				
	M	SE	M	SE	df	T	d	M	SE	M	SE	df	T	d
Short-term														
Knowledge	4.19	0.02	4.23	0.02	461	−2.73**	0.128	4.28	0.02	4.52	0.02	314	−12.12**	0.684
Attitude	3.79	0.02	3.81	0.03	461	−2.05*	0.097	3.93	0.03	4.11	0.03	314	−12.33**	0.708
Behavioral intentions	3.08	0.03	3.29	0.04	461	−11.23**	0.522	3.29	0.04	3.65	0.04	276	−13.84**	0.832
Long-term														
Knowledge	4.29	0.04	4.38	0.04	136	−2.56*	0.217	4.29	0.03	4.58	0.03	125	−8.10**	0.726
Attitude	3.91	0.04	3.89	0.04	136	0.74	-	4.01	0.04	4.07	0.04	125	−2.10*	0.187
Reported behavior	0.37	0.01	0.4	0.01	163	−2.37*	0.187	0.33	0.02	0.4	0.02	127	−4.44**	0.396
Behavioral intentions	3.34	0.06	3.4	0.06	116	−1.27	-	3.35	0.05	3.52	0.05	114	−3.13**	0.293

Note. *$P < 0.05$; **$P < 0.01$.

conservation-related behavior was also significantly higher during the follow-up survey when compared to entry levels for participants of both dolphin shows and interaction programs (DS: $t = -2.37$, $P < 0.05$; IP: $t = -4.44$, $P < 0.01$). However, a comparison of people who had viewed dolphins with those who had not viewed dolphins revealed no significant differences in conservation-related knowledge ($t = -0.28$, $P =$ n.s.), attitude ($t = 0.20$, $P =$ n.s.), reported behavior ($t = 0.09$, $P =$ n.s.), or behavioral intentions ($t = -0.39$, $P =$ n.s.).

A majority of participants of both dolphin shows and interaction programs agreed or strongly agreed both types of programs were entertaining (DS: $z = 24.76$, $P < 0.01$; IP: $z = 21.66$, $P < 0.01$) and educational (DS: $z = 22.09$, $P < 0.01$; IP: $z = 21.32$, $P < 0.01$). Table 8 is a summary of the percent agreement and average scores with standard deviations for each of the questions about the participants' overall experience. A majority of participants for both types of programs also indicated that these programs increased their interest in learning more about (DS: $z = 12.38$, $P < 0.01$; IP: $z = 19.84$, $P < 0.01$) and caring for (DS: $z = 13.29$, $P < 0.01$; IP: $z = 20.06$, $P < 0.01$) dolphins and the marine environment. However, only participants of interaction programs agreed that the program was one of the best experiences of their life (DS: $z = -1.88$, $P < 0.05$; IP: $z = 17.33$, $P < 0.01$).

Table 9 presents the descriptive statistics and correlations for entry levels of knowledge, attitude, behavior, and behavioral intentions and predictor variables including education level, number of dolphin shows attended in the past, and participation in an interaction program in the past. Entry and predictor variables are based on the entire sample ($n = 777$). Follow-up variables are based on that portion of the sample ($n = 292$). The relationship between entry scores and previous experiences was examined using multiple regression analysis. In earlier models, previous experiences at institutions or on dolphin watching boat trips were included. However, there were no significant relationships observed and these variables were removed from further analyses to create a simpler model. The results from the regression analysis are presented in Table 10. The model examined was a significant predictor for entry levels of knowledge ($R^2 = 0.08$, $P < 0.01$), attitude ($R^2 = 0.11$, $P < 0.01$), recent behavior ($R^2 = 0.03$, $P < 0.01$), anytime behavior ($R^2 = 0.12$, $P < 0.01$), and behavioral intentions ($R^2 = 0.06$, $P < 0.01$). Number of dolphin shows attended in the past was a significant predictor for all variables. In addition, attending an interaction program in the past was a significant predictor for all variables, except for recent conservation-related behavior.

DISCUSSION

Participants of dolphin shows demonstrated a short-term increase in conservation-related knowledge, attitudes, and intended behavior. Follow-up results suggest that atti-

TABLE 8. Percent Agreement and Mean Rankings of Participants' Experiences with Dolphin Shows and Interaction Programs

	Dolphin Show			Interaction Program		
Statement	%	M	SE	%	M	SE
This experience was entertaining	96.7%	4.59	0.03	99.4%	4.89	0.02
This experience was educational	90.6%	4.44	0.03	98.4%	4.87	0.02
This experience increased my interest in learning more about dolphins and the ocean	68.4%	3.99	0.04	94.4%	4.65	0.04
This experience increased my caring for dolphins and the ocean	70.5%	4.01	0.04	95.0%	4.65	0.03
This was one of the best experiences of my life	35.6%	3.19	0.05	87.5%	4.39	0.04

TABLE 9. Descriptive Statistics and Correlation Coefficients for Dependent and Predictor Variables

Variable	1	2	3	4	5	6	7	8
1. Entry knowledge	-							
2. Entry attitude	0.57**	-						
3. Entry recent behavior	0.14**	0.18**	-					
4. Entry anytime behavior	0.24**	0.30**	0.56**	-				
5. Entry behavioral intentions	0.32**	0.52**	0.24**	0.35**	-			
6. Education level completed	0.14**	0.00	0.07	0.19**	0.05	-		
7. Number of dolphin shows	0.12**	0.09**	0.16**	0.28**	0.11**	0.09**	-	
8. Interaction program	0.12**	0.12**	0.04	0.14**	0.07	0.00	0.10**	-
M	4.22	3.84	0.35	0.55	3.16	0.57	1.81	0.09
SD	0.42	0.47	0.17	0.20	0.72	0.50	1.24	0.29

Note. *$P < 0.05$; **$P < 0.01$.

tudes and behavioral intentions for these participants return to baseline levels 3 months following the show. These results are similar to other studies examining specific exhibits or programs within zoological institutions in that interest in participating in conservation-related activities often returns to baseline levels 2 or 3 months after the visit [Adelman et al., 2000; Dierking et al., 2004; Dotzour et al., 2002]. However, the participants of dolphin shows retained the conservation-related knowledge gained during the shows when surveyed 3 months following their experience and reported engaging in more conservation-related behaviors 3 months following the show compared to the 3 months before the show.

Participants of interaction programs also had a short-term increase in conservation-related knowledge, attitude, and intended behavior. Moreover, all three of these attributes were significantly higher 3 months following the programs when compared to entry levels. Similar to participants of dolphin shows, participants also reported engaging in more conservation-related behaviors 3 months following the program compared to the 3 months before the program. These results suggest that both dolphin shows and interaction programs can be an important part of a conservation education program at a zoo or aquarium.

Similar to previous studies examining educational effectiveness of zoo exhibits [e.g., Swanagan, 1993], dolphin shows and interaction programs have the ability to increase knowledge, attitudes, and behavioral intentions in the short term. Additionally, there was a long-term sustained increase in conservation-related knowledge with reported changes in conservation-related behavior for participants of dolphin shows and long-term increases in knowledge, attitudes, behavioral intentions, and reported behavior for participants of interaction programs. The differences in the results for dolphin shows and interaction

TABLE 10. Regression Analysis Examining Previous Experiences with Dolphin Shows and Interaction Programs on Conservation-Related Knowledge, Attitude, Behavioral Intentions and Reported Behavior

Predictor variables	Knowledge β	Attitude β	Recent behavior β	Anytime behavior β	Behavioral intentions β
Sex	−0.14**	−0.20**	−0.01	0.00	−0.14**
Education level	0.12**	0.00	0.07	0.17**	0.02
Number dolphin shows	0.10*	0.08*	0.14**	0.26**	0.11**
Interaction program	0.10*	0.14**	0.03	0.11**	0.09*
Participant type	0.14**	0.18**	−0.05	0.05	0.15**
	$R^2 = 0.08$**	$R^2 = 0.11$**	$R^2 = 0.03$**	$R^2 = 0.12$**	$R^2 = 0.06$**

Note. *$P < 0.05$; **$P < 0.01$.

programs compared to results from other zoological exhibits could be attributed to the duration of dolphin shows and interaction programs, or the entertaining value of these programs.

Previous research has shown that duration of time spent at exhibits positively correlates with learning [Falk, 1983]. It is possible that the approximate 20-min duration of dolphin shows or hour and a half duration of interaction programs is the difference between the current results and results from studies examining the effects of other types of programs. Alternatively, information being presented in the form of an entertaining show or interaction program could be the reason for the sustained increases and reported change in behavior. Ninety-seven percent of the participants of dolphin shows and 99% of the participants of interaction programs agreed or strongly agreed that the experience was entertaining. This was consistent with previous results that interactive exhibits, increased animal activity, and animal shows can hold audiences longer than graphic displays [Altman, 1998; Bitgood et al., 1986; Jackson, 1994; Swanagan, 2000], likely due to the entertaining value of those experiences. While the exact reason for the differences in the short- and long-term changes observed for participants of dolphin shows and interaction programs compared to results from previous studies on many different zoo exhibits cannot be identified, the results from the present study suggest that dolphin shows and interaction programs can be an important part of a conservation education program within a zoo or aquarium. Visitors who viewed dolphins compared to visitors who had not viewed dolphins did not demonstrate significant differences in knowledge, attitude, or behavioral intentions. Consequently, it is unlikely that just having the ability to see dolphins during a show or interaction program is the reason for increases in conservation-related knowledge, attitudes, and behavior.

Combining the results from the participant's current dolphin show or interaction program with the results from the regression analysis on entry levels of knowledge, attitude, reported behavior, and behavioral intentions, strengthens the idea that dolphin shows and interaction programs can be an important component of conservation education within zoos and aquariums. Both the number of dolphin shows attended in the past and participation in interaction programs were significant predictors of knowledge, attitudes, behavioral intentions, and reported conservation behavior anytime in the past. However, the number of dolphin shows attended in the past was also a significant predictor for recent conservation-related behavior which suggests that repeat visits to these types of programs may be important in creating long-term sustainable behavior. Since attitudes and behavioral intentions both returned to baseline levels during the 3-month follow-up surveys, having repeat experiences with these types of programs may produce long-term change.

Participants of dolphin shows and interaction programs consistently scored their experiences as entertaining and educational, and a majority of the participants agreed the experiences increased their interest in learning more about and caring for dolphins and the marine environment. A majority of participants of interaction programs even considered the experience as one of the best experiences of their life. These results suggest that participants enjoy these types of programs, and that shows and/or interactive experiences may be important tools for inspiring visitors of zoological institutions to get involved in conservation. With the many anthropogenic threats that dolphins experience, educating the public about conservation issues surrounding dolphins and the marine environment could be a key component in management plans to help conserve dolphins and many other species. Determining ways to increase repeat visitorship may also be an important key in the conservation of wildlife and the environments in which they live. Only through continued systematic evaluation of education programs within zoos and aquariums will we be able to determine the best ways to inspire visitors to conservation action.

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CORRESPONDENCE SUMMARY – Jan-Mar 2017

The following is a summary of correspondence received in the General Manager's Office on the topic of "Cetaceans at the Vancouver Aquarium".

Method	Oppose of Cetaceans in captivity	Support of Vancouver Aquarium	Neutral/Other	TOTAL
Individual Emails	791	411	17	1219
Correspondence sent to Park Board *included Blackfish DVD	1*	11		12
Reference material from speakers at Special Board Meeting	2	4	2	8
Reference material from Vancouver Aquarium provided at Special Board Meeting		4		4
Email Campaign – Thank you for your Unanimous Vote to Amend …	6124			6124
Change.org petition – Thank the PB Commissioners for Banning Whales & Dolphins	800			800
Email Campaign – Please Support Marine Science		1182		1182
Petition – End all Dolphin and Whale Captivity @ Van Aquarium *2017	402			402
Petition – Overturn PB ruling reg. Vancouver Aquarium		2		2
TOTAL	8120	1614	19	9753

*In addition an email campaign titled "End of dolphins and whale captivity at the Vancouver Aquarium" has received 5,300 signatures. This campaign has been active since 2014