

Analysis of the Challenges Inherent in Cetacean Conservation and Recovery Through Expert Opinion

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Abstract

Many of the world's cetacean species and populations are endangered and this study elicited experts' opinions regarding the challenges in cetacean conservation through an online questionnaire. 121 experts from 46 countries contributed. Follow-up interviews were conducted with 61 of these. The results show that conservation efforts face varying challenges related to geography and focal species or population. Human impact was confirmed as the biggest challenge in cetacean conservation and the two most commonly reoccurring challenges were insufficient funding and problems in achieving government/stakeholder involvement. Additionally, support from and collaboration with local communities and non-governmental organisations was noted as highly impactful in positive outcomes of conservation efforts. The interviews highlighted four additional challenges impacting successful conservation outcomes: achieving appropriate government and non-government involvement; socio-economic problems; and issues related to geography, and wildlife health. There are important geographical and regional differences in awareness of relevant policies and organisations. The key issue identified was the establishment of conservation actions within the necessary timeframe to create effective action for threatened species and populations. The results also indicate that river dolphins are especially vulnerable and beaked whales are particularly lacking in terms of information and support a call for more urgent action for cetacean conservation generally. They also support the necessity of having appropriate political will to underpin and implement cetacean conservation efforts. The results indicate sound scientific research alone will not produce intended conservation results as negative human impacts outweighs recovery actions. This means that cetacean conservation to be effective must move up the political agenda.

Key Words: cetacean, whale, dolphin, porpoise, conservation, policy, questionnaire

Funding: This research was conducted as a project in part fulfilment of the master's degree in Global Wildlife Health and Conservation of the University of Bristol. Further research and the write-up and MPS's contribution were supported by Humane Society International.

Abbreviations: Abbreviations used are listed before acknowledgements

1. Introduction

More than half of the 90 living species of cetaceans have a “concerning” conservation status on the International Union for Conservation of Nature (IUCN) Red List, with 13 species and many subspecies/distinct populations listed as ‘Critically Endangered’ or ‘Endangered’, and 24 as ‘Data Deficient’, highlighting another major concern, which is the lack of information for many cetacean species (Rojas-Bracho et al. 2020). This creates an urgent need to identify and address the challenges that hinder cetacean conservation efforts.

Cetaceans are valued highly by the public (Freeman 2008) and are keystone species for ecosystems (Harwood 2001), including facilitating nutrient dispersion (Roman et al. 2014). They are also economically important in the context of tourism (Parsons et al. 2015). These considerations all provide incentives for improving the understanding of the challenges inherent in cetacean conservation.

The key objective of this study was to generate results that would improve understanding of the challenges inherent in cetacean conservation around the world. This study used expert opinion to explore the challenges to cetacean conservation utilising the concept of research prioritisation (Sutherland et al. 2006, 2009, Parsons et al. 2014, and Lewison et al. 2012). The deployment of carefully developed questionnaires to appropriate experts provides an opportunity to use a systematic and quantitative process to incorporate multiple perspective and a range of knowledge (O’Neill et al. 2008). Experts were drawn from different backgrounds, locations, and species-related expertise to try to encompass global challenges. Note was also taken of previous work seeking to identify the main research questions for cetacean conservation, which concluded that success is influenced by geographical, cultural, economic (Parsons et al. 2015) and complex socioecological factors (Pomeroy et al. 2006). These issues were reflected in the survey questions and we also took into account the conclusions of Sutherland et al. (2020), Nunez et al. (2019), Leimu & Koricheva (2005), and van Leeuwen et al. (2001) concerning literature and geography, affiliations and language, respectively.

Due to the widely differing biology and life histories of the 90 or so known cetacean species, which affect the precise nature of conservation actions for them, participants were asked to select a particular taxonomic category: ‘General Cetacean Conservation’, ‘Large Whales’, ‘Other Delphinids’, ‘Riverine Dolphins/Porpoises’, ‘Beaked Whales’, or ‘Specific Species/Population’, for which to answer questions. The breakdown of each category are as follows:

- ‘Large Whales’: Balaenidae, Balaenopteridae, *Caperea marginata*, Eschrichtiidae, Kogiidae, Monodontidae, Orcinus, Physeteridae.
- ‘Other Delphinids’: Cephalorhynchus, Delphinus, Feresa, Globicephala, Grampus, Lagenodephis, Lagenorhynchus, Lissodelphis, Orcaella, Peponocephala, Pseudorca, *Sotalia guianensis*, Sousa, Stenella, Steno, Tursiops.
- ‘Riverine Dolphins/Porpoises’: Iniidae, Lipotidae, Phocoenidae, Plantanistidae, Pontoporiidae, *Sotalia fluviatilis*.
- ‘Beaked Whales: Ziphiidae.

Participants could repeat the conservation questions for up to 3 taxonomic groups and were allowed to provide additional information at the end of each section.

2. Methods

2.1 Background

Expert opinion has been widely used in examining conservation issues for many species (O'Neill et al. 2008, Donlan et al. 2010, Chamberlain et al. 2016). Expert knowledge is classified as either 'substantive', reflecting opinion and knowledge, or 'normative', reflecting the ability to accurately communicate judgements (McBride & Burgman 2011). This study focused on 'substantive' knowledge.

2.2 Survey Design

The survey was designed using Jisc Online Survey (JISC 2020). The structure was developed through a pilot questionnaire, where 3 substantive experts and 3 non-substantive experts (i.e. non-cetacean conservation participants) contributed to finalising the questionnaire; a commonly used method (McBride & Burgman 2011). Ethical approval was given by the University of Bristol's Faculty of Health Science Student Research Ethics Committee (Reference no. 103445).

2.3 Participant List

The initial participant list was created based on an online search for suitable experts guided by their published works, consultation with others in the field and then a subjective assessment of the participants' level of expertise, relevant background, positions held within relevant organisations, and familiarity with legislation. Most survey participants are members of the IUCN Cetacean Specialist Group (CSG). Their membership is contingent on relevant experience, an ability to give credible scientific advice and reflects a high standard of scientific accomplishment and strong commitment to conservation (IUCN 2019).

2.4 Participant Recruitment

Potential participants were approached through an initial recruitment email with information about the aims of the project and a link to the questionnaire. Reminder emails were sent 10 days after initial contact and a final reminder before the closing of the survey, which was on August 10th, 2020.

2.5 Survey Structure

The questionnaire had 3 sections: Participant Classification, Cetacean Category and Conservation Policy, with varying types of questions, including free-text and numerical rank. Follow-up interviews were conducted by email, phone, or video. Participants could select their own level of anonymity. The full survey can be found [here](#) or is available upon request. The survey questions are in Figure 1.

Part 1: Participant Classification Information

Q1: How many years have you worked in cetacean research and/or conservation?

Q2: Briefly describe your disciplinary and/or professional background.

Q3: What country are you based in?

Q4: Please select where you have conducted conservation and/or field work.

Q5: Please provide your awareness of the following organisations and policy initiatives.

Q5a: Please add any other international organisations or policy initiatives.

Part 2: Cetacean Conservation

Q6: Please select the cetacean category for the set of questions.

Q7/16/25: Which do you think affects recovery most for your selected cetacean category?

Q8/17/26: How often do the following factors influence the outcome of recovery efforts?

Q8a/ 17a/ 26a: Please list any other factors that you think influence conservation success.

Q 9/18/27: Please rank the following factors for their importance in successful conservation.

Q10/19/28: Which of the following could have improved the recovery outcome?

Q11/20/29: Did you interact with any of the following?

Q12/21/30: How important was the cooperation for a successful outcome of your project?

Q13/22/31: Are there other agencies or stakeholders you would like to add?

Part 3: Cetacean Conservation Policy

Q32-34: Please allocate 100 point between the three factors: “Assess”, “Plan”, and “Act”, to reflect the importance you place on each factor in regard to cetacean conservation.

Q35-37: Please allocate 100 points between the three values, “Economic”, “Ecological”, and “Societal”, according to your opinion as they relate to perceived cetacean value and implications for conservation.

Q38: How would you describe, on average, the accuracy of the IUCN Red List’s category listings for cetaceans?

Q39: If the IUCN had additional resources available to contribute to its work, how do you think it could best use these resources?

Q40: Is there anything you think the IUCN could do to improve the Red List process for cetaceans?

Figure 1: List of survey questions

3. Results

The Participants

The questionnaire invitation was sent to 338 potential participants and was completed by 121 participants from 46 countries. Sixty-one follow-up interviews were successfully conducted, providing a further source of information.

PART 1: PARTICIPANT CLASSIFICATION INFORMATION

Q1: How many years have you worked in cetacean research and/or conservation?

Answers are shown in Figure 2.

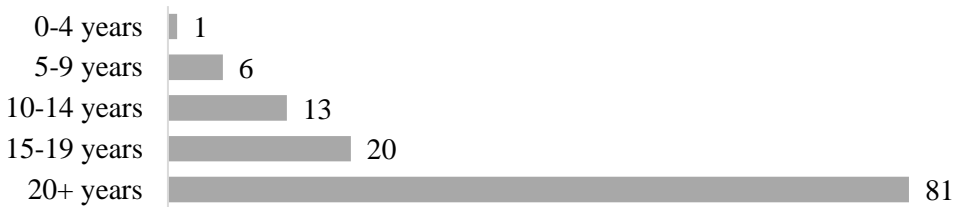


Figure 2: Results for Q1- How many years have you worked in cetacean research and/or conservation?

Q2: Briefly describe your disciplinary and/or professional background.

Listed professions:

- Research (80)
- Professor (26)
- Non-government (17)
- Serve on board (16)
- Director (14)
- Government (11)
- Non-profit (11)
- Biologist (7)
- Education (7)
- Manager (5)
- Acoustics (5)

Top 5 organisations mentioned in this context:

- IUCN (13)
- IWC (7)
- Cetacean Specialist Group (7)
- NOAA (5)
- Society for Marine Mammalogy (3)

Q3: What country are you based in?

Participant answers to Q3 are in Figure 3 and Table 1.

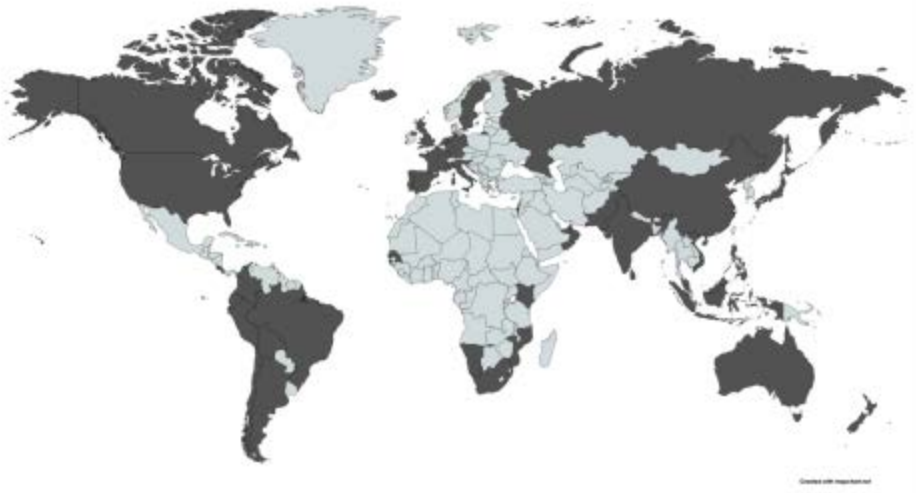


Figure 3: Results for Q3- Map made from mapchart.net showing participant locations in dark grey.

Table 1: Frequency and percentage counts of participants in countries and continents.

AFRICA	9 (7%)	ASIA	14 (12%)	EUROPE	30 (25%)	MIDDLE EAST	3 (2%)
Kenya	2	China	1	France	1	Israel	1
Mozambique	2	India	2	Germany	1	Oman	1
Namibia	1	Indonesia	1	Iceland	1	UAE	1
Senegal	1	Japan	2	Italy	4	N. AMERICA	36 (30%)
South Africa	3	Malaysia	2	Luxembourg	1	Canada	4
AUSTRALASIA	9 (7%)	Pakistan	2	Netherlands	3	United States	32
Australia	4	Philippines	1	Portugal	2	S. AMERICA	14 (12%)
New Caledonia	1	Sri Lanka	2	Russia	2	Argentina	5
New Zealand	4	Vietnam	1	Slovenia	1	Bolivia	1
		C. AMERICA	6 (5%)	Spain	2	Brazil	3
		Bahamas	1	Sweden	1	Chile	1
		Caribbean	1	UK	11	Colombia	1
		Costa Rica	4			Ecuador	1
						Peru	2

Q4: Please select where you have conducted conservation and/or field work.

The participants had conducted research in 324 locations (Table 2).

Table 2: Frequency of each location

Ocean		Ocean	
Northeast Pacific Ocean	49	Mediterranean Sea	24
Indian Ocean	38	Arctic Ocean	21
Northwest Atlantic	37	Northwest Pacific Ocean	15
South Pacific Ocean	36	South China Sea	12
South Atlantic Ocean	30	Baltic Sea	2
Northeast Atlantic	27	Other	33

Q5: Please provide your awareness of the following organisations and policy initiatives.

Participants used a 5-point rank scale to answer the question where 1 (lowest) = “unawareness of” and 5 (highest) = “actively engage with.” Answers, in Table 3, are separated by continent where the respondent is based.

Table 3: Percentages of respondents who selected the top 2 answers: ‘actively engage with’ or ‘actively follow’ for each organisation and policy. Organisations or policies with 75% or greater are boxed. Full names for abbreviations are in Table 6.

	Africa	Asia	Australasia	Europe	Middle East	North America	South America	Central America	Grand Total
Total Respondents	9	14	9	30	3	36	14	6	121
IUCN	100%	100%	89%	80%	100%	58%	100%	33%	79%
IUCN Red List	100%	93%	89%	80%	100%	69%	100%	17%	80%
CMS	100%	57%	56%	50%	67%	22%	57%	0%	45%
CITES	100%	71%	56%	40%	33%	50%	50%	33%	53%
CBD	56%	64%	22%	43%	67%	22%	36%	17%	37%
IWC	89%	71%	89%	90%	100%	86%	79%	100%	86%
NOAA	78%	36%	22%	50%	33%	94%	36%	33%	59%
ESA	33%	21%	0%	23%	0%	92%	7%	0%	39%
MMPA	33%	21%	0%	23%	0%	97%	21%	17%	43%

Q5a: Please add any other international organisations or policy initiatives.

The following were listed by 5 or more participants:

- European Union (13)
- ACCOBAMS (11)
- ASCOBANS (7)
- CCAMLR (6)
- SARA (5)

PART 2: CETACEAN CONSERVATION

Participants could repeat questions 6-13 up to 3 times generating 147 responses from 121 participants. The answers from repeated sections were combined.

Q6: Please select the cetacean category for the set of questions.

Responses per cetacean category are shown below. Twenty-six participants selected the option “Specific Species/Population” and provided the name of their species/population. Their responses were re-coded and added to the list of cetacean categories in Q6 and then used for further analysis. Participant answers to Q36 are in Figure 4.

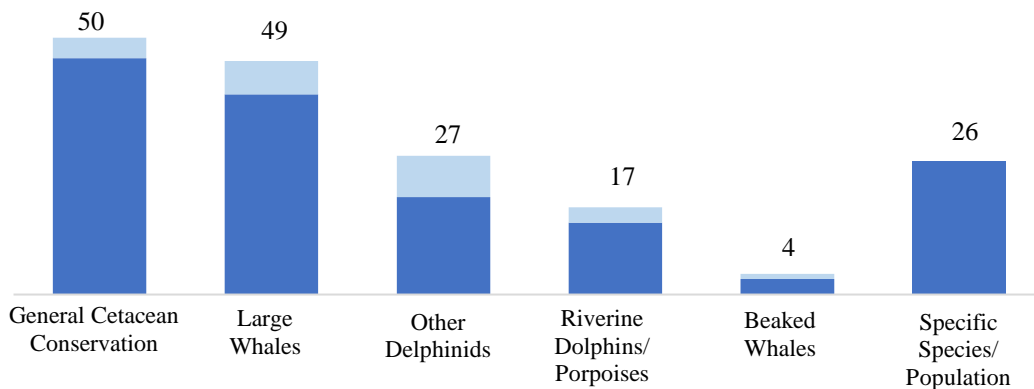


Figure 4: Results for Q6- Cetacean categories selected by each participant (dark blue). “Specific Species/Population” was selected 26 times (light blue) and added to the relevant taxonomic groups. Totals are shown above each category.

Q7/16/25: Which do you think affects recovery most for your selected cetacean category?

Figure 5 shows the 5 possible factors subdivided by cetacean category.

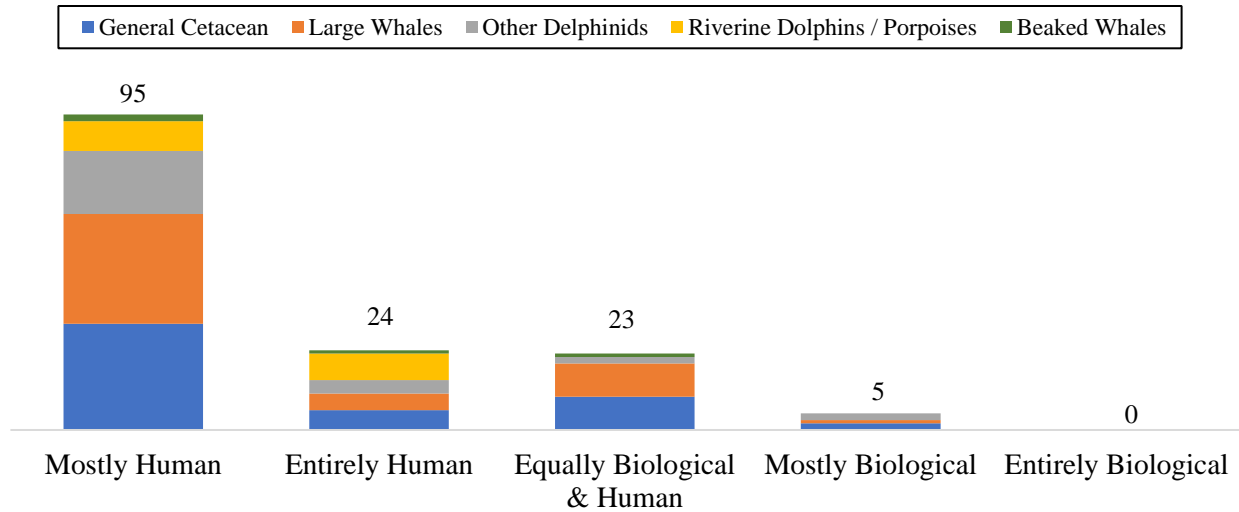


Figure 5: Results for Q7/16/25- Stacked bar chart with frequency counts for each recovery factor. No participants selected ‘Entirely biological’.

Q8/17/26: How often do the following factors influence the outcome of recovery efforts? Answers are shown in Table 4.

Table 4: Factors affecting recovery efforts expressed on a five-point scale from “Never” (1) to “All the time” (5). Maximum value for each factor is 5. The rows are subdivided by cetacean category.

	General Cetacean Conservation	Large Whales	Other Delphinids	Riverine Dolphins/ Porpoises	Beaked Whales	Grand Total
Endangered species legislation	3.6	3.7	4	4	3.3	4
Recovery plans	3.7	3.9	4	4	4.3	4
Data deficiency	4.2	3.9	4	4	4.8	4
International and transboundary cooperation	3.7	4.2	4	4	4.5	4
Insufficient funding	4.5	4.4	5	5	4.8	5
Poor governance	4.4	4.2	4	5	3.5	4

Q8a/ 17a/ 26a: Please list any other factors that you think influence conservation success. Themes listed in order of most frequently mentioned.

- Public awareness
- Economics
- Lack of political will
- Fisheries
- Research
- Education
- Lack of stakeholder interest
- Lack of law enforcement
- Social conflict
- Lack of collaboration
- Human development
- Lack of action

- Lack of community engagement
- Lack of scientific evidence
- Lack of support in developing nations
- Willingness to act
- Lack of protection acts
- Funding
- Agreement between researchers
- Low value for biodiversity
- Climate change
- Corruption
- Lack of whale watching regulations
- Health (zoonotic disease)
- Lack of local expertise
- International trade
- Cross-cultural barriers
- Entanglements

Q9/18/27: Please rank the following factors for their importance in successful conservation. Answers in Table 5.

Table 5: Factors affecting conservation. Summary of weighted mean scores using a four-point scale from “Lowest importance” (1) to “Highest important” (4). The maximum value for each factor is 4.0.

	General Cetacean Conservation	Large Whales	Other Delphinids	Riverine Dolphins/Porpoises	Beaked Whales	Grand Total
Increased human intervention	1.7	1.4	1.6	1.4	1	1.5
Development/implementation of conservation plans	3.4	3.5	3.5	3.5	3.5	3.4
Increased research efforts	2.5	3	2.7	2.7	3	2.7
Increased frequency of population assessments	2.4	2.1	2.2	2.4	2.5	2.3

Q10/19/28: Which of the following could have improved the recovery outcome?
Answers in Figure 6.

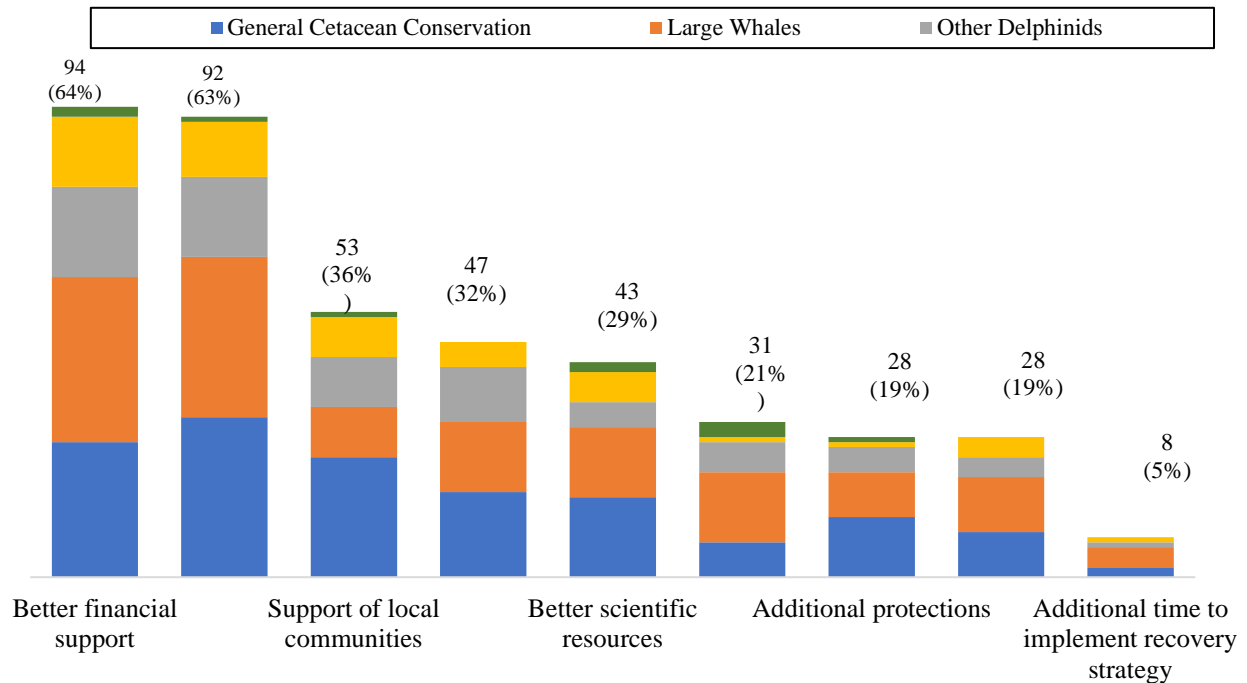


Figure 6: Results for Q10/19/28- Factors that could have improved recovery outcomes: stacked bar chart showing the frequency and percentage count for each factor.

Q11/20/29: Did you interact with any of the following?

The answers are below in order of most to least frequent. 66 participants selected all options.

- Government agencies (136)
- Local communities (135)
- International organisations (125)
- Local non-governmental organisations (126)
- National non-governmental organisations (117)
- International non-governmental organisations (114)

Q12/21/30: How important was the cooperation for a successful outcome of your project? Answers in Figure 7.

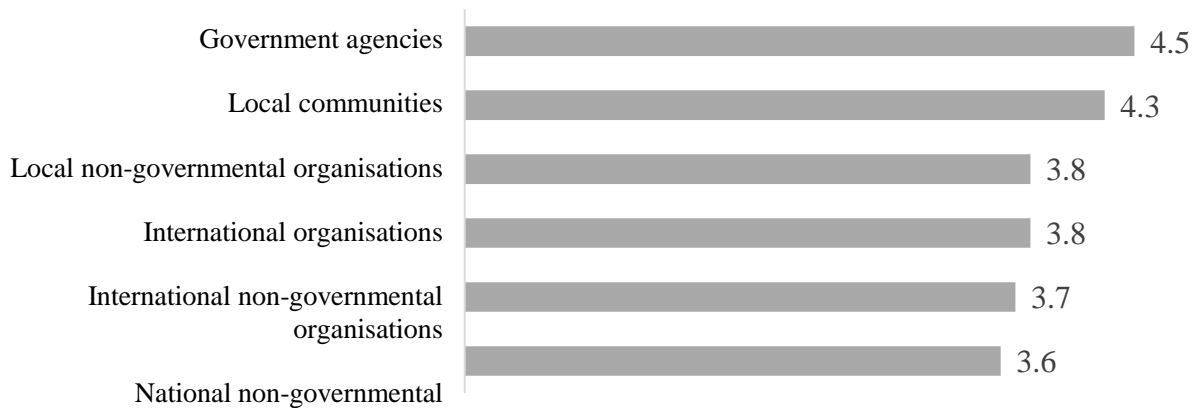


Figure 7. Results for Q12/21/30- Importance of cooperation with various agencies. Summary mean score from a five-point rank scale where 1 (lowest) = “Not Important” and 5 (highest) = “Extremely Important.” Maximum value for each factor is 5.0.

Q13/22/31: Are there other agencies or stakeholders you would like to add?

The 2 unique answers were 1) The tourism industry and 2) indigenous communities specifically in Australia, Canada, and the United States.

Part 3: CETACEAN CONSERVATION POLICY

Participants allocated 100 points between 3 factors. Answers for Q32-37 are shown in Figure 8.

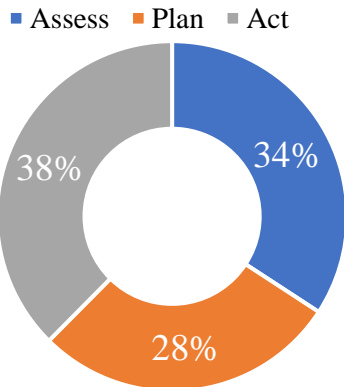
Q32-34: Please allocate 100 points between the 3 factors: “Assess”, “Plan” and “Act” to reflect the importance you place on each factor regarding cetacean conservation.

Definitions of Assess, Plan, and Act were used from the IUCN Species Conservation Cycle.

Q35-37: Please allocate 100 points between the 3 values, “Economic”, “Ecological”, and “Societal”, according to your opinion, as they relate to perceived cetacean value and implications for conservation.

Examples: Economic- cetacean related tourism, Ecological- role in functioning ecosystem, Societal- cultural connections.

Q32/33/34: The Factors: Assess, Plan, Act



Q35/36/37: The Factors: Economic, Ecological, Societal

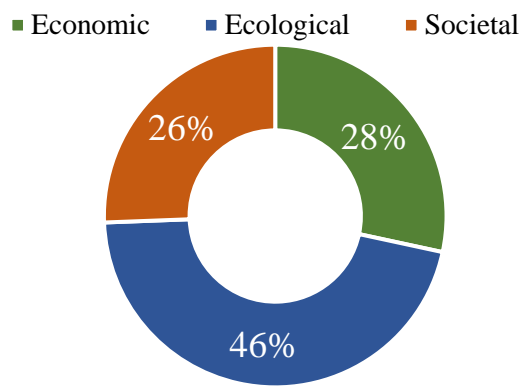


Figure 8: Results for Q32-37: Percentage counts of total points allocated to each of the 3 factors.

Q38: How would you describe, on average, the accuracy of the IUCN Red List’s category listings for cetaceans? Answers in Figure 9.

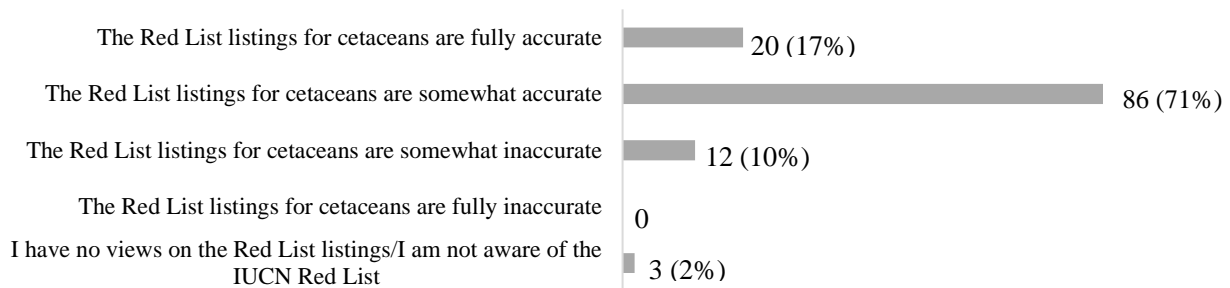


Figure 9. Result for Q38- IUCN Red List Accuracy. Frequency and percentage counts for the 5 possible answers.

Q39: If the IUCN had additional resources available to contribute to its work, how do you think it could best use these resources?

Participants ranked the 7 options, shown on the left of Figure 10: 1 (lowest) to 7 (highest).

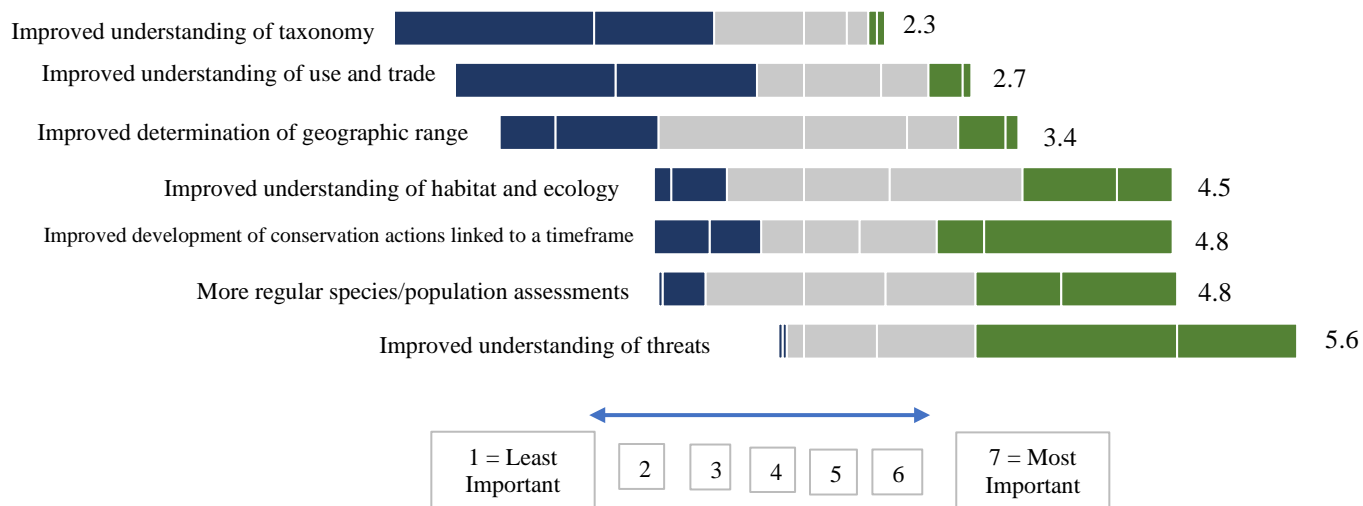


Figure 10. Result for Q39- Use of additional resources by IUCN. Offset bar chart representing the top two (green), middle three (grey), and bottom two (blue) answers. Summary mean score is on the right and the maximum value for each factor is 7.0.

Q40: Is there anything you think the IUCN could do to improve the Red List process for cetaceans?

Sixty-seven participants suggested improvements. Below are the themes listed in most to least frequently mentioned order.

- Funding
- Subpopulation/Population Assessments
- Inclusion of local experts
- Data deficient species
- Support for developing nations
- Criteria/Process flaws
- Taxonomy
- Precautionary principle
- Prioritisation of assessments
- Collaborate with non-IUCN CSG members
- Increase understanding of threats
- Inclusion of all IUCN CSG members
- Create IUCN CSG regional groups
- Collaborate with citizen science
- Ex-situ

4. Discussion

4.1 Quantitative Data

Part 1: Participant Classification Information

Question 1-4:

The results showed a high level of expertise in the participants, with good international representation: 46 countries, all continents (including participants conducting field work in Antarctica), and the 11 main oceans and seas. Additionally, 81 of 121 (67%) of respondents had 20+ years' experience in the field. A decade is considered the minimum time to become an expert (Martin et al. 2012) and 113 of 121 (94%) meet this criterion, underpinning the quality of this survey.

Question 5:

The most notable result in Table 3 related to the International Whaling Commission. All but one continent (Asia = 71%) had 75% or more participants who selected “Actively engage with” or “Actively follow” this organisation and an overall total percentage of 86% awareness. This is arguably supported by the 33% of the participants who selected ‘Large Whales’ as the cetacean category, a category that they responded on and the category where historically the IWC has had considerable input.

For the IUCN, North America and Central America have the lowest awareness, 58% and 33% respectfully. Considering, the US and Canada have national endangered species legislation (ESA, MMPA, and SARA) that mainly focuses on North American species, perhaps this alleviates the need to rely on global organisations and policy initiatives. One US participant commented that “*the IUCN categories are almost irrelevant to species conservation in the US*”.

Africa has the highest overall awareness percentages and several participants mentioned, in the absence of domestic legislation, the importance of international cooperation using the IUCN Red List as a focal point for assessment information and conservation planning. A member of the IUCN CSG commented, “*the IUCN is better suited to provide advice and develop plans than to actually implement those plans*”. CITES received an overall awareness of 53%, perhaps reflecting that CITES has perhaps been more terrestrially focused than marine.

Part 2: Cetacean Category

Question 7/16/25:

It is notable that no participants selected “Recovery is affected entirely by biological factors”. For ‘Riverine Dolphins/Porpoises’, 100% of respondents either chose recovery is affected “entirely” or “mostly” by human-caused factors. This is supported by both the available literature (e.g. Marino et al. 2012, Mason et al. 2020) and post-survey interviews. A participant from Pakistan noted that riverine species’ recovery is limited by the large number of people relying on the habitat for everyday needs such as drinking water, hydropower, agriculture, and food

security, a theme discussed further in section 4.2.2. Other participants mentioned that riverine species are subjected to human-related pressures that ocean species are not, one concluding with the observation that, “*often the situation is managing increasing threats rather than populations*”.

Question 8/17/26:

For ‘Beaked Whales’, “Data deficiency” and “Insufficient funding” scored equally, consistent with Q9 and Q32. Development and implementation of recovery plans are ineffective and nearly impossible without enough data. ‘Large whales’ had a high score, 4.2 out of 5, for “International and transboundary cooperation”. Participants mentioned how political boundaries are arbitrary for cetaceans and protection has limited impact if the species is protected only in parts of their range or migration route. Full protection requires discussion and cooperation between many countries and agencies, which several participants noted had proven difficult.

‘Riverine dolphins/porpoises’ had the only outlying score, with 4.6 out of 5 for “Poor governance”. This is supported by Q7, where human impacts affected recovery most, and specifically with respect to the fishing industry’s detrimental impacts on small cetaceans.

Question 9/18/27:

“Development/implementation of conservation plans” received the highest mean score of 3.4 out of 4. Table 5 shows this is consistent for all categories of cetaceans. “Increased human intervention” was ranked lowest with a score of 1.5 out of 4 and only received 6% of the top vote. However, human intervention was mentioned by a few participants in post-survey interviews. We note that the IUCN CSG has recently been discussing “*integrated conservation*” planning, including utilising the knowledge from the aquarium industry and has recently launched a new group focused on this (IUCN 2020). This is discussed further in section 4.2. (The new group was publicly launched after this survey was completed and was not specifically mentioned by any of the consultees.)

Question 10/19/28:

For “Support of local communities”, in regard to ‘Riverine dolphins/porpoises’ the quantitative data (36%) did not align with the frequent mentions of this in the interviews.

Notable in Figure 6 and consistent with previous questions, “Better information to aid recovery” and “Better scientific resources” received the most mentions for ‘Beaked whales’, further supporting the issue of data deficiency. “Additional time to implement recovery strategy” was the factor least commonly chosen, perhaps from the small number of species/populations that have gone extinct to date.

Question 11/20/29:

Sixty-six of 147 (45%) responses selected interactions with all 6 agencies, implying the requirement for collaboration between the high number of stakeholders involved with cetacean

conservation. This was contrary to Q10, however, where “Local community support” (36%) was less important than “Financial support” (64%) or “National government support” (63%). “International non-governmental organisations” received the least number of responses: 114 of 147, although, that still equates to 78%.

Question 12/21/30:

Results are similar to the previous question where “Government agencies” and “Local communities” were ranked the most important. Noteworthy, although “International non-governmental organisations” were interacted with the least, their importance was higher than “National non-governmental organisations”. One participant noted that support from WWF and the IWC is instrumental in recovery efforts and has provided momentum for projects.

Figure 7 is also split by cetacean category and shows the importance of “International organisations” for ‘Large Whales’, drawing similarities between Q8 and the high importance of “International and Transboundary” cooperation. One participant offered an example where, in Vietnam, cetacean conservation is “*ignored in all aspects until they have been pressed by international/external forces*” such as the US MMPA, as Vietnam is “*heavily dependent on US market*” for fishery exportation.

Question 32/33/34:

“Act” was considered most important with 38% of the points allocated. Qualitative data suggest “Act” can be the most difficult and challenging stage, as many stakeholders are involved in influencing cetacean conservation. Multiple participants mentioned lack of action and interest from the government despite clear evidence for urgency. Ultimately, action relies on funding that is often difficult to obtain.

This question explores the relative difficulties for stage progression in the IUCN Species Conservation Cycle. One participant suggested that some species have sufficient assessment and planning because those stages require less action and governments can easily verbally endorse conservation. Moreover, many participants noted that governments will endorse conservation efforts at the same time as endorsing and funding projects with detrimental impacts on the marine environment, a theme discussed further in section 4.2.1.

“Assess” (34%) also proved to be of high importance. Efforts remain at the “Assess” stage due to the lack of data because cetaceans are difficult to find and study. This is supported by Q40. There was no significant difference between years of experience in cetacean conservation and point allocation; all experience categories ranked priority as Act, Assess, then Plan. There was also no difference in the answers between the non-members and members of the IUCN CSG.

Question 35/36/37:

“Ecological” value received the highest percentage of allocated points with 46%, supported by participants acknowledging the crucial role cetaceans have within the ecosystem: “*achieving a balanced ecosystem should sustainably meet the needs of cetaceans and human stakeholders*”.

“Economic” value (mentioned by 28%) is supported by studies of revenue generated from whale watching (e.g. Van Deren et al. 2019, Projeto Baleia Jubarte 2020). Perceived economic benefits can be used to affect policy (Sanchirico et al. 2013), such as SARA, in which economic value can be considered in the development of recovery plans and designation of critical habitat (Lew 2015). A participant from Mozambique believed that local recovery efforts would benefit from a whale tourism-based industry because “*the government would be more sensitive to the dangers*” to cetaceans, mindful of potential revenue.

‘Riverine Dolphins/Porpoises’ had only 8% lower for the “Societal” value compared to “Ecological” value. A participant from Vietnam mentioned Irrawaddy dolphins (*Orcaella brevirostris*) are considered sacred and communities have temples for worshipping cetaceans, which “*engaged local communities to protect the animals*”.

Question 38:

Of 121 participants, 106 described the IUCN Red List categories to be “fully” or “somewhat accurate”, and none described it as “fully inaccurate”. This shows that the majority of the participants believe the IUCN Red List is conducting mostly accurate assessments and category listings. However, despite 86% of participants selecting “somewhat accurate”, several suggestions for improvements were given in Q40. When looking at the group defined by 20+ years of experience, 10 of 81 (12%) selected “somewhat inaccurate”, the highest percentage of any expertise category. For the “somewhat inaccurate” answers, 42% completed the survey for the ‘Large whale’ category and Central American respondents had the highest percentage (33%), with South America at the second highest with 21%. Interestingly, the 3 participants who “have no view/are unaware of the IUCN Red list” are from North America, supported by Q5’s IUCN Red List awareness.

This result supports the perception that the IUCN Red List is generally agreed upon between researchers with no noticeable differences between the IUCN CSG members’ and the non-members’ answers; suggesting that the CSG is an accurate and fair representation of people involved in cetacean research.

Question 39:

This question had the most variation between the top and bottom answers compared to any other question. “Increased understanding of taxonomy” remains the lowest ranked, however, taxonomic troubles were highlighted many times in the interviews. Respondents mention the importance of understanding the “units to conserve”, stating that the identification of appropriate conservation units is essential for achieving objectives (Taylor 2005) and critical to good cetacean management (Taylor 1997). A participant from Brazil said the ability to define taxonomic units is needed to “*minimise the chances of making (type II) errors that would result in under protection.*” Similarly, a Japanese participant said more generally, “*taxonomy is crucial as baseline information. We cannot build and conduct conservation measures if we do not precisely know what we should protect.*”

Question 40:

Funding was often mentioned for improvements to the IUCN Red list, dedicated for CSG members' time conducting the assessments and to increase the number of assessments. This was supported by the results from Q7 and Q10. Several participants from developing nations mentioned most funding available goes toward socio-economic issues meaning wildlife conservation, specifically cetacean conservation, is not seen as a priority. Data deficiency was also frequently mentioned and one by a participant stated it was a "*difficult bin for any species to find itself in*".

Conducting assessments at the sub/population level was equally mentioned. Species and global level assessments are "*largely meaningless for management action and intervention*" and do not reflect the local situation. However, an IUCN CSG member cautioned that initiating sub/population assessments exponentially increases the workload due to the large quantity of sub/populations globally and the short timeline between reassessments. The inclusion of local experts received the third most mentions, and notably these came from participants based in Africa, South America, and Asia.

4.2 Qualitative Data

The 61 follow-up interviews and free-text questions highlighted 4 main themes which are discussed below.

4.2.1 Government and non-government involvement

Key stakeholders in cetacean conservation efforts are non-government organisations (NGOs) and government organisations, playing a major role in conservation efforts and government agencies playing an integral part in successful outcomes. This is reflected in Q11 with 138 of 147 responses (94%) having interactions with government agencies and 134 (91%) having interactions with local and international NGOs. The use of the term "NGOs" is not meant to imply that all non-governmental organisations are the same, as there are clearly relevant differences in focus and capacity, including the ability to fund and conduct conservation work.

The interviews shed light on a confounding issue within cetacean conservation: perception of governments' inaction and lack of recognition of their leadership role in this field, a role seen by some extent to be filled by NGOs, both national and international. Some examples of international NGO involvement with cetacean conservation issues mentioned by participants include the IWC's small cetacean sub-committee (which is part of its Scientific Committee), WWF's initiative to develop a range state declaration for river dolphins, and the IUCN's Important Marine Mammal Areas with one participant saying "*the IMMA process does exactly what it sets out to achieve. It provides a non-governmental scientifically based reasoning for demarcation of areas of special interest for conservation of marine mammals*".

Additionally, this study highlighted two main issues within the government and non-government interplay. First, NGOs typically do not have the same level of resources, sometime causing projects to be "*undertaken at a fraction of the cost that government or an educational institution would be able to undertake the work*". Furthermore, a participant highlighted the compromises NGOs have to tackle, including paying lower wages, having fewer staff, using older equipment, and relying on volunteer labour. This connects with a limitation mentioned often within this

survey as “*small underfunded NGOs don’t have the capacity to successfully present the value of this work to funding decision makers*”, contributing to the global issue of lack of funding.

The second issue raised was the lack of government will and action. In interviews, 2 participants put it simply that conservation success “*depends on the levels of corruption in the countries*” and “*there is no interest in wildlife just whether they can eat it or make money off it.*” The qualitative data showed multiple participants frustrated with how long the government took in responding to issues and instead they act in ways to reverse progress. One participant from Canada said that, in 2017, the relevant government body was informed that gray whales (*Eschrichtius robustus*) should be managed as 3 distinct populations, 2 of which are endangered, yet “*there has been no government response to date*”. Contrary to government inaction, others mention government action with potentially positive intentions yet negative outcomes. For example, the Hong Kong government has supported years of research for riverine dolphins; however, the fisheries and shipping industries continue to grow, and fishing is still allowed in key areas. This is supported by another participant saying, “*governments throw money at species, but seldom wish to acknowledge the contradictions between their development plans that threaten rivers, and their conservation plans*”. Participants in multiple countries noted “*powerful industries*” such as fishing and shipping, “*preclude moving conservation initiatives solely because they give jobs*” and “*the extent to which recovery plans impact people livelihoods and revenues (closure of fishing zones, slow-down shipping zones) greatly affect conservation success*”. One participant from India provided an example of contradictory actions; the Ganges river dolphin (*Platanista gangetica*) has received conservation awareness from the Indian government, however, this coincides with the government making plans to “*develop industrial commercial inland waterways on 111 rivers of India, which include nearly 90% of the Ganges dolphin’s distribution range in the country.*” The consequences of the river development project are potentially extremely damaging to the habitat and conservation of *P. gangetica*, arguably providing a strong example of government level positive intentions yet negative outcomes. The participant concluded “*The government on one hand, has mobilized conservation funds for river dolphins; but on the other hand, the river development plans that they have made can completely undo any meaningful conservation of river dolphins*”.

4.2.2 Socio-economic issues

A frequently mentioned limitation for successful outcomes was the prioritisation of a nation’s socio-economic issues over wildlife conservation issues. One participant commented that, in Brazil, the government is focused on creating a thriving economy and generating jobs; likewise, a participant from Bolivia mentioned that as a developing country, funding for research is absent as most available funding is allocated to “*socio-economic issues like poverty reduction*”. This idea was similarly seen with participants from Asia who drew awareness specifically to river dolphin conservation efforts. A growing human population creates a heightened need for food availability and security, which is still a major issue in many developing countries. One participant described issues for countries such as China, India, Indonesia, Pakistan and Bangladesh thus: “*all these countries are densely populated so the pressure is on freshwater. Freshwater and the habitat are needed by so many people.*” It can be difficult for governments from developing nations to prioritise habitat restoration and decreasing destruction from riverine usage when pressing socio-economic factors “*all depend on freshwater*”. Unsurprisingly, it

appears from this study that countries with greater socio-economic issues do not treat endangered species conservation as a high priority and have greater limitations and tougher obstacles to tackle.

4.2.3 Geographic limitations

As seen in the quantitative data, the limitations of cetacean conservation are deeply connected to the location of the recovery efforts. These limitations are expedited by the lack of priority given to cetacean conservation efforts by the local government and the priority given by the government to address looming threats. In post-survey interviews, participants were asked if cetacean conservation is perceived as a top priority, in terms of funding, resources, and staffing. Negative responses came from participants in Israel, the Bahamas, West coast of Africa, Pakistan, India, China, Bangladesh, Vietnam, Brazil, Peru, Bolivia, Japan, and Namibia. Participants offered explanations such as that conservation efforts are difficult due to language barriers, a lack of resources and infrastructure, “threats to species originate from genuine human poverty”, governments failing to recognise the importance of action, marine mammal protection only related to captive facilities not wild animals, lack of clear recovery targets, not receiving funding from governments increasing the demand from NGOs, and ultimately, “*the simple answer is ‘cetacean conservation is not perceived as a priority in any terms’*”. One participant mentioned a specific challenge in Japan: “*many people are not very aware of cetacean conservation issues, and cetacean conservation is confused with whaling issues*”.

Not all responses to this question were negative, however. Participants mentioned the following:

- South Africa has good laws (although it lacks compliance);
- Recent implementation of regulated gillnet fishing activities;
- An increase in interest in marine mammals from public authorities in France;
- Multi-lateral efforts in Antarctica working together to develop agreements;
- Acquiring funding for the *P. gangetica* when it was declared India’s National Aquatic Animal in 2010;
- Improvements in Argentina in the last decade through development of parks;
- Allocation of resources for a stranding response network in Indonesia; and
- Funding to fulfil European Union requirements, and a steady growth of local interest in Falkland Island cetacean conservation efforts.

Through the post-survey interviews, it is clear that challenges for successful conservation efforts are closely related to how the relevant national governing body of the country sees matters and, in particular, the perceived importance of the work being undertaken.

4.2.4 Wildlife Health

The responses regarding wildlife health had 2 focuses. First, the One Plan and ex-situ approach: The One Plan approach describes new approaches for cetacean conservation, specifically “ex-situ” methods, which attempt to incorporate involvement from stakeholders, combined with science-based decision making to improve species conservation planning (IUCN 2020). A participant in this study said that with regard to the lessons learned from the efforts to save the

Vaquita (*Phocoena sinus*), “we obviously did too little, too late and we were too timid in our conservation actions.” In a post survey interview, another participant suggested the aversion to the *ex-situ* approach could be because the term is often associated with captive breeding in zoos and aquariums. The participant said there is an “understandable but unhelpful cautiousness or avoidance of implementing intensive actions”, paralleling another participant’s response: “people need to... stop arguing with each other... because that is a distraction from the real issue. Which is 100s or 1000s of small cetaceans a year that are dying, population being extirpated, and species becoming extinct before our very eyes and we are still on land arguing.” A wildlife veterinarian from the United States said disagreement is normal in science and it is important to not let the disagreement impede action but to facilitate discussion, allowing management actions to be taken, and adapt from the lessons learned. Another participant from this study suggested the need to implement “outside ‘standard’ cetacean conservation projects: weigh up the risks and determine whether risks of action are better or worse than risks of inaction; but, ultimately, actually do something.” The One Plan approach was summarised by one participant as “Taking the successful history of keeping cetaceans in captivity and finding ways to apply them to animals in the wild.” Overall, the responses from a few of the survey’s participants suggest that urgent and more aggressive approaches need to be implemented to save endangered dolphins and porpoises.

The second focus concerned the need for an increased integration of wildlife health and veterinary sciences with conservation. There was a clear desire for wildlife health issues to be integrated into conservation plans. A US wildlife veterinarian stressed the importance of understanding individual animal health. The participant suggested for large cetacean populations individual animal health might be of “limited value”, as “animals get sick, animals die- that doesn’t mean the population as a whole is unhealthy.” However, wildlife veterinarian skills can be of great value where the survival of a single animal has high conservation value. Likewise, a participant from Costa Rica noted legislation only accounts for biological factors and not population health, mentioning that diseases affect reproduction, causing the birth rate to decrease. This participant believed that legislation should consider how population health can affect the success of recovery efforts because “sick populations and healthy populations do not behave the same”. This agrees with previous suggestions that health studies can augment conservation efforts (e.g. Simmonds, 2018).

5. CONCLUSION

This survey was able to draw on considerable expert opinion and found more similarities than differences between participants in terms of factors affecting recovery efforts and overall challenges in cetacean conservation. The interviews highlighted that lack of funding and poor engagement from government level are two important major challenges in cetacean conservation and that specific challenges are deeply connected to the location of the species or population concerned. The quality and quantity of the responses acquired from this survey show the novelty of discovery. Prior research on this subject is limited to smaller scale and our studies’ results cover a larger geographic area, and a greater number of species, subspecies, and subpopulations are spoken for. With 121 participants representing 46 countries and all five cetacean taxonomic categories represented, the current understanding of the limitations in cetacean conservation can

be integrated into policy and more effective efforts by taking location of species, lack of funding, and poor engagement from government level into consideration.

None of the 147 responses selected “recovery is affected entirely by biological factors”, highlighting the influence that humans have on cetacean conservation, and it seems that most efforts to produce sound scientific research to underpin recovery actions do not alone produce the intended results, as human impacts, directly and indirectly, continue to block progress.

Recently, a statement of concern regarding cetacean conservation was released, intended to draw attention to the imperilled state of many cetacean species and populations globally. The statement also stresses that action is too little and coming too late and acknowledges that “political will to take action has been lacking” (Rojas-Brachos et al. 2020). One of the coordinators of the statement, Els Vermeulen, said in interview that she felt that increasing the scientific knowledge of cetaceans often does not feel like enough. She said that scientists are “often just ‘documenting extinction’”.

The themes in this statement parallel the themes and concepts gained from this study. In a survey interview a participant mentioned the plight of the baiji (*Lipotes vexillifer*), a well-documented cetacean extinction and that the vaquita (*Phocoena sinus*) will soon follow suit. He said it is clear for both species the current status is the result of “a lack of appropriate conservation action within timeframes that could have prevented the extinctions.” Concluding with “we should not need any more examples to make a strong case for the need for urgent action”. Considering the information garnered from this study, we strongly agree with his statement. We also conclude that the conservation of biodiversity, including that of cetaceans, needs to urgently move up the political agenda if declines are going to be addressed before further species and populations are lost.

Abbreviations:

ACCOBAMS: Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea, and contiguous Atlantic Area

ASCOBANS: Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas

CBD: Convention on Biological Diversity

CCAMLR: Convention on the Conservation of Antarctic Marine Living Resources

CITES: Convention of International Trade in Endangered Species of Wild Fauna and Flora

CMS: Convention on the Conservation of Migratory Species of Wild Animals

CSG: Cetacean Specialist Group

ESA: Endangered Species Act

MMPA: Marine Mammal Protection Act

IWC: International Whaling Commission

NOAA: National Oceanic Atmospheric Administration

SARA: Species at Risk Act

IUCN: International Union for Conservation of Nature

US: United States of America

WWF: World Wildlife Fund

Acknowledgments:

We gratefully thank all participants who completed the survey, especially those willing to participate in a post-survey interview. A sincere thank you to Barb Taylor and Sharon Young for taking part in the questionnaire's pilot trial and, finally, thanks to Timothy and Linda for their support. The views presented here are those of the authors and not necessarily those of any organisations that we are or have been associated with.

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