

How to design better human wildlife conflict management plans?

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ABSTRACT

Human wildlife conflicts are increasing globally around the globe. Effective human wildlife conflict management requires designing and conducting complex operations, which require complex operational plans. Human wildlife conflict management plans guide practitioners in the decision-making process when confronted with human wildlife conflict; however, there are currently no global standards for these plans. For this study, a selection of 32 conflict management plans were examined in terms of their structure and information presentation. The management plans ranged from 5 to 184 pages in length. Most plans were dominated by plain text, with varying degrees of visual richness. This study found that 10 key elements should be considered in conflict management plans to increase their operational effectiveness. Better human wildlife conflict management plans could positively contribute to human wildlife coexistence.

Keywords: Conflict management, conflict management plan, human wildlife conflict

Introduction

Every day across the globe, an infinite number of human wildlife interactions occur in places where humans and wildlife live next to each other. Most of those encounters end without any problems. What defines the status of human wildlife interactions, however, is not those peaceful encounters; but the ones that result in damages to human property, injuries to people, and loss of human life. For example, in India alone, 2300 people were killed by elephants, and 200 people were killed by tigers between 2014 and 2019 (The Hindu, 2019). In Nepal, a single leopard is believed to have killed at least 15 humans in a 15-month span (Shrestha, 2012). In Europe and North America, deer-vehicle collisions cause 30000 human injuries and 200 deaths annually (Nyhus, 2016). In the United States, 131096 wildlife related aircraft collisions occurred between 1990 and 2012, and wildlife strikes (i.e., collisions between animals and aircrafts) in aviation claimed more than 250 human lives, and more than 229 aircraft since 1988 (Nyhus, 2016). Adopting the definition of human-bear conflicts from WSPA (2009), human wildlife conflicts can be defined as “any situation where people perceive wildlife a real or a perceived threat to human property or safety”. According to the International Union for Conservation of Nature’s (IUCN) Human Wildlife Conflict Task Force, conflict is a very complex and urgent challenge in wildlife conservation. Previous studies have focused on human wildlife conflict. For example, Inskip and Zimmermann (2009) provided a global review of human-felid conflicts, and Can et al. (2014) provided a global review of human-bear conflicts. Research on human wildlife conflicts are expanding (see, online Human Wildlife Conflict Resource Library of IUCN Human Wildlife Conflict Task Force for examples of human wildlife conflicts <http://www.hwctf.org/resources/document-library>).

As a consequence of real or perceived threats, people persecute wildlife. Conflicts that involve threatened species are of particular concern (Can et al. 2014). As human activities continue to expand into wildlife habitats and natural habitats continue to be degraded, the number of interactions between humans and wildlife will also grow, leading to increased conflicts. Prolonged human wildlife conflicts negatively affect conservation initiatives, due to the tension created between local communities and wildlife management authorities. In North America, human wildlife conflicts are mostly a nuisance, but in resource-limited parts of the world, conflicts cause hardship for people, and greatly affect rural communities (Chauhan, 2003; Charoo et al. 2011; Can et al. 2014). Human wildlife conflict management is becoming a top priority for wildlife management authorities around the world; failure to effectively manage conflicts undermines human wildlife coexistence.

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Wildlife management authorities increasingly need written strategies and tactics that can be used in human wildlife conflict management. Conflict management plans have thus been created to guide their conflict management operations, but no established standards for these plans have been created, and there has been little research regarding the creation of ideal conflict management plans. The goal of this study was to inspect the currently available human wildlife conflict plans, in order to identify key factors and elements that contribute to satisfactory conflict management plans, and to make recommendations for designing better plans.

Method

A Google search was conducted using the terms “human wildlife conflict management plan,” “human carnivore conflict management plan,” “human-bear conflict management plan,” “human carnivore conflict resolution plan,” “human wildlife conflict resolution plan,” “human wolf conflict resolution plan.” These searches resulted in a total of 216 website links. After manually checking each link, 30 documents were found to be relevant for this study. These documents formed the first data set for the study.

Next, the 50 human-bear conflict management plans used in Can et al. (2014) were considered, and a series of Google searches were conducted to find out whether there are updated versions of the plans used in the original report. During this search, 16 additional documents relevant to conflict management were found, which brought the total number of documents to 66 documents. These documents formed the second data set for the study.

When the first and second sets of documents were combined, and duplicate documents were excluded, there were a total 85 documents. Of these, 32 were conflict management plans and were considered for this study. Each document’s text was analyzed using a web-based, text reading and analysis software, Voyant Tools, created by Sinclair and Rockwell (2016). Specifically, vocabulary density, operational figures, visual richness, and the distribution of certain terms within each conflict plan were examined.

Vocabulary Density Score (VD Score)

VD indicates the number of words, on average, that a reader will encounter between each new word. In other words, “it is the ratio of the number of words in the document to the number of unique words in the document” (Crane, 2020). A higher VD suggests a simpler vocabulary (i.e., simpler text) compared to a lower VD (i.e., more complex text) with a lot of unique words. VD scores were calculated for each of the 32 conflict management plans using the software Voyant Tools (Sinclair & Rockwell, 2016).

Operational Figure Score (OF Score)

Visual elements, such as photographs, maps, diagrams, and flow charts, are often used in conflict management plans. For this study, the term “operational figure score” (OF score) was

coined to describe photographs, sketches, drawings, and flow charts that are deliberately used to increase the effectiveness of communication and to aid decision-making. Visuals that were merely for aesthetic purposes were not counted as operational figures.

Visual Richness Score (VR Score)

For this study, the term “visual richness score” (VR Score) was coined to describe the ratio between the OF score and the document length in pages.

Micro Searching the Conflict Management Plans

The frequency and distribution of specific terms used in a document is a quick way of determining what topics are emphasized in a document. I used the micro search function in the Voyant software program to determine what emphasis was placed on several pertinent topics in the collected conflict management plans. This micro search focused on garbage, education, and lethal approaches. I selected garbage problem, as it is a major cause of conflict in many countries. Education was chosen since it is a major tool used to prevent or reduce conflicts, and lethal approaches were selected since their use in conflict management may also be a cause of conflict itself. The micro searches were conducted in four clusters: Cluster 1 included “decision”, “decisions”, “decided”, “deciding”, and “decide”. Cluster 2 included the term “garbage”. Cluster 3 included “education” and “educational”. Cluster 4 included “lethal” and “lethally”.

Finally, the contents of each document were examined, and all relevant sections were read, in order to assess not only their content, but also the manner in which the information and operational guidance was presented to the reader.

Results

The above described process produced 32 documents directly related to human wildlife conflict management. Of these documents, 13 were from Canada, 7 were from the USA, and 3 documents were from Bhutan. Two documents focused on the African continent as a whole, two focused on North America (USA and Canada), and 2 had a global focus. The remaining three documents focused on Africa (Namibia, Mozambique and Zimbabwe). These documents focused on 25 species: African crocodile (*Crocodylus niloticus*), African elephant (*Loxodonta africana*), American black bear (*Ursus americanus*), Asian elephant (*Elephas maximus*), baboon (*Papio cynocephalus ursinus*), barking deer (*Muntiacus muntjak*), black-backed jackal (*Canis mesomelas*), brown bear (*Ursus arctos*), brown hyena (*Hyaena brunnea*), bush pig (*Potamochoerus porcus*), common hippopotamus (*Hippopotamus amphibius*), coyote (*Canis latrans*), Himalayan black bear (*Ursus thibetanus*), leopard (*Panthera pardus*), lion (*Panthera leo*), rhesus macaques (*Macaca mulatta*), quelea (*Quelea quelea*), sambar (*Cervus unicolor*), snow leopard (*Uncia uncia*), tiger (*Panthera tigris*), African buffalo (*Syncerus caffer*), dhole (*Cuon alpinus*), African wild dog (*Lycaon pictus*), wild boar (*Sus scrofa*) and wolf (*Canis lupus*) (see Table 1 and Figure 1).

On average, the conflict management plans were 66 pages in length. The average sentence was 24 words in length. Each page had an average of 321 words per page, and contained 8 figures. The total number of pages for all 32 documents was 2131 pages. The longest plan had 184 pages, and focused on human-bear conflict management in Prince George, Canada (Ciarniello, 2009). The shortest plan was five pages in length, and was from Canmore, Canada (Town of Canmore, 2019).

The documents with the three highest VD scores included a coexistence plan from the USA with a VD score of .334 (Wild Earth Guardians, 2019), a human-bear management plan from the Grand Tetons in the USA with a VD score of .315 (Rockefeller, 1989), and the wildlife attractant management plan from Canmore, Canada with a VD score of .3, which was also the shortest plan (Town of Canmore, 2019). The lowest three VD scores included a human-bear conflict management plan from the Katmai National Park in the USA with a VD score of .093 (The National Park Service, 2006), the human-bear conflict prevention plan from Prince George, Canada with a VD score of .094 (Ciarniello, 2009), which was also the longest plan, and a human-bear conflict management plan from the Denali National Park in the USA with a VD score of .112.

The maximum number of words per sentence were 39.4, 32, and 32 from the Port Hardy, Canada human-bear conflict management plan (Bear Smart Society, 2010) from Canada, the Canmore wildlife attractant management plan from Canmore, Canada (Town of Canmore, 2019), and the bear conflict prevention plan from the Kananaskis region in Canada (Alberta Community Development, 2006), respectively. The lowest number of words per sentence were found in "Creating Coexistence Plans" (16.8 words, Wild Earth Guardians, 2019), and "Guidelines for the Pre-

vention and Mitigation of Conflict Between Humans and Great Apes" (17.5 words; Hockings & Humley, 2009).

Twenty-two percent (n=7) of the documents had an OF score of zero (Table 2). The highest OF score was 41 (Beausoleil and Lackey 2015), followed by 28 (Government of Alberta 2011) and 17 (Northeast Black Bear Technical Committee 2012; Ministry of Water, Land and Air Protection 2002).

The highest VR score was found in "Responding to Human-Bear Conflict and Capture Handling of Black Bears" (VR score=.49; Beausoleil & Lackey, 2015), "An Evaluation of Black Bear Management Options" (VR score=.40; Northeast Black Bear Technical Committee, 2012), and "Alberta BearSmart Program Manual" (VR score=.40; Government of Alberta, 2011).

The term "decision-making" was most used in "A Decision Support System for Managing Human-Elephant Conflict Situations in Africa" (IUCN SSC The African Elephant Specialist Group 2001) (Figure 2). The term "garbage" was most abundant in three bear conflict plans from Canada (Bear Smart Society, 2010; Ciarniello, 2009; Page-Brittin, 2013) (Figure 2). The term "education" was also most abundant in these three conflict plans (Figure 3). The term "lethal" was referred to the most by "Yukon Human-Bear Risk Management Plan" from Canada (Yukon Environment and Vuntut Gwitchin, 2010), "Creating Coexistence Plans" from the USA (Wild Earth Guardians, 2019), and "Human Wildlife Conflict Mitigation Measures" (Sutera, 2016). More than one-third of the

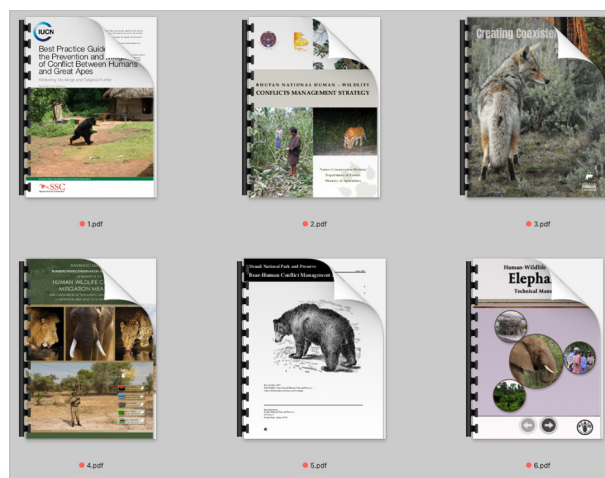


Figure 1
Six of the 32 Conflict Management Related Documents Reviewed in this Study. From Top Left to the Right Bottom, the Documents are About Conflict Management between Humans and Great Apes (Africa); Wildlife in General (Bhutan, the USA and Zimbabwe); Bears (USA) and Elephants (Africa Continent)

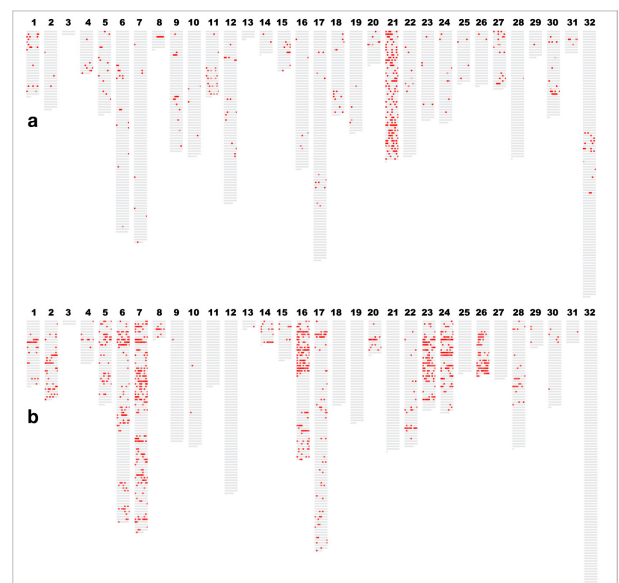


Figure 2. a, b
Distribution of the Terms "Decision", "Decisions", "Decided", "Deciding" and "Decide" in the Human Wildlife Conflict Management Documents Corpus (a). The Gray Lines Indicate the Number of Pages in Each Document (Numbered from 1 to 32) and the Red Dots Indicate the Location of the Terms in Those Pages. Similarly, Panel (b) Shows the Distribution of the Term "Garbage" in the Corpus

plans (37.5%, $n = 12$) did not use the term “lethal”, and 40.6% ($n = 13$) used the term only a couple of times (Figure 3). In terms of the attractants that cause human wildlife conflicts, the words “food”, “garbage” and “crops” were most frequently used (Figure 4). These attractants were referred to 8437 times in total.

The guidance provided by each plan was presented in various ways. In the “Ucluelet Human-Bear Conflict Management Plan” (Beasley, 2007), specific actions were listed together with the party responsible for each action, and a due date. The plan also included the budget for the Bear Aware Education Program,

Table 1
The List of the Documents Included in This Study

Alberta Community Development. 2006. Kananaskis Bear Conflict Prevention Plan. Canada.
Bear Smart Society. 2010. Port Hardy Human-Bear Conflict Management Plan. Canada.
Beasley, B. 2007. Human Bear Conflict Management Plan for the District of Ucluelet. Canada.
Beausoleil, R. A., & Lackey, C. 2015. Responding to Human-Bear Conflict and Capture-Handling of Black Bears, Beausoleil and Lackey. USA.
Bowen-Jones, E. 2012. Tackling Human-wildlife Conflict: A prerequisite for linking conservation and poverty alleviation. Poverty and Conservation Learning Group Discussion Paper, 6(06), 26.
Canadian Park Service. 2005. Bear/Human Conflict Management Plan Mountain National Parks. Canada.
Ciarniello, L. M. 2009. Human-Bear Conflict Prevention Management Plan for Prince George, British Columbia. Canada.
FAO (Food and Agriculture Organization of the United States). 2008. Human-wildlife conflict: Elephant Technical Manual. Italy.
FAO (Food and Agriculture Organization of the United States). 2005. Strategies to mitigate human-wildlife conflicts Mozambique. Italy.
Government of Alberta. 2011. Alberta BearSmart Program Manual. Canada.
Government of British Columbia. 1998. Bear-Human Conflict Reduction Guidelines For River Rafting. Canada.
Hockings, K., & Humley, T. 2009. Best practice guidelines for the prevention and mitigation of conflict between humans and great apes, IUCN.
IUCN SSC The African Elephant Specialist Group. 2001. A Decision Support System for Managing Human-Elephant Conflict Situations. Kenya.
KAZA-TFCA. 2016. Assessment of the human wildlife conflict mitigation measures being implemented by the Kavango-Zambezi Transfrontier Conservation Area (KAZA TFCA) partner countries. Report to the KAZA TFCA Secreteriat. Zimbabwe.
MacHutchon, A. G. 2000. Risk Assessment of Bear – Human Interaction at Campsites on the Tatshenshini River and Lower Alsek River, Yukon, B.C., and Alaska. Canada.
Ministry of Water, Land and Air Protection. 2002. Bear-people conflict prevention plan for parks and protected areas in British Columbia, Ministry of Water, Land & Air Protection, Environmental Stewardship Division, Parks & Protected Areas Branch, Protected Areas Conservation. Canada.
Namibia Ministry of Environment and Tourism. 2016. Human-Lion Conflict Management Plan for North West Namibia. Namibia.
Northeast Black Bear Technical Committee. 2012. An Evaluation of Black Bear Management Options. Canada, USA.
Resort Municipality of Whistler. 2016. Whistler Human-Bear Conflict Management Plan. Canada.
Page-Brittin, P. 2013. Revelstoke Bear Hazard Assessment and Bear Human Conflict Management Plan. Canada.
Rockefeller, J. D. 1989. Grand Teton Human-Bear Management Plan, Grand Teton National Park. USA.
Royal Government of Bhutan. 2017. Human-Elephant Conflict Management Report. Bhutan Ministry of Agriculture and Forests. Bhutan.
Royal Government of Bhutan. 2008. Bhutan national human-wildlife conflicts management strategy, Nature Conservation Division, Department of Forests, Ministry of Agriculture, Royal Government of Bhutan. Bhutan.
South Okanagan-Similkameen Bear Smart Project. 2009. South Okanagan-Similkameen Conflict Management Plan. Canada.
The Humane Society of the United States. (n.d.). A Template Coyote Management and Coexistence Plan. USA.
The National Park Service. 2006. Katmai National Park and Preserve Bear-Human Conflict Management Plan. USA.
Town of Canmore. 2019. Town of Canmore Wildlife Attractant Management Plan. Canada.
US National Park Service. 2003. Denali National Park and Preserve Bear-Human Conflict Management Plan. USA.
US National Park Service. 2002. Yosemite Human Bear Management Plan. USA.
Yukon Environment and Vuntut Gwitchin. 2010. Human-Bear Risk Management Plan. Canada.
Wild Earth Guardians. 2019. Creating Coexistence Plans: Non-lethal Methods for Modern Wildlife Management. USA.
WWF Bhutan. 2016. Human Wildlife Conflict SAFE Strategy. Bhutan.

Table 2
The List of the Documents that Had an OF Score of Zero

Canmore Wildlife Attractant Management Plan (Town of Canmore, 2019).
Mountain National Parks Bear Human Conflict Management Plan (Canadian Park Service, 2005).
Bear Human Conflict Reduction Guidelines for River Rafting (Government of British Columbia, 1998).
National Human-Wildlife Conflicts Management Strategy (Royal Government of Bhutan, 2008).
Yosemite National Park Human-Bear Management Plan (US National Park Service, 2002).
Risk Assessment of Bear Human Interaction at Campsites (MacHutchon, 2000).
Creating Coexistence Plans (Wild Earth Guardians, 2019).

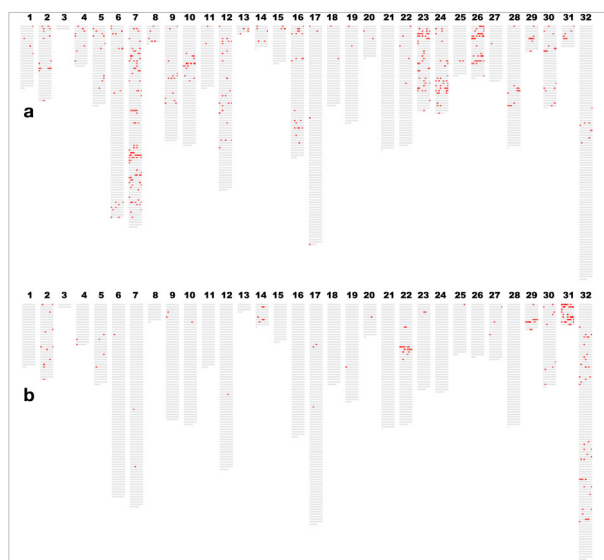


Figure 3. a, b
Distribution of the Terms “Education” and “Educational” in the Human Wildlife Conflict Management Documents Corpus (a). The Gray Lines Indicate the Number of Pages in Each Document (Numbered from 1 to 32) and the Red Dots Indicate the Location of the Terms in those Pages. Similarly, Panel (b) Shows the Distribution of the Term “Lethal” and “Lethally” in the Corpus

which added transparency and accountability. Indicators for the Bear Aware Program were also given, in terms of desired and measurable outcomes.

Some of the plans also included flow charts. For example, the “Katmai National Park Bear Human Conflict Management Plan” included a flow chart on how to respond to a potential bear problem (The National Park Service, 2006). The flow chart enabled the reader to navigate the problem space, from the occurrence of an event to problem resolution. The flow chart also showed that specifically trained technicians should respond to the radio call, and that “responders should coordinate to ensure that a sufficient number of staff respond to advise visitors and provide support.” As a result, the reader is able to fully comprehend the necessary steps to take after the occurrence of a bear problem by looking at a single-page and answering simple “yes”

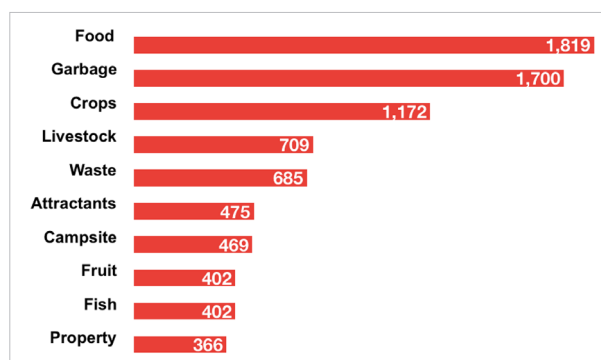


Figure 4
The Main Attractants for Wildlife in the Human Wildlife Conflict Management Corpus and the Number of Times in Each Attractant Mentioned. The Term “Garbage” also Covers the Term “Bins”; the Term “Crops” Also Covers the Term “Crop”; the Term “Campsite” Covers the Term “Campground” as Well

or “on” questions. The conflict management plan also provided a separate single-page flow chart on how to respond to a bear attack.

Another conflict management plan that used a single-page flow chart is the “Wildlife Conflict Strategy” from Mozambique (FAO, 2005), which focuses on necessary management actions in areas with elephants. The plan also included separate flow charts for human-crocodile, human-cattle, human-buffalo, and human-hippo conflicts. The document specified the deliverables, actions, indicators and deadlines required for the completion of the actions, which is similar to the “Ucluelet Human-Bear Conflict Management Plan” (Beasley, 2007).

“A Decision Support System for Managing Human-Elephant Conflict Situations in Africa”, which was prepared by the IUCN SSC The African Specialist Group (2001), is unique in terms of the effort put into a document to ensure that it is indeed a comprehensive, decision-making guide. For example, guideline 2.7 on page 13 provides a table with the title “Do you need to collect more human-elephant conflict information in your area?”. The table provides guidance on data collection by providing a list of different types of data needed, such as incident, complaint,

problem elephant, and problem animal data, as well as data regarding possible measures for human-elephant conflict mitigation. A total of 13 tables are provided, including "How reliable is your present information on human-elephant conflict?"; "Do you really know how bad the problem is?"; "Do you think you understand attitudes of people affected?"; "What human resources do you have available?"; "Do you have a strategy to address your human-elephant conflict problem?"; and "Under what policy constraints do you have to operate?".

The "Whistler Human-Bear Conflict Management Plan" by Resort Municipality of Whistler (2016) included a "Bear Conflict Response Matrix" to guide the reader about which action should be taken during specific conflict situations. Four types of actions are given, each of which is based on the bear's behavior. Bear behavior is categorized into 6 categories from Levels 1 to 6, and then further categorized by habitat type and feeding source (levels A to F) (Resort Municipality of Whistler, 2016). The four actions given on the matrix were "manage" [the bear], "manage with option to remove", "remove from population" and "destroy". As an example, the table dictates to the people implementing the conflict management plan to destroy the bear, if the bear shows "Level 6 – Predatory or non-defensive attack. Enters occupied buildings" type of behavior.

Discussion, and Conclusion and Recommendations

In a previous study focusing solely on human-bear conflicts, Can et al. (2014) revealed that most human-bear conflict management plans lack the details needed to significantly improve the rapid decision-making process. In fact, Can et al. (2014) noted "... plans we reviewed tended toward impenetrably dense text, designed more for life on the shelf ... than for action on the ground in the hands of practical decision makers." This lack of detail and established standards for human wildlife conflict management plans have resulted in a variety of conflict plan styles that are more or less successful, and that each reflect the knowledge, experience, and thought process of the plan's creators, which can vary greatly on the global scale. Established standards for human wildlife conflict management plans could help achieve more effective conflict management, and increase cross-cultural communication regarding the lessons learned from conflict management in various countries. Established standards could also help practitioners to operate more efficiently, and thus achieve better results.

In this study, I aimed to create practical recommendations to improve conflict management plans. To do this, I manually scanned a total of 2131 pages from 32 human wildlife conflict management documents, and also used text reading and analysis software to analyze the documents. I choose this method over a ranking method, as it was not our goal to rank the plans in any way.

I concluded that the number of visuals (e.g., photographs) used in a plan did not reflect how beneficial the conflict plan would be to its reader. It was also observed that the size and quality of

a plan's visuals were also important, as a few high-quality photographs could be more helpful in conveying messages than a large amount of low-quality photographs. Colorful plans with few operational figures were also potentially less helpful than black and white conflict plans containing many helpful operational figures. One example of this was found in "A Decision Support System for Managing Human-Elephant Conflict Situations in Africa", which was prepared by the IUCN SSC The African Specialist Group (2001). The document was prepared with the decision maker in mind, which coincides with the document's title.

The complexity of text in each conflict management plan varied as a reflection of the number of words used in a sentence. Long sentences of 40 words are more difficult to follow, but short sentences do not guarantee clear communication. Ideal sentences are at most 30 words long. Sentences that contained only a single idea were also easier for the reader to understand. I concluded that the ideal length of these documents should be 75 pages, which could even allow for more than one species to be covered. Thus, deciding what not to include in a conflict management plan is likely more difficult than deciding what to include. The content of conflict management plans did not differ between those prepared by governmental and non-governmental organizations. Plans prepared with a participatory approach resulted in more comprehensive documents in terms of scope.

Based on this study, it was concluded that 15 factors play a role in creating an ideal conflict management plan (the way in which each factor contributed to the creation of better-designed conflict plans and the inter-relationships between these factors are given in Figure 5). These factors can be distilled to a total of 10 key elements, which should be considered when creating conflict management plans.

1. Evidence of participatory process: The conflict management plan should state which stakeholders contributed to the plan and in which ways. Some of the conflict management plans analyzed in this study provided little to no participatory information, but rather participatory information was only evident from the contents of the document.

2. Evidence of adaptive management: Conflict management plans are not static documents, and should be regularly updated. Documents should indicate when the plan was published, and when it will be reviewed. Ideally, conflict plans should be reviewed at least every 3 years, and should be implemented on the ground with an adaptive management approach. In this study, some documents did not provide the year the document was published or how often the document is to be reviewed.

3. Definition of key terms: Key terms used in the document should be listed, in order to ensure that the defined terms are correctly understood. As each plan prepared in one country can be used as a reference document in an another country, having a section on the definition of key terms can also make it easier for people with diverse backgrounds to communicate with each other and exchange experiences better.

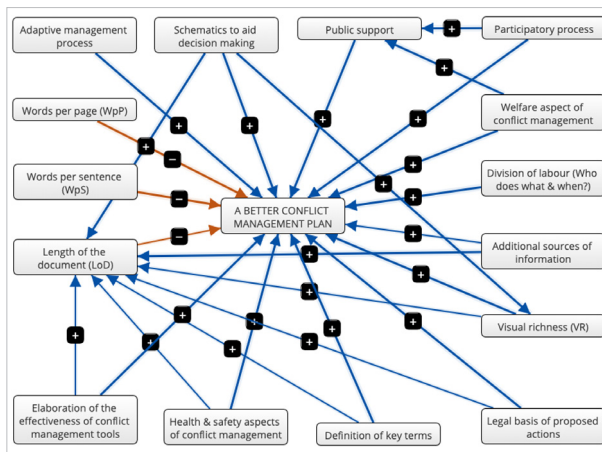


Figure 5
Key Factors to Consider When Preparing a Conflict Management Plan. The Arrows Originate from the Key Factors; Plus and Minus Signs Indicates the Positive or Negative Contribution of Each Factor to the Goal of Producing a Better Conflict Management Plan

4. Who does what: For each action given in a conflict management plan, there are three attributes that need to be defined. These attributes are location, time, and ownership (Can et al. 2014). Location is where the action will be carried out, time refers to when the action will be carried out, and ownership refers to who will be responsible for the implementation of the action. In operational documents such attributions should be clearly stated for efficiency and safety reasons.

5. Use of schematics to aid decision-making: A conflict management plan is about presenting the best available information to the practitioner, which will help them to navigate human wildlife conflicts successfully. Therefore, the most important aspect of any conflict management plan should be the plan's outlined decision-making process. Visuals should be included to help the decision-making process, rather than for aesthetic reasons. Whenever possible, flow charts should be included. Flow charts can also help the author(s) to clarify their thought process, use of logic, and line of reasoning. Both for the author and the reader, a flow chart can help find and rectify any gaps in the recommended conflict strategy. Including even a simple flow chart is helpful and instrumental for decision-making (see Rockefeller (1989) for an example).

6. Elaboration of the effectiveness of conflict management tools: The effectiveness of conflict management strategies vary from species to species, and from one conflict landscape to another. Since most conflict management experience lies within the wildlife management community, practitioners could benefit from information regarding what is known about the effectiveness of different conflict management actions. The author(s) should ensure that they cover all relevant mitigation methods in the plan, and that they combine information gleaned from the literature with previous practical conflict management experience to elaborate on the relative effectiveness of the conflict management actions proposed in the plan.

7. Welfare aspect of conflict management: In North America, the general public expects that wildlife management authorities manage human wildlife conflicts with nonlethal methods (Baruch-Mordo et al. 2014; Can et al. 2014; Spencer et al. 2007). This is also true for many other parts of the world. The micro search conducted in this study showed that lethal methods were mentioned in only a couple of the plans. A discussion of the welfare implications of the suggested management actions may improve public support for conflict management initiatives.

8. Legal basis and health and safety aspect of conflict management: Conflict management plans should provide sufficient warnings that discuss any potential risks that the practitioner may encounter when implementing the plan. This would ensure that practitioners have the opportunity to minimize or eliminate as many potential risks as possible. The legal basis for the implementation of the plan should also be provided.

9. Visual richness of the plan: Plans should include representative photos for every critical aspect of the conflict management strategy, in order to improve communication and to reduce misunderstandings that can occur in text-only documents. For inspiration, author(s) and stakeholders should study operational plans from other fields, such as search and rescue or aviation, as these fields provide prime examples of how to communicate complex operational information. For example, the Maritime Search and Rescue Manual by the Royal National Lifeboat Institution (2017) (see Figure 6) offers figures and diagrams that clearly explain such things as (a) what personal gear is worn during a search, (b) how to work with ropes and draws to avoid injury risk, and (c) what to do if a rescue personnel ends up in the water. Deciding what information should be included in a conflict plan is less challenging than deciding how to best present that information with flow charts, diagrams and photographs.

10. Additional information sources: The knowledge base for dealing with human wildlife conflicts is constantly increasing. Since it is impossible for any plan to provide all the information available on a topic, it is a good practice to provide a list of additional references for the reader to consider, rather than trying to include unnecessary, extensive information in the conflict management plan. A selection of must-read articles, trustworthy websites, and the contact details for relevant organizations (e.g., IUCN Species Survival Commission Human Wildlife Conflict Task Force, or the International Association for Bear Research and Management) should be provided to the reader.

Human wildlife conflicts will occur as long as humans and wildlife coexist. Conflict management is a top priority for wildlife management authorities around the world, as the number of human wildlife conflicts have increased over time with the expansion of human activities into wildlife habitats. This study has shown that the existing human wildlife conflict management plans can be improved, in order to transform them into proper decision-making tools. The 10 key elements identified and elaborated in this study could increase the operational effectiveness of future conflict management plans, which ultimately would positively contribute to human wildlife coexistence.

Unit 1: Personal protective equipment (PPE)

a

1.1 Personal Protective Equipment (PPE)

What is PPE?

Personal protective equipment, or PPE, is equipment or clothing provided to ensure that a person can carry out their own particular role in comparative safety when it is used or worn correctly.

PPE is only useful when correctly fitted and adjusted. Training is essential. It is the user's responsibility to check that PPE is maintained, cleaned, serviceable for use and is stored correctly.

Safety Helmet

- Provides warmth.
- Provides impact protection.
- The face shield protects from the elements (and from blood during first aid).



Drysuits

- Designed for more extreme conditions.
- User is more likely to enter the water.

Maritime PPE

PPE for going to sea is primarily concerned with three main areas of personal safety. They are to keep a person:

- dry
- warm
- afloat.

Lifejacket

- Provides buoyancy.
- Ensures correct body orientation in the water.
- Offers some impact protection.



Foul-weather clothing

- Usually made up of a waterproof jacket and trousers.
- Not designed for entering the water.

2

Unit 1: Personal protective equipment (PPE)

c

1.3 What to do should you end up in the water

Adopt the H.E.L.P. position when alone in the water

- Heat Escape Lessening Posture.
- Inflate the lifejacket.
- Cross the legs and bend them up towards the body.
- Cross the arms and hold onto the shoulders of the lifejacket.
- At night, activate the lifejacket emergency light if fitted. Try and place this at the highest point to ensure good all round visibility.



Adopt the "huddle" position when all together in the water

- Inflate the lifejacket.
- Everyone huddle together.
- Try to attach to each other using a yacht harness if available. Thread the harness around the waist bands or lifting straps of the other lifejackets, NOT around the lifejackets' stoles.
- Being linked together keeps the crew closer together which helps to retain body heat and maintain morale. It also increases the chance of being spotted.
- At night, activate lifejacket emergency lights.
- Constantly monitor each other.



Attract attention



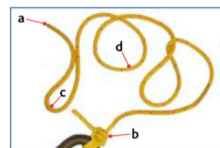
9

Unit 5: Ropework

b

5.1 Ropework

Working ropes contain a great deal of energy with the potential to part and recoil, which could present a serious risk of injury to unaware crew. It is important that everyone operating on a rescue vessel is aware of how to stay safe when working the deck to ensure that they don't become a casualty themselves.



Terms used when describing rope:

- a. Running end/working end
- b. Standing part
- c. Bight
- d. Loop

Safety points for working with ropes:

- NEVER stand on a rope, in a bight, within a loop or in the line of recoil.
- When slipping or undoing a rope under load, extreme caution must be taken to avoid the rope from running away out of control.
- Make sure you are vigilant at all times when working with bits, blocks, cleats, capstans or bollards to prevent hands from becoming trapped when a rope slips.

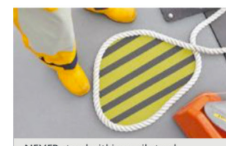
- The wearing of rings is strongly discouraged. Serious injury, including amputation may result if a ring snags.
- Wearing gloves when handling rope and wire carries certain risks. Therefore, the wearing of gloves is left to the discretion of the crew.



NEVER stand within a bight



NEVER in front of a leading block



NEVER stand within a coil stand

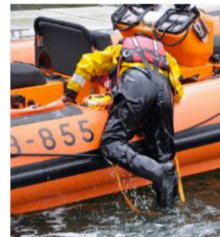
35

Unit 10: Man overboard (MOB) and person recovery

d

10.2 Person recovery

Should you end up in the water, ensure you are familiar with different methods of how to recover yourself back onto your particular boat. Practise this on a regular basis.



If necessary, try to create a 'step' to help you climb out of the water and into the boat.

When recovering a casualty onboard, it is important to ensure that we reduce the risk of injury to rescuers through appropriate manual-handling techniques and positioning. Utilising the lowest deck point to the water surface, the rescuer should keep themselves low with a minimum of three points of contact with the boat, wherever possible.

The following images are some example options for recovering a casualty. Ensure that you are familiar by regularly practising the recovery methods specific to your boat.



Facing towards the sponson



Facing away from the sponson

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Figure 6. a-d

Maritime Search and Rescue Manual by Royal National Lifeboat Institution (2017) is a Manual Designed to "Save Lives by Providing a Resource Containing Essential Skills, Knowledge and Guidance for those Operating in a Maritime Environment" and it is "Designed for Organizations Based in Areas with Limited Access to Equipment". The 108-Page Manual Sets a Good Example of How to Provide Guidance about a Highly Complex Topic Such as Maritime Search and Rescue Missions (Screen Shots of the Pages Used with Permission from the Royal National Lifeboat Institution, UK)

Ethics Committee Approval: Ethics committee approval wasn't needed for this study since the study is based on the analysis of 2131 pages of documents.

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