Scientists' attitudes towards improving the welfare of animals in the wild

A qualitative study

Animal Ethics

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Background

Most work carried out by animal welfare scientists has focused on animals directly affected by humans. Biologists, especially ecologists, have examined the lives of wild animals from different perspectives, but rarely from the point of view of their wellbeing. However, there has been growing interest in recent years on this issue. It has been argued that a new field of research examining this question should be promoted. This new field, tentatively named "welfare biology," would integrate knowledge from the sciences of animal welfare, biology, and other disciplines in ways that could inform policies that would positively affect the wellbeing of wild animals in different ecosystems.

Objectives

The object of this study was to identify some current perspectives about this new research and the best ways to promote it. To investigate these questions, the project was aimed at gaining knowledge about the following:

- The perceptions and attitudes held by those who work in the fields of biology, veterinary science, and related fields towards (1) the suffering and wellbeing of wild animals and (2) efforts to reduce their suffering.
- Research topics related to helping wild animals that are likely to be considered worthwhile by natural scientists. The following were considered in particular: rescues of animals affected by severe weather events, supplemental feeding, population control, vaccination programs, and deparasitation.
- The current possibilities in academia to conduct such research, and the interest, barriers, and opportunities.
- Recommendations by scientists about how to foster research in this field.

Methodology

A qualitative approach was used. We interviewed 15 experts in biology, veterinary science, and environmental studies coming from the UK, the USA, Southern Europe (Spain), German speaking countries (Germany and Switzerland) and Latin America (Mexico and Brazil), and carried out a discourse analysis of their responses.

Results

The interviews indicated a lack of familiarity, especially among biologists, but also to some extent among veterinary scientists, with the suffering of wild animals. The biologists were not very familiar with animal welfare science and its methods.

We detected no clear ranking of the level of support that different interventions to aid animals in the wild receive. Population control was generally approved, especially when killing is seen as the alternative, though this did not always mean support for the proposed measure. Rescuing animals in natural disasters, providing them food during severe weather events, and vaccination were acceptable to many and generally supported to a similar extent, with deparasitation getting only slightly less support.

Several types of responses were repeated for different interventions. Some respondents expressed unqualified support for the measures while others rejected them outright. Most participants expressed support for most of the ways of helping wild animals, but only under certain circumstances. The conditions that were stressed most were if the original source of harm was anthropogenic and if the intervention was backed by sound research indicating it would not have negative effects that might outweigh the benefits.

Concerning what kind of interventions it would be best to promote, one suggestion was that fostering work aimed at improving the wellbeing of animals in urban environments would be particularly promising. Participants also suggested that it would be best to start with forms of helping animals in which there is also an interest in research for other reasons. Vaccination was explicitly mentioned as promising in this respect. This is because, in addition to aiding animals, it can prevent the spread of diseases to humans and domesticated animals. It is also an intervention that has been carried out for a long time and on which a significant amount of research is already being done. Another suggestion was to start with forms of helping animals in which indirectly anthropogenic factors may also be

involved. Aiding animals in need of help due to harmful weather events was cited as an example of this, because it is becoming increasingly uncertain whether the weather events negatively impacting animals in the wild might ultimately have a human cause. It was also pointed out that it would be more productive to start research on the issue with specific and well monitored cases.

Informants also identified some important barriers to working in this field, including lack of funding and epistemic challenges concerning the study of the wellbeing of animals. However, the most important obstacle that came up in the interviews was probably the lack of attention paid to individual animals within the currently prevalent paradigm in biology. Additionally, the veterinary scientists appear to share some of the values the biologists have, although to a lesser extent. In fact, not all veterinary scientists are fully familiar with animal welfare science, let alone wild animal suffering.

In relation to this, it was suggested that investing in younger people in academia might be more cost-effective than focusing on scientists with established careers, as the former are more open to new ideas and more interested in exploring new areas of research. Finally, it was also mentioned that the promotion of cross-disciplinary work may be promising in order to help overcome the lack of familiarity with animal welfare science among biologists, in addition to being necessary for the examination of the factors affecting the wellbeing of animals in the wild.

Limitations

One limitation of this study is that, due to sample size reasons, the interviewees' views may not be representative of those of other scientists , although the responses we got were quite diverse. A more important limitation may be the fact that some of the respondents did not properly understand what wild animal suffering or even animal welfare is, and sometimes confused measures aimed at helping animals with interventions carried out for conservationist aims. This reduced the value and reliability of their responses about such interventions.

Recommendations

Several recommendations can be made about how to promote concern and research about the wellbeing of animals living outside human control. In addition to the promotion of further discussion about wild animal welfare among biologists,

veterinary scientists, and scholars in related fields, the following recommendations can be made for courses of action to help foster research in welfare biology:

- Providing training in animal welfare science for biologists, especially ecologists
- Providing funding for academic work on this topic, targeting young researchers in particular
- Promoting research on wild animal health (for example, the development of new treatments or vaccines)
- Promoting research combining a wild animal welfare and an urban ecology approach to helping improve the wellbeing of wild animals in urban environments
- Promoting research on the ways to help wild animals harmed by severe weather events
- Favoring the promotion of research with a cross-disciplinary approach by combining the contributions from the sciences of animal welfare and biology

Background

There is currently little scientific research about the wellbeing and especially the suffering of animals living in the wild or outside direct human control. To date, most researchers in animal welfare science have only focused on studying the wellbeing of animals who are used by or directly affected by human beings. This has been limited to mostly domesticated animals. It has also included certain animals classified as wild, but only when they are kept in captivity (e.g. wild animals living in zoos) or when they are directly affected by certain human activities such as hunting, management policies, or agriculture (Sainsbury, Bennett & Kirkwood 1995; Swaisgood 2007; Mathews 2010; Walker, Diez-Leon & Mason 2014; Kirkwood 2013). Although there have been some exceptions to this (for instance, Clarke & Ng 2006; Boonstra 2013; Brakes 2019), there is a general disregard for the assessment of the quality of life of animals living outside direct human control. This includes animals living in the wild and in urban or agricultural areas (not including domesticated or captive animals). These animals are not living completely outside human control, because humans affect the places where they live in many ways, and sometimes change it very significantly in short amounts of time. However, they are not being directly affected by humans because they do not have direct physical contact with them (unlike when they are captured, hunted, poisoned, etc.).

These animals are and the way they live are poorly studied in animal welfare science, but is part of the science of ecology studies. Ecology investigates the relations between organisms and their environment in many different ways. It is not restricted to a single aspect and it has many subfields (such as population ecology, community ecology, systems ecology, behavioral ecology, etc.). Each of these subfields has one particular focus and approach to the study of the way organisms relate to other entities. Thus far, welfare has not been one of them. This means that an important feature of the world surrounding us is not being studied. An important aspect of nature is that the welfare of animals living in ecosystems can be positive or negative (the latter being the case when welfare is poor). The latter happens when wild animal suffering takes places, especially when it prevails over the pleasures animals can experience. Wild animal suffering is what individual animals undergo for reasons of

any kind when they are not living in captivity (Animal Ethics 2016b; Faria 2018; Soryl 2019; Waldhorn 2019). The study of wild animal welfare in general and of wild animal suffering in particular should therefore be an area of interest just like other aspects of how ecosystems work. It is also relevant because our actions can positively or negatively affect the welfare of animals living in the wild.

It is important to note that there are interventions in the wild that aid many animals despite having different purposes, ranging from avoiding indirect harms to humans or domesticated animals for conservationist ends (Animal Ethics 2016a). These include rescuing and relocating animals in natural disasters or severe weather events (Bovenkerk et al. 2003; Thomas 2011; Wilkening et al. 2015), providing certain animal populations with supplemental feeding (Boutin 1990; Robbins 2012; Murray et al. 2016), implementing measures of population control (Gray & Cameron 2010; Cohn & Kirkpatrick 2015; Ansari et al. 2017), vaccination (Rupprecht, Hanlon & Slate 2003; Hewinson 2011; Robinson et al. 2018), and deparasitation programs (Inoue et al. 2007; Jamriška et al. 2013; Pedersen & Fenton 2015), among others. This shows that there is a firm foundation for further research on the implementation of these measures for the sake of improving the wellbeing of animals as well.

Due to this, it seems that an important aim of people interested in the study of animals and, most importantly, among those concerned about the wellbeing of sentient animals, should be to promote research in this area (Ng 1995; Soryl 2019). Isolated individual researchers can gain a great deal of knowledge working in this field, but such knowledge will still be very little in comparison to what a wider scientific community can achieve. For this reason, it is proposed to further the creation of a new field of research concerned with estimating the wellbeing of animals living in the wild, the circumstances that improve or worsen their situation, and the concrete measures that can help animals in need of aid who are living outside of direct human control.

This research project aims to study scientists' perspectives about different ways to promote such research, and about which ways seem most promising. In order to learn this, it is important to know what kind of research biologists, veterinary scientists, and scholars in related fields find more interesting and feasible, as well as what they think about different ways the welfare of animals in the wild could be improved.

Objectives

This project has the following objectives:

(1) Describe the perceptions and behaviors of those who work in biology, veterinary science, and related fields regarding the suffering and wellbeing of wild animals, as well as towards the efforts to reduce their suffering.

(2) Identify research topics related to the reduction of wild animal suffering that are more likely to be accepted by the scientific community in the fields of biology and veterinary science. The following courses of action were considered:
   - Rescues in cases of severe weather events
   - Supplemental feeding
   - Population control
   - Vaccination programs
   - Deparasitation

(3) Examine what current perspectives to conduct research on these issues there are, and identify the interests, barriers, and opportunities for doing such research

(4) Come up with recommendations for the best ways of promoting research in this area.

Methodological and sample framework

Method and technique

The research method used in this study was qualitative and based on the use of qualitative interviews, which were conducted with experts in biology, veterinary science, and related fields. (Gubrium & Holstein 2001). Given that knowledge about the problem this study has addressed was very limited, we used this approach to get a deeper and more complex understanding of the views of the scientists, as well as to bring to light key aspects of this problem that we were unaware of (Patton 2015; Taylor, Bogdan & DeVault 2015). We used semi-structured interviews, in which the interviewer has an interview guide, that is, a list of questions of the research topics to be covered. In them, "[q]uestions may not follow on exactly in the way outlined on the schedule. Questions that are not included in the guide may be asked as the interviewer picks up on things said by interviewees. But, by and large, all the questions will be asked and a similar wording will be used from interviewee to interviewee" (Bryman, 2012, 471). In fact, during fieldwork, questions not included in the list were sometimes actually picked up by interviewer but, as this author states, almost all the questions were asked in a similar wording to all interviewees. We carried out two pilot interviews, after which we adapted the script of the interview. In the methodological appendices, we have included the system of concepts, indicators, and variables that we used.

This research strategy allowed us to understand "the perspective of the subject studied", collecting "rich and deep" qualitative data (Corbetta, 2003:37) regarding the perceptions and attitudes of the interviewees towards wild animal suffering, research on different forms of helping wild animals, and the barriers and opportunities do they see in these research topics.

Five of the interviews were carried out in person, while the other 10, due to logistical reasons, were performed using an online voice call platform. They were then fully transcribed and analyzed. The results we obtained led us to formulate several hypotheses, on the basis of which we make the final recommendations at the end of this study. Such hypotheses can also provide the basis for a further study with a quantitative approach to test them and gather more knowledge on this issue.

Sampling procedures

An invitation to participate in the study was sent by email to academics in biology and animal welfare departments in different countries. We selected top departments worldwide, with a focus on Northern Europe and the USA, and to a lesser extent Southern Europe, and Latin America. Some additional scientists were selected following an expert sampling procedure. We aimed at interviewing mainly biologists, but also veterinary scientists and, to a lesser extent, scholars in other related fields. We also tried to reach both men and women. With this, we wanted to reach experts with different backgrounds and from different cultural contexts. Resource constraints conditioned the number of people we were able to reach. We sent email invitations to 386 scientists in total, and interviewed 15 (3,89%) of them.

Interviewees' profiles

The profile of the interviewees was diverse with respect to the following categories:

- All interviewees are researchers in universities or other research centers, with experience of between approximately 10 and 30 years
- 8 are biologists, 5 are veterinary scientists, and 2 work in environmental studies
- 5 of the interviewees are women and 10 are men
- They come from various countries, 4 in the United Kingdom, 3 in the United States, 3 in southern Europe (Spain), 2 in German-speaking countries (Germany and Switzerland), and 3 in Latin America (2 in Mexico and 1 in Brazil). There were 9 interviews conducted in English, 5 in Spanish, and 1 in Portuguese.

Results

1. Perceptions and behaviors towards wild animal suffering and its reduction

Wild animal suffering

Informants from different disciplines had a different understanding of wild animal suffering and related concepts, especially the idea of animal welfare. However, we saw no similar contrast when we considered the amount of time experts have been working in their fields. That is, how long they have been working in their field did not condition the kind of responses they gave to this question. We observed this in the answers to the other questions as well.

Among the informants in the veterinary science field, one of them thought wild animal suffering had to do with population conservation. Another informant, despite saying that she was not familiar with the idea of wild animal suffering, described it correctly, although with a stress on anthropogenic harms. The other veterinary scientists identified this concept with the negative states experienced by animals living in the wild from the point of view of their wellbeing, and they all stressed that wild animals can experience suffering just as domesticated ones can. So there is no crucial difference between wild animal suffering and the suffering of domesticated animals:

> You can talk about the welfare of all kinds of animals, and the concept is exactly the same for a wild animal and for an animal which is kept by people, and it's exactly the same for a human. So, welfare involves a range going from very good welfare to very poor, and obviously when there is suffering the welfare is poor by definition. But I think it is important to say that it is exactly the same idea for humans and nonhumans, and for wild animals and for animals which are kept in captivity. It's a biological characteristic of the animal, the welfare, so there are circumstances where there will be suffering in wild animals as there are with animals which we keep and as there are with humans. (INFORMANT #13)

These respondents were also able to give examples of natural origin factors that cause suffering in wild animals (such as diseases, conflicts with other animals, lack of food or shelter, and stress). The same informant said that

> these are all things which occur naturally; that doesn't mean they are good. Obviously, welfare can be very poor indeed in wild animals, even without any human intervention at all.

The existence of wild animal suffering is thus recognized by veterinary scientists, and not disregarded as irrelevant because it is natural. Informants pointed out the following situations in which wild animals suffer:

- In fires and other natural disasters
- When they are exiled from a pack or herd if they are social animals
- When an offspring is lost, which causes both the mother and the offspring to suffer
- When territory where food and water is available is occupied by another pack, with the possibilities in these cases being to fight, to move away, or to die. The three of them are harmful
- When they suffer from diseases, which causes suffering for those who die and for those who survive
- When they are the victims of predation
- When they suffer attacks by other animals of their own species
- When they suffer any kind of injury, which can also cause chronic pain
- When they starve due to the lack of food, or suffer from the lack of other resources they need.
- When they are negatively affected by environmental factors such as weather conditions

An understanding of wild animal suffering was less common among biologists, with only two of them describing what it is in terms of actual negative states experienced by animals. The others understood it to varying degrees. Two of them appeared to understand it initially, but then described it in terms of suffering due to anthropogenic harms. The following response exemplifies this:

> Interviewer: OK, what are the harms that wild animals suffer or are suffering in the wild? Could you describe some of those harms specifically?
>
> Respondent: So when you say harms, can you define them in some way? Because life out there is pretty rough whether with or without us. Or are we talking about human intervention here?

> I: Any way you like to go with that. I think that's why the question is so general. What is the idea of harm for you? What would that mean to you?
>
> R: Well, I don't think I think about harms as planned events that would be typical in the course of the ecological interaction, predator-prey interaction, cyclical population dynamic or any kind of that stuff. That's just black and white; those are the processes that produced the evolution of creatures we have today. What I would say is that people subject wildlife to unnecessary harm and suffering though our interventions and we've been doing it for a long time. (INFORMANT #4)

In two other cases, the concept seemed to be understood but the biologists assumed that the suffering of wild animals takes place especially when whole populations are significantly affected, rather than at the individual level. One of these biologists pointed out that "veterinary scientists may use terms differently from biologists" (INFORMANT #15), seeming to hint that she was not fully comfortable with the terms being used, such as animal welfare, wild animal suffering, and related terms having to do with the wellbeing of individuals rather than populations and communities.

Finally, the other two respondents had no familiarity with the concept, and stated that it makes no sense to speak about suffering when we are speaking about events that take place in nature. One of the respondents defined the suffering of animals in the wild occurring "when habitat is artificially altered in excess" (INFORMANT #9). He says:

> Your question, whether animals suffer, it seems to me that it would be a difficult one. What is clear is that there is suffering when the cultural elements in an environment are very clear. For example, you go to a chicken farm or a calf farm where animals live in a cage where they can't almost turn around so that the quality of the meat does not suffer, is tender or is at the point where human beings like to eat it, so that can be understood without a doubt that it is animal suffering, no doubt.

It is not clear in this case if the respondent is just assuming that animals suffer when habitats are artificially altered or is actually identifying animal suffering as animals living in environments that are not natural. The position expressed in this response is not a actual denial of the sentience of nonhuman animals. The possibility of animal suffering is accepted, but is only recognized when animals are in a situation of use by humans, such as in farms. The underlying view seems to be that animals in the wild are considered in relation to their role in ecosystems, so the fact that they are sentient beings (which is not ignored, as we saw when domesticated animals are affected) is not considered.

The other informant who gives a similar response says:

> I: Are you familiar with the concept of "wild animal suffering"?
>
> R: I would like to be provided with a definition. Many ideas are often heard, but one can't know what they refer to...
>
> I: Well... what does this concept suggest to you?
>
> R: Are we talking about animals in natural conditions? That doesn't suggest anything to me because we would be talking about a logical and normal behavior of any species, population, community in any habitat one is in.
>
> I: What harms do you think animals living in nature are subjected to?
>
> R: To the ones of each species, population, and living organism. I don't think of the harms that bacteria suffer, why think of large animals? They have to respond and adapt just like the human species does, and like any other organism, just like any plant. Either they adapt or do not survive. That's why I don't understand it, I've read about it, but what is suffering in nature? I don't associate it with anything... it refers to animals, why not plants? (INFORMANT #8)

The identification of the suffering of nonhuman animals and the alleged suffering of plants indicates that the informant is not considering that the capacity to have mental states is relevant here. This informant later adds with regard to negative experiences happening to animals that "it seems to me absolutely anthropocentric to call it suffering."

Finally, the two scholars in environmental studies both understood the meaning of the term "wild animal suffering," though one of them saw it mostly in relation to anthropogenic harms.

Answers also varied significantly when informants were asked if they think animals in the wild can cope with the harms they suffer, with some of them saying they do, and two respondents saying they don't, because the animals typically die. Other respondents gave answers that either do not address the question or state that it depends on the circumstances. Two implied that those who survive do cope with the challenges they suffer, and those who fail to will die, while others responded similarly but in terms of species persistence or extinction. When responding to the question of whether animals can cope with the problems they face, respondents had a tendency to answer in terms of population or species, rather than in terms of animals as individuals, even when they recognized what wild animal suffering is and that it is something that animals as individuals experience.

In addition to a lack of familiarity with the phenomenon of wild animal welfare, in some of the responses we identified a lack of awareness of the existence animal

welfare science as such, because the idea that animal welfare cannot be scientifically examined was expressed by some biologists:

> I am a scientist and scientists should not express opinions — and I am nevertheless expressing my opinion. Scientists must conclude, and to conclude you have to take data, examine numerically such data and information through useful models, and draw conclusions. When talking about wild animals, we are in between opinion and conclusions, when talking about animal suffering. (INFORMANT #9)

We can thus find two different ways of considering what matters in approaching the study of animals, which is reflected in whether the welfare of individuals is considered or not. We also find a tendency to see what is natural as unproblematic (Elliot 1997; Morris & Thornhill 2006; Feber et al. 2016). This is much more common among informants than the nonrecognition of wild animal suffering. This is also reflected in the rest of the responses.

Reducing wild animal suffering

Recognizing what wild animal suffering is doesn't necessarily mean supporting its reduction or accepting that it is an important notion. One of the informants who does understand wild animal suffering also says this:

> I do think that the framework of suffering is in a way too clumsy to address the issues associated with wildlife and wildness, specifically ecosystems, because it focuses, it's such a psychological concept, such an experiential concept and it's so individualistic, and so once you start talking with wildlife managers and introducing the idea of suffering somebody somewhere is going to have to reconcile the conflict between individuals and the whole. (INFORMANT #5)

This illustrates why the perceptions and attitudes towards reducing wild animal suffering need to be examined separately from perceptions about what wild animal suffering is. Still, the former depends on the latter, at least to some extent. Some respondents and understand the expression "helping animals" as meaning "conserving animal populations." They may favor intervention, but for a reason different from the reduction of wild animal suffering, which they don't consider an issue:

> I: In general, do you think that we should intervene in nature in order to help wild animals?
>
> R: So, I think intervention to protect habitat is very important. Interfering in the way that is often understood by society, I think is often a very bad idea. (INFORMANT #12)

> Intervene to recover patterns of relationships that man has wrecked with his actions that, in many cases, have led to these situations of loss of welfare to animals... do not intervene so much by harassing them and destroying the habitat. (INFORMANT #8)

Again, veterinary scientists seemed to better understand what was being asked. This was predicted by the informant who warned about the different language used by biologists and veterinary scientists:

> I just wonder like if you would get useful responses among biologists and veterinary scientists because biologists might say that populations regulate themselves and veterinaries may respond that some intervention is possible. You would get different responses from both groups. (INFORMANT #15)

Another important point is that attitudes towards helping animals in the wild aren't just influenced by views about such suffering, but also influence views about it. This is because a very common idea, that as we saw conditions some of the responses to the previous question, is that we are responsible for humans' actions. But the ways in which this is interpreted vary significantly.

Among those who understand what wild animal suffering is, there is a consensus that it is legitimate or even mandatory to intervene to avoid the animal suffering caused by human beings. The differences begin when the reason animals need help is not a directly anthropogenic one. One of the informants reported that he used to hold the view that the best intervention is no intervention, but eventually changed his mind and would now support helping animals suffering in the wild. Another informant had doubts about this, though is leaning towards helping them:

> I know you could say, well, nature was taking its course and they should die but I don't really feel that… I think if it's something that can be readily prevented or overcome then it's reasonable to do something. (INFORMANT #11)

This response questions the idea that we should let the natural course of events be (even though this respondent is not a biologist, but a veterinary scientist).

Another response was that we should only intervene when animals in the wild are negatively affected by humans because the respondent believed that animals live happily in the wild. This time, the informant is a biologist (who at first didn't understand the question, but did after it was rephrased):

> Oh, I see, improving the wellbeing of animals in the wild rather than protecting their habitats and species conservation. I'm trying to think... What they need is, they need a place to live, they need shelter, habitats, like migrating species they need to be able to move between the habitats. Sorry, I'm thinking aloud. They need food, some may be exposed to stress for

> example, with noise, or light, or other activities from humans, that can also destroy their habitats… take away their resources. Honestly, I think that wildlife, or animals actually are happy, they would be happy with themselves. We don't need a lot actually to make them happy or to provide them with anything as long as they have their resources. I'm not so much into diseases so this is probably a part where I'm lacking a lot of knowledge. (Informant #15)

The most common response, however, is that we should not try to save animals from natural harms, but only from anthropogenic ones, because we should let natural processes take place. This view is common among scholars from all disciplines, although some add that they also, perhaps contradictorily, see that all ecosystems have been modified in one way or another by humans. One informant says: "it's hard for me to think of any situation where we haven't played a significant role in the dynamics of a given group of animals" (INFORMANT #6).

There are some variations in the reasons to hold this position. While in some cases the assumption seems to be that it is wrong to interfere with a natural process, another view that is made explicit is that intervention is very risky, and that by intervening we will be responsible if something goes wrong:

> R: I'm very motivated by this idea that we should not mess with nature. That's a very big thing for me. We screw things up colossally, repeatedly. Our track record is terrible with messing things up. As much as we can do to leave no trace, that seems to me a good pathway for trying to get to a more responsible way of living on the planet. Even though that involves and entails in some ways some suffering…
>
> I: You think it's inevitable then that all human intervention is going to lead to worse outcomes?
>
> R: No, no I don't. I think very often we could do very good things for one another. For instance, if you have a medical issue, I can assist you. I can alleviate your suffering just by giving you pain medication. But in doing that, I do take responsibility for the actions that I've taken. (INFORMANT #5)

On another note, most of those who believe that we should not protect animals from natural harms also appear to be sympathetic to the idea that, while in general natural process should be left alone, there may be some special cases when intervention is acceptable. For instance, the same informant who made the previous statement also said:

> I think it's not unreasonable to help them in some way. We don't have to just say, "nature is red in tooth and claw" and let it be, but by and large I think the obligation to do so is much less strong in the natural world than it is in our human world.

The circumstances under which this respondent would intervene to aid even if no anthropogenic harm has taken place would be when catastrophic natural events occur. The same informant says:

> I will say, there are some cases, we didn't get to these, but they are important cases, these are defeater cases that defeat that line of reasoning. So, for instance, suppose there is some impending cataclysmic event, a volcanic eruption, that's going to just wipe out a system. That's natural. That's naturally caused. That's not something we've done, and there's a lot to lose in a scenario like that. It's also a one-off event, or it's a one-off event at least with regards to that region. I think there's a reason for us to consider cases of assisted migration, assisted colonization, of managed relocation to try to preserve that which is there, not to reduce the suffering of the animals that would be affected by a volcanic eruption but to avoid what can only be characterized as an aberration. But those are fewer and further between than we would like to believe that they are. I think it makes sense at times to intervene. To assist in the return of wildlife in hurricanes, in some cases wildfires, in volcanic eruptions and so on, it makes sense for us to intervene. But it's not as often the case.

In addition to catastrophic events, cases of extreme suffering that are naturally caused are considered justifiable reasons to intervene by some informants, even though they don't accept intervention as a general policy:

> That's really the guiding principle, if it's a man-made problem, then we should intervene. If it's not, then we shouldn't. But there will be instances where there's a lot of high level of suffering of wildlife, where, even though it's a natural process, it will still be good to intervene. I think an example of that would be something like whales that become stranded on beaches. I know there's a lot of controversy of whether that is partly human factors that have caused that sort of a problem. But I think sometimes it's a natural process. And I think you'd have to be quite hard to not agree with trying to rescue an animal as intelligent as that… But as a general principle, I think it should be only where human-induced problems are caused that we should intervene, apart from the overall approach to conservation which should be to maintain ecosystems in natural areas in as healthy state as we possibly can. (INFORMANT #10)

We can thus see how two different cases of natural suffering are considered differently, so providing help is not accepted in all cases. The thinking here may be that if the situation only concerns an individual animal, or a small number of animals, the intervention will not really disrupt any natural process on a significantly wide scale:

> I think there are occasions when interventions for wild animals are valuable to the animals, and there are times when a human intervention will save lives and improve welfare, and therefore it's something which is worth investigating. I think there is a different question which is: should we be intervening with wild animals? And I'm happy to talk about that as well.

> So, I think it's worth investigating, because sometimes we need to be able to do it, so you have to do some kinds of studies to discover how to do it. So there have been some studies on how to care for wild animals or improve the lives of wild animals, and those are valuable things to do. So that might include releasing an animal from a situation where it's been harmed, where it's trapped for example, or dealing with an animal which temporarily needs some help because it has any one of the problems which I mentioned earlier. So, sometimes we need to know how to do that, and, of course, understanding about the health of wild animals is a very important thing in relation to humans and captive animals, as well as in relation to wild animals. (INFORMANT #13)

Another idea, less frequently expressed, is that we should intervene because intervention has been going on for a long time already:

> We must intervene now because we have been intervening for a long time. I mean, since we have intervened so much and have driven them [wild animals] to the situation they are in, we have a moral obligation to intervene. But, respecting the precautionary principle, if not, better not to intervene. But it seems more important to stop bothering them by intervening. I think that this would help them a lot more, and our efforts should be focused on that, but in the meantime, well, it is great [to help them]. (INFORMANT #7)

It was also pointed out that we really have no choice, that not choosing is still intervention, and therefore we should think about the ways such interventions should be carried out:

> I think that we should think seriously about what our interventions are. I think we have to intervene. We don't have a choice. Not making a choice is still intervention because we are everywhere at all times as human beings. I think that our interventions should be much more thoughtful than they currently are. (INFORMANT #4)

Another informant also makes this point, saying:

> where I would challenge the word "nature" is that it implies that humans have no control over it when actually humans are the major influence over what happens in nature nowadays, and on a big scale. (INFORMANT #12)

However, the view that we can't avoid intervening in nature does not mean that we should do it to benefit nonhuman animals. One of the informants pointed out that it "is inevitable that the human species manages nature" (INFORMANT #9), but this informant didn't see wild animal suffering as problematic.

2. Perceptions and attitudes towards different ways of helping animals in the wild

Rescuing

Natural disasters commonly affect animals living in the wild. Suppose that a big fire is taking place in a local forest. Your city council is considering rescuing the affected animals. What would be your opinion on this initiative?

Two main responses were given to this question. One of them is favorable to aiding animals without making such help dependent on the cause of the fire. One of the experts indicates that rescuing animals suffering due to a natural disaster may be "reasonable" if it is "logistically possible and not prohibitively expensive" (INFORMANT #11). Another respondent who responded favorably argued that it is a matter of justice to help animals.

The other common response was that intervention is justified only if the harm has been caused by human action, but not if it is due to a natural cause. However, many of those with this view immediately added that the former is the case most of the time, due to which, in practice, they would almost always support this form of intervention:

> If humans have an impact on wild animals because of human activities and the animals are suffering because of that, then I think we also have an obligation to do something about it. However, if there is a population of wild animals which is being influenced by something which has nothing to do with human activity at all, then I think we do not have an obligation to do it, and I think we should not do it. (INFORMANT #13)

Another informant says:

> I think it depends on the cause of the, for a start, if it's a natural wildfire that's just emerged through a lightning strike or something like that, then in theory, it's a natural process, you perhaps shouldn't intervene. However, most wildfires these days have some form of an anthropogenic cause. (INFORMANT #10)

A respondent who gave a similar response said about the distinction between naturogenic and anthropogenic fires that, while real, "it's a difficult division to make" (INFORMANT #5). Another participant who gave a response of the first type (supporting help to all animals affected by fires, whether anthropogenic or natural)

said that humans have made the effects of fires much worse, including ones that are not directly caused by humans. This would give us extra reasons to help:

> The problem with wildfires is that… human beings have made these events much more damaging than they would be in a natural occurrence, and so of course I would favor that human beings try to mitigate the harm on the animals. (INFORMANT #14)

This respondent qualified the answer by saying that there might be animals who may not need to be rescued, even if others would:

> At first glance this sounds great. Then I start to think about it, I'd ask which animals are involved in that, because like in a forest, there are many different animals, and then it might also be a question, how much are these animals adapted to wildfires… animals, that's a very big term and involving worms and insects, and you know we probably talk about mammals, higher mammals or whatever. The question itself is very broadly formulated, but I get the point, and yes, I'm in favor if something is done to mitigate the loss of animals due to fires.

In addition to these answers, there were three others, each mentioned by a different informant. One of them said that because of the impact humans have had in the wild, justice would only require us to try to put out the fire, but not to rescue the animals. This informant would only save animals at risk of extinction.

Another respondent favored aiding animals when they cannot otherwise survive, and added that her main concern would be environmental restoration rather than helping individual animals:

> if there's a natural disaster I would also kind of put efforts in the restoration of the environment or prevent disasters in the future rather than putting our efforts in rescuing individual animals. (INFORMANT #15)

Finally, one respondent said that intervention should be carried out if there is a human interest in the conservation of the animals in need of aid, "[i]f it is possible to rescue [them] and this is considered worthwhile because they are valuable to man" (INFORMANT #8).

Feeding

Suppose that due to a prolonged drought in your area, food and water supplies for animals living in the wild are increasingly scarce. Neighbors keep finding starved foxes, rabbits, and other animals coming to their yards. Would you agree with providing them with food and water?

Some of the interviewees expressed agreement with this measure without making a distinction based on the cause of the harm. One of them reasoned in favor of this, saying, "I think it's good that [we are] helping out animals to cope with such climate change-induced extreme events" (INFORMANT #14). This view is compatible with the idea that we should only help animals suffering from harms that have some kind of anthropogenic source, if we assume that climate change will always be affecting weather events.

Other respondents agreed, with certain limitations because of the risks involved in the measure. A key concern was whether the populations of the animals who are being helped would grow beyond the numbers it previously had, or if the intervention might have other negative effects. One of the informants responded, "I would definitely say yes" if two conditions were met: first, that the population of the helped animals would not grow beyond its initial numbers, and second, that "the population will be healthy and able to support itself until the situation around changes" (INFORMANT #15). But this respondent would disagree with doing it if the population exceeded its previous numbers as a result, or if "it could mean that the wildlife would be so dependent on humans in the future that a lot of the population wouldn't be able to survive without further intervention from humans. If the population grows beyond those numbers, it would not be able to survive without the help of humans."

Two respondents went further, saying that by intervening, we acquire the responsibility for their continued wellbeing in the future, which is a responsibility we would not have had we not intervened. One of them said:

> I think that if we keep animals ourselves, we have an obligation to care for them, to make sure they don't have poor welfare. If humans have an impact on wild animals because of human activities and the animals are suffering because of that, then I think we also have an obligation to do something about it. (INFORMANT #13)

The other respondent, while stating: "I would favor feeding them under certain situations to maintain the natural population numbers," was worried about going beyond that, because "then you become part of the system, in a sense forever"

(INFORMANT #6). The underlying assumption is that it would be better to avoid these kinds of situations if we are uncertain about whether we are going to be able to take care of the animals.

Another respondent described such decisions as "an ongoing struggle to try to find ways to live with wildlife populations that don't drive them to artificial scarcity or artificial over-abundance" (INFORMANT #5).

In addition, some of the respondents pointed out that this should be studied very carefully because there would be a risk of animals becoming habituated to being helped by humans, thus increasing their risk of being killed:

> I don't think there's anything necessarily wrong with that, but I do think, though, when people do things like these they sometimes make the situation worse. And what I mean by that is habituating wildlife to humans and drawing animals in to environments where there are higher risks, for example being run over by cars or poisoned by rodenticides in new environments in urban areas. I think that it's sometimes counterproductive, and so people end up doing things thinking they benefit animals but they are often placing them at greater risk. (INFORMANT #4)

Another respondent was inclined to agree with the question that was posed, but said it depended on the circumstances. This informant names a number of factors that could justify the intervention:

> I probably, in some circumstances… I would. If it's an extreme drought, I would. I think wild animals are under so much pressure these days from loss of habitat, and that kind of thing, that we do have to support them and sometimes through supposedly natural processes like that. So, again, it depends on whether they're endangered animals. It depends on how severe it is. In mild drought, I'd rather it run its course and was allowed to be just part of evolution and a strong ecological system. I'd rather it was left to run its course. But if it's a severe drought, I think it's justified. I think you have to be very careful how you intervene in that kind of a situation, because you can potentially cause more problems… through disease transmission, if you're feeding animals in close proximity, and also by supporting an unnaturally large population that the ecosystem can't really support. That's quite a difficult question, actually. (INFORMANT #10)

Two other interviewees are undecided. One of them shifts from an apparent initial opposition to agreement that it might be good to do it although there is no political obligation to:

> I: So, in this case would you agree with providing them food?
>
> R: Probably not, actually… Animals are starving all the time. I mean, that's how populations do tend to be regulated. I think if the animals were endangered then I would probably take some

> steps to do something. If they weren't, I think personally if I had the opportunity to help them I probably would, but whether I would say that a government was obliged to, probably not. If a wildlife charity felt it was something they wanted to do, I would probably support them. (INFORMANT #11)

Another informant was not totally decided but tended to disagree out of fear of future negative consequences, expressing a common concern about the risk from animals in the wild being habituated to humans. This interviewee said that there is a tendency to make "decisions that just fix some tiny bits" without a proper understanding of the issues and "without carrying out a risk analysis" (INFORMANT #1). This informant presents an example of what has resulted from a similar course of action in which, after a certain population of animals is provided food, it becomes too large and it is eventually the target of eradication efforts:

> As a result of this there is a pest, a huge reproduction of these animals due to how regulation works in nature. And then, finally, the same ones who fed these animals now exterminate them. It is an incongruity, and it is dangerous for them to think that we are suppliers. If animals are imprinted, that is very dangerous for them, then they will be killed. They may end up locked up or exploited, or killed for being a pest (which is a term we invented).

A different response was that it would be acceptable to aid the animals for preservationist reasons or if humans value the conservation of their populations.

> It sounds good to me, but it is because man values the conservation of certain species and populations. (INFORMANT #8)

Finally, one informant opposed intervention in the case as presented in the question, claiming that in his country, foxes and rabbits are just "pests" (INFORMANT #12).

Population control

Suppose there is an overpopulation of some animals in your area. The city council is considering sterilizing these animals to limit their population. What do you think of this policy?

We found here a positive attitude in general towards population control, although some repondents also make the point that contraceptive measures, or in some cases egg-piercing, would be preferable to sterilization for population control. One respondent agreed with the measure without qualification. In other cases, respondents were wary of the possible effects of this measure and about whether

there is a risk that animals would be harmed. But it is repeatedly argued that this measure would still be better than killing the animals. Some informants make this point: "I'm in favor of such thing, it's more, how to say, more appropriate than shooting them, also more expensive, but probably more appropriate" (INFORMANT #14).

However, some of those who support this measure stated that the reason for the population control would have to be examined. The point was made that the concept of overpopulation is very complex and to a significant extent, constructed by humans and is even unreliable. Another response was that this measure, while being preferable to killing, should be put into practice only when the population issue that is being targeted has increased due to human action:

> If it's caused by human action, then we should try to restore it to the situation which would be there if the human action had not occurred. But if it is not due to a human action, in other words, if there are cycles of populations of wild animals which have nothing to do with humans, in the times when the population increases, we should not try to reduce those populations. (INFORMANT #13)

Two respondents added that this is an issue that should be studied case by case, and that no general answer is possible. Two other informants also thought that the issue would have to be studied case by case, but instead of being undecided, stated their default position would be negative. One of them was reluctant to carry out this measure, but added that

> if the population dynamics had been studied very carefully, and it was a decision made by somebody who understood the population dynamics better than me, then that would be justified but I would be worried about unintended consequences in that situation. (INFORMANT #11)

Finally, the two other informants said they were against this measure, not because they think that killing the animals is better, but because they think that animal populations should be left to regulate themselves. One of them said:

> To sterilize them or not to? Why not let them regulate themselves? Or is it that man has been the main factor in there being an overpopulation of foxes now? It would be necessary to know the origin of the problem, and, concerning sterilization... it depends on the context. (INFORMANT #8)

The other one said that "natural populations regulate themselves with the limitation of their resources" (INFORMANT #15).

Vaccination

Suppose a population of deer is suffering from a painful illness. Your university is considering a research project in order to develop a vaccine that would stop deer from getting the disease. Would you support vaccination of animals for the sake of animal welfare alone?

Responses here are similar to those we saw previously, although the number of supporters is different. Several informants accept this form of aiding animals without adding any further conditions. One of them admitted, however, that she had not reflected a lot about this:

> Yes, I think I would. But to be honest I haven't thought too much about this. It sounds like there would be no harm. You never know what happens, but if there is no harm, I would say yes. (INFORMANT #15)

Another of these favorable responses is unclear because the informant misunderstood the point of the measure as conservation and not animal welfare, despite the question mentioning welfare explicitly. Also, another participant who favored the measure did not consider, at least at first, the possibility of this being carried out to benefit the animals:

> I: You said that you would be in favor of a vaccine to help the deer. If this was not a conservation issue, if we weren't trying to save a particular variety of deer, would you still be in favor of a vaccine?
>
> R: Well, what would be the other reason then?
>
> I: Just to help the deer?
>
> R: Out of empathy. Well, I think you can't take away the conservation aspect there anyway, because if you have a healthy population… if you have suddenly a disease that could spread over time, over the years, over the decades, it might be a conservation issue or if there is something that we can do now, it's good so I think it is a conservation issue anyway. (INFORMANT #14)

Others accepted the measure under certain conditions. Two of them would not be opposed to this measure in principle, but said that we shouldn't be carrying it out without thorough research about all the effects the measure would have. One of them would not know whether to agree or not out of a lack of proper information, and suspects the outcome would be bad, but would not rule out the possibility of supporting it, if after detailed research the evidence backed it as a sound measure:

> In a large part of the interventions, we have such an anthropocentric look and we think that our actions are the best ones, and maybe we are screwing up more than anything else. Not only with the vaccine but also the intervention in the ecosystem, trapping them generates stress for them... I wouldn't really know what to tell you. We would have to assess the study, know what the suffering is, if it is not a measure of population control, like an animal that has an accident, and they can accommodate him and so on, but there comes a time when he dies of starvation because he is not capable of sustaining himself in nature. It would be necessary to see how many animals suffer and if our intervention doesn't cause them to suffer more or doesn't entail that we benefit them at the cost of the suffering of others. (INFORMANT #7)

Two other participants supported the measure unless the disease was purely natural. One motivation for opposing this form of helping animals is the assumption that diseases that have a natural cause can have some sort of ecological or evolutionary role that we should leave alone. One of them said:

> In my heart I would say to treat them, but I think it is not intelligent if it is not an anthropogenic disease, because we save one who should die. (INFORMANT #2)

Another one also stressed the evolutionary role of disease in killing off certain animals:

> I would need to know the cause of the disease. Darwin listed disease as one of the three factors playing a role in evolution and once again it's regrettable, but it happens. (INFORMANT #6)

There was also an informant who agrees with the measure for anthropogenic and for potentially zoonotic diseases, but then, as with other interventions, added that this is generally the case:

> In reality, almost every case where this has been proposed has been proposed because wild animals have a disease which could be transmitted to domestic animals or to humans. I think that in itself is a reason for vaccinating wild animals, so I would be in favor. So, supposing in the UK, at the moment we have tuberculosis in badgers. It was originally brought about by humans bringing bovine tuberculosis into the badger population. So, it was actually started by humans, and I think it would be a good thing if we could vaccinate the badgers in order to minimize tuberculosis in the badgers, not just because it would also reduce the risk of transmission back to cattle. So, I think there are certain circumstances when vaccination of animals in wild populations is an ethically correct thing to do. Then there are other circumstances where it should not be done, or it shouldn't be done without very careful consideration of all the consequences, and that's often difficult to do. (INFORMANT #10)

We can see that this respondent doesn't rule out vaccinating animals for other purposes, but stresses that this shouldn't be done without researching all the

consequences well, a condition that is not brought up when the vaccination program is carried out to save humans from zoonotic diseases.

Another respondent said that he would support studying the issue, but would need to have more information before supporting the actual vaccination program:

> I think it's always good to learn more about these kinds of questions and to have a better toolkit for better vet care or human medical care or science in general. So, I don't see any reason to oppose that.
>
> Before the program were initiated, though, that would actually vaccinate deer, I would have some questions, like I would ask for example whether the disease was endemic in the environment or not. Or whether there was an exotic pathogen. (INFORMANT #4)

The idea here seems to be that vaccination of diseases naturally occurring in a certain area where they have been present for some time already would not require intervention. This is not exactly the same position expressed by the previous respondents, though it is similar to some extent.

Other respondents focused on the aim of the intervention. One of them said that this measure would be acceptable for conservationist aims alone, and another said it would be acceptable if it were either for conservationist aims or for human benefit (for example, to stop a disease from being spread to animals used by humans). This informant said:

> [If] the intention is to protect livestock from catching diseases from the wild animals, and so essentially have a control measure to protect livestock, then I don't think the conservation status of the livestock makes a difference to that. If the intention is to deliberately protect the livestock, sorry; deliberately protect the wildlife against a particular infection that was severely affecting their population, for example, if you were going to, I don't know, vaccinate tigers against, you know, a strain of TB or something that was affecting them, that might be something I would consider if there were a conservation case for doing it, but I don't think anyone would have the inclination or the financial support to vaccinate wildlife for the sake of just vaccinating wildlife unless there was a compelling reason to do so. (INFORMANT #11)

Vaccination is also considered favorably when it targets certain animals about which there are other existing concerns. One informant says that "[i]t could be very useful to vaccinate great apes against measles and against Ebola" (INFORMANT #12). Two other informants said that it would be acceptable for conservationist aims, while if it were for other purposes it would have to be examined more closely. This is similar to a previous response that favored vaccination for human benefit without the restrictions it would have if it were done for the sake of animal welfare.

Deparasitation

Suppose that a certain parasite is causing very significant pain to a population of birds. However, it is not among the limiting factors of that population. Suppose it were feasible to eradicate that parasite. Your city council is considering implementing this measure. Would you support it?

Some respondents supported this intervention without stating any particular circumstances under which they would not favor it. One informant said:

> I would initially say "let's get rid of it if it's causing pain", because I would be looking at the wellbeing of individual animals. So once again we were faced with it in our field work — seeing animals in pain — and we never really did interfere because we really couldn't. But there were times where I would have been glad to put an animal out of their misery especially when you know that doing that is not really altering, much if at all, the social dynamics and what's going on in the population of animals out there. In general, I don't see anything wrong with ending an individual's pain and suffering. (INFORMANT #6)

Another respondent indicated that implementing this measure should depend on the availability of resources to do it:

> Yes, potentially, I would. Again… I think it comes down to resources available. You might prioritize other areas if there's other threats that affect the conservation of those animals, but I think if it's something that's causing harm to individual animals, it should definitely be deserving of support. (INFORMANT #10)

Other informants accept it but express concern that if not carried out carefully, it could have bad consequences for the animals themselves. One argued that these interventions are risky and should be carried out only after a thorough study of their effects. This informant also argued that these interventions are very difficult to carry out successfully. They are expensive and, therefore, typically considered not worth pursuing:

> Not without a study of the environmental impact first, it would be necessary to see what the ecological cycle of parasites is, as maybe these might be important for something else, or perhaps those birds fed others... We should consider the short and medium term effects, many [cases of animals becoming] pests or invasive disasters have been caused by good intentions but without considering interactions...
>
> I would say that deworming is not very possible because parasites have cycles in different places. There are direct and indirect cycles. To eradicate parasites with an indirect cycle, you'd

> have to break the cycle, which is very difficult and very expensive, and it is not believed to be a priority.
>
> Parasites with a direct cycle are easier, although you have to medicate the animals. You can give them the antiparasitic but you cannot verify the dose. You have to spray the grass and animals cannot eat it. It is difficult even with domesticated animals because of the eggs [of the parasites]. (INFORMANT #2)

Another informant is, however, more optimistic towards the future, and says:

> it would be necessary to try to regulate the dynamics of its populations and if there was no other solution, to use poisons, medicines, such as those that kill bacteria. But what will happen in the future, and I do not see this very far in the future, with our advancement in knowledge, we will be able to regulate the predator population and the prey population without the prey or the predator suffering, because the parasite is still a specialized predator. (INFORMANT #9)

One respondent, while not opposing the measure, pointed out significant risks involved in the use of wide range antiparasitics, and advocated for narrow range ones:

> [I]t is necessary to be very careful because [the antiparasitic] is released in nature and it has many effects. If an antiparasitic is used, it has to be one of a very small spectrum for that disease and one that is not active in the environment for long... and there are few of those. A broad-spectrum antiparasitic used in livestock, Ivermectin, is used massively. If we go too far using it, it not only kills the individual's parasites, but when the individual defecates it, it eliminates the antiparasitic in the environment, and it goes into the ground and thus, the beetles that break down the feces and generates compost are no longer present in the ground [as the antiparasitic kills them]. This generates prairie degradation, deforestation, loss of organic material, etc., simply because of Ivermectin. Then you have to keep in mind that allopathic treatments kill, so you have to be very careful because when it is released in nature, it has many consequences. (Informant #7)

Another respondent who had concerns about the expense of the measure said that unless there were some benefit for humans, the intervention should not have priority over other uses of the money spent on it. This comes not from believing the intervention would be wrong, but that it would not be as important as other aims.

> Er, possibly. I think I would have to question whether resources are best spent dealing with that particular animal population as opposed to another situation. There are limited resources and finances available to different countries, so if wildebeests are suffering from a particularly horrible parasite, it wouldn't be something I would feel a strong compulsion to try and solve and eliminate. If that parasite was being transmitted to cattle and therefore affecting the

> economy of farmers in that area then I think there might be a justification for it, but… well, we can't even eliminate all human suffering, let alone all animal suffering. (INFORMANT #11)

One respondent said that in examining this form of intervention, we should take into account whether the parasites are sentient. In addition, this informant rejected helping animals in this situation if it is due to purely natural causes, though at the same time regretting the harm suffered by the animal:

> I am more concerned about sentient organisms than animals which are not sentient. So, if you considered the word parasite, there is a vague border line between parasites and predator, so there are animals which are predators of other animals, but they happen to be smaller, and sometimes we call them parasites, but they may be viewed by almost everybody as just as important as the animals which they are attacking. I am not against predators, and I'm not against parasites per se, so I wouldn't feel that we should try to eradicate parasites as I was saying in relation to pathogens as well. It depends on the animal and the amount of suffering. I'd like to reduce the suffering, but I think if it is a wild animal, I don't think it is our business to reduce the suffering in that animal, and I would be opposed to do it, if it was just entirely a wild animal. (INFORMANT #13)

Another informant found the question too difficult to respond to because of all the issues involved. This respondent feared that it might have side effects for the host animals who are parasitized:

> At first yes, it will alleviate suffering in some way to end this form of parasitism, but we also have to be very careful. Because even in our own species, we ended up with parasites but now we are full of other things because the parasite is missing. Including allergies, for example, for us. Then we take some remedy for the allergy... These parasites may have co-evolved with this species of bird and what we are seeing as a parasitic load can actually be up to a certain equilibrium. Of course, everything depends on the focus. So, if I'm thinking about that animal, I'd try... but it's a complex question to answer yes or no. (INFORMANT #3)

Another informant who was also concerned about the impact of this measure said, "I would be very concerned about the eradication of a parasite in a population if it was doing little harm" (INFORMANT #12). This respondent said that reducing the suffering of the affected animals would be a good reason provided that it has no effect on the host population, but implying he would not do it himself:

> If you could do that without any impact on bird populations but you reduce suffering, then I would be very happy if someone else wanted to do that.

One informant gave a different kind of answer, saying that in the case of disease he would intervene only if it was not an endemic condition:

> For this one I would give the same answer as the last one. I would like to know where this parasite came from, if it's something people introduced in this population. Is it endemic? Is it blowing up because of the way we are changing the environment, for example? That would make it more prevalent. Would that affect the future of the population even if it doesn't kill animals? Does it affect their ability to breed? That sort of thing, to find shelter and food? I would like to ask these kinds of questions.
>
> If the answer to any of those questions would be this is an exotic thing, this is something people brought in, something that will affect the population in the future, then all options should be on the table. (INFORMANT #4)

Another informant would support it, but for the sake of the conservation of the population of the animals:

> R: would say that to put efforts into parasites or diseases that have an impact on population I would always try to put my efforts where it's the most needed. I was thinking of the white nose syndrome with bats that is killing a lot of bats in the US, for example. So this is something I would definitely put my effort in compared to other parasites or disease that does not harm them. If there is maybe money or resources left I'd put efforts to eradicate these diseases, but I would say first concentrate on the most harmful ones.
>
> I: By "harmful", what do you mean exactly?
>
> R: Like for example diseases or parasites that are killing complete populations, so one example is the white nose syndrome which is destroying populations of bats, and you can really see how it was travelling around the coast in the US, so I would say things like that are killing populations… so it's maybe more in the level of the populations rather than the individuals. (INFORMANT #15)

The last respondent would not support this measure except in some very specific cases where it would help human beings:

> I'm pretty sure I wouldn't. And again, it's going to depend on the specifics… I think that the moment that you start intervening in nature and tinkering with stuff, we assume a kind of responsibility for changes... First of all, it's incredibly hubristic to think that we can alleviate suffering in nature. And I'm not clear that we can do that because I think it's just part of being alive and dying that there's some level of suffering. We can reduce it by lobotomizing ourselves or others. We can do that chemically or we can do that physically or what have you, but basically, death is not pretty. It's not good for us. It's not good for other people, for other animals. It's not clear to me that we can do away with it entirely, unless we mess with the psychology in some way of entities.
>
> But beyond that, the moment we try to mess with a system, we take responsibility for any outcomes, good or bad, associated with that system. So it's conceivable that we would alleviate suffering among birds, and thereby they would continue and persevere absent that suffering. So all we do is remove the suffering.

> But much more likely is that we would shift the order of things, whether natural or unnatural, and in shifting the order of things, we essentially take responsibility for any follow-on suffering, just by virtue of our intervention. So that's a huge burden to carry, and it's not one, I think, we should carry. So yeah, I'm pretty sure I wouldn't advocate in favor of that, unless there were some very, very significant and strong reason, probably anthropogenic or anthropocentric reason to do that, like for instance, it really affected a lot of people, as well. That sounds like a weird thing to say given that I just basically rejected the idea that our ethical obligations to nature or ethical obligations to one another can be rooted in concerns about human interests, but I do think there are some times cases where... And I can't think of one with birds and parasites, but where we should or are at least permitted to intervene, if it's the case that it will do harm to outside populations, humans or otherwise.
>
> I can come up with a scenario that's completely hypothetical, not that I'm averse to coming up with a completely hypothetical scenarios. That's my bread and butter. I mean, I would say no. (INFORMANT #8)

The argument here would be that we shouldn't change the natural course of things in the wild, although exceptions can be made if humans are affected.

Other forms of intervention

Besides sheltering, feeding, sterilizing, vaccinating and deparasiting, are you aware of other possible ways of helping animals living in the wild?

Most of the informants took it for granted that habitat conservation is positive for the welfare of animals, and indicated this in their response. There were only a few other ideas mentioned by some of the informants:

- Carrying out research on urban ecology as a way of learning how to improve the situation of animals living in places close to humans (we will see more about this later)
- Rescuing orphaned animals
- Building shelters, which could reduce conflicts between animals who would otherwise fight for dens or other hideouts

Another one considered that in the future, the use of surveillance cameras might be helpful to guard populations of animals. Finally, though not an actual intervention, education was mentioned by some scholars as a way to raise awareness and teach others how to best help animals.

3. Interests, opportunities and barriers for research about ways to help wild animals

Assessment of the research on the situation of animals in the wild from the point of view of their welfare

Suppose your university is planning to research about the welfare of animals living in the wild. What are your views on the issue? Do you consider this a relevant topic of research?

None of the informants expressed opposition to researching wild animals from the point of view of their welfare. On the contrary, there was a general consensus in favor of it. Some of the informants simply expressed approval without explaining the reasons for it. Others indicated that gaining more knowledge is generally good. Another idea that some informants share is that acquiring such knowledge might also be useful because we might want to apply it at some point, even if we still don't know when (this can be considered similar to basic research). One informant indicated that a "university must be a free environment for studying opportunities" (INFORMANT #3), despite lamenting that this is not the case due to the difficulty of challenging prevailing paradigms, a point we will come back to later.

Another response was that acquiring more knowledge about the circumstances affecting animals in the wild can be very important for informing public policies related to this issue:

> I'm involved in research on animals in the wild, so obviously [I'm] supportive, in principle, of that. I think it's very important that any form of policy, particularly animal welfare policy, is based on evidence, and the best evidence we have. So science and research is very, very important in forming that policy. It's not the only thing that should inform a policy, obviously. Judgments come in as well, but I think it's critical that we are able to conduct research on wild animals, so that we can improve our understanding. (INFORMANT #10)

However, although they all support it, such research is not currently being done. Part of the explanation for this discrepancy is, again, informants who accept this research but aren't responding properly to what they are being asked, some because they don't know what wild animal suffering is, and others even when they do. As we have seen already, some of them have in mind the study of animal populations and their conservation instead of animals' suffering and wellbeing. The significance of "wild

animal welfare" does not have much meaning in this discourse, and that void tends to be filled with the meaning of population or ecosystemic relations:

> About the welfare of animals living in the wild? Erm, that's… I'm not sure what that question means, in that animals living in a wild situation, studying their population and behavior is an interesting thing to study. I think studying the consequences of climate change or man's impact on those wild populations is also something that would be interesting to study. Is that what you meant? (INFORMANT #11)

When the initial question is rephrased and explained, the response of this informant focuses again on ecosystemic relations and population conservation. Such a departure from the actual meaning of "welfare" to refer to populations is not uncommon, and is also present in the literature (Stephen & Wade 2018).

This informant, after pointing out that research could be harmful for the animals themselves, nevertheless ends up supporting research, not for the purpose asked in the question, but for the sake of habitat conservation.

> I think there's lots of things you could study about the wildlife, sorry, the welfare of wild animal species. I think it's probably difficult to do those studies without having an impact on the animals themselves, you're going to have to start trapping them and testing them. Doing it with a goal beyond just wanting to know about the welfare of the animals I think is probably important. Identifying a potential problem, for example, that is going to have an impact and then possibly being able to do something to rectify that… we'd be better off investing the money in maintaining their habitats.

There is also a discourse that more clearly defends ecosystems, and not the welfare of the animals, as what matters, indicating that "[t]he challenge is habitat management" and that "[i]n the same way that you manage your stable, you can carry out an equal management in nature" (INFORMANT #9).

In other cases, it is not clear whether they have correctly understood what they are being asked, because the answer given is compatible both with an adequate understanding of what wild animal welfare is and with its confusion with conservation purposes. For example, another informant simply says: "You have to let nature take its course, but any advance in knowledge is important." (INFORMANT #8)

More importantly, both these informants and all the others, including those who understand what wild animal suffering is but oppose intervening to reduce natural harms, agree with carrying out more research regarding how this could be done. There is a difference between attitudes towards intervening in certain ways to improve the welfare of animals in the wild and attitudes about researching welfare and how it can be improved. This is illustrated further in the following sections.

Perceptions of academic interest in studying these kinds of interventions

Thinking about your institution and colleagues, do you think there is an interest in doing research on rescuing, feeding, sterilizing, vaccinating or other ways of helping wild animals?

Responses to these questions are again quite favorable, though in part because some respondents again have other things in mind, such as populations, communities, and ecosystems, instead of individual animals. For example, one of the experts answers this question affirmatively, but indicates:

> I think there is a real interest in trying to rehabilitate the environment in some way and also ensuring that natural spaces are less messed up. And presumably, all the individuals in those spaces are better off, where better off is not wedded to an idea of suffering. (INFORMANT #5)

Another informant, one of the biologists who interpreted wild animal suffering in terms of ecosystem conservation, pointed out that these issues are not studied among biologists and assumed that "no doubt they are at the veterinary school" (INFORMANT #9).

Among those who understand the concept of wild animal suffering, responses seem to be positive. This is more so, again, among veterinary scientists. One of the informants answered that there is currently momentum for wild animal welfare issues among veterinarians: "I think it is growing; there are more and more veterinarians working in wildlife" (INFORMANT #2).

Another veterinary informant confirmed this, stressing in particular that this is an interesting issue to students. He added that, despite this, there is currently little funding for such research. But he mentioned an exception to this: the vaccination of wild animals against zoonotic diseases, which receives funding because potential harm to human beings is at stake:

> There is an interest. I have been working in a veterinary department, and there is a very great deal of interest amongst veterinary students in the welfare of wild animals, diseases of wild animals. These are things which are of great interest to quite a high proportion of veterinary students, so there's a lot of interest in it, and there's very little funding for it, there's very little money available for doing this. But there is certainly interest, and I have colleagues who do this kind of work, mostly looking at diseases. I mean, we have a big epidemiology group working here who are looking at zoonosis, where wild animals have diseases which can be transmitted to humans or can be transmitted to animals which are used by people. (INFORMANT #13)

Finally, one of the scholars in environmental studies also mentions how he has seen an increase in interest about possible interventions benefiting wild animals, but mainly due to an interest by students, reinforcing the idea that young people may be the main drivers of a shift in concern about this:

> [T]here are students increasingly interested in this kind of thing, so some of this work… so I think the faculty have been supportive of projects that have emerged like that, but they have primarily emerged through graduate student interest. (INFORMANT #4)

This informant also makes a very relevant point when he explains the following:

> I see the interest coming from graduate students, from people that are kind of coming up, so I don't see that waning at all. If anything, I see that increasing. I think part of this is related to, and if I could kind of draw a connection related to my own current work, is related to the growth of urban ecology as a field. And just the fact that, and we don't have very good data on this, but we seem to have more wild animals in American cities than we have had in a long time. And I think that people see more, see more charismatic creatures in places where they live and work, suggests that there is going to be an increasing interest in the welfare of those creatures in the future and more attention given to resources to study them. We are seeing a little intersection there between animal welfare and wildlife management in the development of urban ecology as a field.

This is an important remark because intervention to improve the situation of wild animals in urban environments, in addition to being attractive to some young researchers as indicated here, appears to be relatively immune to most of the objections presented above to different forms of aiding animals. These animals live in environments significantly transformed by humans. In addition, many of their populations are already being studied and managed for other purposes. Researching how to do so for the benefit of the animals seems promising. Another informant agreed with this, saying: "[w]e should know more about these animals [wild ones living in urban ecosystems], which are to some degree dependent on human activities" (INFORMANT #13).

Assessment of the opportunities for research on this issue in the future

Do you believe that any of these forms of intervention has a chance of being researched in the future?

Most informants responded positively to this. In certain cases, this is stated without explicitly specifying further conditions. In some, particular examples are mentioned. Setting aside those cases where the question is not properly understood, examples of lines of research include the following:

> Yeah. I think so. I think fertility control is probably one of the areas that we're lacking good methods for. That's something that's definitely, well that's a focus of research already, but is likely to be the focus of more research in the future. I also think vaccination as well, vaccination delivery is a particular challenge in wildlife. I think that's an area of research that's very deserving of attention and likely to get more attention. (INFORMANT #10)

External incentives are mentioned by several informants as key to achieving this. One informant claimed that in general, among professors there isn't a "genuine interest" moved by an ethical concern to study these issues, but that they would do it anyway if they have external incentives. This informant said: "I believe that there is a possibility that this will be researched if there is pressure to do so," and also that "[m]any people would have an interest in seeing if a vaccine saves an animal, but not to help them but to have the prestige of being experts in that subject" (INFORMANT #1).

Another idea that appears in some discourses is that research in this field may be funded especially in those cases where a connection is seen with some human interest:

> Yes, it is being researched, and there will be more. I think there will be more research in some of these areas, there will be more funds for it, but the places where there would be more funds are in particular the ones where there is a risk for humans (INFORMANT #13)

Perception of barriers to research on this issue

What do you think are the limitations or constraints, if any, to researching forms of intervention in nature to help animals?

The main obstacle indicated is the lack of funds to conduct research. This is something that most informants point out. One of the respondents related the availability of funding to political will and public support for certain purposes:

> Well, OK, let's say we start with the political will and the public opinion, if those are in favor or if there is money. If there is money, there are PhD students, post-doc students who go out into the field to conduct such research. So, let's say money is the thing that makes things move, but if the money comes in for such projects, depends on, as I said, politicians and public opinions. (INFORMANT #14)

A veterinary scientist pointed out that interest has mainly been in domesticated animals, which has resulted in few funds being available to work on animals in the wild. This respondent fears that this will continue to be the case:

> I've gone for many years applying for funds to do animal welfare research and I almost never got money for anything to do with wild animals. The only money or anything to do with wild animals was where there was a link to humans or to animals which are used by people. So, it was a very big limitation, and it was an area that I was personally very interested in, and it was very hard to get any money to do work in that area, so that has been for me personally a great limitation. There were lots of things that I'd like have done which I couldn't do relating to the welfare of wild animals. There are published lots of things on the welfare of wild animals, but it's very often based on a relatively small amount of information, sometimes just basic biology information rather than animal welfare science in itself. So, it has been very difficult for anybody who was interested in the area to get any funds to do that sort of work, so I would guess it would continue to be difficult. (INFORMANT #13)

This indicates that there is more public interest in animals used by humans than in those living in the wild, which is reflected in what public administrations are willing to fund.

Epistemic obstacles were mentioned too, due to the high complexity of ecosystems and, as a consequence, the difficulty of making predictions of the effects that interventions might have. This problem, raised by several of the informants, is expressed in the following response:

> Any kind of research with wild animals is more challenging, because it's a bit unpredictable, because you can't create controlled studies or randomized studies, so that limits the kind of

> inferences you can make from that kind of research. It's logistically much more difficult to work with wildlife, because by nature, they're wild, and they're not in a controlled environment. (INFORMANT #10)

This leads this respondent to point out that for any kind of intervention in ecosystems, "there's an element of unpredictability, because we don't understand the whole system very well." Another informant who shares this view concedes that this doesn't stop us from intervening constantly, when she points out: "acting on some part may have consequences that we are not aware of, so sometimes it is better not to intervene... although the truth is we are intervening all the time" (INFORMANT #7).

The last sentence of this response raises concerns about our epistemic limitations and the risks of implementing measures that could have unforeseen effects. However, the complexity of ecosystems and the difficulties in making reliable predictions are not present only when we want to research ways to improve the wellbeing of animals. The same problems are addressed by those who do research for conservationist purposes or environmental management for anthropocentric purposes. This means that such research must be carried out very carefully, not that such research cannot be carried out. A key precaution to implement would be, as some respondents indicate, that monitoring should be a key component of programs to help animals in the wild. But this same approach should be taken for interventions carried out for conservationist or anthropocentric reasons; this is not a limitation for the study of the wellbeing of animals alone. Regarding this, one of the informants who was not worried about wild animal suffering nevertheless pointed out that it could be examined. "Everything can be suitable to be researched", she said, as long as there is funding for it (INFORMANT #7). There is no intrinsic limitation making it impossible to study the wellbeing of animals. However, doing so will depend on whether such research gets the funding it needs, and limited resources are allocated to the issues that are considered important. So if neither scientists nor those funding them regard wild animal welfare an important field of research, then it will not be researched.

This suggests that the key obstacle, mentioned by several informants, is the prevalence of a paradigm in biology that does not give much importance to animals as individuals. We have seen many examples of this already. Some of the responses to this question also indicated this. One informant showed it not by actually stating it, but by giving a response that exemplifies the prevalent paradigm. When asked about interest in research about ways of helping animals, they stated:

> The word "help" is one I don't like here, and wild animals, I do not know which ones they are such. But okay, wildlife… well yes, obviously anything that has to do with nature conservation seems good to me. (INFORMANT #8)

This response doesn't recognize that the issue is with helping wild animals, and she gives a response in terms of conservation. Another relevant indicator pointing to lack of interest in this issue can be found in the fact that the response rate was so low. A very straightforward explanation of this is that the wellbeing of animals is not an issue many biologists find interesting. One of the respondents with a concern for individual animals explicitly addressed this, saying that as biologists they have been trained to focus on populations or other broad entities, like ecosystems, instead of on individual animals:

> We're most of the time trained to think of populations, bigger pictures always, how to protect populations, and maybe eradicate other populations that may be a threat to endangered species or something like that… We sometimes forget about individuals and get lost in big numbers. And I don't think it would be so difficult to do it to be honest. (INFORMANT #15)

This helps explain why work in biology assessing what is positive and negative for animals is not carried out by any of these scientists. But it also indicates that this kind of research by others may not be well regarded among biologists. This informant also identified this attitude as a main challenge to research on animals' wellbeing being done:

> it seems that it's kind of like a bit of an assumption among conservationists that if you think about individuals… you might not be objective anymore, you might be too emotional, so I think it could be a bit more about this, how do you say, this stigma.. that even if you care about an individual animal or animal welfare, you're still a good researcher and you don't become too emotional about it, you do your research, you use your data, you're as objective as you should be as a researcher, but on the other hand I would add no research is really objective because we all put our values into our research.

These two responses indicate that, although a few biologists are interested in the wellbeing of animals, this is not reflected in scientific practice. This conflict is also addressed by another informant:

> [F]or the last hundred years, people have tended to think of wild animals in terms of population, not as individuals, in the way that we manage and think about them, but I do think, there's always been an increasing concern for individual welfare of wild animals as well. This is hard to integrate with the traditional view of wildlife management, as managing populations and conserving species. (INFORMANT #4)

This informant gives a more detailed explanation of how, although this interest has been growing, it does not have an actual impact yet because those influential in the field are aligned with the mainstream paradigm:

> I would say that in every period that you look, there are prevailing ideologies, and ways of thinking, prevailing institutional arrangements, prevailing intellectual frameworks that enable work, good work, to be done in some ways, but also prevent other work from happening and potentially creates blind spots as well. And so, I think we could name a lot of these different episodes or moments. For example, the fact that over the last several decades, conservation biology as a field has paid very little attention to individual animals or animal suffering, is an example of that. I think that, I'm trying to say at any particular moment, people wanting to forge new ideas have significant institutional, intellectual, cultural, political obstacles to overcome. So I think it's the job of the gatekeepers to try to open some of those gates, and I try to do that with some of my work and some of these students. So, that's a very vague, kind of general answer. In terms of more specific answers, I think that students, for better or worse, tend to flock to funding. I'm not a big supporter of allowing dollars to shape your intellectual agenda, but it's reality. And so, to the extent that students can see that there's — and I think that people read different things into that — when students see funding in an area, they think it's an area that has a future for them, and that they can really make a difference... So, I think to the extent that resources can be provided to do this kind of work, I think you'll see more students being interested in it. Kind of circling around to something, which is that wildlife management, I think, for a long time, was drawing from certain kinds of people. It was mostly white, mostly male, people who grew up in a rural environment. That's changed significantly over the last couple of generations, but the gatekeepers, the people that are the heads of these institutions, whether they be wildlife management departments, or whether they be state agencies or whatever, are still those people, so I think there is significant change, generational change going on, but that the institutions and the departments haven't fully responded to that yet.

Another informant responded to the idea of research about welfare: "it sounds great. I want to know more about what they mean by welfare. If we're talking about their happiness, I don't know how they would start researching that" (INFORMANT #5).

In addition, the obstacles related to the prevalent paradigm in scientific practice are not there only for biologists. Problems of a different sort are faced by animal welfare scientists:

> I think that it is a problem within the scientific community, that the things which get the highest amount of credit for people in universities or other research institutions are being able to get funds and publish papers in high profile journals, which are going to be cited by a lot of people. In general, animal welfare research is not cited very much, so that's not very high profile at all, and animal welfare where the animals are wild animals probably would be the

> less interest, unless there is something that has a major conservation aspect which is high profile in the eyes of the public. (INFORMANT #13)

This response points to two obstacles. One is the general lack of concern for animal welfare among scientists, resulting in a lack of academic prestige from working on it. The other is that wild animal welfare has not been considered very relevant among animal welfare scientists. Still, this obstacle might be less difficult to overcome than some of the others, as it doesn't have to do with not considering individual animals but with the kind of individual animals that are considered.

There is one final point about the suggestions the respondents made for overcoming the obstacles we have seen. One of the biologists said that in light of the lack of expertise she saw in her field about assessments of the wellbeing of animals, "it becomes more important to work interdisciplinarily" (INFORMANT #15). This informant also suggested that it would be desirable if there were more initiatives for biologists who are interested in animals as individuals to have their views discussed, especially given that they seem to be a minority:

> there may be conferences, maybe small conferences where conservationists who are also interested in animal welfare come together and share ideas and support each other, and maybe platforms where they can share their kind of view about animal welfare.

One of the biologists also claimed that it would be positive if biologists started to consider animal welfare science in relation to their work, saying:

> I think it would be great if there was a group that studied this. Usually the term "welfare" is associated with a different context... but... I don't see any problem. (INFORMANT #3).

The idea here seems to be that animal welfare is usually examined by veterinary scientists working with domesticated animals, but that it could be meaningfully included in biological research as well.

Another informant also recognized this lack of familiarity with animal welfare, and indicated as a cause the fact that animal welfare is currently not included in university curricula. She said that it would be necessary to provide such training:

> the point is that this is difficult because it is not in the curricula. We are poorly trained in animal welfare... it would be necessary to start to provide training in animal welfare, and it should be transversal (veterinary degree, biology...). (INFORMANT #7)

This idea is echoed by another informant who also adds that it is more productive to invest in the training of new generations of scientists than in those with established

careers who are less likely to change their approach to their work. When asked about the obstacles for research on ways of helping animals, he responded:

> I think that it is essentially the state of the training of biologists, essentially. Because you find a lot of this idea of nonintervention, of letting nature go in the right direction, letting it fix itself... I think this is the first thing that must be changed, this basis of thought... I really believe that we need people who are willing and convinced about this for this to start moving... and you need to invest in the youth, essentially. Because people with established careers have little desire and little movement space. But the young people who attend the laboratories of these elders are all eager for new things, for working on different things. (INFORMANT #3)

Finally, another biologist pointed out that encouraging research among fellow biologists about animal welfare is feasible and indicates that he has already had some success in getting the attention of other biologists by arguing that the state of animals' welfare influences how they behave, and thus the validity of the data collected from them (Linklater & Gedir 2011; Walker et al. 2012). Biologists would thus need to pay attention to animal welfare even if only for the sake of the soundness of their research: "[t]he big picture view is that the database is more reliable" (INFORMANT #6). Although increasing concern for this would not mean increasing concern for the wellbeing of animals in itself, it can eventually promote it indirectly.

Limitations of this study

This study has faced several limitations. The first one is that very few people responded to the emails we sent (the rate of interviewees per contacted people being 3,89%). This probably affected the kind of responses we got from them. Those who responded are likely to be more open to talking about the question of the welfare of animals in the wild, and this means their answers might not be representative of how other biologists or veterinary scientists would have responded. Saturation was only achieved in some cases. Still, it might be representative of what biologists and veterinary scientists who are more likely to be interested in the welfare of animals in the wild think, which is also useful for the purpose of this project. Nevertheless, not all the interviewees shared a view that was favorable to the consideration of the interests of animals. The attitudes of the informants towards the interview itself show this to some extent. Some informants said that they found it interesting and challenging. For instance, one of the respondents said that "these questions you've been asking are really interesting" (INFORMANT #4), a remark that was also made by another informant who added that "[i]t's also good to reflect about such things. So, it was also a nice challenge for myself to get in there for a little bit about such questions" (INFORMANT #14). However, one respondent said:

> I found the questions really scary. I think I responded according to my training, according to how I should think as a conservationist. It's really a conflict there, for me. I think I haven't clarified it probably really for myself, so I think the question may lead people to think more about this. (INFORMANT #15)

Then, another informant had a bad impression of the interview:

> So, the whole basis of many of the questions has been that it's useful for us to directly intervene in very small parts of ecosystems. And I think that usually, although society often wants to do that, the effects of those in the long term are often very negative. As most of your hypothetical questions have been based on that premise, I've not found the questions interesting or useful in terms of stimulating a conversational pool of thought. (INFORMANT #12)

These observations are indicative of something that many of the responses have shown, which is that the attitudes towards the questions were fairly diverse, which suggests that the limitation we are discussing, while present, is not a radical one. Another consideration is that the scientists we interviewed are also diverse with regard to the time they have been working in their field of expertise (ranging from around 10 to 30 years). However, the time that informants have been working in academia did not appear to affect the kind of attitudes they showed. The differences have more to do with the culture, knowledge, and value paradigms that are prevalent in each discipline, and accordingly with the prevalent way of understanding what its object of study really is.

In a different study reaching a larger number of scientists with different areas of competence, this concern might be less relevant, but given that we only interviewed 15 scientists, our conclusions on the basis of their views may not be representative. This is certainly a concern, but given that we want to get an idea of the kinds of views throughout the field, it may not be an important limitation. In addition, some of the people we interviewed were leading experts in the fields of animal welfare and compassionate conservation.

Also, the fact that many of the respondents did not know what wild animal suffering or welfare is and responded to the questions thinking that they were about conservationist aims is a problem, because it has impeded our ability to get additional information from them, or the information we got was distorted. However, this has also been helpful in demonstrating the large extent to which natural scientists are unfamiliar with these concepts, which may also have been a cause for the low response rate of the scholars we contacted. Despite all this, we did get some useful information from some of the scholars who were unfamiliar with the concepts.

Finally, an important limitation is that, even though we often reached the level of saturation at which no further information was gained, there were many ideas that it appears some of the interviews did not saturate. This is probably due to how new this issue is to many scientists. We thus think that with more interviews we might have been able to gather more useful information, although due to resource constraints, and considering especially the low response rate, we opted to limit it to 15 interviews, which we expected to be a suitable number for the purposes of this study.

Conclusions

This study has shed light on a number of issues related to the attitudes of scientists towards reducing wild animal suffering. We will now examine the most important ideas that can inform our efforts to promote research in this field.

Understanding of wild animal suffering and wild animal welfare

We saw that many scholars, especially — though not only — biologists, still don't understand what wild animal suffering, or even what animal welfare actually is. Two factors will need to be taken into account in order to promote the study of this problem in academia.

There is a lack of familiarity with welfare science animal among biologists

We have seen some relevant differences between some of the responses from veterinary scientists and from biologists. We might think that this is due only to their having different sets of values concerning the wellbeing of animals — it has been argued in the literature by a biologist (Zemanova 2017) that biologists currently lack training in animal ethics. However, the differences here are not just about ethics but extend to perceptions about what animal welfare actually is. One thing that influences the views of biologists is that they have a significant lack of familiarity with animal welfare science.

In light of this, it seems that increasing awareness and familiarity with animal welfare science appears to be an urgent need in order to promote any kind of work that seriously considers what is best for animals as individuals. One way in which this could be promoted would be by providing training in animal welfare science to biologists, given that such training is not present in university curricula.

Veterinary scientists may lack an understanding of wild animal suffering

Unlike the biologists, the veterinary scientists we interviewed displayed a knowledge of environmental factors and the ecology of wild animals, so they do not seem to have a symmetric lack of familiarity with the contributions of biologists. However, some of them were not familiar with the idea of the suffering of wild animals, even if they were with the notion that domesticated animals do suffer. We hypothesize that the following factors probably play an important role in this:

- The influence of the prevailing paradigm in ecology on other natural sciences (which explains why veterinary scientists are well aware of the basics of the science of ecology, while biologists are not aware of the work of veterinary scientists).
- The fact that competence in animal welfare cannot be taken for granted among veterinary scientists (Beausoleil 2016) — although their competence on this is usually much higher than among biologists.
- The focus of the science of animal welfare to date on the situation of animals used by humans, especially on those kept in farms.
- The influence of one conception of animal welfare which defines it in terms of the possibility for animals to display their natural behavior (Hewson 2003), as opposed to one formulated in terms of sentience, or mental states (Gregory 2004; Broom 2014). Such a view could lead some veterinary scientists to believe that no welfare issues can take place when an animal is living in the wild. This can potentially drive the focus away from suffering.

This lack of familiarity with wild animal welfare is nevertheless less pervasive than the case of biologists. Although some veterinary scientists lack this awareness, many others are competent in animal welfare and could potentially work on wild animal suffering. However, these scientists will also be under the influence of the factors mentioned above. Due to this, in addition to making work in wild animal welfare more visible, it seems relevant to challenge the conception of animal welfare in terms of natural behaviors, because an animal can be behaving naturally and be suffering. While assessments of wild animal welfare is just a part of the kind of work that will be needed in order to examine the conditions under which animals do better or worse, it will be a crucial part of it, and promoting it can get more animal welfare scientists involved.

Attitudes towards different ways of helping animals in the wild

The study of perceptions and attitudes provided us with several useful ideas about how to best promote work in this area, although not in a straightforward way. Since this is a qualitative study, it is not our purpose to quantify the degree of support expressed for each intervention, but to gather useful ideas about perceptions and attitudes towards them. But we can point out that this study has not indicated a significant difference in the support that the different interventions may receive. We saw that population control was generally approved over killing, but this did not always mean support for the measure itself. Several informants said that they would need to know more about the circumstances, and others thought it is not a measure that we should carry out, even when they considered killing worse. Rescuing animals in cases of disaster, providing them food in such cases, and vaccination got similar levels of support, with deparasitation getting just slightly less support. What we saw, in fact, is that the informants' responses towards the interventions tended to follow similar patterns, with only some variations from certain interventions to others.

Also, we didn't receive many suggestions of other possible forms of helping animals in the wild, and the ones we received were not repeated by others. We got one suggestion concerning work in urban environments, which we will discuss below. Although this is something we were aware of (Horta 2017), we did not include it in the interview script, and we think it would have been fruitful to do so. We included it in the subsequent quantitative study we carried out after this one, based on its results.

Other suggestions we got concerned the criteria for choosing a promising intervention to begin working on. The following appear to be the most relevant ones:

Forms of helping animals in which there is also an interest for other reasons are more likely to be supported

Types of intervention that improve the situation of animals and in addition attain other aims that scientists, politicians, and/or the public see as important are likely to get support in a way that other interventions will not. Vaccination was mentioned several times as an example of a promising intervention, because it is one that in addition to aiding animals can prevent the spread of diseases (a) with zoonotic potential or (b) that are more likely to cause economic damage for animal industries.

Further advantages of such interventions are that they have already been carried out for a long time, so there is abundant literature about them, a track record of successful interventions, and many experts on it already.

The challenge here would be to achieve a shift in the aims with which such work is carried out, for it to be applied in cases where it primarily benefits nonhuman animals. Just promoting this research in a way that doesn't promote assessments of the welfare of wild animals would not be promoting welfare biology.

Specific and well monitored cases are more preferable

Concerns about epistemic limitations and risks drove some respondents to mention the need to properly monitor the effects of our efforts to help animals. This sounds like another feasible way of proceeding, one that should be incorporated in the programs at the planning stage.

Forms of helping animals in which there may also be indirectly anthropogenic factors involved are favored

We have seen that many of the informants are wary about intervening in nature when no anthropogenic circumstance is present. This concern can be less important, however, in the case of ecosystems significantly modified by human action. Two types of cases were mentioned where the harms are natural but the circumstances are conditioned by human action. One type is interventions to improve the wellbeing of wild animals living in urban environments. These animals suffer in similar ways to animals living in the wild. Helping them is a clear example of a form of intervention that can aid many animals without significantly transforming natural ecosystems. The second type is interventions to help animals suffering due to weather events, because we currently can't know the extent to which they are due to human action. A further advantage of these two types of cases is that they can satisfy one or two of the previously mentioned indications. This is because, for reasons that may be anthropocentric or conservationist, urban ecology and weather effects on animals are receiving a growing amount of attention. Also, interventions in urban environments are easier to monitor than others, in part because of where they take place.

Barriers and opportunities for work in this field

We can now consider the perception of the interest that currently exists towards investigating how to help animals living outside human control (in the wild and elsewhere), and of the obstacles that this research might face. This is a field that is receiving very little attention at present. Given this, the assessment carried out by the respondents struck us, initially, as very optimistic, even taking into account the confusions that we have seen about the aim of such research. This study has also identified some important barriers to it, the most important one being the currently prevalent paradigm in biology. The level to which this paradigm has entailed a lack of concern for the wellbeing of animals has been extensively reflected in the literature (Soulé 1985; Rolston 1992; Foulton & Ford 2001; Driscoll & Watson 2019). Until several decades ago, the prevalent view in biology tended to recognize only the promotion of human interests as a sound final purpose. Currently, it recognizes conservation and preservation as respectable aims, but not the consideration of individual animals. This paradigm is not just a methodological one, but rather one that is primarily informed by certain values and purposes, which makes it harder to leave room for alternative accounts.

Still, informants pointed at how concern about this issue is growing, even if slowly. This has also been reflected in the more recent literature (Paquet, & Darimont 2010; Bekoff 2013; Beausoleil 2014; Baker, Sharp & Macdonald 2016; Hampton 2017; Beausoleil et al. 2018; Hampton & Hyndman 2018; Field et al. 2019). Some scientists, including some of the informants, may hold two opposite narratives, one in line with the prevalent paradigm and one that incorporates concern for sentient beings. They may be aware of this opposition, and swing between them.

However, epistemic difficulties do not mean that an issue cannot be researched. Some issues will be relevant within a certain paradigm and others will not be, but that does not mean that the latter can't be studied, or can't be relevant according to some different paradigm.

In light of this, we can consider the following ideas for fostering research on how to help animals in the wild.

Students and young scholars are likely to be more receptive

It was mentioned by different informants that it is necessary to invest in younger people. They pointed out that students are less conditioned by the prevalent

viewpoints. One of these informants stressed that they are interested in doing new things, and another one claimed that academic "gatekeepers" are currently older people whose views it will be difficult to change. Because of this, the most promising approach seems to be to offer research opportunities to younger people. It also means that concern about wild animals may not be expanded in the immediate future, but it seems a better approach to growing a positive attitude towards it in the medium and long term.

Cross-disciplinary work between biologists and animal welfare scientists appears to be a promising approach

We have seen that there is a problem in life scientists lacking familiarity with animal welfare science, and that one way to address this may be by providing training in this field. Another way of overcoming this, that some of the informants supported, is the promotion of cross-disciplinary work in which biologists could work together with animal welfare scientists. This would enable the biologists working on these projects, and also those reading the resulting publications of such work, to become more familiar with the concepts and the methods of animal welfare science.

In fact, some cross-disciplinary work of this kind has started to take place already (McLaren, Bonacic & Rowan 2007; Linklater & Gedir 2011; Beausoleil et al. 2018), although there is still much room for improvement here (Cattet 2013), and to date conservation tends to be given significantly more importance over welfare. This is interesting because there would be another reason in addition to the one we have just seen to promote cross-disciplinary work. This is, simply, that in order to properly understand the different factors affecting the wellbeing of animals in the wild, the methods of different disciplines, especially ecology and animal welfare science, are going to be needed. None of the currently existing fields can do the work alone. So the promotion of cross-disciplinary work may end up being not only useful, but actually indispensable.

Specific recommendations

In light of the results of this study, several recommendations can be made about how to promote concern and research about the wellbeing of animals living outside human control. In addition to the promotion of further discussion about wild animal welfare among natural scientists, especially among ecologists, zoologists and animal welfare scientists, the following can be mentioned:

- The promotion of training in animal welfare science for biologists, and especially ecologists
- The provision of funding for academic work in wild animal suffering, targeting especially young researchers
- The promotion of work on wild animal health, including assessments of how the animals' wellbeing can be improved by the development of new treatments or vaccines
- The promotion of work combining a wild animal welfare and an urban ecology approach, aiming at improving the wellbeing of wild animals living in urban environments
- The promotion of work on the ways to aid wild animals victims of harmful weather events
- The promotion, in particular, of research having a a cross-disciplinary approach combining the contributions from the sciences of animal welfare and ecology, as well as other related fields in biology

Methodological annexes

Annex 1. System of concepts and variables developed for this study

Concept #0. Informants' background

CONCEPT 0	VARIABLES
Informants' background	1. Can you explain, in short, what is your field of study?
	2. How long have you been involved in this field / present position?

Concept #1. Perception of wild animal suffering and animal welfare

CONCEPT 1	VARIABLES
Perception of wild animals suffering and animal welfare	3. Are you familiar with the concept of "wild animal suffering"?
	3.1. [If yes] Can you describe your understanding of this phenomenon?
	3.2. [If no] What does this concept suggest you? What phenomenon do you think it could refer to?
	3.3. [If not already answered] What are the harms that animals suffer living in the wild? Can you describe them?
	4. Do you believe animals can cope by themselves with the challenges nature poses to them?

Concept #2. Attitudes towards the kind of intervention (variables)

CONCEPT 2	VARIABLES
Attitudes towards the kind of intervention	5. [**Rescuing**] Natural disasters commonly affect animals living in the wild. Suppose that a big fire is taking place in a local forest. Your city council is considering rescuing the affected animals. What would be your opinion on this initiative?
	6. [**Feeding**] Suppose that due to a prolonged drought in your area, food and water supplies for animals living in the wild are increasingly scarce. Neighbors keep finding starved foxes, rabbits and other animals coming to their yards. Would you agree with providing them with food and water?
	6.1. [In case the problem of population explosion is raised] What if providing them with food and water would not cause the population to grow beyond the numbers it previously had?
	7. [**Population control**] There is an overpopulation of some animals in your area. The city council is considering sterilizing these animals to limit their population. What do you think of this policy?
	8. [**Vaccination**] Suppose a population of deer is suffering from a painful illness. Your university is considering a research project in order to develop a vaccine that would stop deer from getting the disease. Would you support vaccination of animals for the sake of animal welfare alone?
	8.1. [If yes] Would you maintain your position if no conservation issues were involved?
	8.2. [If yes and not already answered] Would you maintain your position if it involved no benefits for humans?
	9. [**Deparasitation**] Suppose that a certain parasite is causing very significant pain to a population of birds. However, it is not among the limiting factors of that population. Suppose it were feasible to eradicate that parasite. Your city council is considering implementing this measure. Would you support it?
	10. [**Others**] Besides sheltering, feeding, sterilizing, vaccinating and treating parasitism, are you aware of other possible ways of helping animals living in the wild?
	10.1. [If yes] Would you support any of those other measures?

Concept #2. Attitudes towards the kind of intervention (practical cases**)**

CONCEPT 2	PRACTICAL CASES
Kind of intervention	Rescue
	Feed
	Sterilize
	Vaccinate
	Deparasiting
	Others

Concept #3. Positions towards positive interventions research

CONCEPT 3	VARIABLES
Positions towards positive intervention research	11. Suppose your university is planning to research about the welfare of animals living in the wild. What are your views on the issue? Do you consider this a relevant topic of research?
	[If not already answered] Would you support such a research group?
	[If not already answered] Would you join this initiative?
	12. Thinking about your institution and colleagues, do you think there is an interest in doing research on rescuing, feeding, sterilizing, vaccinating or other ways of helping wild animals?
	13. Do you believe that any of these forms of intervention has a chance of being researched in the future?
	14. What do you think are the limitations or constraints, if any, to researching forms of intervention in nature to help animals?

Annex 2. Indicators and concepts system

CONCEPT	INDICATOR
0. Informants' background	Field of study
	Experience in the field of study
1. Perception of wild animal suffering and animal welfare	Perception of the concept of wild animal suffering
	Perception of the harms that wild animals suffer
	Perception about the extent to which animals can cope with the challenges they face in the wild
2. Attitudes towards different kinds of intervention	Rescuing
	Feeding
	Population control
	Vaccination
	Deparasitation
	Others
2. General attitudes towards the research on ways to help wild animals	General attitudes towards research on ways to help wild animals
3. Positions towards the research on ways to help wild animals	Attitudes towards university research on helping wild animals
	Perception of academic interest towards studying this issue
	Assessment of the opportunities for these projects to be investigated in the future
	Perception of the barriers faced by research on ways to help wild animals

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