Introduction to wild animal suffering

A guide to the issues

Animal Ethics

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ANIMAL ETHICS

Published by Animal Ethics

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Animal Ethics is a nonprofit charity aiming at providing information and resources about issues related to the moral consideration of all sentient animals. It is approved by the Internal Revenue Service as a 501(c)(3) tax-exempt organization, and its Federal Identification Number (EIN) is 46-1062870.

Suggested citation: Animal Ethics (2020) *Introduction to wild animal suffering: A guide to the issues*, Oakland: Animal Ethics, retrieved from https://www.animal-ethics.org/introduction-wild-animal-suffering.

Acknowledgements

Animal Ethics wants to express our gratitude to Animal Charity Evaluators, who funded this work through its Effective Animal Advocacy Fund. This project was completed by Oscar Horta, Leah McKelvie, Gary O'Brien, Cyndi Rook, Olaia Freiría, Daniel Dorado, and Max Carpendale.

Contents

Introduction

Think for a moment of a wild animal. What animal do you picture?

When asked this, most people picture a healthy, adult mammal or bird such as a lion, an elephant, or an eagle. They often think of happy animals enjoying themselves. In reality, however, life is not easy for animals in the wild. From the moment they are born or hatch from their eggs, they face very serious threats. The factors causing them are diverse. Some are due to direct human action. Others may be indirect results of human action, natural circumstances, or a combination of the two. Among the factors that can be partly or completely natural are harmful weather conditions; hunger and malnutrition; thirst; a wide range of diseases; accidents and injuries; conflicts with other animals; parasitism; and psychological stress. These are not unusual circumstances, and the harms from them are as painful and severe to wild animals as they would be to domesticated animals or to us. In fact, due to these harms, many animals have lives that contain much more suffering than happiness.

We can think, for example, of a chick who falls from her nest and, starving to death on the ground for days, suffers from the cold and the pain of the injuries sustained in the fall. Or a new-born fish starving after never being able to find any food. Such cases are common among young animals. Other animals may be able to survive for longer and reach adulthood but live with chronic pain, or die after having endured a lot of suffering. One example of this is a deer with Nasal Bot parasitic infection. Larvae grow in their nasal cavities until they are so numerous and so large that the deer is no longer able to breathe and slowly suffocates to death.

Examples such as these counteract the idea that the best thing we can do for animals in the wild is simply to leave them alone. There are many cases where we can't do anything to help animals, or where helping them may cause greater harm to others. But there are other cases where we can make a difference for animals that is net-positive overall.

Some people might wonder why we should pay attention to these natural causes of harm when there are so many visible ways animals are harmed by humans today, such as being kept in captivity or by things like fishing. Shouldn't we focus our attention solely on those animals harmed by human beings instead of worrying about wild animals? But concern for wild animal suffering is just an expansion of this concern about the wellbeing of animals generally. There is no contradiction in caring about all sentient animals, regardless of whether they are being harmed by humans or by other causes, such as harmful weather conditions or disease. The contradiction would be in caring only about what happens to the animals that humans harm, and not caring about other animals.

Why wild animal suffering is very important

In order to get a better sense of the importance of wild animal suffering, we need to be aware that many animals have lives filled with suffering, as in the examples above. Such cases are much more numerous than we might initially believe. We can see this in the way animal populations evolve — and in their juvenile mortality rates. A key factor determining this is the reproductive strategy that different animals follow. In nature, some animals reproduce by having only one offspring at a time. These are animals who typically give extensive parental care to their offspring, in order to maximize their likelihood of survival. However, most animals follow a different reproductive strategy: bringing into existence a very large number of offspring. Their survival rates at the beginning of their lives are typically very low. If the animals reproduce just once during their lives and their populations remain stable, on average only two of their offspring per litter or clutch makes it to adulthood (that is,

one per parent). If they reproduce several times, the average number who survive from each clutch decreases.[1]

Some of these animals might survive for some time even if they don't manage to reach maturity. But in many cases, they die shortly after they have started to exist. Some of them might never develop into sentient beings. But many of them do, and they typically die in ways that are likely to be painful, sometimes extremely so. They starve to death, are killed by other animals, or die from other factors such as cold or disease. Many of these animals die before they have a chance to enjoy any positive experiences in their lives. They might experience little more than the pain of their deaths, so suffering appears to outweigh happiness in their lives.[2] Unfortunately, these animals are probably the majority of those who come into existence. This is the main reason wild animal suffering is of great importance. It can make a big difference that there are ways to help some of these animals. The following are some examples.

Causes of wild animal suffering and ways to help animals

Many animals in the wild suffer immensely and die prematurely. Just some of the factors are harmful weather conditions, natural disasters, disease, parasitism, hunger, malnutrition and thirst, psychological stress, conflicts

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[1] See for instance Roff, D. A. (1992) *Evolution of life histories: Theory and analysis*, Dordrecht: Springer; Stearns, S. C. (1992) *The evolution of life histories,* Oxford: Oxford University Press; Flatt, T. & Heyland, A. (eds.) (2011) *Mechanisms of life history evolution: The genetics and physiology of life history traits and trade-offs*, Oxford: Oxford University Press; Vandermeer, J. H. & Goldberg, D. E. (2013) *Population ecology: First principles*, Princeton: Princeton University Press.

[2] Ng, Y.-K. (1995) "Towards welfare biology: Evolutionary economics of animal consciousness and suffering", *Biology and Philosophy*, 10, pp. 255-285; Tomasik, B. (2015a [2009]) "The importance of wild-animal suffering", *Relations: Beyond Anthropocentrism*, 3, pp. 133-152; https://www.ledonline.it/index.php/Relations/article/view/880/717 [accessed on 11 December 2019]; Horta, O. (2015 [2011]) "The problem of evil in nature: Evolutionary bases of the prevalence of disvalue", *Relations: Beyond Anthropocentrism*, 3, pp. 17-32, https://www.ledonline.it/index.php/Relations/article/view/825 [accessed on 11 December 2019].

between animals, and accidents that can cause severe injuries. It is possible to help alleviate this suffering, for example by rescuing animals stranded on beaches, trapped in ice, snow, or mud ponds; providing shelter and assistance to sick and injured animals; caring for orphans; and saving animals from starving in particularly harsh situations. On a larger scale, vaccination programs save huge numbers of animals from suffering and dying due to disease.

New programs can also be developed.[3] For example, well-monitored pilot programs could start with the aim of helping wild animals living in suburban, urban, or industrial areas. What we learn can then be applied to animals living in agricultural zones, and then in semi-wild and wild areas. In the future, we will be able to innovate in ways that we aren't able to today. For this to be possible, however, it is necessary that we have and spread an attitude of concern for animals.

The reasons why animals are not being helped

Some people don't care about what happens to animals at all — despite the fact that they can also feel and suffer. But most people are just not familiar with what the lives of these animals are like. In particular, they don't know about animal population dynamics — and many who do know fail to recognize how it relates to animals' suffering.

In addition, we have cognitive biases that distort how we imagine animal life in nature. We mentioned above that when most people think of wild animals, the image that comes to mind is that of big animals, most likely mammals, or maybe big birds; in any case almost certainly vertebrates. Furthermore, in almost all cases, they think of adult animals. They may think of lions and tigers, perhaps of giraffes, elephants, wolves, eagles... but they

[3] See Animal Ethics (2019a [2016]) "Helping animals in the wild", *Wild animal suffering*, *Animal Ethics*, https://www.animal-ethics.org/helping-animals-in-the-wild [accessed on 29 December 2019]; (2019b [2016]) "The situation of animals in the wild", *Wild animal suffering*, *Animal Ethics*, https://www.animal-ethics.org/situation-of-animals-wild [accessed on 29 December 2019]. Below in this guide there are many examples of this explained in much more detail.

seldom think of, say, fishlings or invertebrates that have just broken out of their eggs. However, these animals are the overwhelming majority in nature. Most animals in the world are small, and most animals alive at any one time are very young. In other words, the perception that most people have of animals in the wild is completely unrepresentative — and it very much conditions their views about what the lives of these animals are like.

Finally, there are people who think that we should not help animals living in the wild because doing so is not "natural."[4] We should note, however, that when humans are suffering in the ways that wild animals commonly do, we typically support helping them. Why have a different attitude when it comes to animals? The animals just want to be free from the suffering caused by those conditions, so we should help them whether or not humans are responsible.

We should also note that humans already frequently do intervene in nature to further human interests. We build entire cities with houses, hospitals, schools, libraries, and many other things that make our lives safer and more convenient. We also plant the food we need to eat. If we are ready to transform our surroundings for the sake of our needs, we should be willing to do so when other sentient beings like wild animals need help.

Learning more about how to best help animals

Because finding the best ways to help animals requires careful study, it's important to invest in research that will help us to both optimize the results for animals and to avoid negative indirect consequences of helping them. The good news is that there is already a lot of data that can be used for this purpose. Veterinary scientists have focused on assessing the wellbeing of domesticated animals, but they have also examined that of wild animals. Ecologists have researched the population dynamics of these animals, their life histories, and the way they interact with other animals and their

[4] Rolston, H., III (1992) "Disvalues in nature", *The Monist*, 75, pp. 250-278; Musschenga, A. W. (2002) "Naturalness: Beyond animal welfare", *Journal of Agricultural and Environmental Ethics*, 15, pp. 171-186. Waldhorn, D. R. (2019) "Toward a new framework for understanding human-wild animal relations", *American Behavioral Scientist*, 63, pp. 1080-1100.

surroundings. All this can provide us with a firm grounding on which to base programs to help animals.

Unfortunately, knowledge from these different areas is seldom integrated. Furthermore, concern for nonhuman animals as individuals has not yet been included among the aims of most scientific research projects. Cross-disciplinary research about the suffering of animals in the wild and the ways to help them would allow us to integrate the relevant knowledge already obtained to make further progress.

Such research can help us learn more about how the wellbeing of animals is affected on an ecosystem level in different situations. It will also allow us to develop new ways to help animals, and to assess existing ways. More research can help us to choose and improve more effective methods, as well as helping others to understand how important this issue is. It can also aid us in developing new ways of helping animals that will increase our positive impact in the future.

Due to this, an attitude of caring about animals in the wild can potentially have a big impact not only on the animals currently living but on future ones as well. This is very important, because if we really care about what happens to animals, we should not worry only about those living today. Those who will live in the future have the potential to suffer just as much, so making it possible that the future is the best it can be for them should be a top priority for all of us.

With this book, we aim to provide a clearer understanding of the reality of wild animal suffering and, more importantly, of what can be done about it. It provides an introduction to this question for anyone interested in it, and will be especially useful to those involved in animal advocacy who want to know what they can do to help wild animals. It will also benefit people working in natural sciences who want to learn how their work can help animals.

The book has three parts. Part I explains the ways that wild animals suffer and how we can help them. Part II presents the main issues in the debate about the moral consideration of animals. Part III gives an overview of the current perspectives for the scientific study of the wellbeing of wild animals, which has been called welfare biology.

The first part begins with an introduction to the problem of wild animal suffering and clarifies what it is. It also explains the impacts of negative factors on the lives of animals living in the wild, and the relationship between the prevalent reproductive strategies and the proportion of suffering among wild animals. We'll then see ways these animals can be helped, and already are being helped, on different scales. Then, we will see the kinds of things that each of us can do to make a difference for wild animals.

The second part gives an overview of contemporary debates about ethics and animals. This addresses reservations many people have about helping animals. We then examine the differences between the views defending the moral consideration of animals and those defending other criteria, as in some positions in environmental ethics. Finally, we will see what sentience is, and consider some indicators of its presence in different animals, especially invertebrates.

The third part examines the ways to promote research in academia about how to best help wild animals. We look at the concepts of wellbeing, animal welfare, and wild animal welfare. We will also discuss welfare biology, which is the study of the situation of animals with regard to their wellbeing. We'll see reasons to promote academic research in welfare biology, and what some promising lines of research for this field are.

We hope this book will be useful to you. Our intention is to help you become familiar with the issues discussed in it, and to share some tools that enable you to do further research on them. If you want to learn more, you can visit our website, where you'll find much more detailed information about many of these issues: https://www.animal-ethics.org.

Part one

Wild animal suffering and ways of helping wild animals

1

What is wild animal suffering?

We will now consider in more detail different meanings the term "wild animal suffering" can take on. As the word "suffering" indicates, concern about the harms suffered by animals relates to what affects their wellbeing — with what is positive or negative for them. It's different from conservation, which is about how species, populations, or ecosystems can be affected. Wild animal suffering is about how *the wellbeing of individual animals* can be negatively affected. There's another harm — death — which is not suffering, so strictly speaking it wouldn't be part of "wild animal suffering," but the term can also be used in a broader sense that includes not only suffering but also the harm of death.

There are different kinds of factors that can negatively affect animals living outside of direct human control. By animals under "direct human control," we mean animals such as those living in captivity and domesticated animals whose lives and activities are directly determined by human beings. To simplify things, the harms animals living *outside* of direct human control can suffer can be put into three main groups:

> *Directly anthropogenic harms* are the harms that are a direct result of specific human actions, either intentional or unintentional.

Examples of *intentional direct harm* are fishing and hunting. Another example is the intentional eradication of certain animals. This may be for economic reasons, such as when they are killed because of their negative impact on agriculture. It can also be for conservationist purposes, such as when animals are killed as a result of their impact on other species. Examples of

unintentional direct harm are when animals are injured or killed by harvesting machines or by being run over by vehicles.

> *Indirectly anthropogenic harms* are the harms that result from human action, but are not the direct result of specific actions.

They range from the harms caused by lost fishing nets to harms to animals due to extreme weather events from human-caused changes to the climate.

> *Natural harms* are the harms suffered by animals that take place without any human action being involved.

Examples of these are harms from starvation, weather events, accidents, conflicts between animals, and natural disasters.

As we saw above, many people are unaware that animals that are not in captivity can suffer for natural reasons, or else they think that only the harms that come from human actions matter Due to this, the term "wild animal suffering" is commonly used to mean the harms thus excluded, that is, those suffered by nonhuman animals that are either partially or totally natural. Another way of using this term is to mean all kinds of harms suffered by wild animals, including those that are anthropogenic and those that are natural. So we have these two meanings for this term:

> *Wild animal suffering (1)*: the harms suffered by animals living outside of direct human control that are partly or totally natural.
>
> *Wild animal suffering (2)*: the harms from any cause suffered by animals living outside of direct human control.

Ultimately, the reasons for concern about natural harms are the same as those about harms from human action: we want animals to have lives that are as good as possible, free from suffering and premature death. So in practical terms, the choice of one or another meaning for the term "wild animal suffering" may not be very important. The point is that all the harms suffered by animals matter, not just those that are directly anthropogenic, but also indirectly anthropogenic and natural ones.

There aren't strict boundaries between the three different types of harms. It could be argued that poisoning invertebrates with insecticides is a direct anthropogenic harm, but if they are poisoned by pesticides used to kill weeds, that would be an indirect anthropogenic harm. Of course, for the animals affected, the end result is the same. Moreover, there can be combinations of the three types, especially of indirect and natural harms. Suppose that a new disease is introduced into a forest indirectly through human action and that some animals die from it. If the animals contract the human-introduced disease, then that harm is indirectly anthropogenic and partly natural, since the process by which it spreads is natural.

Harms of this combined kind could be very common, because humans have changed most of the ecosystems on Earth. In fact, because of human-caused changes to the climate, it is likely that there is no longer a single ecosystem unaltered by human activities, with the possible exception of some in the deep ocean and other remote zones. In addition, it is estimated that more than one-third of the world's land surface is being used for agricultural purposes.[5] Also, around one-fourth of the total land is forests, including large areas that have been planted partially or totally by humans, especially in temperate zones. Primeval forests, which have developed with very little human interaction, are a minority (a very small percentage for example in Europe).[6] Yet, even these primeval ecosystems have been changed because of human activities affecting the climate. This means that there is no longer a clear distinction between strictly natural harms and partly natural, partly anthropogenic harms to animals.

This is also why wild animals living in those areas could be considered to some extent under human control, because human action can modify the

[5] Bruinsma, J. (ed.) (2003) *World agriculture: Towards 2015/2030. An FAO perspective*, London: Earthscan, http://www.fao.org/3/y4252e/y4252e.pdf, pp. 124-157 [accessed on 15 November 2019].

[6] Potapov, P.; Laestadius, L.; Yaroshenko, A. & Turubanova S. (2009) *Global mapping and monitoring the extent of forest alteration: The intact forest landscapes method*, Rome: Forest Resources Assessment; Potapov, P.; Hansen, M. C.; Laestadius, L.; Turubanova, S.; Yaroshenko, A.; Thies, C.; Smith, W.; Zhuravleva, I.; Komarova, A.; Minnemeyer, S. & Esipova, E. (2017) "The last frontiers of wilderness: Tracking loss of intact forest landscapes from 2000 to 2013", *Science Advances*, 3. e1600821.

places where they live and the conditions in which they live. The animals we are specifically concerned with here live outside of *direct* human control.

Wild animal suffering: not just about animals living in the wilderness

The meaning of "wild animals" should also be clarified. It is inaccurate to think of wild animals as only those that typically live in the wild, because the same animals can be found in other places. The term "the wild" can also be confusing. Properly speaking, it means areas or ecosystems untouched, or only affected in minor ways, by human beings. Sometimes it is understood to mean all areas that don't have significant human presence or activity, including, for example, forests managed by humans. But the term wild animal suffering is not meant to include only the animals living in those places.

Many animals that most people consider "wild" live outside of direct human control, in areas devoted to agriculture or animal farming. However, they can also be found in urban, suburban, and industrial areas. Many types of vertebrates, like small mammals (e.g., squirrels), reptiles (e.g., lizards), birds, and many invertebrates (e.g., butterflies) live in urban environments.[7] They are often directly harmed by human actions. But they also suffer because of how their ecosystems affect their lives. So they can also be included within the definition.

Other animals who live outside of direct human control but are not typically classified as wild are those considered "feral." However, the distinction between "feral" and "wild" animals is not relevant from the point of view of their suffering. They are harmed in similar ways because of the challenges they must face. Accordingly, we can certainly include feral animals in the term "wild animal suffering."

We can therefore see that the term "wild animals" in "wild animal suffering" denotes all animals living outside of *direct* human control. "Wild

[7] Hadidian, J. & Smith, S. (2001) "Urban wildlife", in Salem, D. J. & Rowan, A. N. (eds.) *The state of the animals 2001*, Washington, D. C.: Humane Society Press, pp. 165-182; Michelfelder, D. P. (2018) "Urban wildlife ethics: Beyond 'parallel planes'", *Environmental Ethics*, 40, pp. 101-117.

animal" is a linguistic shortcut that is used for simplicity. But we have to remember that it covers not only the animals living in wild or semi-wild areas, but also feral animals and those living in urban environments.

Species membership is not what is relevant

A common way to use the term "wild animal" is to refer to animals who do *not* belong to species that have been domesticated (selectively bred for many generations by humans, like dogs and chickens). There are animals who are wild in this sense but live in captivity, such as minks in a fur farm, captive elephants trained for labor, and zebras in a zoo. These animals usually suffer a lot because of their use by human beings, and their situation is something that anyone concerned about animal suffering should be quite worried about.

Our focus here is animals who do not live in captivity. They are in a different situation and have different needs. To account for this, they are covered by the term "wild animal suffering." Borderline cases include animals who are used in farming but spend most of their lives unconfined, like a goat or a sheep who spends her whole life in the hills.

Problems with the term "wildlife"

Another term that is often used is "wildlife." This is an inaccurate term for wild animals for two reasons. First, it is often used to refer to all kinds of living organisms. This doesn't differentiate animals from other organisms that are not sentient. Second, even when it is used to refer specifically to wild animals, the word "wildlife" is not a countable quantity, so it doesn't recognize animals as individuals.

So, to conclude, the word "wild" as used in "wild animal suffering" does not distinguish animals in terms of their species. It doesn't, like "wildlife," refer to them as part of an undifferentiated component of an ecosystem. It also has nothing to do with the assumption that they have a ferocious character or nature. It just describes a circumstance they are in.

Other terms related to wild animal suffering

People concerned about the situation of these animals sometimes use other terms. "Helping wild animals" has been used to refer to efforts to help them. The term "wild animal welfare" is used as a descriptive term for their situation from the point of view of their wellbeing.[8] Note, however, that "wild animal welfare" has been used in several different ways:[9]

> *Wild animal welfare (1)*: the situation of undomesticated animals with respect to their wellbeing.
>
> *Wild animal welfare (2)*: the regulations about the ways undomesticated animals are kept in captivity.
>
> *Wild animal welfare (3)*: the science that assesses the wellbeing of undomesticated animals.

A possible source of confusion comes from the common use of the term to refer to undomesticated animals *living in captivity*, rather than those *living in the wild*.

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[8] See for instance Kirkwood, J. K.; Sainsbury, A. W. & Bennett, P. M. (1994) "The welfare of free-living wild animals: Methods of assessment", *Animal Welfare*, 3, pp. 257-273; Harrop, S. R. (1997) "The dynamics of wild animal welfare law", *Journal of Environmental Law*, 9, pp. 287-302; Kirkwood, J. K. (2013) "Wild animal welfare", *Animal Welfare*, 22, pp. 147-148; JWD Wildlife Welfare Supplement Editorial Board (2016) "Advances in animal welfare for free-living animals", *Journal of Wildlife Diseases*, 52, pp. S4-S13.

[9] See Haynes, R. P. (2008) *Animal welfare: Competing conceptions and their ethical implications*, Dordrecht: Springer. Sometimes the term "animal welfare" is used among animal advocates for the view that it is acceptable to cause certain harms to animals provided that they are not excessive—see Francione, G. L. (1995) *Animals, property and the law*, Philadelphia: Temple University Press; (2000) *Introduction to animal rights: Your child or the dog?*, Philadelphia: Temple University Press. According to this view, some uses of animals that can be harmful to them are acceptable if the harms that are considered necessary for such use are minimized. This meaning is different from the others we have seen here. What we have said up to this point, and in the rest of the book, does not concern this other question, or imply taking a stance in support of this view.

Finally, the term "welfare biology" is used for a proposed field of study that would examine the wellbeing of all animals, especially those living outside of direct human control. It would primarily, though not necessarily only, study wild animal suffering. More technically, it can be defined as the study of sentient living beings with respect to their positive and negative wellbeing.[10] Welfare biology would be a cross-disciplinary field that includes wild animal welfare science together with contributions from ecology and other fields in the natural sciences. Wild animal welfare science would assess the wellbeing of animals by considering their behavior, physiology, and other indicators. Other fields like ecology would examine the external factors that affect it. Welfare biology has the potential to inform policies to help wild animals and prevent some of the harms they suffer.

[10] Ng, Y.-K. (1995) "Towards welfare biology: Evolutionary economics of animal consciousness and suffering", *Biology and Philosophy*, 10, pp. 255-285; see also Carpendale, M. (2015) "Welfare biology as an extension of biology: Interview with Yew-Kwang Ng", *Relations: Beyond Anthropocentrism*, 3, pp. 197-202, https://www.ledonline.it/index.php/Relations/article/view/884/0 [accessed on 17 October 2019]; Faria, C. & Horta, O. (2019) "Welfare biology", in Fischer, B. (ed.) *Routledge handbook of animal ethics*, New York: Routledge, pp. 455-466.

2

Harms suffered by animals due to weather conditions and natural disasters

Now that we have seen what wild animal suffering is, we will examine the different ways animals suffer in the wild. We're going to start by considering how they can be harmed by factors related to their physical environment, in particular by weather conditions and natural disasters.

Weather conditions and nonhuman animals

Weather, especially temperature, plays a major role in influencing the suffering of animals in the wild. Fluctuations in temperature in certain regions affect large numbers of animals. Many animals, especially those who reproduce in large numbers, may colonize a certain area when weather conditions are fit for them to live there, only to die later when weather conditions change. Floods and heavy winds can also displace marine animals so they end up in unfavorable environments.

Cold-blooded animals like fishes, amphibians, reptiles, and invertebrates are particularly susceptible to sudden changes in temperature. Young animals who cannot migrate or who live in shallow waters that get cold more quickly are especially at risk.

Temperature changes

Cold weather leads to loss of life more routinely than hot weather. Animals who don't hibernate or don't become dormant in cold weather have to endure

large variations in temperature. The temperatures may fall within a range they can survive but still be very uncomfortable. This can weaken an animal's immune system and make her more susceptible to illness.

It's common for large portions of a population of mammals to die every winter, and more than half can be wiped out during a particularly harsh winter. Unlike many other animals in temperate climates, deer populations don't migrate or hibernate in the winter. They try to crowd into the few spots that provide some shelter from the cold, wind, and snow. Food is also scarcer for them during the winter.[11]

Animals who hibernate are also more vulnerable during the winter due to an increased risk of disease or starvation before the winter's end. For example, bats can suffer from frostbite or starve to death if they awaken during their winter hibernation and fly around too much, depleting the fat stores they need to get them through the rest of the winter. Crickets, like many other insects, can survive the winter in diapause (dormancy). Whether they survive typically depends on which stage of their life cycle they are in and how unstable the winter temperatures are. Some insects can withstand being frozen solid because they produce cryoprotective chemicals similar to antifreeze. However, if they thaw out due to sudden warming temperatures, they may not survive a refreeze.[12]

Birds can usually tolerate a relatively large range of temperatures. But if they are sick or injured and unable to fly to a warmer place or can't keep up their body heat in the winter, they can suffer from frostbite. They can also suffer from crash landings on ice or wet pavement that they mistake for water. Swans and other birds who can't move well out of water sometimes get stuck on ice and injure their wings trying to flap them against the hard surface.[13]

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[11] Wooster, C. (2003) "What happens to deer during a tough winter?", *Northern Woodlands*, February 2, https://northernwoodlands.org/outside_story/article/what-happens-to-deer-during-a-tough-winter [accessed on 14 October 2019].

[12] Callahan, R. (2018) "How do crickets go into a hibernation state when cold?", *Sciencing*, October 17, https://sciencing.com/crickets-hibernation-state-cold-12051048.html [accessed on 23 June 2019].

[13] Brown, C. R. & Brown, M. B. (1998) "Intense natural selection on body size and wing and tail asymmetry in cliff swallows during severe weather", *Evolution,* 52, pp. 1461-

Cold-blooded animals like fishes, amphibians, and reptiles have to expose themselves to warmer or cooler water or air to regulate their body heat. As a result, they are more vulnerable than mammals and birds to heat stress or hypothermia due to sudden temperature changes. Although marine environments generally have smaller temperature fluctuations than air, there can be a large variation in temperatures between bodies of water. Just as land animals migrate to inhabit new areas, marine animals can move into areas that are colder or hotter than is good for their bodies.

Sea turtles commonly experience "cold stunning" when there is a rapid change in temperature or when the water remains too cold for too long. Cold stunning occurs when decreased heart rate and circulation result in shock and lethargy that can be fatal. Young turtles are especially at risk because they often live in shallow water that gets cold faster. Cold stunning often happens during unusually cold spells, but in some areas it is chronic, occurring every winter and killing more than half the turtles who aren't able to migrate.[14]

In response to warmer temperatures, the metabolism of some marine animals slows down, enabling them to better adapt. However, many marine animals experience heat stress that impairs their ability to consume oxygen. If temperatures remain too high for too long, they will be unable to survive. In extreme cases, or when changes in the climate occur progressively over longer time periods, entire populations may die off, suffering a great deal in the process. Animals dying from extreme weather conditions can experience a lot of pain in addition to losing their lives.

1475; Raddatz, K. (2018) "Frigid temps pose danger to local wildlife", *CBS Minnesota*, January 4, https://minnesota.cbslocal.com/2018/01/04/cold-wx-wildlife [accessed on 19 June 2019].

[14] Gabriel, M. N. (2018) "Hundreds of sea turtles 'cold-stunned' by frigid temperatures in Gulf waters", *USA Today*, January 4, https://eu.usatoday.com/story/news/nation-now/2018/01/04/hundreds-sea-turtles-cold-stunned-frigid-temperatures-gulf-waters/1006047001 [accessed on 19 June 2019]; Foley, A. M.; Singel, K. E.; Dutton, P. H.; Summers, T. M.; Redlow, A. E. & Lessman, J. (2007) "Characteristics of a green turtle (*Chelonia mydas*) assemblage in northwestern Florida determined during a hypothermic stunning event", *Gulf of Mexico Science*, 25, pp. 131-145.

Other weather conditions apart from temperature

Many factors other than extremes of temperature can affect animal populations. Some animals require a certain level of humidity to thrive and can suffer a great deal in arid regions. For others, too much humidity or rain can be harmful. Although there are many animals who are not affected by rain, or who actually like rain, there are others who are bothered by it or have illnesses or physical conditions that are worsened by it. Just as rain, snow, and strong wind can negatively impact human wellbeing, they can cause similar discomfort and stress to animals living in the wild. Even if these uncomfortable weather conditions don't kill them, just as they usually don't kill us, they can still cause suffering for nonhuman animals. Without access to adequate shelter or medical care, complications that would be minor for humans can be severe for animals living in the wild.

Several other weather phenomena can have a huge impact on animals, and can wipe out entire populations. Their effects can combine with other factors such as disease and the availability of food and water. Consider, for example, droughts, heavy snows, and flooding. These extreme conditions can kill animals directly, for example by drowning, or indirectly, for example by damaging the food supply. Weather conditions can also trigger epidemics among animals. Many animals get weaker during the winter due to the harsh weather, which makes them more susceptible to becoming sick. Other animals suffer from diseases that become active only when certain weather conditions occur. For example, many birds carry avian cholera that affects them mainly in very cold weather. Lobsters are more susceptible to lobster shell disease when the water is warmer, which weakens their shells and makes them more susceptible to injury and predation.

Animals in natural disasters

Animals living in the wild are particularly vulnerable in natural disasters. Earthquakes, hurricanes, volcanic eruptions, tsunamis, and forest fires can have devastating consequences for them. Many animals die, drowned or buried alive by dirt, ash, lava, or snow; crushed to death in collapsed or burnt

burrows; smashed against trees and rocks, or pelted by hailstones. Others sustain major injuries.

Animals are often at high risk of being displaced and sometimes orphaned, either because they moved to safer places or because they were swept away by high winds or rushing flood waters. If displaced animals are crowded together in a small area, they risk major outbreaks of disease and parasite infestations. Malnutrition and starvation due to limited food supplies also become major risks.

Storms

The wind, rain, and debris from storms injure and kill animals, including destroying shelters and contaminating food and water sources. Strong winds and rain can cause broken limbs and head trauma, as well as breathing problems and infections from getting water in the lungs. Most of these problems would not be fatal if the animals received care, but in most cases, they do not. A few lucky mammals and birds get care if they are blown into urban areas and are found disoriented on someone's lawn.

Rotating storms known as supercell thunderstorms can rise 10 miles high and have hurricane-force winds. When these storms occur in colder weather, animals are killed or injured when they are pelted with jagged hailstones the size of golf balls.[15] Storm surges and strong winds can create such pressure on the seabed floor that large amounts of sediment and large objects are stirred up and tossed around. The pressure can also rapidly mix the colder water near the bottom of the ocean with warmer shallow waters. This can cause hypothermia in cold-blooded animals who rely on the water temperature to regulate their body temperature. The strong currents produced by the mixing

[15] Cappucci, M. (2019) "Montana hailstorm slaughters 11,000 birds", *The Washington Post,* August 21, http://www.washingtonpost.com/weather/2019/08/21/montana-hailstorm-slaughters-birds [accessed on 13 September 2019].

waters can kill many small and slow-moving animals who can't just swim away.[16]

Floods

Smaller animals are more vulnerable to drowning or dying in floods and mudslides.[17] Burrowing animals may be safe from smaller disturbances, but torrential rains can collapse their burrows or block the entrances, trapping them or leaving them without shelter. Burrow entrances can be blocked by branches, leaves, stones and other debris moved around by water or wind. Leaves and debris can also harm marine animals, blocking sunlight, reducing oxygen levels as they rot, and suffocating animals with gills by blocking them.[18]

Fires

A single wildfire can kill millions of animals.[19] The flames and smoke of forest fires kill most animals in their path, including many burrowing animals who are too near the surface, and animals who live in rivers and streams as the flames pass over. Animals who run away may be caught by waiting predators along the path. Even if they survive the fires, the aftermath can leave animals

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[16] National Oceanic and Atmospheric Observation *(2018) "*How do hurricanes affect sea life?*", National Ocean Service*, June 25, https://oceanservice.noaa.gov/facts/hurricanes-sea-life.html [accessed on 23 September 2019].

[17] Shafeeq, M. (2018) "Kerala floods leave trail of destruction in forests; elephants, tigers among several animals killed", *Firstpost*, August 30, https://www.firstpost.com/india/kerala-floods-leave-trail-of-destruction-in-forests-elephants-tigers-among-several-animals-killed-5081351.html [accessed on 21 August 2019].

[18] Dilonardo, M. J. (2018) "What happens to animals during a hurricane?", *MNN,* September 12, https://www.mnn.com/earth-matters/animals/stories/what-happens-wildlife-during-hurricane [accessed on 21 August 2019].

[19] Phys.org (2019) "More than 2 million animals perish in Bolivia wildfires", *Phys.org,* September 26, https://phys.org/news/2019-09-million-animals-perish-bolivia-wildfires.html [accessed on 5 October 2019].

with burns, blindness, and respiratory problems that can be fatal or permanently debilitating.

Some animals, like squirrels, porcupines, and koalas try to get away by climbing trees, which is not a good strategy in a fire. Other animals may try to flee but then panic and return to their dens. Smaller animals can burrow into the ground but if they don't burrow deeply enough, they will die when their dens heat up like an oven.[20] Fleeing animals may die due to smoke inhalation, burns, exhaustion, disorientation, or attacks from other animals.[21] Mothers may not be able to leave with their babies, and territorial animals may be more reluctant to leave and end up staying where they are until it's too late to get away.

Smoke injury is sometimes short-lived and heals within a few days. However, if it is severe enough or prolonged, it can cause greater harm, including lung damage, vision loss, or blindness. Birds are especially at risk of serious respiratory harm because of how much air they take in relative to their size.[22] Burned skin can cause a lot of pain, limit mobility, and may never heal completely. Singed wings and other appendages can affect an animal's ability to move around and navigate.

Earthquakes and tsunamis

In earthquakes, animals can be crushed by falling rocks. Sea birds and aquatic animals who live in shallow waters near the shore are buried in sand or debris and suffocate. Many of them are washed ashore where they die slowly because they can't breathe outside of water. Earthquakes may be followed by

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[20] Zielinski, S. (2014) "What do wild animals do in a wildfire?", *National Geographic*, July 22, https://www.nationalgeographic.com/news/2014/7/140721-animals-wildlife-wildfires-nation-forests-science [accessed on 13 September 2019].

[21] Daly, N. (2019) "What the Amazon fires mean for wild animals", *National Geographic*, August 23, http://www.nationalgeographic.com/animals/2019/08/how-the-amazon-rainforest-wildfires-will-affect-wild-animals [accessed on 13 September 2019].

[22] Cope, R. B. (2019) "Overview of smoke inhalation", *Merck manual: Veterinary manual,* https://www.merckvetmanual.com/toxicology/smoke-inhalation/overview-of-smoke-inhalation [accessed on 23 September 2019].

landslides that bury animals alive and destroy their homes, or by floods that can drown them or sweep them away.[23]

In addition to shaking land, earthquakes can shake and displace the seabed. Land masses can sink into the water, along with the animals who live there. When the ocean floor is displaced, it can create a tsunami, which is a series of high, fast waves that begin quickly, can cross oceans, and can last for days. When tsunamis strike, birds and other small animals can drown when they are washed into the water and unable to get back to dry land.[24]

Volcanoes

Animals can also be harmed by volcanic eruptions. They can last for months or years, spewing abrasive and toxic lava and ash, causing explosions, and heating nearby water that can boil marine animals alive. Ash deposited by volcanoes on land contains chemicals and sharp edges that harm animals in the area for many years after an eruption. The sharp edges of the ash cause eye and skin irritation and are abrasive to teeth, hooves, and insect wings. Ingestion of the ash causes respiratory problems and gastrointestinal blockages.[25] Ash and other debris get stuck in gills and suffocate aquatic animals, and lava can leave tiny, glassy shards that harm them as the water passes through their gills. Ash and gases also destroy food and water supplies.

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[23] Bressan, D. (2016) "Earthquakes can have devastating impacts on wildlife", *Forbes,* Nov 30, https://www.forbes.com/sites/davidbressan/2016/11/30/earthquakes-can-have-devastating-impacts-on-wildlife/#5c400731a554 [accessed on 31 August 2019].

[24] Goldman, J. (2011) "Impact of the Japan earthquake and tsunami on animals and the environment", *Scientific American,* March 22, https://blogs.scientificamerican.com/guest-blog/impact-of-the-japan-earthquake-and-tsunami-on-animals-and-environment [accessed on 13 September 2019].

[25] Leggett, R. (2018) "Plants & animals around volcanoes", *Sciencing*, April 23, https://sciencing.com/plants-animals-around-volcanoes-8259688.html [accessed on 19 September 2019]; *Scientific American* (2005) "How do volcanoes affect world climate?", October 4, https://www.scientificamerican.com/article/how-do-volcanoes-affect-w [accessed on 19 September 2019].

3

Diseases and parasitism

Diseases in nature

We now consider another very significant source of suffering and premature death for animals, which is disease. To understand how harmful disease can be to animals, think of the immense suffering that disease caused to human beings before the advent of modern medicine. This is the situation of animals in the wild. The harms caused by disease are worsened by lack of access to treatment and, sometimes, by lack of opportunity to rest and recuperate. In addition to their debilitating effects on the body's ability to function and recover, illness and disease can increase the negative effects of environmental conditions and other stressors faced by wild animals. The result can be increased suffering and death.[26]

There are so many diseases that affect nonhuman animals in nature that they cannot all be listed here. Some of them are illnesses humans can suffer from too, like flu, pneumonia, tuberculosis, cholera, Ebola, anthrax, salmonella, diphtheria, and rabies.[27] Cancer is also common in both land and marine

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[26] Beldomenico, P. M.; Telfer, S.; Gebert, S.; Lukomski, L.; Bennett, M. & Begon, M. (2008) "Poor condition and infection: A vicious circle in natural populations", *Proceedings of the Royal Society of London B: Biological Sciences*, 275, pp. 1753-1759.

[27] Simpson, V. R. (2002) "Wild animals as reservoirs of infectious diseases in the UK", *The Veterinary Journal*, 163, pp. 128-146; Gortázar, C.; Ferroglio, E.; Höfle, U.; Wobeser, G. A. (2005) *Essentials of disease in wild animals*, New York: John Wiley and Sons; Frölich, K. & Vicente, J. (2007) "Diseases shared between wildlife and livestock: A European perspective", *European Journal of Wild Research*, 53, pp. 241-256; Williams, E. S. & Barker, I. K. (eds.) (2008 [2001]) *Infectious diseases of wild mammals*, 3rd ed., New York: John Wiley and Sons; Martin, C.; Pastoret, P. P.; Brochier, B.; Humblet, M. F. & Saegerman, C.

animals. Some populations of whales suffer from cancer at similar rates to humans.[28] Other common diseases that can infect animals living in the wild are distemper, chronic wasting disease, African swine fever, and a variety of fungal infections.[29]

Diseases in invertebrates

Most people don't think much about how invertebrates might suffer from disease, but they contract bacterial, viral, and fungal infections just like other animals. Some are very specific to the animals they infect and don't spread to vertebrates, but they can be treated similarly, with vaccines, antibiotics, and antifungals.[30] Here are some common diseases found in land-dwelling and marine invertebrates.

(2011) "A survey of the transmission of infectious diseases/infections between wild and domestic ungulates in Europe", *Veterinary Research*, 42, a. 70; Washington State Department of Health (2019) "Animal transmitted diseases", *Washington State Department of Health* , https://www.doh.wa.gov/YouandYourFamily/IllnessandDisease/AnimalTransmittedDiseases [accessed on 26 June 2019].

[28] Martineau, D.; Lemberger, K.; Dallaire, A.; Labelle, L.; Lipscomb, T. P.; Pascal, M. & Mikaelian, I. (2002) "Cancer in wildlife, a case study: Beluga from the St. Lawrence estuary, Québec, Canada", *Environmental Health Perspectives*, 110, pp. 285-292; Albuquerque, T. A. F.; Drummond do Val, L.; Doherty, A. & de Magalhães, J. P. (2018) "From humans to hydra: Patterns of cancer across the tree of life", *Biological Reviews*, 93, pp. 1715-1734.

[29] Cole, R. A. & Friend, M. (1999) "Field manual of wildlife diseases: Parasites and parisitic diseases", in Milton, F. & Franson, J. C. (eds.) *Field manual of wildlife diseases: General field procedures and diseases of birds*, Washington, D. C.: U. S. Geological Survey, pp. 188-258; Williams, E. S. & Barker, I. K. (eds.) (2008 [2001]) *Infectious diseases of wild mammals*, New York: John Wiley and Sons; Dantas-Torres, F.; Chomel, B. B. & Otranto, D. (2012) "Ticks and tick-borne diseases: A One Health perspective", *Trends in Parasitology*, 28, pp. 437-446; Wobeser, G. A. (2013) *Investigation and management of disease in wild animals*, Dordrecht: Springer.

[30] Raukko, E. (2018) "The first-ever insect vaccine PrimeBEE helps bees stay healthy", *University of Helsinki*, October 31, https://www.helsinki.fi/en/news/sustainability-news/the-first-ever-insect-vaccine-primebee-helps-bees-stay-healthy [accessed on 18 august 2019].

Black death in butterflies

One major disease that affects butterflies is nuclear polyhedrosis virus, or the black death. It's called this because affected animals become lethargic and their bodies start to decay, turning black. Their insides liquefy and ooze out of their decaying body. The virus usually strikes in the caterpillar phase. It causes a great deal of stress to the caterpillar, who will refuse to eat and may regurgitate food. The virus can take up to three days to kill the caterpillar.[31] The infected drops of the liquefied body spread easily onto leaves and is further spread by parasites, infecting the caterpillars who eat those leaves.[32]

Cricket paralysis virus

A widespread disease afflicting crickets is known as cricket paralysis virus. Infected crickets become malnourished, have trouble jumping, lose coordination, and then their legs become paralyzed and they fall on their backs, where they lie for a few days before dying. It can also infect other insects, and similar strains infect bees and flies.[33]

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[31] Hadley, D. (2019) "Why are monarch caterpillars turning black?", *ThougtCo*, July 12, https://www.thoughtco.com/monarchs-turning-black-4140653 [accessed on 14 August 2019].

[32] Stairs, G. R. (1966) "Transmission of virus in tent caterpillar populations", *Entomological Society of Canada*, 98, pp. 1100-1104.

[33] Liu, K.; Li, Y.; Jousset, F.-X.; Zadori, Z.; Szelei, J.; Yu, Q.; Pham, H. T.; Lépine, F.; Bergoin, M. & Tijssen, P. (2011) "The *Acheta domesticus* densovirus, isolated from the European house cricket, has evolved an expression strategy unique among parvoviruses", *Journal of Virology*, 85, pp. 10069-10078; Szelei, J.; Woodring, J:; Goettel, M. S.; Duke, G.; Jousset, F.-X.; Liu, K. Y.; Zadori, Z.; Li, Y.; Styer, E.; Boucias, D. G.; Kleespies, R. G.; Bergoin, M. & Tijssen, P. (2011) "Susceptibility of North-American and European crickets to Acheta domesticus densovirus (AdDNV) and associated epizootics", *Journal of Invertebrate Pathology*, 106, pp. 394-399.

Lobster shell disease

Lobsters can contract a common disease known simply as shell disease. Healthy lobsters have a slippery protective layer that prevents the shell from being eroded by bacteria. With shell disease, this barrier disappears, allowing the shell to start to erode. The disease itself is not always lethal, but it can cause the lobster distress and weakness that increases vulnerability to other harms such as injury.[34]

Diseases and infections in vertebrates

More is known about diseases that affect vertebrates. Vertebrate diseases tend to be easier to study because the animals are typically larger and many vertebrate diseases are known to be transmissible between a variety of vertebrates, including humans and domesticated animals. The diseases below are a sampling of common diseases in vertebrates.

Cholera in birds

Avian cholera is a common bacterial disease in birds living in both temperate and arctic climates. Many birds carry the disease, but it only becomes active when the birds are physically or emotionally stressed. Very cold weather or high water forcing birds in temperate regions to leave their homes are common stressors that can bring out the disease in infected birds. It causes weight loss, mucous discharge, diarrhea, and rapid breathing. It frequently leads to pneumonia. It can attack the liver, spleen, and skin and cause arthritis due to inflammation. Avian cholera can have a very high mortality rate, especially when it first spreads through a colony. It is spread by direct contact and by ingestion of contaminated water or soil.[35]

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[34] Groner, M. L.; Shields, J. D.; Landers, D. F.; Swenarton, J. & Hoenig, J. M. (2018) "Rising temperatures, molting phenology, and epizootic shell disease in the American lobster", *The American Naturalist,* 192, pp. E163-E177.

[35] Iverson, S. A; Gilchrest, H. G.; Soos, C.; Buttler, I. I.; Harms, N. J. & Forbes, M. R. (2016) "Injecting epidemiology into population viability analysis: Avian cholera transmission

Distemper

Distemper is a viral disease related to measles that attacks the gastrointestinal, respiratory, and nervous systems of mammals. It is commonly associated with dogs but also affects many animals in the wild, including raccoons, foxes, wild cats, monkeys, and seals. Infected animals can exhibit behaviors similar to those caused by rabies, including drooling, circling behavior, chewing fits, nonresponsiveness to the environment, and loss of fear of humans and other animals. It can cause fever, vomiting, convulsions, and paralysis. It is usually fatal. Those who survive may have permanent neurological damage.[36]

Skin diseases in amphibians, reptiles, and fishes

Amphibians are susceptible to deadly skin diseases, such as fungal infections and ranavirus. The aquatic fungal infection chytridiomycosis is one of the deadliest pathogens on record. It afflicts frogs, salamanders, and other amphibians in wet climates. The fungus eats through an animal's skin, causes metabolic changes, and finally kills the animal by triggering cardiac arrest. In addition to the skin, lesions develop on multiple internal organs and muscles. It spreads continually from immune amphibians to those who are vulnerable.[37]

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dynamics at an arctic seabird colony", *Journal of Animal Ecology*, 85, pp. 1481-1490; Sander, J. E. "Fowl cholera", *Merck manual: Veterinary manual*, https://www.merckvetmanual.com/poultry/fowl-cholera/overview-of-fowl-cholera [accessed on 8 December 2019].

[36] Kameo, Y.; Nagao, Y.; Nishio, Y.; Shimoda, H.; Nakano, H.; Suzuki, K.; Une, Y.; Sato, H.; Shimojima, M. & Maeda, K. (2012) "Epizootic canine distemper virus infection among wild mammals", Veterinary *Microbiology*, 154, pp. 222-229; Williams, E. S. & Barker, I. K. (eds.) (2008 [2001]) *Infectious diseases of wild mammals*, 3rd ed., New York: John Wiley and Sons, part 1.

[37] Schelle, B. C.; Pasmans, F.; Skerratt, L. F.; Berger, L.; Martel, A.; Beukema, W.; Acevedo, A. A.; Burrowes, P. A.; Carvalho, T.; Catenazzi, A.; De la Riva, I.; Fisher, M. C.; Flechas, S. V.; Foster, C. N.; Frías-Álvarez, P.; Garner, T. W. J.; Gratwicke, B.; Guayasamin, J. M.; Hirschfeld, M.; Kolby, J. E.; Kosch, T. A.; La Marca, E.; Lindenmayer, D. B.; Lips, K. R.; Longo, A. V.;

Sickness behaviors

Disease is more widespread in nature than many people realize. One of the reasons people misjudge the extent to which it affects animals living in the wild is that many animals have evolved to avoid showing signs of illness. Animals who look weak or vulnerable are prime targets for predators. Moreover, those who live in groups may lose social status or be abandoned and left to fend for themselves when they are least able to. Alternatively, sometimes animals selectively exhibit sickness behaviors, such as lethargy and sleepiness. This happens when the sickness behaviors are not caused by the illness itself, but rather by conserving energy to fight off an illness. Depending on the time of year and other circumstances, showing signs of illness might reduce opportunities to reproduce or make it impossible to defend valuable territory. An animal might take more time to rest and recover outside of breeding season, rather than trying to defend their territory. During breeding season, they might use their energy to reproduce and defend their nests or dens rather than on recovery efforts.[38]

Therefore, an animal can be suffering greatly from a disease or illness that we cannot recognize without performing medical checks. As more research is undertaken on how animals are affected by diseases in the wild, our knowledge in this area continues to grow.[39] In the meantime, it is worth noting

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Maneyro, R.; McDonald, C. A.; Mendelson, J., III; Palacios-Rodriguez, P.; Parra-Olea, G.; Richards-Zawacki, C. L.; Rödel, M.-O.; Rovito, S. M.; Soto-Azat, C.; Toledo, L. F.; Voyles, J.; Weldon, C.; Whitfield, S. M.; Wilkinson, M.; Zamudio, K. R. & Canessa, S. (2019) "Amphibian fungal panzootic causes catastrophic and ongoing loss of biodiversity", *Science*, 363, pp. 1459-1463.

[38] Lopes, P. C (2014) "When is it socially acceptable to feel sick?", *Proceedings of the Royal Society of London B: Biological Sciences*, 281, 20140218.

[39] Barlow, N. D. (1995) "Critical evaluation of wildlife disease models", in Grenfell, B. T. & Dobson, A. P. (eds.) *Ecology of infectious diseases in natural populations*, Cambridge: Cambridge University Press, pp. 230-259; Branscum, A. J.; Gardner, I. A. & Johnson, W. O. (2004) "Bayesian modeling of animal- and herd-level prevalences", *Preventive Veterinary Medicine*, 66, pp. 101-112; Nusser, S. M.; Clark, W. R.; Otis, D. L. & Huang, L. (2008) "Sampling considerations for disease surveillance in wildlife populations", *Journal of Wildlife Management*, 72, pp. 52-60; McClintock, B. T.; Nichols, J. D.; Bailey, L. L.;

that there are recognizable behavioral signs in some animals who are experiencing fevers, including lethargy, decreased appetite, and reduced grooming, though as mentioned earlier, animals may be able to choose not to exhibit these behaviors if the cost is too high.[40] Humans can also learn a lot by observing larger animals in hospitals or doing autopsies, and there are increasingly sensitive methods of noninvasively detecting signs of illness in the wild.

Some animals are hard to observe at all, such as small animals who spend most of their lives hiding underground and extremely numerous tiny invertebrates. Marine animals can also be difficult to study because of their numbers and also because it's more difficult to study them non-invasively. As a result, the amount of suffering caused by diseases in the wild is much greater than many people would imagine.

There is another often fatal threat to animals' health that sometimes overlaps with disease. This is parasitism.

Parasitism and parasitoidism

Approximately half of all species of animals and plants are parasitic at some stage in their lifecycle; few, if any, species are not infested by any parasites. Many parasites are microbial pathogens that can harm their hosts by causing disease. Others are larger organisms, including animals. Some parasites cause little harm to animals. Some, however, cause pain and weaken them. Parasitoids ultimately kill the animals they infest.

The actions of a parasite can cause fatigue, making it harder for the host to find food and avoid predators. Some parasites castrate their hosts, leaving their other systems intact so that the host can survive, diverting the energy

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MacKenzie, D. I.; Kendall, W. & Franklin, A. B. (2010) "Seeking a second opinion: Uncertainty in disease ecology", *Ecology Letters*, 13, pp. 659-674; Camacho, M.; Hernández, J. M.; Lima-Barbero, J. F. & Höfle, U. (2016) "Use of wildlife rehabilitation centres in pathogen surveillance: A case study in white storks (*Ciconia ciconia*)", *Preventive Veterinary Medicine*, 130, pp. 106-111.

[40] Hart, B. L. (1988) "Biological basis of behavior of sick animals", *Neuroscience & Biobehavioral Reviews,* 12, pp. 123-137.

from reproduction into sustaining the parasite. Some parasites cause behavioral changes in their hosts (particularly intermediate hosts) that make them more susceptible to predators (final hosts).[41] Intermediate hosts provide an environment for the immature parasite to develop and grow, and final hosts are where sexually mature parasites reproduce.

For example, there's a parasitic fluke that reproduces inside of its final hosts, which are grazing ruminants like cows, and its eggs are excreted in the host's feces. The first intermediate hosts are common snails, who consume the feces and become infested by the larval parasites. An infested snail forms cysts around the parasites, which he then excretes. These cysts are consumed by the second intermediate host: an ant. The parasite is able to take control of the ant's behavior, forcing him to climb to the top of a blade of grass where he will be eaten by a grazing animal, in which the now mature parasites can reproduce.

Some parasites are called hyperparasites because they feed on other parasites. They are not to be confused with superparasites, which live in large populations within a single host (such as wasps whose larvae are parasites of caterpillars)[42]. The following are some examples of conditions caused by parasites that are prevalent among wild animals.

Sarcoptic mange

Sarcoptic mange is a skin disease caused by burrowing parasitic mites. The infestation causes an allergic reaction to the mite, resulting in intense scratching and biting. It affects several species of nonhuman mammals, including dogs, cats, coyotes, bears, and wombats. Wombats are especially badly affected by mange. It is believed that this is due to conditions inside wombat burrows being especially conducive to the survival and transmission

[41] Gopko, M.; Mikheev, V. N. & Taskinen, J. (2017) "Deterioration of basic components of the anti-predator behavior in fish harboring eye fluke larvae", *Behavioral Ecology and Sociobiology*, 71.

[42] Van Alphen, J. J. & Visser, M. E. (1990) "Superparasitism as an adaptive strategy for insect parasitoids", *Annual Review of Entomology*, 35, pp. 59-79; Sullivan, D. J. & Völkl, W. (1999) "Hyperparasitism: Multitrophic ecology and behaviour", *Annual Review of Entomology*, 44, pp. 291-315.

of sarcoptic mites. Infested wombats get bloody lesions, lose hair, their skin becomes crusted and infected, and their eyes and ears become crusted over. The disease can cause blindness or deafness. In severe cases, it can lead to a slow and lingering death. This disease is believed to be one of the most painful ones afflicting nonhuman animals.

Parasitic infestations in birds

Trichomonosis

Wild birds commonly suffer from trichomonosis, a disease caused by parasites. It can be a debilitating and sometimes deadly disease that usually affects the mouth, esophagus, crop, and glandular stomach of birds as well as other organs such as the liver. Other extensively reported parasites in birds are tracheal worms. These obstruct the trachea and bronchi, resulting in major respiratory distress. In response, infested birds usually cough, sneeze, and shake their heads trying to dislodge the parasites. They may lose body mass, display anemia, and often die of starvation. Heartworms, reported in swans and geese, are similarly debilitating.

Common parasites among reptiles and amphibians

Protozoan infections

Haemopoteus, a protozoan parasite transmitted by blood-sucking insects, has been reported in various species of reptiles and amphibians, mostly turtles and tortoises. It has debilitating effects on skeletal muscles and other organs, such as the liver. One protozoan parasitic infection causes colitis, abscesses of the liver and other organs, and sometimes death. Spirorchiid trematodes infect turtles and snails, affecting major arteries and the heart. Other protozoan infections are reported in a variety of reptiles, mostly snakes and

lizards, causing regurgitation, diarrhea, weight loss, and enlargement of the gastric mucosa.[43]

Parasitoidism among invertebrates

Ichneumonidae and Braconidae wasps

Among the best known examples of parasitoidism among invertebrates is the case of *Ichneumonidae* and *Braconidae* wasps. These animals lay their eggs in the bodies of other insects, such as caterpillars and ants. Some of these wasps are hyperparasites, laying their eggs in the bodies of other parasitic wasps. When the eggs hatch, the larvae start to eat their host alive, leaving the host's vital organs intact until the end. Only after the edible nonvital parts of the host have been eaten is the host finally killed, probably after having endured great pain.[44]

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[43] Jovani, R.; Amo, L.; Arriero, E.; Krone, O.; Marzal, A.; Shurulinkov, P.; Tomás, G.; Sol, D.; Hagen, J.; López, P.; Martín, J.; Navarro, C. & Torres, J. (2004) "Double gametocyte infections in apicomplexan parasites of birds and reptiles", *Parasitology Research*, 94, pp. 155-157;

Tkach, V. V.; Snyder, S. D.; Vaughan, J. A. (2009) "A new species of blood fluke (Digenea: Spirorchiidae) from the Malayan Box turtle, *Cuora amboinensis* (Cryptodira: Geomydidae) in Thailand", *Journal of Parasitology*, 95, pp. 743-746; Chen, H.; Kuo, R. J.; Chang, T. C.; Hus, C. K.; Bray, R. A. & Cheng, I. J. (2012) "Fluke (*Spirorchiidae*) infections in sea turtles stranded on Taiwan: Prevalence and pathology", *Journal of Parasitology*, 98, pp. 437-439.

[44] Weng, J. L. & Barrantes Montero, G. (2007) "Natural history and larval behavior of the parasitoid *Zatypota petronae* (Hymenoptera: Ichneumonidae)", *Journal of Hymenoptera Research*, 16, pp. 327-336; Komatsu, T. & Konishi, K. (2010) "Parasitic behaviors of two ant parasitoid wasps (Ichneumonidae: Hybrizontinae)", *Sociobiology*, 56, pp. 575-584.

4

Hunger and psychological suffering

Malnutrition and hunger in wild animals

Another important factor that can seriously affect the lives of animals is the lack of food. Many animals suffer through long periods of hunger and malnutrition, yet they survive. Others starve to death, often shortly after birth. The most common cause of starvation in the wild is simply being born in an environment where there is not enough food for all. Unfortunately, this is the situation of most animals who are ever born. Most species of animals reproduce in very high numbers. Many different species of arthropods and fishes, for example, can lay from thousands to millions of eggs during their lifetime. This means that populations would grow out of control if most of the offspring survived. In order for a population to remain stable, on average only one offspring per parent can survive to adulthood. The rest will die. Some eggs don't hatch, some animals are killed by predators, siblings, or even parents shortly after birth, but one of the most common forms of death is by starvation just after being born or hatched. For those who do survive, there are multiple challenges and dangers that can easily lead to malnutrition, starvation, and thirst.

Parents are at greater risk of starvation just before and after mating, when their energy levels and fat stores can drop by 50% or more. Babies are also more vulnerable, even in species that have few children and care for their young. Young mammals prematurely separated from their mothers rarely find the food they need to survive. When food is scarce, a mother may starve herself in an effort to nourish her children. Alternatively, she may reject her children, refusing to feed them or let them suckle. Sometimes, malnourished

mammals are unable to produce milk. In these circumstances, babies either starve in the nest or den, or are abandoned, as is often seen among squirrels. Non-mammals can be at even greater risk of starvation during mating and parenthood, as their fat reserves drop and their access to food is severely restricted. Salmon, for example, endure an exhausting journey upriver to their breeding grounds, swimming against the current and leaping up waterfalls. Throughout this period, they do not eat. Some survive to make the journey again in subsequent years, but many do not, expending the last of their energy to reproduce, and dying shortly thereafter.

Animals also face intermittent and seasonal periods of starvation. For example, different deer species don't hibernate or migrate, and they routinely starve in large numbers every winter due to scarcity of shelter and food. In some areas, more than half a population of sea turtles can die during the winter when they become stunned by the cold and are too disoriented to eat or move around.

Under food stress, mammals, birds, and fishes first shed accumulated stores of fat and then begin consuming muscle mass as an emergency source of energy, which can be debilitating and eventually becomes fatal as organs atrophy. Migration and dormancy are common adaptive responses to lack of food, but they have their own dangers. Migration takes a great deal of energy, and its success often depends on how favorable the weather and food conditions were in the previous spring and summer. Dormant animals are still vulnerable to starvation, as well as disease and stress from heat or cold.

Invertebrates employ similar strategies to cope with starvation periods, and many invertebrates, including insects, have evolved to survive for months or even years without food. Others migrate, but their ability to take off and to fly can be reduced by hunger stress and malnutrition, leading to death.

Throughout the animal kingdom, lack of energy sources is common. During times of food scarcity, the animals who starve first are those with lower fat stores, such as juveniles, animals who have lost energy due to breeding, animals too weak to migrate, and those with lower social status who have less access to food. Food scarcity is worsened by the simultaneous occurrence of hunger and predation. How are these two things related? First, to avoid being killed, animals try to find food in places where the risks that

other animals pose to them are lower. For example, they will look for food in wooded areas where they can hide instead of in open plains where predators can more easily see them. When there is not enough food in the areas where they hide, they face hunger and malnutrition. When malnutrition becomes critical, they start leaving safer areas, increasing their vulnerability.

Thirst

Thirst is another major contributor to high mortality rates in wild animals. There are two fundamental ways the lack of water causes wild animals to suffer and often to die painfully. First, during times of drought, there are not enough resources available for a large population of animals, so many of them die of thirst. Second, as with malnutrition, some animals show a reluctance to seek water because of the risk posed by predators. They hide in safe places where there is little or no water. Eventually, thirst forces animals to take many risks to satisfy their need for water. When they finally leave their hiding places, they are so debilitated that they become easy prey at watering holes or in open fields. Others stay in their hiding places until they are so dehydrated that they cannot move. Thus, they are unable to reach water and they die of thirst.[45]

Extreme thirst is a frightening experience. It produces a sense of exhaustion caused by reduced blood volume, and the body attempts to compensate for the lack of water by raising the respiratory and heart rates. Next comes dizziness and collapse, and ultimately death.[46]

Diseases can also lead to dehydration. For example, frogs can be infected by the chytrid fungus, which thickens their skin so much that they can't absorb water and essential nutrients. Since frogs primarily hydrate themselves through their skin, this is usually deadly if left untreated. A treatment exists and the infection is simple to cure, but currently there is no way to treat large

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[45] TNN (2010) "Starvation, thirst kill many antelope in Jodhpur", *The Times of India*, July 4, https://timesofindia.indiatimes.com/city/jaipur/Starvation-thirst-kill-many-antelope-in-Jodhpur/articleshow/6126087.cms [accessed on 24 February 2013].

[46] Gregory, N. G. (2004) *Physiology and behavior of animal suffering*, Ames: Blackwell, p. 83.

populations of frogs in the wild. The disease can be further complicated by other factors such as heat stress. Heat stress can worsen the condition of a dehydrated frog, even at temperatures that do not harm them when they are hydrated.

At times, authorities respond to droughts or lack of food in ways that harm the animals who are suffering. Sometimes measures are approved to deliberately starve animals. This happens, for example, to urban pigeons.

Psychological stress in wild animals

In addition to facing physical harms like the ones we have seen above, animals can also suffer psychologically due to the situation they are in. While the effects of stress in domesticated animals have been well documented,[47] there have been fewer studies on wild animals, and the severity and number of stressors that afflict wild animals have likely been underestimated by scientific research, except for the effects of captivity on wild animals.

Wild animals have to face adverse circumstances on a daily basis that can be stressful: physical trauma, disease, food shortages, conflicts with others of their species or group, dislocation due to severe weather conditions or natural disasters. They can also be frightened by loud or unfamiliar sounds. In mammals, birds, and arthropods, there is evidence of animals showing PTSD-like symptoms in response to stressful events, of mood and anxiety disorders, and of negative moods spreading within social groups. Here we will cover stress related to external threats and various aspects of social living.

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[47] See for example, Dantzer, R. & Mormède, P. (1983) "Stress in farm animals: A need for reevaluation", *Journal Animal Science*, 57, pp. 6-18; Wiepkema, P. R. & van Adrichem, P. W. M. (eds.) (1987) *Biology of stress in farm animals: An integrative approach*, Hinglaw: Kluwer Academic; Broom, D. M. & Johnson, K. G. (1993) *Stress and animal welfare*, Hinglaw: Kluwer Academic; Moberg, G. P. & Mench, J. A. (2000) *The biology of animal stress: Basic principles and implications for animal welfare*, New York: CABI.

Stress due to external threats

Stress caused by the risk of being attacked by other animals seems to arise in two major ways. The first is directly from the conflict itself, in which animals must face the stress of fleeing or fighting. The confrontation may be so intense that the prey animal dies of stress.[48] Second, stress can arise in prey animals who are forced to balance their need for food against the risk of being killed, and decide whether to decrease foraging or to risk exposure to predators.[49] Often, animals decrease the likelihood of being caught by choosing to eat less. In those conditions, additional stress responses are likely to be triggered by starvation and dehydration.

This can be made worse by certain human interventions that are carried out for ecological purposes, such as the reintroduction of predators into an area to preserve a threatened species of plant. One way this is done is when wolves are reintroduced in an attempt to prevent large herbivores (for example, an elk or a deer) from eating certain foods. Not only do the wolves eat these animals, but their presence causes the grazing animals to hide in places where they are less visible and where they eat less plentiful, less nutritious plants. The dynamics that result from this are called the "ecology of fear."

The stress of social animals

Living in social groups involves costs for animals, primarily due to social conflict and competition. Many species of animals that are social and subsocial (such as crickets and lobsters) have dominance hierarchies, as do solitary animals like octopuses, who compete over territory. Although a lot of fighting for position is ritualized, some involves actual violence or ongoing harassment. The social status that each animal has in the hierarchy

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[48] McCauley, S.; Rowe, J. L. & Fortin, M.-J. (2011) "The deadly effects of 'nonlethal' predators", *Ecology*, 92, pp. 2043-2048.

[49] Clinchy, M.; Zanette, L.; Boonstra, R.; Wingfield, J. C. & Smith, J. N. M. (2004) "Balancing food and predator pressure induces chronic stress in songbirds", *Proceedings of the Royal Society B: Biological Sciences*, 271, pp. 2473-2479.

dramatically influences her level of wellbeing, particularly when it comes to stress-related diseases. It has been well documented that social subordination constitutes a stressor in different social species among primates, rodents, and some types of aquatic animals. In low-ranking animals of these social species, depressive responses and a decrease in reproductive opportunities are often observed.[50]

Other subordinate animals may face frequent threats and intimidation in order to remain in their group. Common causes of intimidation include food access and sexual competition — often together because of the extra energy demands of reproduction. Dominant males might attack or threaten other males who try to mate, and kill the children of other fathers, causing grief to the mothers, who are then coerced into mating. We give more detail about this in the following section about conflicts between animals.

Subordinate females in matrilineal groups can face constant threats and deprivation, in which dominant females use aggression and intimidation to limit the access of subordinates to mating opportunities and food. The children of subordinate females might also be killed by the dominant female. She may force the subordinates to serve her, especially to further her reproductive success. This is common in meerkat gangs. The mothers whose children were killed must help care for the young of the dominant female or

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[50] ; Fox, H. E.; White, S. A.; Kao, M. H. & Russell, D. F. (1997) "Stress and dominance in a social fish", *The Journal of Neuroscience*, 17, pp. 6463-6469; Koolhas, J. M.; de Boer, S. F.; Meerlo P.; Strubbe, J. H. & Bohus, B. (1997) "The temporal dynamics of the stress response", *Neuroscience and Biobehavioral Reviews,* 21, pp. 775-782; Koolhas, J. M.; Dde Boer, S. F.; de Rutter, A. J.; Meerlo, P. & Sgoifo A. (1997) "Social stress in rats and mice", *Acta Physiologica Scandinavica. Supplementum*, 640, pp. 69-72; Shiverly, C. A.; Laber-Laird, K. & Anton, R. F. (1997) "Behavior and physiology of social stress and depression in female cynomolgus monkeys", *Biological Psychiatry*, 41, pp. 871-882; Sapolsky, R. M. (2004) "Social status and health in humans and other animals", *Annual Review of Anthropology,* 33, pp. 393-418; Abbott, D. H; Keverne, E. B.; Bercovitch, F. B.; Shively, C. A.; Mendoza, S. P.; Saltzman, W.; Snowdon, C. T.; Ziegler, T. E.; Banjevic, M.; Garland, T., Jr. & Sapolsky, R. M. (2003) "Are subordinates always stressed? A comparative analysis of rank differences in cortisol levels among primates", *Hormones and Behavior*, 43, pp. 67-82; Sapolsky, R. M. (2005) "The influence of social hierarchy on primate health", *Science*, 308, pp. 648-652.

else be evicted from their colony and face the hazards of trying to survive on their own.

Grieving

Stress due to the adverse effects of maternal separation has been studied in numerous social species. Maternal separation can have a long-lasting effect on the physiology and behavior of both mother and child. After separation, common responses of the mother are reducing activity, moving with a bent-over body, and exhibiting other sickness behaviors induced by the stressful event. A mother who loses a child may carry the dead child around or refuse to leave the body for days. This has been observed in primates, birds, elephants, cetaceans, and many other animals.

Orphaned animals face fear and loneliness. Infants who are separated from their mothers show increased reactivity to stress throughout their lives and increased risk of disease. In wild animals, this has been observed in cetaceans, elephants, rodents, and primates, and other social species are likely to experience similar effects.

In addition to the effects of maternal separation, there are many documented cases of elephants, cetaceans, dogs, birds, and other animals exhibiting grieving behavior at the loss of family members or friends. Animals like geese and ducks mate for life and grieve the loss of a partner. A mourning goose will lose weight, separate from her flock, and exhibit submissive behavior (and if she partners again, it will typically be with another goose who has also lost a partner).

5

Conflicts

In a previous chapter, we saw one form of conflict between animals that is very common: parasitism. In this chapter, we will see some of the other conflicts that can commonly occur between animals and that can result in serious harms. We'll first see the ones that take place among animals of the same species. Afterwards, we'll look at harms due to conflicts with animals of other species.

Intraspecies conflicts

Animals of the same species fight to secure food, territory, mates, or social status within a group. Some animals eat members of their own species. Fighting can result in injury or death. We'll look at some of these harms.

Fighting over territory

Territoriality is a widespread cause of intraspecific conflict. It occurs when an individual animal defends a particular area (the territory) against intrusion by other animals, and thereby maintains exclusive access to food, nesting sites, or mates. Animals use a variety of methods to demarcate and defend their territories, from scents to sounds to ritual displays. Sometimes, however,

animals use force to defend their territories, and this means risking injury or even death for the defender or the intruder.[51]

Birds

Many species of birds are territorial, at least during the breeding season, and some will fight to defend their territory.[52] These fights can be brutal, leaving one or both parties with painful injuries. Blackbirds are extremely territorial, with both males and females fighting to protect their territory.

Mammals

Intergroup violence is common among chimps. Such conflicts usually center around control of territory or the kidnapping of fertile females. Also, big cats are frequently territorial. Tigers are generally solitary, maintaining individual territories. Generally, fights over territory result in the weaker individual submitting, though sometimes injury or death can result.[53]

Insects

Many ant species are highly territorial. Honey ants have specialized workers called repletes. The repletes are fed by the other workers and are used as living larders, storing honey for the winter. When one colony is significantly stronger than another, it will raid the weaker colony, killing or driving away the queen, enslaving the workers and capturing the honey-rich repletes to feed their own colony.[54] In order to access the honey, the workers chew through the abdomen of the repletes.

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[51] Harrington, F. H. & Mech, L. D. (1979) "Wolf howling and its role in territory maintenance", *Behaviour,* 68, pp. 207-249; Begon, M.; Townsend, C. R. & Harper, J. L. (2006) *Ecology: From individuals to ecosystems*, Oxford: Blackwell, pp. 132-133.

[52] Ritchison, G. (2009) "Bird territories", *Eastern Kentucky University,* http://people.eku.edu/ritchisong/birdterritories.html [accessed on 16 August 2019].

[53] Mazák, V. (1981) "*Panthera tigris*", *Mammalian Species,* 152, pp. 1-8.

[54] Hölldobler, B. (1976) "Tournaments and slavery in a desert ant", *Science,* 192, pp. 912-914; Hölldobler, B. (1981) "Foraging and spatiotemporal territories in the honey ant

Fighting over mates

Polygyny is a mating system in which a single male lives and mates exclusively with multiple females. This system has been observed in elephant seals, gorillas, pheasants, and baboons. Since the numbers of males and females in most species are approximately equal, polygynous mating systems lead to competition between males for access to females. Elephant seal males fight to control a beach and thereby to have exclusive mating rights over the females in that territory. A successful male can have a harem of up to 100 females, while most males will not have a chance to mate at all. The fights between males can be brutal, especially when the males are evenly matched.

Sexual coercion

Having offspring is generally a much bigger investment of resources for females than it is for males – it is females who undergo pregnancy or lay eggs, who provide most of the parental care, and, in mammals, who provide milk for their young. Male investment of energy and resources is much lower. Males therefore tend to adopt a reproductive strategy that focuses on maximizing their number of mates, while females tend to adopt a strategy of having fewer, higher quality mates. Males coerce females into mating with them, by physically forcing them to mate, harassing them until they accede, or by punishing refusals to mate.

Sexual coercion is common among animals of many species, including insects, fishes, birds, bottle-nosed dolphins, and primates. The victim usually struggles and attempts to escape and is often immobilized by the attacker. In some cases, it results in severe injury from actions like scalping (tearing the skin over the head) in water birds. The rape attempts can be made individually or in groups, like the "rape flights" performed by groups of

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Myrmecocystus mimicus wheeler (Hymenoptera: Formicidae)", *Behavioral Ecology and Sociobiology,* 9, pp. 301-314.

drakes. The risk of injury is high and the severity of the act may lead to the drowning of the assaulted animal.[55]

Social status

In social animals, social status is important because a higher rank may mean better access to mates and resources like food and territory. Chimpanzees have been witnessed killing members of their own groups over social status, mating rights, or in apparent political power struggles. Sometimes the loser in a power struggle is chased away, and sometimes attacked or killed.

Cannibalism and infanticide

Cannibalism is common in nature. In many cases, cannibalism is practiced on infants. In some cases, this allows the cannibal to eliminate the progeny of a rival. In other cases, it is the parent who kills, and sometimes consumes, their own children. This behavior has been observed in different species of aquatic animals, birds, rats, sloths, and beetles. It isn't always clear what causes parents to kill their own children. In some cases, it may be to cut their losses or recoup the energy expended in a "bad investment," for example, if the infants are developing too slowly, are sick, or there isn't enough food for them all. The parent might be starving or stressed, due to difficult environmental conditions. In some cases, parents kill their offspring in order to make themselves available for mating so they can "try again" for a better brood.

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[55] McKinney, F. & Evarts, S. (1998) "Sexual coercion in waterfowl and other birds", *Ornithological Monographs*, 49, pp. 163-195; Connor, R. & Vollmer, N. (2009) "Sexual coercion in dolphin consortships: A comparison with chimpanzees", in Muller, M. N. & Wrangham, R. W. (eds.) *Sexual coercion in primates and humans: An evolutionary perspective on male aggression against females*, Cambridge: Harvard University Press, pp. 218-243; Garner, S. R.; Bortoluzzi, R. N.; Heath, D. D. & Neff, B. D. (2010) "Sexual conflict inhibits female mate choice for major histocompatibility complex dissimilarity in Chinook salmon", *Proceedings of the Royal Society B: Biological Sciences*, 277, pp. 885-894; Han, C. S. & Jablonski, P. G. (2010) "Male water striders attract predators to intimidate females into copulation", *Nature Communications*, 1, a. 52.

Sibling rivalry

Whenever an animal has multiple offspring at once, there is the potential for sibling rivalry. Food and parental attention are limited. In situations where the resources available aren't sufficient, either because of poor environmental conditions or the large size of the brood, siblings have to compete with each other for the resources they require.

Siblicide is frequently observed in birds. Nazca boobies are large seabirds whose chicks almost always engage in siblicide. The mother lays one or two eggs in each clutch. The first chick is usually born around five days before the second, and almost invariably kills the younger sibling by dragging him from the nest.[56]

Spotted hyena cubs are born with their eyes open and with developed teeth, and they begin fighting each other shortly after birth.[57] These fights function to establish rank, but in times of intense food competition, they can result in death. The strongest cubs may not kill the weakest directly, but they can limit their access to their mother's milk, eventually starving them to death.

Animals killed by animals of other species

Animals may be killed by animals of other species in a variety of ways. The time it takes for the victim to die also varies. For instance, sometimes animals are eaten alive. Some small animals are killed by the digestive enzymes of those who eat them. Some spiders paralyze animals with venom before injecting them with digestive enzymes which liquify the animal's body. Depending on the kind of venom and the size and species of the captured animal, they may still be alive and capable of feeling pain during this process. Some others are eaten while still alive instead of being killed first. Among them, some are swallowed and digested alive, while others are disemboweled.

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[56] Anderson, D. J. (1990) "Evolution of obligate siblicide in boobies: A test of the insurance egg hypothesis", *The American Naturalist*, 135, pp. 334-350.

[57] Frank, L. G.; Glickman, S. E. & Light, P. (1991) "Fatal sibling aggression, precocial development, and androgens in neonatal spotted hyenas", *Science,* 252, pp. 702-704.

The vast majority of animals are invertebrates, and most conflicts are fought among them.

Animals who avoid being captured also suffer in a variety of ways from the presence of threatening animals. When they share an environment with such animals, they may suffer from psychological distress, as well as poor nutrition because they are too afraid to graze in dangerous open areas. For its part, hunting is a dangerous activity too. It is common for predatory animals to be injured or killed while hunting. They can suffer accidents by losing their footing in high speed chases over difficult terrain or be injured during the struggle with the animal they are hunting. If the injury is severe enough to prevent them from hunting, they may die of starvation.

6

Injuries due to accidents

In previous chapters we have seen how animals can be injured by external factors like certain weather events or by conflicts with other animals. Another way in which animals can be injured is due to accidents. These kinds of physical injuries are one of the most common threats to animals living in the wild. In some cases, animals incur severe injuries that kill them directly. In other cases, their injuries can affect them in ways that are indirectly fatal, for example, by reducing their ability to find food or to evade predators. Even when animals aren't killed by their injuries, they can be left with chronic pain, especially when their injuries don't heal properly.

Broadly speaking, we can categorize causes of injury into three main groups: conflict with other animals, injuries caused by severe weather and natural disasters, and accidents. Here, we'll discuss how animals can be injured in accidents.

Animals living in the wild are subject to injuries in their everyday lives. Many accidents result from falls, collapsed dens or burrows, collisions, or getting stuck. Birds crash into trees, elephants get stuck in swamps, deers puncture their eyes on low-hanging branches, and squirrels fall out of trees. Invertebrates get appendages stuck and lose body parts in molting mishaps.

Crushing injuries

Many animals sustain crushing injuries caused by accidental trauma. For example, rocks or tree branches can fall on an animal. Some animals step on smaller animals. Male penguins can accidentally crush a chick while they are displaying, which can cause internal injuries. The type and degree of crushing

injury depends on the amount of force, resulting in a range of injuries from minor bruising to severe hemorrhage, fractures, and rupture of internal organs.[58]

Fractures

Vertebrates can suffer from a variety of fractures to bones in the spine, head and neck, limbs, jaw, wings, shell, or horns. Bone fractures in spine, limbs, and wings are common and can be fatal.[59] Birds and squirrels sometimes fall from trees and break their legs or backs. Animals can also be injured while trying to traverse difficult terrain. A deer can break a leg if she slips on wet rocks while trying to make her way down to a river to drink. Horns are also made of bone and can bleed. If torn away near their base, skin will be torn as well.[60]

Walruses have been documented falling from cliffs, often in large numbers. It isn't entirely clear what is responsible for these accidents. Walruses often haul out onto land to rest, and sometimes when the beaches are too crowded, they will climb up gentle slopes with cliffs on the other side. Once there, they can be frightened by polar bears, or they can simply lose their footing when returning to the sea.[61]

Tortoises and turtles can get fractured shells from falls, object impacts, or being trampled on by other animals. Large fractures can be quite serious. A turtle's shell serves as a sort of backbone, and a turtle can be paralyzed or their lungs can collapse depending on where the crack is. If the fracture is deep, there can be blood loss. There are nerve endings in and around the shell,

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[58] Seddon, P. J. & Heezik, Y. V. (1991) "Effects of hatching order, sibling asymmetries, and nest site on survival analysis of Jackass Penguin chicks", *The Auk*, 108, pp. 548-555.

[59] Bulstrode, C.; King, J. & Roper, B. (1986) "What happens to wild animals with broken bones?", *The Lancet,* 327, pp. 29-31.

[60] Morris, P. J.; Bicknese, B. & Sutherland-Smith, M. (2008) "Repair of horn and frontal bone avulsion in a forest buffalo (*Syncerus caffer nanus*) with a polymethylmethacrylate dressing," *Journal of Zoo and Wildlife Medicine*, 39, pp. 99-102.

[61] Letzer, R. (2019) "Is climate change really causing walruses to jump off cliffs?", *LiveScience*, April 13, https://www.livescience.com/65226-why-netflix-walruses-fall-off-cliffs.html [accessed on 8 September 2019].

so it can be painful in the way any broken bone can cause pain. Some breaks can't heal, and the ones that do, heal slowly. Because of their slow metabolisms, it can take years for a broken shell to heal. Shell rot can set in due to a fungal or bacterial infection under the crack. Aquatic animals are particularly susceptible to shell rot.

Birds have legs that are easily broken because they are small and often hollow. They may also be fragile due to malnutrition or excessive egg laying. Common causes of broken legs are falls, fights, accidental collisions with other animals, or being accidentally stepped on by a larger animal. The thinness of flying birds' bones helps them in flight, but makes their bones more prone to shatter or fragment.[62]

Beaks can break from collisions or fights. A bird can also break her beak if she gets it stuck in something. If she panics and rips herself free, she can break her beak off. Beaks are made of skin covered in keratin (the same material as our fingernails). A beak is attached to bones, and the beak tip has a concentration of nerves and blood vessels. Birds use their beaks not only as mouths but also in the way we use our hands to pick things up. If a bird's beak is injured, she may be unable to eat, drink, build a nest, or protect herself. Certain breaks cause bleeding, and in some cases, a bird can bleed to death from a broken beak. Injured beaks can also lead to breathing or sinus problems. Beaks don't repair themselves, but the injured part can grow out. The tip continually grows because it is constantly wearing out due to use, but injuries far from the tip can be permanently disfiguring. An injured bird might only be able to eat soft food, which could make it difficult to survive in the wild.[63]

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[62] Bennett, R. A. & Kuzma, A. B. (1992) "Fracture management in birds", *Journal of Zoo and Wildlife Medicine* 23, pp. 5-38.

[63] Harvey, P. (2010) "Avian casualties: Wildlife triage", *Vet Times*, September 20, https://www.vettimes.co.uk/app/uploads/wp-post-to-pdf-enhanced-cache/1/avian-casualties-wildlife-triage.pdf [accessed on 7 September 2019]

Wing tears

Bat and insect wings can tear from collisions with objects, plants, thorns, or from fungal infections. Tears in bat wings are serious injuries and can lead to blood loss.[64] Tears can heal on their own, but torn wings affect flight capability, sometimes preventing flying altogether. The animals also require rest and extra energy to heal, and while they are healing, they are more vulnerable to starvation and other threats.

Eye injuries

Animals in nature can sustain eye injuries due to foreign objects, punctures, or smoke. A common way an animal receives an eye injury is from running into branches. Because many animals escape predators and other threats by running into the woods, many run into low-hanging branches. While this usually only affects one eye, any permanent damage or vision loss can make the animal more prone to other harms in the future. Flying animals are at an advantage because there are fewer things to run into. However, birds can injure their eyes falling out of trees at an early age, or by running into branches when taking off. They can also be injured by talons in fights with other birds. Eye injuries that don't heal inhibit a bird's ability to fly.

Eyelid injuries, such as rips or punctures, often happen due to falls or running into something. The eyelid is a fragile part of an animal's body. It can easily be damaged, and if not healed properly, an injury can lead to vision loss or infection. Getting sand, glass, or other foreign objects stuck in the eye can be very painful for many animals, who might injure themselves trying to get them out.[65]

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[64] Khayat, R. O. S.; Shaw, K. J.; Dougill, G.; Melling, L. M.; Ferris, G. R.; Cooper, G. & Grant, R. A. (2019) "Characterizing wing tears in common pipistrelles (*Pipistrellus pipistrellus*): Investigating tear distribution, wing strength, and possible causes", *Journal of Mammalogy*, 100, pp. 1282-1294.

[65] Richter, V. & Freegard, C. (2009) *Standard operating procedure: First aid for animals*, Canberra: Department of Environment and Conservation, https://www.cdu.edu.au/sites

Self-amputation

Appendages like limbs, wings, and antennae can be lost directly in accidents or fights, but many animals lose appendages by self-amputation. When in danger, octopuses amputate their own arms, lizards their tails, and spiders their legs. They can do this when their appendages get trapped or stuck, or in fights with other animals. They can also do it to prevent venom from a sting from spreading throughout their body, or after molting errors. When it is not to escape from a dangerous situation, self-amputation may be a response to pain resulting from an injury or an attempt to remove a useless body part.[66]

The degree to which a lost appendage affects an animal depends on the type of appendage, the function of the appendage, and the environment. Some animals, like octopuses and spiders, often manage well when missing an arm or a leg.[67] An unhealed limb can be particularly harmful to jumping insects like crickets.[68]

A crayfish who only molts once a year can manage without a leg, but losing a claw or an antenna could seriously impair their ability to survive fights with other animals or to explore their environment and seek shelter.

Some vertebrates have some regenerative capacity, such as lizards who regenerate tails, different types of fishes who regrow fins, and salamanders who can regrow limbs. Bats can regenerate wings and ears and ungulates their antlers. However, the regrown parts may be smaller or weaker, and if the

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/default/files/ori/documents/dpaw_sop14.2_first_aid_for_animals.pdf [accessed on 29 August 2019].

[66] Kachramanoglou, C.; Carlstedt, T.; Koltzenburg, M. & Choi, D. (2011) "Self-mutilation in patients after nerve injury may not be due to deafferentation pain: A case report", *Pain Medicine,* 12, pp. 1644-1648; Emberts, Z.; Miller, C. W.; Kiehl, D.; St. Marya, C. M. (2017) "Cut your losses: Self-amputation of injured limbs increases survival", *Behavioral Ecology,* 28, pp. 1047-1054.

[67] Alupay, J. S. (2013) *Characterization of arm autotomy in the octopus,* Abdopus aculeatus, PhD thesis, Berkeley: University of California.

[68] Parle, E.; Dirks, J.-H. & Taylor, D. (2016) "Bridging the gap: wound healing in insects restores mechanical strength by targeted cuticle deposition", *Journal of the Royal Society Interface*, 13, 20150984.

animal is under too much stress, they might not be able to regenerate the part at all.[69]

Molting

Molting is a common cause of injury in arthropods. Even when they don't need to repair a body part, arthropods need to molt — shed their exoskeletons — in order to grow, and then their new exoskeletons must be hardened or reconstructed, together with other body parts such as the linings of organs. Although arthropods are vulnerable to external injuries during molting and while their new exoskeletons are still soft, they are more likely to die or be injured because of a fault in the complex molting process. They might also fail to regenerate an injured body part, leaving them with reduced functioning until the following molt, which might be months, or in some cases, years.[70] This is worse for older animals, who tend to molt less frequently as they age.

Some larvae cannot breathe while their exoskeletons are coming off and can asphyxiate if it takes too long or something else goes wrong. For example, mayfly larvae must take in extra oxygen before they molt because they leave their tracheal lining behind and stop breathing during the molting process. In other species, just getting out of their exoskeletons can take months, and if they get stuck, they can be crushed to death as they keep growing.[71]

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[69] Goss, R. J. (1987) "Why mammals don't regenerate—or do they?", *Physiology*, 2, pp. 112-115.; Brockes, J. P. (1997) "Amphibian limb regeneration: Rebuilding a complex structure", *Science,* 276, pp. 81-87; Darnet, S.; Dragalzew, A. C.; Amaral, D. B.; Sousa, J. F.; Thompson, A. W.; Cass, A. N.; Lorena, J.; Pires, E. S.; Costa, C. M.; Sousa, M. P.; Fröbisch, N. B.; Oliveira, G.; Schneider, P. N.; Davis, M. C.; Braasch, I. & Schneider, I. (2019) "Deep evolutionary origin of limb and fin regeneration", *Proceedings of the National Academy of Sciences of the United States of America*, 116, pp. 15106-15115.

[70] Mykles, D. L. (2001) "Interactions between limb regeneration and molting in decapod crustaceans", *Integrative and Comparative Biology*, 41, pp. 399-406; Maginnis,T. L. (2006) "The costs of autotomy and regeneration in animals: A review and framework for future research", *Behavioral Ecology*, 17, pp. 857-872.

[71] University of California Museum of Paleontology (2005) "The dangers of molting!", *Understanding Evolution,* https://evolution.berkeley.edu/evolibrary/article/0_0_0/mantisshrimp_05 [accessed on 4 October 2019].

Molting arthropods can also tear off a sensitive part as they extract themselves, losing or twisting their limbs, crushing their lungs, or injuring an eye or other soft tissue. Some injuries cause life-threatening hemorrhages. Animals are more susceptible to attacks from animals of their own or other species while they are molting. For example, prawns are more likely to be injured or killed by other prawns during certain stages of molting.

Long-term effects of injuries in the wild

An injured animal can experience intense pain and discomfort. Pain can also lead to behaviors that are dangerous to the animal, such as decreasing their intake of food and water, leading to weight loss, muscle breakdown, and impaired breathing.[72] They may also be unable to eat or drink adequately to promote healing or even to stay alive.

An injured animal is also likely to suffer from a range of other problems due to infections and related diseases. In the absence of medical treatment, infection is a natural correlate of wounding in the wild. Damaged tissues also tend to become infested by parasites.[73] Parasitic infestation may be extremely painful and may cause additional complications, such as diarrhea, vomiting, and visual disturbance.

Finally, the disabling effects of the injury — exacerbated by infection or parasite infestation — jeopardize the animal's wellbeing in many important respects. The animal may not be able to escape from threatening situations or to keep up with their social group. Injured animals also become preferential targets for the attacks of other animals.[74]

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[72] Northern Ireland. Executive Information Service (2015) "Welfare of dogs: Potection from pain and illness", *Northern Ireland Direct,* https://www.nidirect.gov.uk/articles/welfare-dogs-protection-pain-and-illness [accessed on 3 March 2019].

[73] Francesconi, F. & Lupi, O. (2012) "Myiasis", *Clinical Microbiology Reviews*, 25, pp. 79-105, https://doi.org/10.1128/CMR.00010-11 [accessed on 14 August 2019].

[74] Curio, E. (1976) *The ethology of predation*, Berlin: Springer; Martín, J.; de Neve, L.; Polo, V. & Fargallo, J. A. (2006) "Health-dependent vulnerability to predation affects escape responses of unguarded chinstrap penguin chicks", *Behavioral Ecology and Sociobiology*, 60, pp. 778-784; Penteriani, V.; Delgado, M. M.; Bartolommei, P.; Maggio C.; Alonso-

Animals living in the wild are vulnerable to a vast array of horrific physical injuries. We've seen that the causes of these injuries are many and varied, including the slashes and bites of other animals; fire, ice, and torrential rains; falls and collisions; and self-amputation and molting accidents. Many of these injuries would be mild if the injured animal had a safe place to heal and adequate food and rest, but this is often not possible due to the many challenges of living in the wild.

Álvarez, C. & Holloway, J. (2008) "Owls and rabbits: Predation against substandard individuals of an easy prey", *Journal of Avian Biology*, 39, pp. 215-221.

7

Reproductive strategies and wild animal suffering

Until now, we have been seeing specific ways animals can be harmed. In this chapter, we will examine the extent of the suffering of wild animals more broadly, by looking at general indicators of how many animals die on average relative to how many survive at different life stages. This is a useful indicator because the factors that cause animals to die, such as disease, lack of food or water, injuries, and cold, often cause suffering to the dying animals. It sounds obvious, but it's an important point. If an animal is born and starves to death without ever being able to eat, the main experience in her short life is what it feels like to starve to death. For this reason, knowing the proportion of animals who typically die at different ages in a certain species — known as age-specific mortality — can give us a general indication of the extent to which suffering is present in populations of that species. It can also enable us to roughly estimate the proportion of animals with very bad lives in comparison to those who have relatively good lives. This estimation may be very rough, but it's the best one we can make at this point.

We can begin by considering some of the reasons why in most species, most animals die shortly after birth, while only a few survive to adulthood. Ecology and natural history are not shaped by the interests of sentient individuals. Instead, they optimize an individual's biological fitness, that is, the ability of individuals to leave descendants, especially their direct descendants but also other close or distant relatives (who have similar genetic makeups). Because of this, different animals have different traits due to natural selection, because particular traits tend to increase their fitness.

Among these traits, some shape the life history of animals. A life history is the sum of the patterns and events that occur at certain ages, especially those related to reproduction and survival. These include, among other factors, the age at which the animals first reproduce, the number and size of offspring each time they reproduce, how much they invest in parental care, how many times they reproduce during their lifetime, and when they die.

Organisms and populations face trade-offs in reproductive strategies. If an animal has many offspring, it won't be possible for her to invest significantly in their survival. And vice versa: if an animal invests a great deal of energy in the survival of her children (so, for example, they are more developed at birth or receive more parental care), she will not be able to have many of them. Animals with these reproductive traits may give birth to just one child or lay just one egg each time they reproduce. Because of their low reproduction rate and the greater energy they invest in their offspring, populations of these animals will have relatively low rates of mortality.[75]

But for a large number of species, what maximizes the number of offspring that survive is not the maximization of each one's ability to survive, but the maximization of the number of offspring they have. In these cases, a trait that provides some survival advantage, such as parental care, may not be selected for if it requires an energy investment that makes it impossible to have a larger number of offspring. As a result, species that follow this reproductive strategy tend to have high infant mortality rates, and the individuals tend to have very short lives.

Through evolution, animals end up having some of these traits instead of others, and the traits they end up with shape their life histories. Some mammals such as great apes, marine mammals (whales, dolphins, seals, and porpoises), bears, elephants and other herbivores, and some birds such as

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[75] Roff, D. A. (1992) *Evolution of life histories: Theory and analysis*, Dordrecht: Springer; Stearns, S. C. (1992) *The evolution of life histories,* Oxford: Oxford University Press; Flatt, T. & Heyland, A. (eds.) (2011) *Mechanisms of life history evolution: The genetics and physiology of life history traits and trade-offs*, Oxford: Oxford University Press; Sæther, B. E.; Coulson, T.; Grøtan, V.; Engen, S.; Altwegg, R.; Armitage, K. B.; Barbraud, C.; Becker, P. H.; Blumstein, D. T.; Dobson, F. S. & Festa-Bianchet, M. (2013) "How life history influences population dynamics in fluctuating environments", *The American Naturalist*, 182, pp. 743-759.

albatrosses follow a reproductive strategy of having a few offspring and giving them a lot of care. However, there are very few species of animals who do this. The overwhelming majority of animals follow a different strategy, reproducing in large, in most cases very large, numbers and with high infant mortality rates.

In a stable population, assuming that the number of members of different generations remains similar, only one offspring per parent will survive to maturity and reproduce. Most other animals will die, often shortly after coming into existence. As we have seen, most animals exhibit this reproductive strategy, including most species of invertebrates, fishes, amphibians, and reptiles. For example, common cane toads can have clutches exceeding 25,000.[76] Many marine- and land-based invertebrates can lay hundreds, thousands, and in some cases millions of eggs at a time. Other animals have mixed reproductive strategies that result in having large numbers of offspring.[77]

Consequences for animal suffering

The predominance of reproductive strategies that result in large numbers of offspring dying when they are very young has important consequences for the suffering of animals. Although some animals might experience little pain due to a quick death or lack of sentience, others suffer greatly from a prolonged death. The fact that many animals begin their lives very small and underdeveloped does not mean they aren't sentient. For example, it has been shown that adult zebrafish respond to harmful stimuli in a way that indicates sentience, and that larval zebrafish respond in similar ways to adults. In addition, animals who die when they are very young may not have had any

[76] Rastogi, R. K.; Izzo-Vitiello, I.; Meglio, M.; Matteo, L.; Franzese, R.; Costanzo, M. G.; Minucci, S.; Iela, L. & Chieffi, G. (1983) "Ovarian activity and reproduction in the frog, Rana esculenta", *Journal of Zoology*, 200, pp. 233-247.

[77] Vandermeer, J. H. & Goldberg, D. E. (2013 [2003]) *Population ecology: First principles*, 2nd ed., Princeton: Princeton University Press; Rockwood, L. L. (2015 [2006]) *Introduction to population ecology*, Hoboken: Wiley-Blackwell; Leopold, B. D. (2018) *Theory of wildlife population ecology*, Long Grove: Waveland.

significant positive experiences in their lives prior to the terrible experience of dying. This gives us strong reason to think that their short lives likely contain much more suffering than pleasure.[78]

What about the animals who belong to species with high survival rates in infancy? Many of these animals still die before reaching maturity. Even if a mother gives birth to only one offspring per reproductive season, the frequency of her reproduction means she can have several offspring over the course of her lifetime. We can see this in humans, who biologically have the potential to have more than 10 children during their lives. Recall that, for a population to remain stable, only one offspring per parent tends to survive. This means that even for animals with relatively high survival rates, it is common for most children to die in their youth.

As for the few animals who live to adulthood, we can't automatically assume they are happy. They constitute the minority whose lives are long enough to include relatively large amounts of positive experiences. However, these animals may have lives that consist of prolonged suffering due to factors

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[78] Ng, Y.-K. (1995) "Towards welfare biology: Evolutionary economics of animal consciousness and suffering", *Biology and Philosophy*, 10, pp. 255-285; Tomasik, B. (2015a [2009]) "The importance of wild-animal suffering", *Relations: Beyond Anthropocentrism*, 3, pp. 133-152, https://www.ledonline.it/index.php/Relations/article/view/880/717 [accessed on 11 December 2019]; (2015b) "Estimating aggregate wild-animal suffering from reproductive age and births per female", *Essays on Reducing Suffering*, http://reducing-suffering.org/estimating-aggregate-wild-animal-suffering-from-reproductive-age-and-births-per-female/#_blank [accessed on 12 October 2019]; Faria, C. & Paez, E. (2015) "Animals in need: The problem of wild animal suffering and intervention in nature", *Relations: Beyond Anthropocentrism*, 3, pp. 7-13, https://www.ledonline.it/index.php/Relations/article/download/816/660 [accessed on 30 December 2019]; Horta, O. (2017b) "Animal suffering in nature: The case for intervention", *Environmental Ethics*, 39, pp. 261-279; Vinding, M. (2016) "The speciesism of leaving nature alone, and the theoretical case for wildlife anti-natalism", *Apeiron*, 8, pp. 169-183; Fischer, Bob (2018) "Individuals in the wild", *Animal Sentience: An Interdisciplinary Journal on Animal Feeling*, 3/23, a. 8. On the relation between age-specific mortality and wild animal suffering see also Alonso, W. J. & Schuck-Paim, C. (2017) "Life-fates: Meaningful categories to estimate animal suffering in the wild", *Animal Ethics*, https://www.animal-ethics.org/life-fates-essay-prize-2017 [accessed on 29 December 2019]; Hecht, L. B. B. (2019) "Accounting for demography in the assessment of wild animal welfare", *bioRxiv*, 819565.

like disease, malnutrition and thirst, weather conditions, parasitism and conflicts with other animals, injuries, and psychological stress. Thus, even when animals survive past their infancy, their lives might still consist of more suffering than enjoyment.

Even when adults have good lives, the total amount of suffering experienced by the young can still outweigh the positive experiences of adults, for reasons we have already seen: the disproportionate number of offspring who don't survive and who have lives with more pain than pleasure.

To conclude, what we have seen so far doesn't imply that suffering necessarily prevails for all animals, all populations, or all species, but it suggests that this is the case for the majority of animals. It also shows that by looking at the population dynamics of different species — in particular, at how many animals on average die in comparison to how many survive at certain ages, known as their age-specific mortality — we can get a very rough idea of the proportion of suffering compared to wellbeing in that species. It can also help us to compare their suffering to the suffering endured by other animals with different age-specific mortality rates. The prevalence of suffering in an animal population doesn't depend on contingent circumstances, but is the result of how natural selection works. In a nutshell, the underlying explanation can be summarized as follows:

In natural history, sentience is selected for because in many situations, it increases an animal's fitness. Sentience implies that when an animal's needs are satisfied, she will probably feel pleasure, but when she is affected by circumstances threatening to kill her, such as lack of food, physical harm, or inadequate temperature, the animal will suffer. In addition, certain life history traits are selected for that favor certain reproductive strategies. The most prevalent traits make it impossible for more than a fraction of sentient beings to survive past infancy and to have their needs satisfied. The rest will die due to circumstances such as those mentioned above, which can cause great suffering. Because of this, suffering is likely to prevail for the majority of animals.

This shows why our efforts to help them when it is feasible are so important. We can't help all the animals who need it. However, there are many cases when it is possible to help some or many of them.

8

Rescuing trapped animals

We will now consider some of the ways to actually help animals in the wild. As we have seen, they often suffer accidents and injuries. They may be burned by wildfires or frozen by sudden frosts; trapped by difficult terrain such as mud ponds or frozen lakes, and face painful, lingering deaths; or they might simply be injured in the normal course of living their lives, just as humans are. Unlike humans, though, animals in the wild rarely have effective help available to them when they endure accidents or injuries. They find themselves almost helpless against the threats they face, such as extreme weather conditions and natural traps. Nevertheless, humans do sometimes manage to rescue injured or trapped animals, even in difficult circumstances.

Ice and snow

Large mammals can get trapped in frozen lakes. They may cross the lakes in search of food, only to fall into the water when the ice breaks underneath them. If the ice isn't solid, then their efforts to get out of the water simply break off more ice, leaving them trapped in the icy water. Unable to free themselves, they may die from hypothermia. Symptoms of hypothermia in mammals include shivering; confusion; lethargy and weakness; reduced heart rate, respiration, and blood pressure; and, eventually, unconsciousness and death. Alternatively, they may die from shock, organ failure, exhaustion, drowning, starvation, being eaten by other animals, or as a consequence of injuries they incur as they struggle to break free. Sometimes even if the ice beneath them doesn't break, they can lose their footing on the frozen surface. Unable to regain their footing, they can be trapped on the ice, far from land.

Many cases have been documented of rescues of animals from these kinds of situations.

Animals in cold climates may become trapped on ice floes and end up floating far from the coast, stranded until the ice melts and they drown or die of hypothermia in the freezing waters. Sometimes it is possible to help them. Whales can become trapped by sea ice too. As the ice thickens around them, whales can be cut off from deeper water. When this happens, they can drown, suffocate, or starve to death. Though rarer than strandings, the rate at which whales become trapped by ice seems to be increasing.[79] Rescuing whales trapped by ice is often more difficult than rescuing whales stranded on a beach, though there have been successful rescues involving ice breaking ships, de-icing machines, helicopter rescues, and using chainsaws to keep breathing holes open.

Mud

There are documented cases of rescues of animals trapped in mud ponds. This happens most frequently to large animals such as elephants. Elephants frequently bathe in mud ponds in order to protect their skin from insects or the sun, or simply because it feels good. Sometimes, they become stuck in the mud. In these situations, they can drown, suffocate, starve to death, or be slowly eaten alive by other animals. Birds, even those who can fly, can become trapped in mud as well. They, too, can often be saved.

Strandings

Cetaceans such as dolphins and whales can sometimes become disorientated and end up stranded on beaches. In such situations, it's almost inevitable that they will die. Moreover, traditionally, when they were trapped in this way

[79] Matthews, C. J. D.; Raverty, S. A.; Noren, D. P.; Arragutainaq, L. & Ferguson, S. H. (2019) "Ice entrapment mortality may slow expanding presence of Arctic killer whales", *Polar Biology,* 42, pp. 639-644. Although when many people think of trapped animals they may think at first about so-called companion animals, we can see that those living in the wild need assistance much more often.

without any possible means of defending themselves, humans would often hack them to pieces for their flesh and blubber. Recently, however, attitudes towards these animals have changed, and in some cases human beings do help them.

Helping animals in fires and natural disasters

Other animals may need to be rescued when they're the victims of natural disasters, just as humans and domesticated animals would in their situation. They may be washed away or drowned by floods; battered by hurricanes; or buried by landslides, avalanches, or earthquakes. Many animals die in such natural disasters. In many cases, it would be possible to save them, if only humans chose to do so. However, the plight of animals in the wild affected by natural disasters is generally ignored. Fortunately though, this isn't always the case. There are many cases in which human beings have helped animals in such situations. These cases demonstrate that humans are both willing and able to help animals threatened by natural disasters. Furthermore, there are some signs that the general public is starting to become more concerned about the suffering of animals in the wild caught up in natural disasters.

Animals in fires

Fires occur regularly in nature. Some are started by human beings, either accidentally or deliberately. Others have natural causes. It is sometimes possible to help the animals affected by them, and in fact there are many cases in which this has already been done.

There have also been cases in which wild animals have been helped or rescued from fires or the effects of fire. Efforts are often carried out with a focus on animals that people like or that are more visible, but this does show how it is possible to help these animals. For example, there are many stories of koalas being rescued from wildfires. Because they are slow moving, they cannot effectively flee from fires. They also have weak immune systems, which means that if they sustain burn injuries, they are likely to die from infection.

Hundreds of koalas die in Australian wildfires every year.[80] Rescuing them may be easier than rescuing other animals who are smaller or more difficult to catch, so people who might not be able to save other animals have saved them.

It's also possible to help animals in the wild in simpler ways. For example, during the 2019 wildfires in Southern Australia, Wildcare Australia, Inc. (an organization that rescues wild animals) encouraged people living in the affected areas to leave out bowls of water for wild animals.[81] It's a small effort for humans, but to an injured and disoriented animal, it might be the difference between life and death.

Animals in floods

There have been many cases in which animals have been saved from floods. An example of this took place in Kaziranga National Park in India. This park is located in the Assam region, which is prone to regular severe flooding. The region is surrounded by hills, so when there is heavy rainfall, it rushes down the hills, flooding the plains including the national park. It was estimated that floods in 2019 killed around 200 large animals, including deers, rhinos, buffaloes, boars, porcupines, and an elephant. Rescue workers in boats and all-terrain vehicles managed to rescue 64 animals from the floods, including deers, rhinos, reptiles, and birds.[82]

A more systematic intervention was the construction of 33 artificial highlands within the park. These areas of high land have allowed animals to more easily find refuge from the rising waters. The construction of the highlands is credited with reducing the death toll from the annual floods: it is

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[80] Koala Info (2019) "Koalas and Australia's bushfires", *koalainfo.com,* http://koalainfo.com/koalas-and-australian-bushfire [accessed on 13 September 2019].

[81] Gerova, V. (2019) "Koala mum and joey rescued as fires tear through bushland", *10 Daily*, Sep 07, https://10daily.com.au/news/australia/a190907myisr/koala-mum-and-joey-rescued-as-fires-tear-through-bushland-20190907 [accessed on 21 September 2019].

[82] Guha, N. & Ghosh, S. (2019) "Wildlife and people work together during Assam's annual tryst with floods", *Mongabay*, July 23, https://india.mongabay.com/2019/07/wildlife-and-people-during-assams-annual-tryst-with-floods [accessed on 16 September 2019].

estimated that the floods in 2017 killed over 400 large animals, compared to around 200 in 2019.[83]

Independent organizations have also often played a role in rescuing animals in these situations. One example of this was when torrential rainfall caused extensive flooding in Arlington County in Virginia in 2019. Because of the time of year, many wild animals were orphaned by the storm as they were thrown from their nests or separated from their parents by the floodwaters. Rescue workers with the Animal Welfare League of Arlington were able to save dozens of animals, including ungulates and dozens of orphaned birds and squirrels.[84]

In some cases, people acting independently, without the aid of organizations or governmental agencies, can take action to help animals. Here's one example. Flash flooding in Mississippi in 2016 put many animals at risk of drowning. Two brothers noticed animals escaping from the flooded woods into a dry pasture in front of their house. They had a small boat and decided to use it to rescue animals trapped by the floods. Driving across flooded fields to the woods, they rescued several mice, shrews, and rabbits. Once in the woods, they got into the small boat and searched for animals trapped by the rising waters. They managed to rescue several opossums and armadillos.[85] Their story shows that it is entirely possible for just a couple of people to rescue animals in difficulty.

Animals in other natural disasters

Animals have been saved from natural disasters of many kinds, such as hurricanes, earthquakes, tsunamis, landslides, avalanches, and volcanoes. Below are just a few examples.

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[83] *Ibid.*

[84] Airey (2019) "Wild animals, pets rescued during the flood", *ARLnow*, July 26, https://www.arlnow.com/2019/07/26/wild-animals-pets-rescued-during-the-flood [accessed on 21 September 2019].

[85] Akande, Z. (2016) "Man dives into flash flood, fills his boat up with animals", *The Dodo*, November 03, https://www.thedodo.com/man-fills-boat-with-animals-during-flood-1656582972.html [accessed on 21 September 2019].

Hurricanes are devastating for animals living in the wild. Unlike human beings and their companion animals, animals in the wild generally don't have shelter sufficient to cope with the impact of a hurricane. In 2019, in Walterboro, South Carolina, an animal sanctuary cared for hundreds of animals injured, displaced, orphaned, or otherwise impacted by Hurricane Dorian. Injuries include broken legs, head trauma, and pulmonary aspiration requiring immediate antibiotic treatment.

The 2018 tsunami in Indonesia washed sea turtles onto the shore, leaving some stranded up to a kilometer from the sea. Rescue workers created makeshift stretchers to carry them back to the sea.

Volcanic eruptions kill animals directly by burying them in lava and ash, and can harm animals caught in the vicinity. They can be burned by falling ash, or they can become sick from ingesting it (usually by eating ash covered grass) or inhaling it. After a 2018 eruption in the Philippines, many domesticated animals were at risk of injury, sickness, hunger, or death. World Animal Protection evacuated terrestrial animals from dangerous areas, and provided food and medical treatment to those who required it.[86]

Marine animals are also affected by eruptions, as lava coming into contact with water produces glassy shards, which are harmful to aquatic animals with gills. Lava flowing into water can also increase acidity levels which may be harmful to marine animals in the region.[87] Larger marine animals like sea turtles can be spotted from the air and rescued, or rescued from nearby shores that have not yet been affected by the eruption.

The examples above demonstrate that humans are able to rescue animals in the wild from a range of natural disasters, disasters which they often cannot cope with without our help. For the most part, our rescues focus on

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[86] World Animal Protection (2018) "Rescuing burnt and injured animals in the Philippines after Mayon Volcano eruption", *World Animal Protection*, January 31, https://www.worldanimalprotection.org.uk/news/rescuing-burnt-and-injured-animals-philippines-after-mayon-volcano-eruption [accessed on 2 October 2019].

[87] Shen, M. (2018) "Hell on Earth! Hawaii volcano eruptions set the sky on fire as it's revealed the impact of the disaster will affect marine and wildlife for decades", *Daily Mail*, June 9, https://www.dailymail.co.uk/news/article-5824465/Scientists-say-Hawaii-volcano-eruptions-affect-marine-wildlife-decades.html [accessed on 2 October 2019].

domesticated animals rather than on those living in the wild, but we can expand rescue plans to include more animals living in the wild.

9

Providing aid to sick, injured, or orphaned animals, building shelters, and helping hungry and thirsty animals

Rescuing animals is only one way we can help animals in the wild. Now, we will see some ways they get medical treatment when they are sick or injured. Then we'll see some examples of caring for orphaned animals. Finally, we'll see some cases where hungry or thirsty animals have been helped.

Treating sick animals

Treating mange

Sarcoptic mange is a skin disease caused by burrowing parasitic mites. It affects several species of nonhuman mammals, including dogs, cats, coyotes, bears, and wombats. Wombats are especially badly affected by mange. It is believed that this is due to conditions inside wombat burrows being conducive to the survival and transmission of sarcoptic mites. Infested wombats lose hair, their skin becomes crusted and infected, and their eyes and ears become crusted over. In severe cases, it can lead to death.[88] Infested wombats are generally treated with a medication called moxidectin. But the stress of capture can kill wombats, especially when they are in a weakened state. So the

[88] Department of Primary Industries, Parks, Water and Environment (Tasmania) (2017) "Wombat mange FAQs", *Wildlife Management,* https://dpipwe.tas.gov.au/wildlife-management/fauna-of-tasmania/mammals/possums-kangaroos-and-wombats/wombat/wombat-mange/wombat-mange-faqs [accessed on 9 September 2019].

treatment is usually administered using a specially designed flap placed above the entrance to the wombats' burrows.

Probiotic treatment

White nose syndrome is a disease caused by the fungus *pseudogymnoascus destructans*. Since 2007, it has killed more than six million bats in North America. The mortality rate is higher than 90% in some species. The disease disrupts bats' hibernation, causing them to either starve to death by using up all of their fat stores, or to die of exposure while trying to find food in winter. In 2019, bats were treated with the probiotic bacterium *pseudomonas fluorescens,* which increased their survival rate from 8% to 46%. Although the motivation to find a cure comes from conservationist interests, widespread application would nonetheless significantly reduce suffering and premature death among bats.[89]

Probiotic treatment may also be valuable in treating disease in other species. The chytrid fungus *batrachochytrium dendrobatidis* has had a devastating effect on amphibians, killing millions of animals across more than 500 species. Infected amphibians show symptoms such as low appetite, lethargy, and thickening of the skin which leads to death because affected animals are unable to take in nutrients and release toxins through their skin. Some amphibians breathe through their skin, and once infected, they may be unable to breathe. Boreal toads treated with a probiotic had a 40% higher survival rate. Probiotics may be used in the future to treat or protect amphibians susceptible to the disease.[90]

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[89] Hopkins, M. C. & Soileau, S. C. (2018) *U.S. Geological Survey response to white-nose syndrome in bats: U.S. Geological Survey Fact Sheet 2018–3020*, Reston: U.S. Geological Survey; Hoyt, J. R.; Langwig, K. E.; White, J. P.; Kaarakka, H. M.; Redell, J. A.; Parise, K. L.; Frick, W. F.; Foster, J. T. & Kilpatrick, A. M. (2019) "Field trial of a probiotic bacteria to protect bats from white-nose syndrome", *Scientific Reports,* 9, https://www.nature.com/articles/s41598-019-45453-z.pdf [accessed on 9 September 2019].

[90] Scheele, B. C.; Pasmans, F.; Skerratt, L. F.; Berger, L.; Martel, A.; Beukema, W.; Acevedo, A. A.; Burrowes, P. A.; Carvalho, T.; Catenazzi, A.; De la Riva, I.; Fisher, M. C.; Flechas, S. V.; Foster, C. N.; Frías-Álvarez, P.; Garner, T. W. J.; Gratwicke, B.; Guayasamin, J. M.; Hirschfeld, M.; Kolby, J. E.; Kosch, T. A.; La Marca, E.; Lindenmayer, D. B.; Lips, K. R.; Longo, A. V.;

Research on the possibility of probiotic treatments for a fungal disease in snakes and another in honeybees is also underway. Probiotics have also been used to inhibit zoosporic infections in different species of fishes.[91] Probiotics have the potential to significantly improve the welfare of many animals living in the wild by protecting them against diseases or by mitigating their effects.

Treating injured animals

Animals living in the wild are frequently injured in conflicts or accidents. For example, they may be injured during fights with other animals for multiple reasons: to defend themselves or their territory, to secure resources, in conflicts over mating partners, or to attain a higher social standing within a group. In some species, females are often injured by males in forced copulation. And, like humans, wild animals can become injured in accidents. But it is often possible to treat their injuries. Animals in the wild are sometimes territorial. Often they defend their territory with ritualized aggression, for example by intimidating displays, vocalizations, and gestures. Sometimes, however, they are forced to fight to defend their territory, and this can result in serious injuries.

Broken limbs are a frequent occurrence among animals in the wild, and without intervention, they are often a death sentence, because the injured animal is less capable of finding food and evading predators. Limbs can be

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Maneyro, R.; McDonald, C. A.; Mendelson, J.; III; Palacios-Rodriguez, P.; Parra-Olea, G.; Richards-Zawacki, C. L.; Rödel, M.-O.; Rovito, S. M.; Soto-Azat, C.; Toledo, L. F.; Voyles, J.; Weldon, C.; Whitfield, S. M.; Wilkinson, M.; Zamudio, K. R. & Canessa, S. (2019) "Amphibian fungal panzootic causes catastrophic and ongoing loss of biodiversity", *Science,* 363, pp. 1459-1463, https://amphibiaweb.org/chytrid/chytridiomycosis.html [accessed on 9 September 2019].

[91] Hill, A. J.; Leys, J. E.; Bryan, D.; Erdman, F. M.; Malone, K. S. & Russell, G. N. (2018) "Common cutaneous bacteria isolated from snakes inhibit growth of *Ophidiomyces ophiodiicola*", *EcoHealth*, 15, pp. 109-120; El Khoury, S.; Rousseau, A.; Lecoeur, A.; Cheaib, B.; Bouslama, S.; Mercier, P.; Demey, V.; Castex, M.; Giovenazzo, P. & Derome, N. (2018) "Deleterious interaction between Honeybees (Apis mellifera) and its microsporidian intracellular parasite Nosema ceranae was mitigated by administrating either endogenous or allochthonous gut microbiota strains", *Frontiers in Ecology and Evolution*, 6, a. 58.

broken in accidents or through conflict with other animals. If treated, animals can often make a full recovery. A broken wing is usually fatal for wild birds and other flying animals. Most are relatively easy to treat, however — birds and bats who are brought to wild animal rehabilitation centers usually make a full recovery. It's even possible to fix a broken insect wing at home, like those of butterflies, whose wings are frequently damaged.

Caring for orphaned animals

Animals in the wild who receive parental care sometimes lose one or both parents. In such circumstances, it's unlikely that they will survive. Most orphaned animals will starve to death, die of dehydration, or be eaten by other animals. The small number of orphans who do survive often undergo terrible hardships. It's difficult for very young animals to survive. Most newborn animals receive no parental care, which increases their risk of dying. But those who do receive parental care may be so dependent on it that losing it means almost certain death.

Many nonhuman animals have strong emotional bonds with their families, and they miss their parents and feel grief when they die. Social animals who are orphaned can also suffer from loneliness because they are deprived of the social interaction that is so essential to their wellbeing. Fortunately, humans can assist orphaned animals, by rescuing them and providing them with the care they need.

Examples of currently existing wild animal orphanages include Rhino Orphanage in South Africa.[92] Elephants can be orphaned too, because of drought, poaching, or by becoming trapped in mud, for example. The Sheldrick Wildlife Trust in Kenya cares for orphaned elephants and rhinos, and at the time of writing they have successfully raised 244 orphaned elephants and 17 rhinos. The Senkwekwe Centre in Virunga National Park in the Democratic Republic of the Congo is a sanctuary for the care and protection of orphaned mountain gorillas and eastern lowland gorillas. Gorilla infants are extremely

[92] Care for Wild Rhino Sanctuary (2016) "How to tell black and white rhinos apart", Care for *Wild Rhino Sanctuary,* https://www.careforwild.co.za/meet-our-orphans [accessed on 25 August 2019].

dependent on their mothers and are highly unlikely to survive on their own if their mothers are killed.[93]

Most animals don't receive parental care. They are typically born in large numbers and die shortly after coming into the world. An example is sea turtles. The number of them who reach adulthood is very low. In some cases, however, it is possible to provide them with help. People have made efforts to help baby turtles survive. One way is to help the hatchling turtles to reach salt marshes or the sea, which are safer than the areas surrounding their nest. These measures are typically taken because of conservationist concerns, but they help the animals involved.[94]

Building shelters

Another way to help wild animals is by building shelters or other structures for them to use. These structures allow animals to avoid dangerous weather conditions or avoid predators. Many different types of animals build nests for these reasons.[95] However, it might take a long time and may not be as good as a structure that we could build for them. We can help animals by providing them with suitable pre-constructed shelters or nests.[96]

In addition to protecting them from wind, rain, and other weather conditions, shelters give back part of the body heat the animals lose, because it contributes to warming the structure, rather than being lost as it would

[93] Stewart, K. J. (1988) "Suckling and lactational anoestrus in wild gorillas (*Gorilla gorilla*)", *Reproduction,* 83, pp. 627-634.

[94] For a possible exception see Ferrara, C. R.; Vogt, R. C.; Sousa-Lima, R. S.; Tardio, B. M. R. & Bernardes, V. C. D. (2014) "Sound communication and social behavior in an Amazonian river turtle (*Podocnemis expansa*)", *Herpetologica*, 70, pp. 149-156; Sea Turtle Conservancy (2019) "Information about sea turtles: General behavior", *Conserve Turtles,* https://conserveturtles.org/information-sea-turtles-general-behavior [accessed on 4 September 2019].

[95] Hansell, M. & Hansell, M. H. (2005) *Animal architecture*, New York: Oxford University Press on Demand.

[96] Bovenkerk, B.; Stafleu, F.; Tramper, R.; Vorstenbosch, J. & Brom, F. W. A. (2003) "To act or not to act? Sheltering animals from the wild: A pluralistic account of a conflict between animal and environmental ethics", *Ethics, Place and Environment*, 6, pp. 13-26.

otherwise be. For these reasons, access to this kind of shelter can easily be the difference between life and death for an animal. Structures may allow animals to avoid threats from other animals by serving as hiding places that other animals may not notice or cannot reach.

The most common shelters built by humans are "bird boxes." These are commonly used by birds when they start families. If bird boxes aren't cleaned after a family of birds finishes using it, however, diseases and parasites may be spread to a new family of birds.[97]

Structures can be built for many other animals as well. For example, bats need a warm place to roost where they can safely sleep, raise their young, and hibernate. They will roost in human buildings when they have good opportunities to do so. Bats living in buildings have been found to be doing much better on quite a few different metrics than those roosting in natural settings.[98] We could build more buildings specifically for bats to use or we could allow them to use more existing buildings.

It has also been found that rabbits can benefit when well-designed and well-placed artificial warrens are built for them. Invertebrates can also be helped in this way. A species of moth, Acrobasis betulella, has been found to use leaf rolls that were created by scientists. Animals of other species of arthropod in the area were also found to use these structures.[99]

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[97] Møller, A. P. (1989) "Parasites, predators and nest boxes: Facts and artefacts in nest box studies of birds?", *Oikos*, 56, pp. 421-423; Arrington, D. (2011) "What birds want in a birdhouse", *The Seattle Times*, April 4, https://www.seattletimes.com/life/lifestyle/what-birds-want-in-a-birdhouse [accessed on 10 November 2019].

[98] Lausen, C. L. & Barclay, R. M. (2006) "Benefits of living in a building: big brown bats (*Eptesicus fuscus*) in rocks versus buildings", *Journal of Mammalogy*, 87, pp. 362-370.

[99] Hansell, M. & Hansell, M. H. (2005) *Animal architecture*, New York: Oxford University Press, pp. 216-217; Fernández-Olalla, M.; Martínez-Jauregui, M.; Guil, F. & San Miguel-Ayanz, A. (2010) "Provision of artificial warrens as a means to enhance native wild rabbit populations: What type of warren and where should they be sited?", *European Journal of Wildlife Research*, 56, pp. 829-837.

Helping hungry and thirsty animals

Lack of access to clean water is another source of suffering and a serious risk to the health and lives of animals. Wild animals can also be helped when they need water, and it's often easy to do. Water can be left in small containers that are accessible to them. There is a risk to small animals who could fall in and drown, however, so small ladders or other ways for them to get out are important. Water containers also have to be cleaned regularly so they don't transmit diseases from some animals to others.

It could be problematic to build very large ponds, which could lead to certain animals such as mosquitoes and other insects reproducing in very large numbers, only to die painfully shortly afterwards due to lack of resources. The insects might also spread diseases and parasites to other animals.

Another way to help animals is by saving some of them from starving when they face extreme food shortages. In fact, there are interventions to feed animals in the wild in some cases. Circumstances such as severe droughts or harsh winters may mean many animals starve to death. Due to this, animals are sometimes provided with the food they need to survive. This is sometimes done in order to conserve certain populations of animals that are particularly appealing to human beings.[100] In other cases, the animals who are saved are ones that have some touristic value, as when tourists want to watch animals that are typical of a place. For these reasons, supplemental feeding measures are taken in a number of national parks in different countries. Even if these interventions are not carried out with the aim of helping the animals themselves, they end up being positive for them.

However, it is important in these cases to be careful not to provide so much food to animals that they reproduce beyond the numbers their populations used to have. Otherwise, more of them will die because there will

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[100] Brittingham, M. C. & Temple, S. A. (1992) "Does winter feeding promote dependency?", *Journal of Field Ornithology*, 63, pp. 190-194; Marion, J.; Dvorak, R. & Manning, R. E. (2008) "Wildlife feeding in parks: Methods for monitoring the effectiveness of educational interventions and wildlife food attraction behaviors", *Human Dimensions of Wildlife*, 13, pp. 429-442.

not be resources for all of them to survive. This is why in many cases it is not a good idea to provide extra food for animals in the wild, because it can cause much more suffering in the future as a result of trying to reduce it in the present.[101]

[101] Kallander, H. (1981) "The effects of provision of food in winter on a population of the great tit *Parus major* and the blue tit *P. caeruleus*", *Ornis Scandinavica*, 12, pp. 244-248; Lott, D. F. (1996) "Feeding wild animals: The urge, the interaction and the consequences", *Anthrozoös*, 4, pp. 232-236; Cooper, S. M. & Ginnett, T. F. (2000) "Potential effects of supplemental feeding of deer on nest predation", *Wildlife Society Bulletin*, 28, pp. 660-666; Schoech, S. J.; Bowman, R. & Reynolds, S. J. (2004) "Food supplementation and possible mechanisms underlying early breeding in the Florida Scrub-Jay (*Aphelocoma coerulescens*)", *Hormones and Behavior*, 46, pp. 565-573; Robb, G. N.; McDonald, R. A.; Chamberlain, D. E.; Reynolds, S. J.; Harrison, T. J. & Bearhop, S. (2008) "Winter feeding of birds increases productivity in the subsequent breeding season", *Biology Letters*, 4, pp. 220-223; Jones, D. (2011) "An appetite for connection: Why we need to understand the effect and value of feeding wild birds", *Emu: Austral Ornithology*, 111, pp.1-7; Orros, M. E. & Fellowes, M. D. E. (2012) "Supplementary feeding of wild birds indirectly affects the local abundance of arthropod prey", *Basic and Applied Ecology*, 13, pp. 286-293.

10

Vaccinating animals in the wild

Diseases have the potential to kill animals in very large numbers. We have already seen the great amount of suffering that disease can cause to animals in the wild. Apart from helping animals who are already sick, an important way we can protect animals in the wild from disease is through vaccination. There are many examples of large-scale vaccinations of animals living in the wild. Perhaps the most successful cooperative effort is the vaccination campaign against rabies, which has been carried out in several countries on a large scale. Vaccinations against many other diseases that wild animals suffer from have also been developed.

Oral rabies vaccination

Rabies is an appalling disease for those animals affected by it. Spread by bites, it causes inflammation of the brain. Symptoms can include fever, pain, tingling/burning sensations, hydrophobia, aggression, confusion, and muscle paralysis. Once symptoms are apparent, death is generally inevitable. One paradigmatic example of wild animal immunization is the vaccination of animals against rabies that successfully eradicated the disease in most of Europe by 2010 and in large areas of North America. This is done in order to prevent the disease from spreading and being passed on to animals living with humans, such as dogs, or to humans. The vaccination is done through the

aerial dispersal of baits containing the rabies vaccine which are then eaten by the animals.[102]

In the US, attempts to eliminate the disease started in the 1970s and it has been achieved in large areas of the northeastern United States and Canada. One such program was the prevention of its spread in raccoons in Massachusetts by orally vaccinating 63% of the population, which was sufficient for a successful eradication of the disease in the area. Another example is the oral rabies vaccination program for coyotes in Texas which led to a large reduction of rabies cases as well as stopping its growth in the affected area. A coordinated effort between the USA, Mexico, and Canada has been proposed in order to eradicate rabies from other areas.[103] Similar programs have been implemented all over the world.[104] The data from these

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[102] The procedure of oral vaccination of foxes is described in Department for Environment, Food and Rural Affairs (2010) *Vaccination as a control tool for exotic animal disease: Key considerations*, London: Department for Environment, Food and Rural Affairs.

[103] Baer, G. M.; Abelseth, M. K. & Debbie, J. G. (1971) "Oral vaccination of foxes against rabies", *American Journal of Epidemiology*, 93, pp. 487-490; Fearneyhough, M. G.; Wilson, P. J.; Clark, K. A.; Smith, D. R.; Johnston, D. H.; Hicks, B. N. & Moore, G. M. (1998) "Results of an oral rabies vaccination program for coyotes", *Journal of the American Veterinary Medical Association*, 212, pp. 498-502; Robbins, A. H.; Borden, M. D.; Windmiller, B.S.; Niezgoda, M.; Marcus, L. C.; O'Brien, S. M.; Kreindel, S. M.; McGuill, M. W.; DeMaria, A., Jr.; Rupprecht, C. E. & Rowell, S. (1998) "Prevention of the spread of rabies to wildlife by oral vaccination of raccoons in Massachusetts", *Journal of the American Veterinary Medical Association*, 213, pp. 1407-1412; MacInnes, C. D. & LeBer, C. A. (2000) "Wildlife management agencies should participate in rabies control", *Wildlife Society Bulletin*, 28, pp. 1156-1167; MacInnes, C. D.; Smith, S. M.; Tinline, R. R.; Ayers, N. R.; Bachmann, P.; Ball, D. G. A.; Calder, L. A.; Crosgrey, S. J.; Fielding, C.; Hauschildt, P.; Honig, J. M.; Johnston, D. H.; Lawson, K. F.; Nunan, C. P.; Pedde, M. A.; Pond, B.; Stewart, R. B. & Voigt, D.R. (2001) "Elimination of rabies from red foxes in eastern Ontario", *Journal of Wildlife Diseases*, 37, pp. 119-132; Slate, D.; Rupprecht, C. E.; Rooney, J. A.; Donovan, D.; Lein, D. H. & Chipman, R.B. (2005) "Status of oral rabies vaccination in wild carnivores in the United States", *Virus Research*, 111, pp. 68-76.

[104] Childs, J. E.; Robinson, L. E.; Sadek, R.; Madden, A.; Miranda, M. E. & Miranda, N. L. (1998) "Density estimates of rural dog populations and an assessment of marking methods during a rabies vaccination campaign in the Philippines", *Preventive Veterinary Medicine*, 33, pp. 207-218; Pal, S. K. (2001) "Population ecology of free-ranging urban

programs provide evidence of efficacy and specifics of implementation that will make it easier to vaccinate more animals in the future.

While the animals in the cases above were vaccinated not for their own good, but to protect human interests, vaccinating animals in the wild against rabies benefits them immensely by protecting them against a terrible disease. The lessons we have learned in our ongoing struggle against rabies can be used in future vaccination programs aimed at promoting the wellbeing of individual animals in the wild. Furthermore, our successes in this fight should inspire optimism about future vaccination efforts.

Brucellosis vaccinations in the Greater Yellowstone Area

Brucellosis is a contagious disease caused by various bacteria of the Brucella family. It affects cows and other ruminants as well as some marine mammals and humans. Its main effects in nonhuman animals are on the reproductive system, causing infertility, abortions, stillbirth or birth of offspring unable to survive. It can also cause swelling of the testicles in males, and the bacteria can get into the joints and cause arthritis.[105]

Brucellosis is prevalent among the wild elk and bison populations living in the Greater Yellowstone Area. It has been estimated that more than 14,000 of those animals in the area are infected.[106] Since Brucellosis can be transmitted

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dogs in West Bengal, India", *Acta Theriologica*, 46, pp. 69-78; Kitala, P. M.; McDermott, J. J.; Coleman, P. G. & Dye, C. (2002) "Comparison of vaccination strategies for the control of dog rabies in Machakos District, Kenya", *Epidemiology and Infection*, 129, pp. 215-222; Cleaveland, S.; Kaare, M.; Tiringa, P.; Mlengeya, T. & Barrat, J. (2003) "A dog rabies vaccination campaign in rural Africa: impact on the incidence of dog rabies and human dog-bite injuries", *Vaccine*, 21, pp. 1965-1973.

[105] World Organisation for Animal Health (2019) "Brucellosis", *World Organisation for Animal Health,* https://www.oie.int/en/animal-health-in-the-world/animal-diseases/Brucellosis [accessed on 7 September 2019].

[106] United States Animal Health Association (2006) *Enhancing brucellosis vaccines, vaccine delivery, and surveillance diagnostics for elk and bison in the Greater Yellowstone Area: A technical report from a working symposium held August 16-18, 2005 at the University of Wyoming*, Laramie: The University of Wyoming Haub School and Ruckelshaus Institute of Environment and Natural Resources.

between species, these animals in Yellowstone act as "reservoir" species for the disease. To combat this, a vaccine (RB51) has been developed for the bison population in Yellowstone.

Sylvatic plague, prairie dogs, and ferrets

Sylvatic plague is an infectious bacterial disease that affects rodents such as prairie dogs. It is caused by the same bacteria responsible for bubonic plague in humans. The devastating effects of "Black Death" pandemics on human populations are familiar to almost everybody. Not so familiar are the mortality rates of wild rodents who still succumb to sylvatic plague. Outbreaks among prairie dogs can reach mortality rates of close to 100%. Symptoms include fever, dehydration, low energy, lack of appetite, difficulty breathing, enlarged spleen, and swollen lymph nodes. 95% of prairie dogs die within 78 hours of infection.[107]

In 2019 in South Dakota, the plague decimated a population of prairie dogs and, since then, has affected black-footed ferrets who eat prairie dogs. A mass immunization of prairie dogs was undertaken, primarily because humans value the ferrets who are at risk of infection. Prairie dogs have shown a survival rate of more than 95 per cent of those infected after they are vaccinated.[108] Even though the aim of the vaccination is the protection of ferrets, prairie dogs also benefit from it. At least, that is, until they are preyed upon by healthy ferrets.

In 2017, biologists in Montana started distributing the oral vaccine baits using drones. This allows them to cover much more ground than they could by hand delivering the baits. With the drones, it's possible to vaccinate 4,000 prairie dogs in a single day.

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[107] Abbott, R. C. & Rocke, T. E. (2012) *Plague: U.S. Geological Survey circular 1372*, Madison: National Wildlife Health Center; Prairie Dog Coalition (2018) *Prairie dogs, people and plague*, Boulder: The Humane Society of the United States.

[108] Leggett, H. (2009) "Plague vaccine for prairie dogs could save endangered ferret", *Wired*, August 4, http://www.wired.com/wiredscience/2009/08/prairiedogvax [accessed on 25 July 2013].

Ebola and great apes

Ebola is a horrible disease causing a range of symptoms including fever, internal bleeding, muscle weakness, difficulty breathing and swallowing, vomiting, and diarrhea. In humans, it is fatal in about 50% of cases. In gorillas, the mortality rate may be as high as 90%. Since the 1990s, the Zaire strain of Ebola has killed many thousands of gorillas and chimpanzees. One study suggests that an outbreak in 2002-2003 killed over 5,000 gorillas. It seems that vaccination would be an obvious solution to fight this disease. In fact, this has been proposed to save the lives of African great apes. The vaccination procedure consists of either vaccines in bait, as used for rabies vaccines, or hypodermic darts.

There is more interest in treating great apes because their species is generally highly valued, and also because of recent threats to human health that have spread through contact with or consumption of infected apes. Other animals may not receive the same attention, but they could be treated similarly.

Anthrax

Pilot vaccination programs have been also developed against anthrax in animals. Vaccination has been shown to be effective in black rhinos, zebras, and cheetahs.[109] So far they have only been vaccinated for conservationist reasons, but such vaccination programs could be extended to all animals who suffer from anthrax, regardless of their perceived use or value to human beings.

Tuberculosis, wild boars and badgers

Tuberculosis is still an active disease infecting both human and nonhuman individuals. In 2011, an oral vaccine was delivered in bait to free-living wild

[109] Turnbull, P. C. B.; Tindall, B. W.; Coetzee, J. D.; Conradie, C. M.; Bull, R. L.; Lindeque, P. M. & Huebschle, O. J. B. (2004) "Vaccine-induced protection against anthrax in cheetah (*Acinonyx jubatus*) and black rhinoceros (*Diceros bicornis*)", *Vaccine,* 22, pp. 3340-3347.

boars under natural conditions of transmission.[110] Badgers have also been vaccinated against this disease.

Vaccinating insects

Like other animals, insects suffer from disease. Until recently, it was believed that insect vaccination wasn't possible, because insect immune systems, though similar in some ways to mammalian systems, don't use antibodies. Recent research at the University of Helsinki has shown that it is possible to vaccinate honeybees. When a queen bee eats something containing pathogens, the pathogen's signature molecules are bound by a protein called vitellogenin. Vitellogenin carries these molecules into the queen's eggs, where they act as inducers for immune responses. This means that we can vaccinate thousands of bees simply by vaccinating the queen. Research is being done to develop a vaccine for American foulbrood, a bacterial disease that can devastate honeybee colonies.[111] The sheer number of insects in the world means that the welfare potential of vaccination is huge.

An example: vaccination to control animal diseases in the UK

The United Kingdom provides a good example of how to begin implementing a vaccination program. It is probably the place where the immunization of animals against disease is most normalized. Vaccination is widely implemented to protect animals from diseases such as Avian Influenza and Newcastle Disease in birds. In the UK, there is a Vaccine and Antigen Bank

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[110] Garrido, J. M.; Sevilla; I. A.; Beltrán-Beck, B.; Minguijón, E.; Ballesteros, C.; Galindo, R. C.; Boadella, M.; Lyashchenko, K. P.; Romero, B.; Geijo, M. V.; Ruiz-Fons, F.; Aranaz, A.; Juste, R. A.; Vicente, J.; de la Fuente, J. & Gortázar, C. (2011) "Protection against tuberculosis in Eurasian wild boar vaccinated with heat-inactivated *Mycobacterium bovis*", *PLOS ONE*, 6, e24905.

[111] Raukko, E. (2018) "The first ever insect vaccine PrimeBEE helps bees stay healthy", *University of Helsinki*, October 31, https://www.helsinki.fi/en/news/sustainability-news/the-first-ever-insect-vaccine-primebee-helps-bees-stay-healthy [accessed on 8 September 2019].

where the government keeps supplies to be used in potential outbreaks, or to be deployed for conservation such as for penguins and parrots. The UK also contributes to the EU Vaccine Bank for Classical Swine Fever as well as to the high priority Foot and Mouth antigens bank, where antigens and vaccines are kept ready to be used when needed.[112]

The examples above show that vaccination is a feasible way to dramatically improve the welfare of animals in the wild. We can vaccinate animals against horrific diseases such as rabies, tuberculosis, and even the plague. We even have the ability to totally eradicate certain diseases from the entire surface of the earth. And these abilities will only increase as we learn more. In the future, much more progress can be made towards larger scale prevention of harms suffered by animals in the wild.

[112] Department for Environment, Food and Rural Affairs (2010) *Vaccination as a control tool for exotic animal disease: Key considerations*, London: Department for Environment, Food and Rural Affairs.

11

What you can do

Raising awareness about helping animals

For animals to be helped in the ways we have seen above, and in other, new ones, there are two main conditions that must be met. First, it is necessary that there is a will to actually help them. Second, we need the knowledge and means to do so. We will start here with the first condition.

Many people are not very familiar with the situation of animals living in the wild, or with whether they need help. Describing what the lives of animals in the wild are actually like can help to raise people's concern for them and increase interest in learning more about ways of helping wild animals. Showing people examples of how helping animals is possible or where it is already being done can also play an important role. It is also important to promote the moral consideration of all sentient individuals in general, because in our society animals are still disregarded. Sentient beings, regardless of the ecosystem they are in or whether they belong to a numerous or scarce species, can experience what happens to them as positive or negative. We will see all this in much more detail in the second part of this guide, which will present the main arguments and debates in the field of animal ethics.

This work of raising awareness has to take place in different spheres. Different approaches and communication styles in these different spheres will be required so that as many people as possible get the message. It is especially important to raise concern among people who are involved in animal advocacy and in altruistic causes, especially those who are interested in how to achieve the best results in helping others in need. It is also crucial that

students and scientists working in life sciences be able to learn more about this issue.

Beyond that, we can also reach the general public, especially younger generations. This will lead to more and more people supporting and joining efforts to help animals. Moreover, the general public has the potential to influence policy and law makers, whose decisions can greatly affect animals.

Making progress towards a future with fewer harms to wild animals

In addition, gaining more knowledge is crucial so we'll be better able to help. It is sometimes believed that because ecologists study entities like populations, species, and ecosystems, they might only be concerned about those entities, and not about individual animals. However, there is no reason it has to be this way. There are different goals that can be advanced by acquiring more knowledge in these disciplines. We need to distinguish between these goals and the science itself. Not long ago, this science was applied only to promote human interests. Currently, environmentalist goals are more common. However, this knowledge can also be applied to help all sentient individuals. Moreover, there is a growing number of cases in which it actually is applied for this purpose, and we should encourage the growth of this trend.

The third part of this guide will assess how progress can be made in the scientific arena to spread interest about the wellbeing of animals in the wild. To achieve this, it has been proposed that work at the intersection of several natural sciences, in particular the sciences of ecology and animal welfare, should be carried out. This would allow us to examine the wellbeing of animals and the factors affecting it.

What can I do to help animals?

We have seen things that can be done for animals in the wild. We will now see something much more specific and practically relevant. We will see what you can do to make a difference too, depending on your situation.

There are some simple ways in which everyone can help, even if you have only a little time. Some of us might be in a position to help animals in the wild directly. In such cases, not only can we help those animals, but also let other people know about it. In this way, we can set an example to help reinforce and illustrate an ethic of concern for animals. You might never have such an opportunity, but there are many other ways you can help, as you could with any other cause. You can let others know about the situation of animals in the wild and the ways to help them. One way is by sharing information about this online, especially on social media. You can follow Animal Ethics or other organizations working in this field, share posts, and encourage others to do the same. You can also help by doing volunteer work or donating.

Some people can help more specifically due to their professional backgrounds which make it possible for them to help organizations to work more effectively. You might also have some specific skills that will make it possible to give advice or to offer pro-bono work. Or if you work in certain fields, like law, politics, or as a public official, there are ways to include more consideration for the interests of animals in important decisions affecting them. Educators can help to spread concern about wild animals among students. Public figures can help to give more visibility to the issue. These are just some possible ways to help. You might think of others based on your experience, location, and people you know.

If you're a student or work in academia, you can also help to promote interest about this issue in your university and among your peers. This can be done by organizing events such as talks or seminars. In addition, students and researchers at early stages of their careers can consider specializing in areas of research directly relevant to the wellbeing of animals in the wild. More generally, if you're a researcher or a scholar, at any stage of your career, there are many valuable topics of research you can pursue that will directly or indirectly affect the situation of animals in the wild and the ways to improve it. Your research can be very important not just in shedding new light on these questions, but also in fostering further research. Depending on your specific area of research, it could also inform potential programs or policies that can help wild animals.

Finally, if you are involved in working for animals or in altruistic advocacy work in general, you can consider adding helping wild animals to your list of supported concerns. You can include this issue in your informational materials about the reasons and ways to help animals. This doesn't require a completely different form of messaging. On the contrary, you can simply incorporate concern for animals in the wild as what it is: one of the ways of taking animals into account. Animals in the wild can feel and suffer just as those in captivity can, so there's no reason not to care about them too.

You can consider how much information about wild animals and on what particular topics to add to your materials. You can do this by using the information in this guide or on our website in your online texts and other outreach materials. You don't have to worry about giving us credit for using our materials about wild animals. What really matters to us is that you too can help animals in the wild. So feel free to take as much information as you want from our materials and use it in yours.

You can also engage in other kinds of campaigns. If your organization focuses on specific campaigns aimed at near-term goals, or if you do lobbying work, you can consider campaigning for the implementation of policies that make a difference for animals in the wild. It is sometimes possible to expand certain initiatives that have already been put into practice.

If you are interested in learning what kind of work you could do, or would like any kind of advice concerning wild animal suffering, just get in touch with us and we will be happy to provide you with ideas and suggestions fitted to the kind of work you already do. You can also speak to other people who are involved in working for animals and encourage them to do the same. There is a lot that can be done to have a positive impact on wild animals, both in the short term and, especially, in the long term.

Part two

Ethics and animals

12

Speciesism, moral consideration and anthropocentrism

In addition to being the name of our organization, "animal ethics" is a term for a field in ethics. It's about how we reflect on the way we should act towards nonhuman animals. The key issue in animal ethics is "speciesism." In this section, we'll see what speciesism is, as well as some of the different forms of speciesism. In particular, we'll look at anthropocentrism, which is a form of speciesism that favors humans, and we'll examine some of the arguments people have used to defend it.

Speciesism: a form of discrimination

The word "speciesism" was coined almost fifty years ago, and is analogous to "racism" and "sexism." Like racism and sexism, speciesism is a form of discrimination – in this case, discrimination against those who are not members of a certain species. Discrimination occurs when someone is treated worse than others for an unjustified reason. Just like skin color and sex, species membership is a biological characteristic that is independent of how we should morally consider someone. Speciesism can be defined as treating those who don't belong to a certain species worse for no justified reason, or giving them less moral consideration.[113]

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[113] Ryder, R. D. (2010 [1970]) "Speciesism again: The original leaflet", *Critical Society*, 2, pp. 1-2; Horta, O. (2010) "What is speciesism?", *Journal of Agricultural and Environmental Ethics*, 23, pp. 243-266.

What do we mean by giving them less consideration? It means that we act as if the harms they can suffer, and the benefits that could be given to them, count for less. Another way of saying this is that we don't treat their interests according to a common standard. What "interest" means in this context is a potential benefit or harm. You have an interest in something — for example, in being provided with medical care — if it is something that will benefit you. You have an interest against something – for example, against being beaten — if it will harm you.

We consider the interests of two individuals equally when we give the same priority to interests of equal importance, regardless of whose interest it is. For example, imagine two people, Alice and Betty, are suffering from malaria and are in need of medicine. They both have the same disease, and both are suffering equally badly. Each of them has an interest in receiving medical treatment, and the interest is equally strong for both of them. We can cure both of them. If we decide that it's very important to treat Alice, so we treat her, but not very important to treat Betty, and we don't, then we have failed to consider their interests equally. We consider Alice's interest important, but not Betty's.

In the case of Alice and Betty, the interests were the same. But equal consideration of interests doesn't mean that the interests of the individuals have to be exactly the same. They can be very different. Nor does it mean that we must treat different individuals in exactly the same way. But if we are to give their interests equal consideration, then we must take them equally seriously if they are equally important interests. For example, a fish has an interest in living in water, and a squirrel has in interest in living on land. These interests are very different. They are equally important, however, because a fish would suffocate on land and a squirrel would drown underwater. What is important here is that we recognize that both interests are equally important, even though the contents and the holders of the interests are very different.

Equal consideration of interests also means that we give greater priority to interests that have more weight. By weight, we mean greater impact on an individual. Michael's interest in having a mild pain relieved is less important than Sarah's interest in having a severe pain relieved. If we gave priority to the milder pain over the severe pain, we would be considering the interests of

those two individuals unequally, unjustifiably favoring Michael's lesser interest over Sarah's greater one.[114]

Moral consideration

We've discussed the meaning of discrimination, which is treating others worse for unjustified reasons, and the meaning of interests, which are potential harms or benefits. Now we'll see how the term "moral consideration" is related to them.

Moral consideration is a way of saying that we are taking someone's interests into account. When we give someone moral consideration, it means we consider how they will be affected by our actions and omissions, along with our attitudes and decisions. When we think we should give moral consideration to someone, we call them "morally considerable."[115] If we don't give *any* moral consideration to someone, we might do all kinds of things that could harm them. We might treat them as a mere object. We might harm them simply for our own amusement, or force them to work until they collapsed. Or we might completely disregard them, no matter how bad their situation is or how easily we could relieve it.

However, moral consideration isn't all or nothing. We can give greater or lesser degrees of moral consideration to different beings. For example, in modern society most people give nonhuman animals *some* moral consideration, so animal interests generally count for something (we generally think it's wrong to hurt or kill animals for no reason at all, for example). But

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[114] The unequal status view is presented in Vallentyne, P. (2005) "Of mice and men: Equality and animals", *Journal of Ethics*, 9, pp. 403-433 as well as in DeGrazia, D. (2008) "Moral status as a matter of degree?", *Southern Journal of Philosophy*, 46, 181-198, and it is criticized in Rachels, J. (2004) "Drawing lines", in C. Sunstein and M. Nussbaum (eds.) *Animal rights: current debates and new directions*, Oxford: Oxford University Press, pp. 162-174; Singer, P. (2009) "Speciesism and moral status", *Metaphilosophy*, 40, 567-581; Horta, O. (2017a) "Why the concept of moral status should be abandoned", *Ethical Theory and Moral Practice*, 20, pp. 899-910.

[115] Pluhar, E. B. (1995) *Beyond prejudice: The moral significance of human and nonhuman animals*. Durham: Duke University Press; Bernstein, M. H. (1998) *On moral considerability: An essay on who morally matters*, Oxford: Oxford University Press.

they are typically given far less consideration than humans. Note that we can give some moral consideration to someone, but be willing to frustrate greater interests of hers in favor of lesser interests of others. This is discrimination.

It's also possible to discriminate against someone without harming them, by treating them less well than we treat others for unjust reasons.[116] We discriminate against nonhuman animals — even if we don't do anything to harm them — if we are not willing to help them in situations where we would be willing to help humans. For example, many people think it's very important to help humans who are in danger of being affected by natural disasters, but few think that we should help animals in the wild when they face similar dangers (although this has been changing in recent years).

So we can see that speciesism, like other forms of discrimination, can have many different implications for their victims, including both our actions against them and our omissions to act in ways that will benefit them. People commonly reject discrimination against other humans, and think all humans should be equally considered. Rejecting speciesism means that we should have a similar attitude towards other sentient beings. This doesn't mean denying that individuals from different species often have different interests (just like individuals of the same species have different interests). What it means is that when their interests have the same weight, that is, when the harms or benefits are similarly bad or good for the one experiencing them, then the interests should count the same.

The species membership of the individuals who have those interests shouldn't make a difference

The alternative to speciesist discrimination is a position that does not give different moral consideration to individuals of different species. We can call this a nonspeciesist view. *Nonspeciesism* can be defined as the absence of speciesism. In addition to the term nonspeciesism, you might have heard the term antispeciesism. While nonspeciesism means trying to avoid acting or

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[116] A detailed account of discrimination can be found in Lippert-Rasmussen, K. (2014) *Born Free and Equal? A Philosophical Inquiry Into the Nature of Discrimination*, Oxford: Oxford University Press.

thinking in a speciesist way, antispeciesism means actively working against speciesism.

Anthropocentrism and other forms of speciesism

The most common form of speciesism is discrimination against nonhuman animals in comparison to humans. We see it in how we routinely behave towards nonhuman animals in ways that we would never behave towards other humans. The view that the interests of humans count more than equally strong interests of other animals is called anthropocentrism. If we agree that anthropocentrism is unjustified, and is therefore a form of speciesism, we can also call it *anthropocentric speciesism*.[117]

However, this is only one type of speciesism. There are many ways in which some nonhuman animals are discriminated against in comparison to other animals. For example, animals who are more closely related to humans, or who share certain capacities that many humans have, are usually given greater consideration than all other animals. This includes great apes like chimpanzees and gorillas, along with other animals such as dolphins and elephants. In many countries, animals such as pigs, cows, chickens or different species of fishes are treated comparatively worse than dogs and cats. Pigs, cows, and chickens are used for some human purposes in ways that dogs and cats are not. In some countries, it's different and all these animals are used for similar purposes. Another reason that certain animals are treated better than others is because humans have an aesthetic preference for them. Animals such as panda bears or butterflies are often favored over black bears or beetles. In other cases, the differences have to do with different scientific interest in the animals. Also, mere size makes a difference: smaller animals are typically given less consideration than larger ones. This is one reason why invertebrates, despite being the majority of animals, are often disregarded, even though there is evidence of their sentience, as in the complex behaviors of bees and their centralized nervous systems. Some people even think of small invertebrates like insects as "not really animals." Finally, some animals

[117] Dunayer, J. (2004) *Speciesism*, Derwood: Ryce; Horta, O. (2010) "What is speciesism?", *Journal of Agricultural and Environmental Ethics*, 23, pp. 243-266.

are treated worse than others just because people have a dislike for them. This happens when animals are considered aesthetically "ugly."

Most people don't hold just one type of speciesist attitude. Usually, people hold several, if not all, of these different speciesist attitudes. As a result, the moral consideration that people give to different animals often ends up being influenced by a combination of morally irrelevant factors. The factors that these diverse forms of discrimination are based on are irrelevant because they are unrelated to the interests of those who are favored and harmed by the discrimination.

Out of all these views, the one with potentially the most harmful consequences for nonhuman animals is anthropocentrism. In light of this, it is crucial to examine whether this is a justified position or not. We will now examine some of the arguments used to try to justify anthropocentrism.

Defenses of anthropocentrism

There are different ways in which anthropocentrism — the view that human interests count for more than other animals' interests — can be defended (note that we are now talking about the way the anthropocentric views themselves are defended, not the arguments to counter those claims, which we'll talk about later). Anthropocentric views can be classified into several groups.

First, it is sometimes claimed that the interests of human beings should count more than those of other sentient beings, and no further argument is given. It is simply taken for granted. This view is so commonplace that most people don't think to question it except in cases where the type or degree of discrimination is unusual.[118]

A second type of claim is that human interests should count more because there is some special condition that only human beings satisfy, but this special condition cannot be verified (or else is recognized to be false). Examples of

[118] Posner, R. A. (2004), "Animal Rights: Legal, Philosophical and Pragmatic Perspectives", in Sunstein, C. & Nussbaum, M. C. *Animal rights: Current debates and new directions*, Oxford University Press, Oxford, 51-77; Williams, B. (2006) *Philosophy as a humanistic discipline*, Princeton: Princeton University Press, part. 13.

this include having an immortal soul or some kind of privileged position in the universe.[119]

Third, there are claims that human interests count more because only human beings have certain special capacities or traits. These are usually complex cognitive capacities, or abilities related to them, such as language or the ability to accept responsibilities towards others. According to these positions, anyone with those features deserves special respect and greater moral consideration than beings who lack them.[120]

Fourth, it's argued that human beings have certain special relationships with other humans, such as love, sympathy, and solidarity.[121] According to this argument, we have these special relationships only with other humans, so we should grant full moral consideration to other humans, but since we don't have similar relationships with nonhuman animals, we are justified in not giving them the same consideration. Another argument regards power relations. It is argued that humans can disregard other animals because we are stronger or more powerful than they are, but that we should respect other humans because humans have a similar level of strength or power.

Finally, there are views that combine one or more of these arguments. For example, it is sometimes claimed that in order to be given full moral consideration, a being must either have certain complex cognitive capacities *or* have certain special relationships with us. Or that we should respect all beings who belong to the same species that we do *or* who have complex intellectual capacities.

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[119] Harrison, P. (1989) "Theodicy and animal pain", *Philosophy*, 64, pp. 79-92; Reichmann, J. B. (2000) *Evolution, animal 'rights' and the environment*, Washington: The Catholic University of America Press.

[120] Frey, R. G. (1980*) Interests and rights: The case against animals*, Oxford: Oxford University Press; Leahy, M. (1991) *Against liberation: Putting in animals in perspective*, London: Routledge; Carruthers, P. (1992) *The animal issue: Moral theory in practice*, Cambridge: Cambridge University Press.

[121] Becker, L. C. (1983) "The priority of human interests", in Miller, H. B. & Williams, W. H. (eds.) *Ethics and animals*, Clifton: Humana Press, pp. 225-242; Midgley, M. (1993) *Animals and why they matter*, Athens: The University of Georgia Press; Petrinovich, L. (1999) *Darwinian dominion: Animal welfare and human interests*, Massachusetts: MIT Press.

If these claims, or at least some of them, are right — in fact even if only one of them is right, then anthropocentrism would be a justified view. However, there are strong arguments against reaching this conclusion, as we'll see next.

13

Arguments against speciesism I

In this chapter, we will see the main arguments against anthropocentrism. Some of them are general arguments that question all the ways anthropocentrism can be defended, while others focus on particular ways of defending this position. We'll start by considering the latter.

Begging the question

Begging the question means assuming from the start what you want to prove. It's a form of circular reasoning, where the truth of the premises relies on the truth of the conclusion. In other words, it's starting with the conclusion we want to reach, and working backwards to try to justify it. Begging the question applies to two types of arguments defending anthropocentrism, one that is definitional and one that is based on criteria that cannot be verified in any way. An example of a definitional claim in support of anthropocentrism is that it is simply intuitive that humans count more than nonhuman animals, and that this intuition doesn't have to be backed up by further reasoning.[122]

But many people don't share that intuition. Moreover, our intuitions shouldn't be trusted when we have arguments pointing in the opposite

[122] Diamond, C. (1991) "The importance of being human", in Cockburn, D. (ed.) *Human beings*, Cambridge: Royal Institute of Philosophy, pp. 35-62; Lynch, T. & Wells, D. (1998) "Non-Anthropocentrism? A Killing Objection", *Environmental Values*, 7, pp. 151-63; Gaita, R. (2003) *The philosopher's dog: Friendships with animals*, London: Routledge.

direction, that is, leading us to think that they are unreliable intuitions.[123] The argument from begging the question points out that definitional defenses don't give any actual reasons why we should accept them.

Something similar can be said about views based on criteria that can't be verified. Giving reasons that no possible amount of evidence can show to be right or wrong cannot prove something. When, as in this case, we have no basis to believe them, unverifiable claims can be considered mere rationalizations — that is, inventions that we come up with in order to support a view we want to defend.

The argument from species overlap

Other arguments in defense of anthropocentrism claim that human interests are worth more because humans have certain special capacities or relationships that *can* actually be verified. The argument from species overlap shows that such claims fail to draw a dividing line between humans and other animals. In addition, it suggests that such claims must be rejected because they lead to unacceptable conclusions.

The key point of the argument from species overlap is that there is no feature that we can verify that all humans have and that no other animal has. Consider, for example, complex cognitive capacities. There are human beings who don't have them, such as those who have suffered certain kinds of brain damage. Some human beings are born with congenital conditions preventing them from ever developing complex cognitive abilities. Babies also lack these capacities. The same can be said about related capacities, such as the command of a language or being able to recognize and accept responsibilities towards others.[124]

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[123] Singer, P. (2004) "Ethics beyond species and beyond instincts: A response to Richard Posner", in Sunstein, C. & Nussbaum, M. (eds.) *Animal rights: Current debates and new directions*, New York: Oxford University Press, pp. 78-92.

[124] Regan, T. (1979) "An examination and defense of one argument concerning animal rights", *Inquiry*, 22, pp. 189-219; Pluhar, E. (1996) *Beyond prejudice: The moral significance of human and nonhuman animals*, Durham: Duke University Press; Ehnert, J. (2002) *The argument from species overlap*, master's thesis, Blacksburg: Virginia

We might think that babies are different because they have the potential to develop those capacities, but this doesn't happen for babies who don't make it to adulthood. And it seems unacceptable to think that these children shouldn't be respected as much as other children. In fact, none of us should be treated according to what we merely have the potential to do. You might have the potential to become the president or prime minister of your country, but that doesn't mean that you should to be treated as if you actually are president. The same applies in all other cases when someone has the potential to develop a certain capacity but doesn't have it yet. So this response to the argument from species overlap doesn't work.

The case is similar if we consider not capacities, but relationships, such as relations of sympathy or power. There are many humans who don't have anyone who takes care of them or loves them, and people who are powerless, like many orphans and elderly people. The argument from species overlap shows that anthropocentric arguments based on these criteria fail. They can't establish any good reasons why humans and nonhuman animals should be considered differently. If we accept the claim that having such capacities or relationships matters for whether and how someone should be considered and treated, we will have to accept that all those who don't have such capacities and relationships should be disregarded or deserve less consideration. This means that many humans will not be granted full moral consideration, because they lack the capacities or relationships that are supposedly essential to full moral consideration. But this is a conclusion most of us will find unacceptable. Instead, we can acknowledge that in order to be granted full moral consideration, one doesn't have to have those special capacities or relationships. This allows us to fully respect all human beings. But then, if we accept this, we will have to acknowledge that those capacities and relationships are not relevant to giving someone full moral consideration. Otherwise, we would have to accept the conclusion based on the following premises:

Polytechnic Institute and State University; Horta, O. (2014) "The scope of the argument from species overlap", *Journal of Applied Philosophy*, 31, pp. 142-154.

(1) It is justified to deny full moral consideration to those who lack certain intellectual capacities or special relationships with others.

(2) Not all humans have certain intellectual capacities or special relationships with others.

If we accept the two premises of the argument, then the following conclusion (3), must be accepted.

(3) It is justified to deny full moral consideration to humans who lack certain intellectual capacities or special relationships with others.

The second premise is irrefutable since it is a fact that there are humans who don't have certain intellectual capacities or special relationships with others.

The only way the conclusion can be avoided is to reject premise 1, that it's justified to give less consideration to the interests of those without certain capacities or special relationships. This means that this argument cannot support the case against respecting nonhuman animals without also supporting the case against respecting humans.[125]

Those defending anthropocentric positions have argued against this in several different ways. Some have claimed that, when some members of a species have certain cognitive capacities, then we should give equal moral consideration to all individuals of the same species. So, for example, since

[125] The argument from species overlap has often been called "the argument from marginal cases." This name is inaccurate. To start with, it is not clear what "marginality" refers to. If it refers to membership to humanity, it is a wrong denomination, as humans who fail to satisfy the criteria are not marginal humans; they are as human as any other human beings. Being human is not determined by having those features; individuals with fully human DNA, born to human beings, who don't have those capacities or relationships are not marginal humans. If, instead the term "marginal" is used to mean not humanity, but the possession of certain features, it is an inaccurate term, because some humans do not possess those features at all (not just in "marginal" ways), and because it implies that humans who have higher capacities than average would also be marginal. It makes more sense to instead refer to it as the "argument from species overlap" because the central point is that there is an overlap among different species regarding how they satisfy certain requirements. The "argument from species overlap" shows that those requirements can't be satisfied by all the members of only a certain species.

there are humans with complex cognitive abilities, we should give the same moral consideration to all humans, whether they have those abilities or not. Others have argued that, while humans who lack certain capacities should not be recognized as fully morally considerable, they should nevertheless be respected as if they were, in an "honorary" way, so to speak. Both of these positions combine two ideas. They first argue that having certain capacities is what matters. But then they claim that belonging to a certain species –– our species –– is what matters. We have seen that the latter claim can be rejected by showing that it begs the question, so it cannot be a sound response to the argument from species overlap.

Suppose someone tried to argue that humans deserve special treatment not because of any particular attribute, but because of a combination of attributes that make humans special. Now suppose that they come up with a group of attributes that is unique to humans. That still wouldn't support their claim, because they would actually be arguing that humans are special because they are the most like humans. That is a circular argument. They would be begging the question by concluding that humans deserve special treatment because they are human.

The argument from impartiality

We see that the different ways to defend anthropocentrism fail because they either beg the question or because they fail when challenged by the argument from species overlap. So, combining the two arguments we have seen so far, we have a full refutation of the defenses of anthropocentrism.

There are other arguments that challenge all kinds of defenses of anthropocentrism. Each of these arguments is sufficient by itself without needing to be combined with any other claim. One of these arguments, called "the argument from impartiality," argues that anthropocentrism is incompatible with fairness. The argument starts with the premise that in order to be fair, we should only accept a position that we would accept if we thought impartially about it.

What do we mean by impartial? There's a thought experiment used in philosophy that can help us to see more clearly what we would decide if we

were being impartial. In this thought experiment, we think about how we would want individuals to be treated in the society where we will live. But there is one condition. We have to think about how we would respond to this question if we didn't know what our place in the society would be. That is, we could be born rich or poor, with high status or low status, healthy or sick, with cognitive abilities greater or less than average.

In contemporary philosophy, this uncertainty about what our position would be is known as the veil of ignorance. Behind this veil of ignorance, we would not know the class, gender, skin color, economic status, or anything else about who we would be. This thought experiment is intended to help us come up with a just system for a society. The idea is that if we were thinking only of ourselves and we didn't know what position we would be born into, we would want the society to be as fair as possible.

This thought experiment also helps us to consider what would be a fair way to treat nonhuman animals. We can expand the veil of ignorance to include all sentient beings. So, in the hypothetical situation we have just seen, you wouldn't know if you were going to be born as a human being or as an animal of a different species. And the total number of sentient animals may be up to or more than a quintillion, which is 10^{18}, or a billion billion, which is more than 160 million times the number of humans. So in this scenario, chances are you would find you were a nonhuman animal. If we reflected on this, we would not prefer a situation where the odds are that we would be deprived of consideration and potentially harmed as a result. We would not want to be in a society where nonhuman animals are disregarded if we might be — probably would be — a nonhuman animal.[126] So if we consider the matter in a truly impartial manner, we would have to reject anthropocentrism.

A different thought experiment also helps us to consider the consequences of our decisions in an impartial manner. We consider what decisions we would

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[126] VanDeVeer, D. (1979) "Of beasts, persons and the original position", *The Monist*, 62, pp. 368-377; Rowlands, M. (2009 [1998]) *Animal rights: Moral, theory and practice*, 2nd ed., New York: Palgrave Macmillan. See also Harsanyi, J. C. (1977) *Rational behavior and bargaining equilibrium in games and social situations*, Cambridge: Cambridge University Press; Rawls, J. (1999 [1971]) *A theory of justice*, rev. ed., Cambridge: Harvard University Press.

make if we had to consecutively live the lives of all the different individuals affected by our decisions. Again, thinking about this scenario would lead us to take the interests of nonhuman animals into account too, whenever the consequences of human actions could potentially harm them. Otherwise, the consequences for us would almost certainly be terrible. This thought experiment is like the previous one in that it shows us that impartiality requires us to oppose discrimination against nonhuman animals.

14

Arguments against speciesism II

So far, we have seen three arguments against anthropocentrism: begging the question, or assuming from the start what you are trying to prove; the argument from species overlap, which shows that there are no special capacities or relationships that all humans and only humans have; and the argument from impartiality, which questions all defenses of anthropocentrism on the basis of fairness. There is another argument that challenges the priority of human interests. This argument is about the reasons we should grant moral consideration to a being. The argument is called "the argument from relevance." It can be divided into two parts. The first one concludes that what matters to be morally considerable is being able to be harmed and benefited. The second one concludes that those who are able to be harmed and benefited are sentient beings.

The argument starts with a couple of ideas that are very intuitive, and from which the argument gets its name. The first is that our decisions should be based on relevant factors. The second is that the relevant factors are about what is at stake in our decisions. For example, if we need to decide who will get a job as a medical doctor at a hospital, what is relevant is the candidates' knowledge and their ability to make good judgements about patients' health, because that is what the job is about. Suppose that we are deciding whether an orphan child should be seen by a doctor in that same hospital. What is relevant in this case is whether the child is unhealthy, because this is the reason for being seen by a doctor. Imagine if the doctor said to the child, "I can't treat you because you don't have a medical degree." That would be absurd, because that's not a relevant factor in this case.

So what about when it comes to granting moral consideration to someone? What's at stake is whether they could be harmed or benefited as a result of what we do. So we can say that what's relevant to granting moral consideration is simply this: being able to be harmed or benefited. To put it more simply, the argument is based on the following premises:

(1) We should make our decisions according to relevant factors

(2) The relevant factors in our decisions are about what is at stake in those decisions

From this, it follows that:

(3) We should make our decisions according to what is at stake in them

We now see what moral consideration is about:

(4) In our decisions about whether to give someone moral consideration, what is at stake is whether that individual can be benefited or harmed

So we can conclude:

(5) We should give moral consideration to those individuals who can be benefited or harmed

Of course, there are people who reject some or all of these premises. But the consequences of doing so are ones that most of us probably wouldn't want to accept, because it would mean accepting that our decisions could be made based on factors we would recognize as irrelevant. This is why many people do agree with these premises. And the conclusion that follows from them is that sentience is what is relevant for moral consideration.[127]

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[127] Sapontzis, S. F. (1987) *Morals, reason, and animals*, Philadelphia: Temple University Press; Singer, P. (1990) "The significance of animal suffering", *Behavioral and Brain Sciences*, 13, pp. 9-12; Robinson, W. S. (1997) "Some nonhuman animals can have pains in a morally relevant sense", *Biology and Philosophy*, 12, pp. 51-71; Bernstein, M. H. (2015) *The moral equality of humans and animals*, Basingstoke: Palgrave MacMillan; Horta, O. (2018a) "Moral considerability and the argument from relevance", *Journal of Agricultural and Environmental Ethics*, 31, pp. 369-388.

Many defenders of speciesism claim that we should grant full moral consideration to those who have certain complex intellectual capacities, or those who have special relationships of solidarity with others. But neither of these conditions determines *that* one can be harmed or benefited by what we could do or refrain from doing to them. Our particular circumstances or cognitive abilities may affect some of the particular *ways in which* we can be harmed and benefited, but they don't determine *whether* we can be negatively or positively affected in the first place. Therefore, cognitive capacities or relationships are irrelevant when it comes to what moral consideration is about. Instead, sentience — the capacity to have positive and negative experiences — is what determines that we can be harmed or benefited by what happens to us. Accordingly, sentience should be what matters for moral consideration.

In some cases, it is argued that only those who can give moral consideration to others should receive moral consideration. But this is like claiming that only those who can practice medicine should be treated by doctors. As we saw in the example above, this is wrong because what is relevant for being a doctor is different from what is relevant to needing to see a doctor. Equally, whether or not one is able to give moral consideration to others is not what is relevant to being harmed or benefited.

Having seen this, the second part of the argument can be presented in a very simple way, starting with the last point made above:

(5) We should give moral consideration to those individuals who can be benefited or harmed

(6) What makes someone capable of being benefited or harmed is being sentient

(7) We should give moral consideration to those individuals who are sentient

Rejecting all forms of speciesism

The arguments we have just seen are used to challenge anthropocentrism. However, they can be used against any form of speciesist discrimination.

Recall that speciesism is discriminating against members of a certain species for any reason. That includes discriminating against nonhuman animals compared to humans, *and* discriminating against some animals compared to other animals.

Suppose we held a view that, among nonhuman animals, only great apes were morally considerable. Or only mammals. Such views have a lot in common with anthropocentric views that favor humans over all other animals. This is just a case of redrawing the dividing line — where humans plus a few other species are favored, for reasons different from their being sentient. So we can reject these views on similar grounds.[128] Sentience, not species membership, determines whether one can be harmed or benefited.

The importance of sentience

Given what we have just seen, we might wonder if it would be speciesist to make a distinction between animals of species that are sentient and animals of species that are not. There are two ways to respond to this. The first is that the distinction between sentient and nonsentient beings is not between species, but between the individuals. Species are not sentient; their individual members are. The second point is that, as the argument from relevance shows, there is a difference between sentience and the criteria that defenders of anthropocentrism use, such as species membership, complex cognitive capacities, and relationships. None of these criteria are relevant to whether or not someone can be harmed. Sentience, unlike the other criteria, is what makes it possible for an individual to be harmed, so it *is* a relevant distinction.

There is a response to the argument from relevance that claims that human suffering is the only significant kind, or at least that it's more significant than the suffering of other animals, because it involves psychological suffering. This argument doesn't question the idea that physical pain can be as bad in nonhuman animals as it is in human beings, but it claims that human psychological suffering is more important than the physical pain that nonhuman animals suffer.

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[128] Dunayer, J. (2004) *Speciesism*, Derwood: Ryce.

So the question here is, does the psychological element of pain and suffering really make it more significant for humans than for other animals? Against such a claim, it can be argued that we don't value our psychological experiences more than our physical experiences. Terrible physical torture isn't necessarily more bearable than grief, distress, or fear.[129] If our psychological suffering is not necessarily more significant than our physical suffering, and if our physical suffering is not more significant than nonhuman animals' physical suffering, then we have to conclude that our psychological suffering is not necessarily worse than the physical suffering of nonhuman animals. This would lead us to reject the argument for the priority of human sufferings. Therefore, nonhuman animal suffering must be taken into account the same way we would like our own suffering to be taken into account.

There's another claim based on complex psychology used to disregard the interests of animals. It is argued in some cases that although sentient nonhuman animals have an interest in not suffering, they do not have an interest in living. That is, the argument claims that nonhuman animals are not harmed by death, or only suffer a tiny harm by dying. This means that the death of nonhuman animals is objectionable only in a limited way, if at all. One way to argue for this claim is to say that only humans can understand the fact that they are alive and, therefore, have a desire to live. This view is based on the idea that what is positive or negative for us is that our desires are satisfied or thwarted.

One argument against this is that there are nonhuman animals who fight hard to stay alive, and that many of them appear to understand the fact that they are alive. But there is another response, one that doesn't require animals to have this kind of understanding. Suppose that animals did not have minds complex enough to have a desire to live. They would still be harmed by death according to this view, because death would make it impossible for them to satisfy any more of the desires that they do have.

Another argument used to disregard the interests of nonhuman animals claims that only those who can see themselves as beings who persist through

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[129] Rollin, B. (1989) *The unheeded cry: Animal consciousness, animal pain and science*, Oxford: Oxford University Press; Horta, O. (2017) "Why the concept of moral status should be abandoned", *Ethical Theory and Moral Practice*, 20, pp. 899-910.

time, and thus can make plans for the future, can have an interest in living. Again, we could point out that at least some animals seem to have a sense of time. Also, if this argument were right, then death would not be a harm for human beings who don't have complex cognitive capacities. This is very difficult for most people to accept.

There is another way this argument can be questioned. It can be argued that even if one isn't able to see oneself in the future and have future wishes and desires, one would be harmed by death because depriving someone of life deprives them of any future positive things. One would miss out on these future experiences even if they were not planned or anticipated. That is, if nonhuman animals die, they can no longer enjoy all the good things that they could experience if they were to remain alive. Thus, all sentient animals can be harmed by death. Sentient animals not only have an interest in not suffering, but also have an interest in positive experiences, and this means they have an interest in remaining alive.

Of course, it can be argued that in some cases death can be beneficial to us. This happens in cases where there is more suffering than happiness in our lives. But the reason death can be a relief in these cases is the same: because if we die, we will no longer suffer all the negative things in the future.[130] It often happens, especially with animals in the wild, that the same things that lead to an animal's death lead to great suffering. An example is when an animal undergoes an agonizing, long death due to disease. In such cases, death is better than continuing to live in misery.

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[130] The view that nonhuman animals are not harmed by death is defended for instance in Cigman, R. (1981) "Death, misfortune and species inequality", *Philosophy & Public Affairs*, 10, pp. 47-54; Harman, E. (2011) "The moral significance of animal pain and animal death", in Beauchamp, T. L. & Frey, R. G. (eds.) *Handbook on ethics and animals*, Oxford: Oxford University Press, pp. 726-737. The view that animals are harmed by death is defended in McMahan, J. (2008) "Eating animals the nice way", *Daedalus*, 137, pp. 66-76; (2002) *The ethics of killing: Problems at the margins of life*, Oxford: Oxford University Press; Bradley, B. (2009) *Well-being and death*, New York: Oxford University Press. For general explanations of the view that death is a harm by deprivation, see for instance Nagel, T. (1970) "Death", *Noûs*, 4, pp. 73-80; Scarre, G. (2007) *Death*, Stocksfield: Acumen.

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Ethical theories and nonhuman animals

Once we have seen the main arguments for and against speciesist views, we can consider what the main views in ethics today may have to say about this issue. Ethics is about our ultimate reasons for acting in certain ways. Among other things, ethical thinking has the job of detecting contradictions among different moral views we might have. For example, if we claim that we should respect all those who can suffer *and* that we can exploit nonhuman animals, then that is a contradiction. In addition, we may prefer some ways of acting to others for other reasons, such as how they match other moral views we see as acceptable. Ethical theories result from this reflection on how we should act. There are many different ethical theories, which differ according to the way they require us to act and in the arguments that support them. We will see the main ones and the way the moral consideration of animals can be assessed according to them.

For many situations, different ethical theories disagree about how we should act. For example, according to some views, it is always wrong to tell a lie, regardless of the consequences. According to others, whether or not we should lie depends on the situation and what the outcome would be for those affected by the lie. Despite their differences, the most widely accepted ethical theories can all support a defense of the moral consideration of nonhuman animals and the rejection of speciesism. Arguments questioning speciesism are about how we decide who we should give moral consideration to and are not specific to a single theory. However, each theory also has its own arguments, different from the others, since each theory has its own framework of reasons for why we should act in some ways and not in others.

Main distinctions in ethics

Most theories in ethics fall within one of the following three main paradigms: consequentialist theories, deontological theories, and character-based theories.[131]

(1) Consequentialist views claim that what we should do is determined by what actions make the situation better, or less bad. They claim, for example, that we should minimize suffering, maximize happiness, or minimize inequality. Robin Hood exemplifies a type of consequentialist view — he steals from the rich to give to the poor. His actions can be guided by the principle that we should act in a way that reduces inequality, or that promotes the general happiness, or that reduces suffering, and he disregards the conventional moral norm that it is always wrong to steal.

(2) Deontological views claim, instead, that there are certain actions that we are *obligated* to take because we should follow a rule or norm, even if by doing so we make the situation worse. Other actions are *prohibited*, even when by taking those actions we make the situation better. Someone with a deontological view might think they should never tell a lie, even to protect someone from harm, or that it's wrong to worsen the situation for someone who is innocent even if by doing so we could make the situation less bad for other people.

(3) Character-based views are a third type of approach, based on the claim that we should have a certain morally sound character, and act accordingly. They will typically stress the importance of developing certain moral qualities, such as kindness and fair-mindedness, and they will act in a way that expresses those qualities.

There are different particular theories that fall within each of these paradigms. We will now see what they defend and how they are compatible with opposing speciesism.

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[131] Pettit, P. (ed.) (1993) *Consequentialism*, Aldershot: Dartmouth; Hursthouse, R. (1999) *On virtue ethics*, Oxford: Clarendon; Darwall, S. (ed.) (2008) *Deontology*, Oxford: Blackwell.

Ethical theories and animals

We have seen that one family of theories is consequentialism. An example of a consequentialist theory is utilitarianism. In a nutshell, utilitarianism claims that we should minimize the total amount of suffering and maximize the total amount of happiness. This theory necessarily has to count all the pleasures and all the suffering equally regardless of who is experiencing them, because valuing some instances of suffering more than others would not achieve the best result.[132] It is impossible to achieve this without all sentient beings being considered equally.

There are some ethical theories that are compatible with multiple paradigms. One of them is egalitarianism, of which there are both consequentialist and deontological versions. Egalitarianism doesn't defend homogeneity. Rather, egalitarianism is a family of ethical theories according to which a situation is improved if the positive and negative things are distributed the least unequally. Egalitarians might claim that equality is good because inequality is bad in itself, or because it's unfair.

According to egalitarianism, it's better if everyone lives at a satisfying level of happiness, rather than if some enjoy paradise-like conditions while others are suffering in a very bad situation. This would be the case even if in the second situation the total sum of happiness minus suffering was higher. What matters in egalitarianism is not only that the amount of happiness be as high as possible, but also that, for those who are worse off, the bad situation is improved as much as possible.

Because egalitarianism is concerned with equality, it's opposed to views that defend the unequal consideration of interests. Like other ethical views, egalitarianism entails that the interests of nonhuman animals must be taken into account just as the interests of human beings are. Moreover, a consistent

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[132] Mill, J. S. (1969 [1852]) *Whewell on moral philosophy*, in *Collected works*, vol. X, London: Routledge, pp. 165-201; Singer, P. (2011 [1979]) *Practical ethics*, 3rd ed., Cambridge: Cambridge University Press; Matheny, G. (2006) "Utilitarianism and animals", in Singer, P. (ed.) *In defense of animals: The second wave*, Malden: Blackwell, pp. 13-25; de Lazari-Radek, K. & Singer, P. (2014) *The point of view of the universe: Sidgwick and contemporary ethics*, Oxford: Oxford University Press.

egalitarian has an additional reason to care about the interests of nonhuman animals. Nonhuman animals are typically in much worse situations than human beings. In order to best promote equality, then, an egalitarian should give extra importance to helping them.[133]

A view that is similar to egalitarianism is prioritarianism. This view is not really concerned with inequality itself. It gives priority to improving the situation of those who are the worst off. Therefore, the practical consequences concerning nonhuman animals coincide with those of egalitarianism.[134]

Another family of ethical theories that covers many different views, including both consequentialist and deontological positions, are suffering-focused ethics. These positions maintain that reducing suffering has priority over other things, such as promoting happiness. According to suffering-focused views, there is no possible amount of happiness in the world that can compensate for the existence of suffering, or at least of extreme suffering.

There are several forms of suffering-focused ethics. Some of them are types of what is known as negative consequentialism. This name comes from the fact that these views give reducing what is negative (such as suffering) priority over promoting what is positive (such as pleasure). One negative consequentialist theory is negative utilitarianism. Negative utilitarianism commonly advocates reducing suffering as much as possible, regardless of whose it is. Other possible forms of negative consequentialism include negative prioritarianism, and egalitarian views focused on reducing negative things and helping those who are suffering the most. The name for this last

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[133] Gompertz, L. (1997 [1824]) *Moral inquiries on the situation of man and of brutes*, London: Open Gate; Crisp, R. (2003) "Equality, priority, and compassion", *Ethics*, 113, pp. 745-763; Faria, C. (2014) "Equality, priority and nonhuman animals", *Dilemata*, 14, pp. 225-236; Horta, O. (2016) "Egalitarianism and animals", *Between the Species*, 19, https://digitalcommons.calpoly.edu/bts/vol19/iss1/5, pp. 109-145 [accessed on 20 August 2016]. For more general presentations of egalitarianism, see Temkin, L. (1993) *Inequality*, Oxford: Oxford University Press; Holtug, N. & Lippert-Rasmussen, K. (eds.) (2007) *Egalitarianism: New essays on the nature and value of equality*, Oxford: Oxford University Press.

[134] Holtug, N. (2007) "Equality for animals," in Ryberg, J.; Petersen, T. S. & Wolf, C. (eds.) *New waves in applied ethics*, Basingstoke: Palgrave Macmillan, pp. 1-24. Prioritarianism is defended in Parfit, D. (1995) *Equality or priority*, Kansas: University of Kansas.

kind of view is negative consequentialist egalitarianism — negative because it prioritizes reducing suffering, consequentialist because actions are considered according to their consequences, and egalitarian because it's concerned with equality. Finally, there are other suffering-focused views that are not consequentialist. One could be that we should follow a deontological rule to reduce suffering. Or that reducing suffering is what someone with a virtuous or a caring moral character would do.

These positions are not compatible with disregarding the interests of any being who can suffer. Disregarding someone's suffering would amount to not considering some of the suffering in the world. This would make it impossible to achieve the aims of these theories. To put it simply: it's impossible to hold a view that places importance on reducing suffering and not include animal suffering.[135]

Rights theories are compatible with both consequentialist and deontological approaches, but are most often deontological. Rights views maintain that there are things we cannot do to individuals because they are holders of moral rights. Legal rights also protect the interests of individuals, but legal rights and moral rights are different things. Here we are dealing with ethical approaches, so everything that is said here has to do with moral, not legal, rights. According to a standard defense of rights, we should act in a way that we would want everyone else to act as well. It has been traditionally believed that this entails respecting all humans. A common expression of this is that all humans should be treated as ends in themselves, rather than as mere means to an end. This is because if we want others to respect us this way, then we should act the same.

We have to consider that nonhuman animals are sentient too. If we were in their place, we would not find it acceptable to have our interests

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[135] Contestabile, B. (2020 [2005]) "Negative utilitarianism and justice", *Practical philosophy: A Socratic examination of the Buddhist truths*, http://www.socrethics.com/Folder2/Justice.htm [accessed on 28 March 2020]; Leighton, J. (2011) *The battle for compassion: Ethics in an apathetic universe*, New York: Algora. See also Mayerfeld, J. (2002) *Suffering and moral responsibility*, Oxford: Oxford University Press; Gloor, L. (2019 [2016]) "The case for suffering-focused ethics", *Center on Long-Term Risk,* https://longtermrisk.org/the-case-for-suffering-focused-ethics [accessed on 16 November 2019].

disregarded as theirs are. "Treat others as you would like to be treated," then applies in their case as well. Although nonhuman animals can't always treat us the same way we treat them, we can think of this as, "treat others as you would want to be treated if you were in their situation." This is, after all, how we treat human babies and other humans who are unable to reciprocate the respect we give them. Due to this, many contemporary rights theorists have pointed out that not only humans — but all sentient animals — should be considered as ends in themselves.[136]

Finally, two examples of character ethics are virtue ethics and care ethics. The virtue ethics approach in moral philosophy defends the view that when deciding how to live, we should consider not what would make the world a better place or what norms we should obey, but rather whether our actions would be virtuous ones.

Some virtue ethicists have claimed that to be virtuous is to fulfill our potential to become full moral agents, and we can only fulfill such potential by letting *others* satisfy their own interests as well. Since sentient beings are harmed when they cannot satisfy their own best interests, the virtue ethics approach implies respecting the interests of others. Moreover, because insensitivity is not considered virtuous, we could also claim that the most virtuous action would be not to just do no harm, but to actually do good, and to try to help animals whenever possible.[137]

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[136] Regan, T. (2004 [1983]) *The case for animal rights*, 2nd ed., Berkeley: University of California Press; Francione, G. L. (2000) *Introduction to animal rights: Your child or the dog?*, Philadelphia: Temple University Press; Franklin, J. H. (2005) *Animal rights and moral philosophy*, New York: Columbia University Press; Korsgaard, C. M. (2018) *Fellow creatures: Our obligations to the other animals*, Oxford: Oxford University Press. See also Kant, I. (2020 [1785]) *Groundwork for the metaphysics of morals*, Oxford: Oxford University Press. For contractarian defenses of animal rights see Rowlands, M. (2009 [1998]) *Animal rights: Moral, theory and practice*, 2nd ed., New York: Palgrave Macmillan; see also Rawls, J. (1999 [1971]) *A theory of justice*, rev. ed., Cambridge: Harvard University Press; VanDeVeer, D. (1979) "On beasts, persons and the original position", *The Monist*, 62, pp. 368-377.

[137] Hursthouse, R. (2000) *Ethics, humans, and other animals: An introduction with readings*, New York: Routledge; Nobis, N. (2002) "Vegetarianism and virtue: Does consequentialism demand too little?", *Social Theory and Practice*, 28, pp. 135-156; see also

Care ethics prescribes that we should have a caring attitude towards the needs of others, helping them when they need it and refraining from harming them. Traditionally, this view also values the relationships that caring agents have with other beings. Because of this, we might think that since we usually have stronger relationships with humans, we should give priority to their interests and pay less attention to the interests of nonhuman animals. However, this is rejected by those who argue that we cannot be considered caring agents if we fail to care for the interests of beings we know are suffering. Being a caring agent would require having a caring response to that suffering. This is setting aside the fact that many people have closer relationships with some nonhuman animals than with other humans.[138]

We should also keep in mind that, as we saw previously, the situation of most nonhuman animals today is in general much worse than the situation of most human beings. Due to this, care ethicists should prescribe paying special attention to them. How bad their situation is can outweigh our lack of personal relationship with them.

So, to conclude, the main ethical theories today all seem to imply, or are compatible with, full moral consideration for nonhuman animals. This means that in order to oppose speciesism and promote helping animals, we don't have to accept any particular ethical view. Challenging speciesism is compatible with all of them.

Hursthouse, R. (2001) *On virtue ethics*, Oxford: Oxford University Press; Annas, J. (2011) *Intelligent virtue*, New York: Oxford University Press.

[138] Donovan, J. (2006) "Feminism and the treatment of animals: From care to dialogue", *Signs*, 31, pp. 305-329; Adams, C. J. & Donovan, J. (eds.) (2007) *The feminist care tradition in animal ethics: A reader*, New York: Columbia University Press. See also Held, V. (2006) *The ethics of care: Personal, political, and global*, Oxford: Oxford University Press.

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Animal ethics and environmental ethics

We have already seen the reasons to give all sentient beings moral consideration, which is the key idea defended by different views in animal ethics. We'll now see what some of the main positions in environmental ethics have to say on this matter. There are many different views in this field. The ones we will examine here are those related to the key point that concerns us, which is: what entities are morally considerable? That is, which entities should we respect so they are not harmed, but rather benefited, by our actions?

Ecocentrism

Certain views in environmental ethics don't value individuals, but rather population groups or wholes such as ecosystems or species. These views are given the name "holism."[139] Individuals can be a part of a whole; however, they are not valued in and of themselves according to these views, but only *as parts of a whole*.

There are different types of holism. One of them is ecocentrism. According to ecocentrism, ecosystems themselves are morally considerable entities, independently of any instrumental value they might have for the lives of the sentient individuals living in them.[140] We might think that protecting an

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[139] Shrader-Frechette, K. (1996) "Individualism, holism, and environmental ethics", *Ethics and the Environment*, 1, pp. 55-69; Marietta, D. E. (1988) "Ethical holism and individuals", *Environmental Ethics*, 10, pp. 251-258; see also Varner, G. E. (1991) "No holism without pluralism", *Environmental Ethics*, 13, pp. 175-179.

[140] Callicott, J. B. (1989) *In defense of the land ethic: Essays in environmental philosophy*, Albany: SUNY Press; (2013) *Thinking like a planet: The land ethic and the earth ethic*,

ecosystem amounts to protecting the interests of its inhabitants, but that is not the case. Ecocentrism values ecosystems themselves, not their inhabitants. In fact, the animals living in them may be considered relevant only as components of the ecosystems, and their lives may be considered important only to the extent that they contribute to a particular ecosystemic configuration.

In some cases, ecocentrism can have consequences that are positive for these animals. In other cases, the consequences can be very bad, because according to this view, it is right to disregard the interests of the animals if that promotes ecosystem preservation. This happens when animals in populations that grow very large are killed for the sake of maintaining a certain ecosystem's balance. Critics can argue that those who hold this view are not being consistent or are subordinating this position to an anthropocentric one. This is because human beings change ecosystems more than nonhuman animals do, even in comparison to non-native animals who are are killed with the intention of preserving ecosystems. However, supporters of ecocentrism almost never think that way when it comes to human beings — they would not kill humans for posing a threat to the integrity of an ecosystem.

Another argument against ecocentrism is that ecosystems themselves cannot experience anything good or bad; only the animals living in them can. As we've discussed in the part about sentience, when determining whether someone or something is worthy of respect and protection, what matters is whether they can be affected positively or negatively by our actions from a subjective point of view, which can only happen if there is the capacity for positive or negative experiences — the capacity for sentience.

Oxford: Oxford University Press. This view was inspired by Leopold, A. (2013 [1949]) *A Sand County Almanac & other writings ond ecology and conservation*, New York, Library of America.

Views concerned about species rather than about their members

Another kind of holism views species as morally considerable, instead of their members. It is often believed that species should be preserved because they have some sort of value in themselves, a value unrelated to what's in the best interests of the individuals who are members of the species.[141] A problem arises when valuing a species entails giving less moral consideration to sentient individuals.

An example of this is the killing of ruddy ducks in Europe. They are not native to Europe, but were introduced there by humans. Some of them interbreed with white-headed ducks, which are native to Southern Europe and Western Asia. This results in hybrid ducks, and the white-headed trait has become less prevalent. The prevalence of ruddy ducks poses no threat to ecosystems because the ecological interactions of both ruddy and white-headed ducks are identical. However, ruddy ducks are being killed with the only aim promoting biodiversity, regardless of the negative impact on the sentient individuals who are affected by it.[142]

Some defenses of species preservation are that if species disappear, then empirical knowledge will be lost, future generations will not be able to have contact with these species, and we will no longer be able to experience the *beauty* of diversity. There's a difference between these views and the view that biodiversity is *intrinsically* valuable. Instead, these views support species conservation because humans value it — humans value the knowledge it would bring or they appreciate it aesthetically.[143] Whatever the reasons for valuing biodiversity, for the affected animals the results are very similar.

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[141] Rolston, H., III (1985) "Duties to endangered species", *BioScience*, 35, pp. 718-726; Johnson, L. (1991) *A morally deep world: An essay on moral significance and environmental ethics*, New York: Cambridge University Press.

[142] Henderson, I. & Robertson, P. (2007) "Control and eradication of the North American ruddy duck in Europe", *Managing Vertebrate Invasive Species, USDA National Wildlife Research Center Symposia*, paper 16.

[143] See regarding this Hargrove, E. C. (ed.) (1992) *The animal rights/environmental ethics debate: The environmental perspective*, Albany: SUNY Press; Rolston, H., III (1999) "Respect for life: Counting what Singer finds of no account", in Jamieson, D. (ed.) *Singer*

The arguments against these views are similar to the ones we have seen against ecocentrism. First, species as such are not sentient entities with interests; their members are. Second, we do not agree with this holist view when it comes to humans. We don't think that increasing the genetic fitness of humanity is the same as helping individual humans or that it's something we should sacrifice the welfare of individual humans for. Thinking this way is strongly rejected in modern societies, and shouldn't be done when it comes to animals either.

Views concerned with the wilderness

There are other positions in environmental ethics that focus on leaving the wilderness untouched. According to these views, it is not that there are certain entities that we should consider, such as human beings, sentient beings, or ecosystems. Rather, what is important according to these views is conserving what is natural. Natural ecosystems are considered valuable because they are the result of natural processes and not of human action.[144] There is no term that is widely used to name this view, though a term that fits is that they are "naturocentric" views.

People who support this view argue that, while suffering and death are generally bad, they are not bad when they occur for natural reasons. So, they are not bad when they happen to nonhuman animals in nature. We can object to these views by saying that there are many things that are natural that we consider negative, such as cancer and malaria, while there are other things that are unnatural and very good, such as hospitals and libraries. We can also

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and his critics, Oxford: Blackwell, pp. 247-268; Gunnthorsdottir, A. (2001) "Physical attractiveness of an animal species as a decision factor for its preservation", *Anthrozoös*, 14, pp. 204-215.

[144] Godfrey-Smith, W. (1979) "The value of wilderness," *Environmental Ethics*, 1, pp. 309-319; Katz, E. (1992) "The call of the wild: The struggle against domination and the technological fix of nature", *Environmental Ethics*, 14, pp. 265-273; Elliot, R. (1997) *Faking nature: The ethics of environmental restoration*, New York: Routledge. Some views combine this approach with an ecocentric one, see Hettinger, N. & Throop, B. (1999) "Refocusing ecocentrism: De-emphasizing stability and defending wildness", *Environmental Ethics*, 21, pp. 3-21.

argue that even if being natural gives some value to entities, other factors would have to be considered relevant too. This includes the harms to animals from their suffering and premature deaths. The negative value, or disvalue, of these harms can outweigh the value given to them as parts of natural processes.

Biocentrism

Biocentrism is the position that the morally considerable entities are all living things and only living things. Unlike the positions we have just seen, biocentrism is focused not on wholes, but on individual living things. The difference between biocentrism and positions that focus on the interests of sentient animals is that, according to biocentrism, what matters is not being sentient, but simply being alive.[145]

Focusing on all living things is very different from focusing on the wellbeing of others, since not all living things are conscious and therefore not all living things have feelings of wellbeing. Consider plants. Their bodies can be damaged or they can be killed, but they aren't capable of experiencing these things as good or bad. They aren't capable of experiencing anything at all. They respond to their environment, but they have no way of subjectively experiencing the stimuli or their responses to those stimuli.

Biocentrism doesn't oppose giving moral consideration to sentient animals. But it has some implications that are hard to accept. One is that we should consider the lives of bacteria and other non-sentient organisms and try to minimize their deaths. Most of us, however, don't think that nonsentient beings like bacteria have interests that we should take into account even though they are alive.

Biocentrism and holism are views exclusively about what kind of entities should be morally considerable. There are other views that are often identified with environmentalist philosophies that are not restricted to this and are

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[145] Taylor, P. (1986) *Respect for nature*, Princeton, Princeton University Press; Agar, N. (1997) "Biocentrism and the concept of life", *Ethics*, 108, pp. 147-168; Varner, G. E. (2002) "Biocentric individualism", in Schmidtz, D. & Willot, E. (eds.) *Environmental ethics: What really matters, what really works,* Oxford: Oxford University Press, pp. 108-120.

defined by other ideas as well. For example, the term "deep ecology" is often used for various positions that there is some value in the existence of natural entities,[146] and the term "social ecology" is used for the view that supports environmental conservation as a key factor needed for human social justice.[147] In this book, however, we do not cover them, because our purpose is about what the criteria are for moral consideration.

To summarize, it's commonly thought that the way we should express concern for animals living in the wild is through environmentalism, but we've just discussed several problems with that view. Helping individual sentient animals is different from the conservation of ecosystems, populations, or landscapes. Animals are individuals with interests, like an interest in not being in pain and an interest in having enough food to eat. If we want to help animals, it's important to understand their specific interests, which are different from simply the continued existence of the groups the animals belong to or the ecosystems they live in. If it were not for this confusion, it's likely that more people would be helping animals living in the wild.

That being said, research done for conservationist purposes can be useful to research about helping animals in the wild, and vice versa, so there is much ground for learning here. What we have seen so far concerns the debate between ethical approaches to what our ultimate aims should be.

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[146] Næss, A. (2005) *The selected works of Arne Næss. Deep ecology of wisdom*, vol. X, Dordrecht, Springer; Sessions, G. (ed.) (1995) *Deep ecology for the twenty-first century: Readings on the philosophy and practice of the new environmentalism*, Boston: Shambhala; Fox, W. (1995) *Toward a transpersonal ecology: Developing new foundations for environmentalism*, Albany: SUNY Press.

[147] Bookchin, M. (1980) *Toward an ecological society*, Montreal: Black Rose; (1990) *The philosophy of social ecology: Essays on dialectical naturalism*, Montreal: Black Rose; Clark, J. (1997) "A social ecology", *Capitalism Nature Socialism*, 8, pp. 3-33.

17

What is sentience?

We have seen that there are strong reasons to conclude that being sentient is what matters for someone being morally considerable. Sentience is the capacity to have experiences. Another word for this is "consciousness." A conscious being is a subject of experience, meaning an entity that can experience what happens to itself. Another way of describing this is to say that there is "something it is like to be" a conscious animal.[148] Animals can be subjects of experience if they have physiological structures that can give rise to consciousness.[149]

Conscious beings can experience something external in the environment, internal to the body, or a thought or memory. When a being is no longer conscious, it can no longer have experiences, so it ceases to be an individual. In

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[148] Nagel, T. (1974) "What is it like to be a bat?", *Philosophical Review*, 83, pp. 435-450.

[149] On the question of animal consciousness see Griffin, D. R. (2001) *Animal Minds: Beyond Cognition to Consciousness*, Chicago: University of Chicago Press; Allen, C. (2004) "Animal pain", *Noûs*, 38, pp. 617-643; Lurz, R. (ed.) (2009) *The philosophy of animal minds*, Cambridge: Cambridge University Press; Allen, C. & Trestman, M. (2014 [1995]) "Animal consciousness", in Zalta, E. N. (ed.) *The Stanford Encyclopedia of Philosophy*, Stanford: Stanford University, http://plato.stanford.edu/archives/sum2014/entries/consciousness-animal [accessed on 16 December 2019]; Le Neindre, P.; Bernard, E.; Boissy, A.; Boivin, X.; Calandreau, L.; Delon, N.; Deputte, B.; Desmoulin-Canselier, S.; Dunier, M.; Faivre, N. & Giurfa, M. (2017) *Animal consciousness*, EFSA Supporting Publications, 14, p.1196E, European Food Safety Authority, https://efsa.onlinelibrary.wiley.com/doi/pdf/10.2903/sp.efsa.2017.EN-1196 [accessed on 23 November 2019]; Andrews, K. & Beck, J. (eds.) (2018) *The Routledge handbook of philosophy of animal minds*, New York: Routledge; Allen-Hermanson, S. (2018) "Animal consciousness", in R. Gennaro (Ed.) *The Routledge handbook of consciousness*, New York: Routledge, pp. 388-407.

other words, it is no longer a subject of experience. If someone has an accident that irreversibly destroys the capacity for consciousness, the subject ceases to exist, even if the body is still alive.

A synonym that is sometimes used for "conscious" or "sentient" is "having mental states." As the term implies, a mental state can only be experienced by a mind. A state of mind is any kind of experience, even a very simple one such as feeling a physical pain or pleasure. This should not be confused with the complex cognitive functions associated with thinking and learning. Having certain complex intellectual abilities is not necessary in order to have a mental state; all that is required is being sentient. In other words, whether a being *experiences* the world is different from whether they can mentally solve certain problems. Note that some of the criteria we use for assessing whether a being is sentient — that is, conscious — may involve some degree of cognition. If an animal is able to perform complex cognitive tasks, that's an indirect indication that their mind is powerful enough to support sentience. But cognition is not a primary reason for thinking that a being is conscious.

Consciousness shouldn't be confused with self-consciousness either — that is, being conscious of ourselves. An animal may not be conscious of herself and could still have other kinds of experiences. People sometimes make the argument that sentience requires self-consciousness, but this is a minority position.

The capacity to feel suffering and pleasure

The experiences beings can have differ greatly. Some of them are sensations, such as tastes, sounds, or smells that we like or dislike, and feelings of pain. There are also experiences that are not related to the senses, but rather to thoughts, like when we remember or imagine something, or when we think of a problem. Others are related to emotions, such as joy, fear, distress, and satisfaction. Some experiences can be felt as pleasant or enjoyable in some way, while others can be experienced as unpleasant. Broadly speaking, positive experiences can be referred to as "pleasures," and negative experiences as "suffering." This terminology makes it simpler to talk about,

but it's important to keep in mind that it refers not only to good and bad *physical* sensations, but to *all* kinds of positive and negative experiences.

The positive or negative aspect of an experience — what makes us feel good or bad — is called a "valence." The fact that our experiences are valenced is what makes us consider them morally relevant. We can be helped or harmed, and so can others. It also makes the question of which beings are sentient an important and urgent one.[150]

When we say that suffering is bad by definition, we mean that it is *experienced* as bad. Of course, one can have a negative experience, such as a pain, that might be good in an instrumental way. The pain of a burn from a stove is useful because it causes us to be careful not to get burned again. Although the pain itself is negative, the outcome is positive. In fact, it is the negative experience of pain that makes it instrumentally good, because that is what motivates us to get out of a situation that is bad for us, or to avoid repeating it. It's similar when something we enjoy harms us, such as when we eat too much rich food. In this case, something that in itself is enjoyable is instrumentally negative.

The problem of consciousness

Now, we'll turn to the problem of consciousness. This problem can be formulated as follows: how is it that, from a purely material basis (a brain or a centralized nervous system), consciousness emerges? Answering this this question requires knowing what structures must be present in an organism and how they would need to function for consciousness to be possible.[151]

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[150] Strictly speaking, it might be possible for an animal to be conscious but to not have any valenced experiences—that is, no pains or pleasures. However, because valenced experiences are such an important part of the function of consciousness, this doesn't seem very likely. For convenience, we'll assume that if a being is conscious, then that being is able to feel suffering and pleasure.

[151] Allen, C. & Bekoff, M. (1997) *Species of mind*, Cambridge: MIT Press; Tye, M. (2017) *Tense bees and shell-shocked crabs: Are animals conscious?*, New York: Oxford University Press.

There is no reason to suppose that only a human-like central nervous system will give rise to consciousness, and there's a great deal of evidence that very different types of animals are conscious. An example is bird brains, which have many structural similarities to mammals' brains, but different arrangements of neurons. Yet the brain circuits of birds seem to be wired in *a different way* that creates *a similar effect* in terms of consciousness.

Due to the difficulty of solving the problem of consciousness, it is unlikely to be solved in the near future. Given the current information, it is impossible to know with certainty which beings with centralized nervous systems are conscious. We know that without a centralized nervous system, animals cannot be conscious, but we don't know what degree of complexity is necessary.

We know that sentience doesn't require a brain configuration like ours, like that of mammals, or even like that of vertebrates. Even though invertebrates do not have all the same brain regions that we have, they often have functionally similar regions, which should also be able to support consciousness.[152] There is nothing about the particular way our nervous systems are organized that is necessary for consciousness to be present. Rather, there may be vastly different types of nervous systems with centralization. There is strong evidence that some animals, such as octopuses and honeybees, are conscious despite having very different kinds of brains.

Another reason to think that having a brain like ours is not necessary for consciousness is that humans have not only complex thoughts, but also simple experiences like feeling pain. The ability to have complex thoughts is not a necessary part of consciousness, which suggests that the type of nervous system necessary for consciousness could be much simpler than ours. So sentient animals may be very numerous.

Criteria for evaluating the presence of sentience

Another problem is that the only consciousness we are directly aware of is our own — we are not directly aware of the experiences others have. But we can

[152] Elwood, R. W. (2011) "Pain and suffering in invertebrates?", *ILAR Journal*, 52, pp. 175-184.

infer that they are conscious in light of all the evidence we have. This inference happens with humans, and with nonhuman animals as well, because they share many relevant features that indicate the presence of consciousness. If the most straightforward interpretation of someone's behavior and neurobiology is that they are conscious, we should think that they are conscious. For example, we associate certain behaviors with pain, such as crying and grimacing. Many nonhuman animals exhibit similar indications of pain. Additionally, when an animal's behaviors are very complex, it can indicate conscious thinking.

The key issue here, however, is physiology — that is, whether the animals' bodies are wired in ways that make the presence of consciousness possible. As mentioned above, we do not understand the underlying neural basis of consciousness. We can't directly test for consciousness yet. Instead, we have to use whatever indirect evidence is available to make an educated guess. The key factor seems to be the presence of a nervous system that can process information in a way that makes experiences possible.

Which beings are conscious?

We will now apply the criteria we have to different groups of animals in order to gain a better understanding of which of them could be conscious. The clearer cases are those of animals who have a centralized nervous system with a central organ (basically a brain) that is quite complex. The centralization allows these nervous systems to process information in complex ways. As a result, it's no surprise that animals with such nervous systems can have a wide range of behaviors. This group of animals includes vertebrates and invertebrates (such as mollusks like octopuses and arthropods like bees). As we'll see, all available sources of evidence point towards these animals being conscious.[153]

Many animals have centralized nervous systems with a brain that is not large and complex. This includes arthropods, among which there are insects,

[153] Kaas, J. H. (ed.) (2007) *Evolution of nervous systems: A comprehensive reference*, Amsterdam: Academic Press.

arachnids (like spiders), and crustaceans (like lobsters and crabs).[154] There is important evidence to conclude they are conscious as well. Not only does the organization of their nervous systems seem to be sufficient for giving rise to consciousness, but their behavior also seems to support this. In their everyday lives, they behave in varied and changeable ways to do things such as getting food or avoiding harms. This suggests the kind of flexible behaviors that can only occur in conscious beings.

There are other animals who have minimally centralized nervous systems without a brain. They include, for example, gastropods like snails, bivalves such as mussels, and other animals with a small number of neurons like certain nematodes. In these cases, there can be doubts about whether they are sentient or not. Given the problems involved in determining the basis of consciousness, we cannot rule out the possibility that they are sentient. We'll discuss invertebrate sentience in more detail in the next chapter.

Some people have a hard time understanding that certain kinds of animals could be sentient, especially when they look much different from us or are much smaller than we are. But we should keep in mind that thinking less of someone based on mere looks is a bias that we should try to avoid. If these animals meet the criteria that indicate they could feel pain or pleasure, we should conclude that they probably are sentient. It does not matter what they look like.

We know that sentient animals, human and nonhuman, have experiences that are positive or negative. Since the problem of consciousness will likely remain unsolved for many decades or longer, we should act on the assumption that any animal with a centralized nervous system could be sentient. We should consider the likelihood that they *are* sentient, and that we can affect them through our actions, so we should give them moral consideration.

Finally, there are living organisms that do not behave the way animals with centralized nervous systems do, and that lack the physiology to carry out the functions that nervous systems perform. Examples are plants, fungi, and protists, as well as some animals such as sponges that don't have nervous systems. These beings don't meet the criteria for the possibility of sentience. However, although when we look at animals, we consider particular structures

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[154] *Ibid*.

that can give rise to consciousness, that does not mean that *animal-like nervous systems* are necessary for sentience. Future beings such as artificial intelligences could have central processing systems that are also able to carry out the functions that give rise to consciousness.

18

Invertebrate sentience

We saw in the last section that being sentient means having felt experiences of the world — that is, there is something it is like to be a sentient animal. *Experience* is the important thing here. "Having experiences" has the same meaning as "being sentient." We have also seen that, because we don't know exactly what structures are necessary to give rise to consciousness, we can't know for sure exactly which beings are sentient. However, there are some indicators for the presence of sentience that we can look for. Note that indicators of sentience are not proofs of sentience, and lack of them are not proof that sentience is not present. Indicators are simply different types of evidence that increase our confidence that sentience is present. An example is complex and diverse behaviors that seem to show learning and thinking. A weaker indicator would be the presence of complex features like eyes, which may suggest the capacity to have the experience of sight.

The question of sentience is more difficult when it comes to animals that are more numerous — that is, invertebrates. Invertebrates are animals that don't have backbones and they are typically small. Invertebrates include arthropods (such as crustaceans and insects), mollusks (including cephalopods, snails, and bivalves), nematode worms, and many other types of animals. This is an especially important problem, not only because there's a growing number of invertebrates being used for different human purposes, but also because their numbers in the wild are staggering.[155] Getting a better

[155] Knutsson, S. (2015) *The moral importance of small animals*, master's thesis, Gothenburg: University of Gothenburg.

idea of which of them might be sentient will help us to improve our estimates of how to best make a difference for them.[156]

To examine this question, we will now look at how different criteria for sentience are satisfied by different types of invertebrate animals.

Cephalopods

Cephalopods are a unique class of mollusks with very complex nervous systems. Octopuses have up to 500 million neurons. Electroencephalography recordings of octopuses and cuttlefish showed that electrical activity varied with brain states in similar ways to mammals; this is considered an indicator of consciousness.[157] They also display very complex behaviors. The evidence is therefore quite powerful that they are sentient. They were explicitly mentioned as an example of conscious beings in the Cambridge Declaration of Consciousness in 2012 by a prominent group of scientists.[158] Due to this, we do not need to discuss the case of these animals in detail, and can instead consider other cases where sentience is less clear. An example is arthropods.

Arthropods

Arthropods are invertebrates with hard external skeletons, and many limbs that have multiple joints. Examples include insects (such as bees and flies),

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[156] Carere, C. & Mather, J. (eds.) (2019) *The welfare of invertebrate animals*, Dordrecht: Springer. See also Mather, J. A. (2001) "Animal suffering: An invertebrate perspective", *Journal of Applied Animal Welfare Science*, 4, pp. 151-156; Horvath, K.; Angeletti, D.; Nascetti, G. & Carere, C. (2013) "Invertebrate welfare: An overlooked issue", *Annali dell´Istituto superiore di sanità*, 49, pp. 9-17.

[157] Hochner, B.; Shomrat, T. & Fiorito, G. (2006) "The octopus: A model for a comparative analysis of the evolution of learning and memory mechanisms", *The Biological Bulletin*, 210, pp. 308-317. See also Godfrey-Smith, P. (2016) *Other minds: The octopus, the sea, and the deep origins of consciousness*, New York: Farrar, Straus and Giroux.

[158] Low, P.; Panksepp, J.; Reiss, D.; Edelman, D.; Van Swinderen, B. & Koch, C. (2012) *The Cambridge Declaration on Consciousness*, http://fcmconference.org/img/CambridgeDeclarationOnConsciousness.pdf [accessed on 14 August 2019].

crustaceans (such as crabs and lobsters), and spiders. Arthropods generally live in complex, demanding worlds, where it seems like consciousness would have adaptive value. A key function of consciousness might be to create a picture of the world where potential options can be traded off against each other and actions can be selected.

The scientific evidence on whether insects and other arthropods meet the criteria for consciousness isn't complete. However, the evidence that does exist tends to show that they do satisfy these criteria.[159] Many people think insects aren't conscious, maybe because they are so small and people know little about them. But, in fact, some insects are capable of some pretty complex behaviors and traits, many of which most people are unaware of. We'll see some examples of behaviors that, if we saw them in larger animals, most of us would think provided good evidence of consciousness.

There is more evidence that fruit flies are conscious than there is for many other invertebrates. Fruit flies have smaller brains than honeybees, and their minds may be closer to that of the average insect, so evidence of sentience in them would make the case stronger for other insects. There is evidence that fruit flies respond in a non-reflexive way that is reminiscent of anxiety. When there is a shadow overhead (a possible predator), they will often stop eating and fly away, but when they are very hungry, they sometimes decide to stay and eat.[160] This suggests that they take various positive and negative factors into consideration and come to an overall decision, which seems like a key function that consciousness plays. It also suggests fear in them.

For insects with simpler behaviors and nervous systems, we might not know if their behavior and physiology is sufficient for sentience. But we can consider an argument by analogy: other insects have quite complex behaviors.

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[159] Gherardi, F. (2009) "Behavioural indicators of pain in crustacean decapods", *Annali dell'Istituto Superiore di Sanità*, 45, pp. 432-438; Barron, A. B. & Klein, C. (2016) "What insects can tell us about the origins of consciousness", *Proceedings of the National Academy of Sciences*, 113, pp. 4900-4908.

[160] Gibson, W. T.; Gonzalez, C. R.; Fernandez, C.; Ramasamy, L.; Tabachnik, T.; Du, R. R.; Felsen P. D.; Maire, M. R.; Perona, P. & Anderson, D. J. (2015) "Behavioral responses to a repetitive visual threat stimulus express a persistent state of defensive arousal in Drosophila", *Current Biology*, 25, pp. 1401-1415.

A clear example of this is bees. Their behavior, including their famous waggle dance, which is used to communicate with other bees, leads us to think that they are conscious. Because of the similarity of their nervous systems, if bees are conscious, then it could follow that other insects are conscious, too. There is also evidence of various types of complex behavior in ants, including some level of flexible tool use.[161]

Less is known about arachnids than insects. However, the evidence that does exist indicates that their nervous systems are of similar size, complexity, and centralization to those of insects. Therefore, it might make sense to infer that if insects are sentient, then arachnids are sentient too.

In the case of crustaceans, the available evidence suggests that they are conscious. Some of these animals show a deliberate and non-reflexive response to noxious stimuli, which is suggestive of consciousness.[162] For example, crabs show evidence of nursing, rubbing, and guarding wounds. This appears to be a long term, non-reflexive response to injury that is plausibly a key reason why suffering evolved. Another example is hermit crabs. Hermit crabs must find new shells to live in as they grow. When they choose a shell that injures them, they don't automatically give up that shell, but they will change shells as soon as they have another option.[163] In crayfish, there is evidence for a behavioral state that looks like anxiety as it is expressed in conscious animals.

One common argument against arthropods being sentient is that their brains might be too small to be able to support sentience, which seems like a

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[161] Maák, I.; Lőrinczi, G.; Le Quinquis, P.; Módra, G.; Bovet, D.; Call, J. & d'Ettorre, P. (2017) "Tool selection during foraging in two species of funnel ants", *Animal Behaviour*, 123, pp. 207-216.

[162] McCambridge, C.; Dick, J. T. & Elwood, R. W. (2016) "Effects of autotomy compared to manual declawing on contests between males for females in the edible crab cancer pagurus: implications for fishery practice and animal welfare", *Journal of Shellfish Research*, 35, pp. 1037-1044.

[163] Elwood, R. W. & Appel, M. (2009) "Pain experience in hermit crabs?", *Animal Behaviour*, *77*, pp. 1243-1246.

complex thing.[164] However, we don't have a good understanding of how complex the physiological basis of consciousness is. The basic experiences of pain and pleasure might be quite simple, as they don't require complex thoughts. Also, insects can perform some complex behaviors with such small brains, so it's not clear why they couldn't also be conscious.

Some people believe that arthropods — insects, for example — have very inflexible behavior. They believe that insects only have preset and rigid responses to stimuli. If this were true, arthropods would probably have little need for consciousness. However, while their behavior is less flexible than vertebrate behavior, it is still flexible.[165] An example of this is bees' waggle dance that was mentioned above. Bees communicate to other bees in their colony about the location of food by moving in ways that vary depending on different factors. They agitate their bodies according to how much food they found, they move in a certain direction to signal the direction of the food, and they move for a certain length of time to indicate how far away the food is.[166] On the other hand, as of yet, little evidence of some behaviors of sentience such as wound guarding or limping has been observed in insects. There also isn't much evidence that insects will selectively prioritize noxious stimuli (for example, by stopping all other activities to respond to a threat). But this is more a lack of available evidence, rather than positive evidence that insects do not do these things. Also, recall that these things are indicators of sentience, not requirements for it. When we say "indicators of consciousness," we don't mean things that are necessary for consciousness. They just indicate a certain likelihood of sentience, and some indicators are stronger evidence than others.

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[164] Adamo, S. A. (2016) "Do insects feel pain? A question at the intersection of animal behaviour, philosophy and robotics", *Animal Behaviour*, 118, pp. 75-79.

[165] See regarding this Keijzer, F. (2013) "The Sphex story: How the cognitive sciences kept repeating an old and questionable anecdote", *Philosophical Psychology*, 26, pp. 502-519.

[166] Griffin, D. R. & Speck, G. B. (2004) "New evidence of animal consciousness", *Animal cognition*, *7*, pp. 5-18.

Animals with centralized nervous systems with ganglia

The problem becomes more complex if we consider other animals with a simpler structure — without a brain, but only some central nervous ganglia. This is the structure of many invertebrates, for example, bivalve mollusks (such as mussels and oysters) and gastropods (such as snails). The behavior that many of these animals display is very simple. It could be performed without requiring that the animals that display it be conscious. This may be the case with animals that stay attached to rocks or other surfaces without moving, such as bivalves or animals such as barnacles.

Bivalves can perform some movements, such as opening and closing their shells. But that doesn't necessarily indicate sentience — these movements could be triggered in a more economical way in terms of energy by a stimulus-response mechanism. In fact, their behavior is not more complex than that of other beings without a centralized nervous system, such as carnivorous plants. However, many bivalves are mobile when they are young, and some, such as European fingernail clams, are more active, climbing on weeds to find a feeding spot. Some can swim and have image-forming eyes. An animal that has eyes might also have the experience of sight. And being able to *experience* something is what it means to be sentient. Some fingernail clams react with increased heart rates when under attack. Behind these movements, there may be more than simply stimulus-response, though their physiology leaves the question open. But we should keep in mind that these animals are *much* more closely related to sentient animals than, for example, plants are.

Snails have a slightly larger number of neurons and they are more active than bivalves. There is also more available evidence about whether snails are conscious, but this is mostly because bivalves have been less studied, and not because we have conclusive evidence that bivalves are not conscious. The differences between their nervous systems are small.

Overall, it seems clear that the evidence for arthropod consciousness is stronger, but snail and bivalve consciousness are possibilities that should not be dismissed.

Animals with centralized nervous systems with small numbers of neurons

Nematode worms are a possible edge case of consciousness. It is unclear whether they could be conscious. They have a small number of neurons — only around 300–400. Yet, they have what is known as a circumoral brain, which is a nerve ring, though it is not known whether this is enough for sentience. In addition, there are some indications that they are conscious, including evidence that they go into a fear-like state when they smell the odor of a predator.[167]

It is sometimes claimed that invertebrates could not experience conscious pain because they do not have nociception, which is the ability to detect damaging stimuli. Yet, specialized nociceptors have been found in a number of invertebrates. Though nociception alone does not determine whether an animal can feel pain, it plays a key role in the experience of pain in many animals. There are also invertebrates where nociceptors have not been found, but they still show the ability to detect noxious stimuli by other mechanisms. If they can detect it, it could potentially be translated into an experience of pain.[168]

There are strong reasons to give animals of uncertain sentience the benefit of the doubt. If we treat them as though they are sentient when they are not, we might waste some resources, but nothing too great. On the other hand, if they are sentient but we treat them as though they are not, then we might cause or permit great harm.[169]

All this is relevant because human beings often harm not only large animals, but especially small ones, such as many invertebrates, in very high

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[167] Liu, Z.; Kariya, M. J.; Chute, C. D.; Pribadi, A. K.; Leinwand, S. G.; Tong, A.; Curran, K. P.; Bose, N.; Schroeder, F. C.; Srinivasan, J. & Chalasani, S. H. (2018) "Predator-secreted sulfolipids induce defensive responses in *C. elegans*", *Nature Communications*, 9, a. 1128.

[168] Eisemann, C. H.; Jorgensen, W. K.; Merritt, D. J.; Rice, M. J.; Cribb, B. W.; Webb, P. D. & Zalucki, M. P. (1984) "Do insects feel pain?—A biological view", *Experientia*, 40, pp. 164-167.

[169] Birch, J. (2017) "Animal sentience and the precautionary principle", *Animal Sentience: An Interdisciplinary Journal on Animal Feeling*, 2/16, a. 1.

numbers. When it comes to caring about wild animals, it is not only large, emblematic animals that we should be concerned about, but also small animals like invertebrates, which make up the majority of animals, and tend to have shorter and more precarious lives.

Part three

Academic work to help wild animals

19

The concepts of welfare, animal welfare, and wild animal welfare

In the first part of this book, we saw the problem of wild animal suffering, the different ways wild animals are harmed, and some ways in which it can be addressed. In the second part, we saw the reason why wild animal suffering matters, as well as the reasons we have to conclude that many animals, including a very large number of invertebrates, are sentient and thus can be harmed by the different factors affecting wild animals. In the third part of the book, we are going to see how further work on this topic can be carried out in the scientific arena. We will examine the key concepts involved, see why and how such work can develop, and take a look at perspectives for future work in this field.

We have seen that "wild animal suffering" is a general term for the harms that animals living outside of direct human control suffer due to causes that are partly or entirely natural. To refer to the wellbeing of animals living in the wild, we can use the term "wild animal welfare." There are, however, several different ways the term wild animal welfare is used. We will say more about this and related terms, below.

Concepts of welfare

More often than not, the terms *wellbeing* and *welfare* are used to describe how someone feels, i.e., well or bad. We should note that these terms are optimistically biased. The term "well" has a positive meaning. The "well" in "wellbeing" (and in "welfare") might make us think that the default situation is

positive, that is, that individuals tend to have positive wellbeing, when in fact, wellbeing can be positive or negative.

The most common way this concept is understood is that you have good welfare when you have mainly positive experiences, that is, when your life is predominantly enjoyable. And you have negative welfare when you're feeling bad. In other words, wellbeing can be positive or negative, depending on the circumstances. After all, sentient beings do not always feel good. This is especially the case for nonhuman animals, both those who are used by humans (mostly in factory farms) and those who live in the wild.

Natural sciences, especially veterinary science, primarily use the term "welfare." When pleasure, satisfaction, or other positive experiences prevail, it is commonly called "good welfare." When pain, distress, or other negative experiences prevail, it is commonly called "poor welfare." In philosophy, and sometimes in social sciences, the terms "positive wellbeing" and "negative wellbeing" are more common.[170] The term "wellbeing" is used by philosophers to refer to how well or how badly your life is going. There are several views about what wellbeing is. According to mental states theories, it is only experiences that affect your wellbeing. Some of these theories claim only that having negative experiences such as feeling pain is bad for you; others add to this that having positive experiences, such as feeling pleasure, is good for you. According to the objective list theory, positive and negative wellbeing includes other things, such as meaningful relationships or achievements on the one hand, and failure on the other hand. Desire theory claims that it is good for you to have your desires satisfied, and bad for you to have them thwarted, regardless of whether you have positive or negative experiences as a result. Some of these views, called antifrustrationist, claim that while having your

[170] Broom, D.M. (1991) "Animal welfare: Concepts and measurement", *Journal of Animal Science*, 69, pp. 4167-4175; Crisp. R. (2017 [2001]) "Well-being", in Zalta, E. N. (ed.) *The Stanford Encyclopedia of Philosophy*, Stanford: Stanford University, https://plato.stanford.edu/entries/well-being [accessed on 15 October 2019]; Nordenfelt, L. (2006) *Animal and human health and welfare: A comparative philosophical analysis*, Wallingford: CABI.

desires satisfied need not be good, not being able to achieve them is always bad.[171]

The term "welfare" is used in three main ways in the natural sciences when discussing animal welfare.[172]

(1) The way someone feels

(2) The way someone feels, plus other factors affecting how someone feels, such as one's health

(3) The capacity to behave in a way that is considered natural

The second two concepts are more complex than the original and intuitive meaning of the term. We could say they divert the issue from the key problem at stake, which is how good or bad one feels.

The second conception of welfare can be challenged by arguing that external factors that are different from actual experiences are not important in themselves. They can, however, be relevant indirectly, as indicators of how good or bad those experiences are.

The third conception of welfare can be challenged on similar grounds. At this point, we know that what is natural is sometimes good, but is often not. In many cases, animals behaving "naturally" are feeling good, but in other cases, they are not. An animal in a relaxed situation, in which she has food, shelter, and good health, will behave very differently than if she had to face the challenges animals typically face in the wild.

If these criticisms are correct, we might wonder why these alternative conceptions are held. One of the factors explaining this is that the science that

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[171] Parfit, D. (1984) *Reasons and persons*, Oxford: Oxford University Press; Crisp, R. (2006) *Reasons and the good*, Oxford: Oxford University Press; Fletcher, G. (2016a) *The Philosophy of well-being: An introduction*, Oxford: Routledge; (ed.) (2016b) *The Routledge handbook of the philosophy of well-being*, Oxford: Routledge.

[172] Hewson, C. J. (2003) "What is animal welfare? Common definitions and their practical consequences", *Canadian Veterinary Journal*, 44, pp. 496-499; Duncan, I. J. (2006) "The changing concept of animal sentience", *Applied Animal Behaviour Science*, 100, pp. 11-19; Nordenfelt, L. (2006) *Animal and human health and welfare: A comparative philosophical analysis*, Wallingford: CABI; Fraser, D. (2008) *Understanding animal welfare*: *The science in its cultural context*, New York: John Wiley and Sons.

studies animal welfare is a cross-disciplinary field that uses various methods. These include the assessment of different physiological and behavioral indicators of animal welfare as well as external conditions. These *indicators* should not be confused with wellbeing itself. A big challenge we face is that the aspiration to present animal welfare science as providing objective results reinforces this, since we can obtain objective data of factors such as an animal's health or behavior, but less so of the animal's experiences.

Meanings of "animal welfare" and "wild animal welfare"

Having seen the classifications above, we can now consider the different ways the term "animal welfare" has been used.[173]

(1) The main and more straightforward meaning is the one we saw above: how good or bad an animal is feeling.

(2) It is also used as the name of a science (or group of sciences). The science of animal welfare is the scientific study of how good or bad animals are feeling, that is, how good or bad their lives are in terms of their wellbeing. It uses different methods that consider behavioral and physiological indicators to assess how animals are feeling.

(3) Another use is to refer to legal measures or regulations whose purpose is to limit the extent to which animals suffer some harms.

(4) Finally, it is sometimes used for the view that the harms animals suffer because of their use in animal products or services should be reduced, though not necessarily eliminated.

The term "animal welfare" as used in "wild animal welfare" concerns the first and second uses of the term.[174] It doesn't necessarily concern the third one, as

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[173] Haynes, R. P. (2008) *Animal welfare: Competing conceptions and their ethical implications*, Dordrecht: Springer.

[174] Kirkwood, J. K. (1992) "Wild animal welfare", in International Whaling Commission (ed.) *Report of the whale welfare and ethics workshop*, Cornwell: Eden Project, pp. 66-68; Sainsbury, A. W.; Bennett, P. M. & Kirkwood, J. K. (1995) "Welfare of free-living wild animals in Europe: Harm caused by human activities", *Animal Welfare*, 4, pp. 183-206;

there are currently very few laws about how the welfare of wild animals can be affected by human actions. Almost all of the laws affecting animals in the wild are based on environmental or conservation law that considers animal populations or species, but not individuals. So, "wild animal welfare" can be understood to mean:

> First, the situation of undomesticated animals (including feral ones) with regard to how good or bad their wellbeing is.
>
> Second, the scientific study of how good or bad such wellbeing is. There has been very little research about this in comparison to research on the wellbeing of domesticated animals.

"Wild animal welfare" and "wild animal suffering"

There are three main differences between the meanings of "wild animal welfare" and "wild animal suffering." The term "wild animal suffering" has been used to name partially or completely natural harms suffered by animals living outside of direct human control. In some cases, "wild animal welfare" is used as a synonym of "wild animal suffering." This can make sense depending on the context, though we should bear in mind the possible confusions derived from the different meanings of "wild animal welfare."

The first difference is that the term "wild animal welfare" appears to consider the wellbeing of animals in the wild in general, while "wild animal suffering" refers in particular to their negative wellbeing, that is, to the bad part of it. However, factors positively affecting the wellbeing of individuals typically also reduce their suffering. Also, it could be argued that the most crucial component of the wellbeing of animals in the wild (and of others as well) is their suffering.

Another difference between the terms is that, unlike "wild animal suffering," the term "wild animal welfare" is also commonly used for the

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JWD Wildlife Welfare Supplement Editorial Board (2016) "Advances in animal welfare for free-living animals", *Journal of Wildlife Diseases*, 52, supp. 2, pp. S4-S13; Soryl, A. A. (2019) *Establishing the moral significance of wild animal welfare and considering practical methods of intervention*, Master's thesis, Amsterdam: University of Amsterdam.

welfare of wild animals directly affected by human beings (and the study of this). This includes both animals in captivity and animals in the wild being directly harmed by humans (for instance, by eradication methods or by fishing). Not only this, but because of a tendency to disregard the wellbeing of animals living outside of human control, the term "wild animal welfare" is most often used to refer to captive animals of species that have not been domesticated, such as wild animals in circuses or zoos. There is no reason to limit the meaning of the term this way. It could also refer to animals living outside of human control. The term "wild animal suffering," on the other hand, does not refer to wild animals in captivity, but only to those living outside of human control.

The third difference is that the term "wild animal welfare" is also used for the science that studies the welfare of the animals mentioned above. Again, this typically includes animals in captivity, and it's sometimes assumed to include *only* them. But here again, it is perfectly valid for the term to include the scientific study of the wellbeing of animals in the wild as well, and to use the same indicators of wellbeing that are used for animals in captivity. In fact, the term "captive wild animal welfare science" could be a more appropriate name for the study of animals in captivity.

In some cases, "wild animal welfare" is used as a synonym of "wild animal suffering." This can make sense depending on the context, though we should bear in mind the possible confusions derived from the different meanings of "wild animal welfare."

Wild animal welfare science can help us to assess the wellbeing of animals living in the wild. But in order to understand *why* the conditions of an animal's life are the way they are in a particular environment, we need ecology and other scientific fields. An understanding of how ecosystems work will help us to understand what kinds of conditions could result from different ecosystem changes, whether natural or human-caused. This is one of the things we'll look at next.

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What is welfare biology?

The term "welfare biology" has been used to name the study of the factors affecting the wellbeing of animals, especially those living outside of human control. Research in this area is still very recent and limited.[175] More technically, it can be defined as follows:

> *Welfare biology*: the study of sentient living beings with respect to their positive and negative wellbeing

In principle, welfare biology concerns the wellbeing of all animals, whether they live in captivity or outside of human control. However, the main task of welfare biology would be to assess what the lives of animals in the wild are like and to find ways of reducing the harms they suffer. This is because, given the complexity of ecosystems, it's much more difficult to discover the best courses of action to help animals in the wild. For this reason, it's an area where studies in biology and, more specifically in ecology, are crucial. We don't need to know how ecosystems work in order to know that a dog is suffering in a cage and will be better off if we free her, but we do need to understand how they work to know if a certain change in an ecosystem will likely result in less overall suffering for the animals there. So we can say that welfare biology would primarily, though not necessarily only, study wild animal suffering, and that one of its main goals would be to inform policies to prevent the harms the animals suffer.

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[175] See Ng, Y.-K. (1995) "Towards welfare biology: Evolutionary economics of animal consciousness and suffering", *Biology and Philosophy*, 10, pp. 255-285; Faria, C. & Horta, O. (2019) "Welfare biology", in Fischer, B. (ed.) *Routledge handbook of animal ethics*, New York: Routledge, 455-466.

The term "welfare biology" has sometimes been used in a different sense, meaning using the science of ecology to improve human wellbeing. However, a better term for that field would be "human welfare biology."[176] Literally, the term "welfare biology" means research in biology about welfare, so there is nothing in the term to limit the relevant welfare to humans alone. Also, because the point of welfare biology is to study the *welfare* of sentient living beings, it is not primarily concerned with other questions that are not directly related. Accordingly, it doesn't consider animals as mere representatives of their species or population group, or as units of an ecosystem. Rather, it would focus on animals as sentient individuals, and on what could be good or bad for them as individuals.

The wild animal welfare science approach

We now know that the term "wild animal welfare science" can be used for the study of the wellbeing of undomesticated animals. This can be seen as part of the work of animal welfare science. However, work in this field has mostly focused on animals in captivity, seldom considering animals living outside of human control. Despite this, much of the work that has been done in this field can be applied to animals in the wild. To start with, existing knowledge about what kinds of things can positively or negatively affect animals in captivity can be extrapolated to other animals in similar situations. This is pretty clear when the animals are of the same species or closely related ones. Even when this is not the case, some of the findings can help us to make informed guesses when it comes to other animals.

Now, let's consider ways of assessing the wellbeing of animals who live outside of human control. As mentioned before, animal welfare science integrates methods from very different approaches. This is because it considers several different criteria or indicators related to animals' wellbeing.

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[176] Eckersley, R. (1992) *Environmentalism and political theory: Toward an ecocentric approach*, New York: SUNY Press; Wells, D. (1993) "Green politics and environmental ethics: A defence of human welfare ecology," *Australian Journal of Political Science*, 28, pp. 515-527; Ghosh, D. (1999) *Selected essays on welfare ecology*, Calcutta: Centre for Sustainable Living.

The most important ones include physiological and behavioral assessments of how animals may be feeling.

Physiological assessments consider factors related to the state of the animals' bodies. They include parameters concerning the health of the animals and indicators showing the animals' physiological states when they are in certain situations. They include, for example, heart rate variations, temperature, and corticosteroid levels. The idea here is twofold. First, when an animal's health is bad, the animal could be in pain. Second, when animals are distressed or in pain, it also affects their physiology.

Behavioral assessments consider what animals' behavior can tell us about the way they feel. We're all familiar with making such assessments of the individuals who surround us; animal welfare science does this in more rigorous ways, using knowledge of how animals of different species behave when they are feeling well or ill.

Another consideration is how external factors affect the animals. These include the availability of the resources animals need to live, such as food and water, shelter to mitigate the impact of weather conditions, and others related to their particular environments. By examining the conditions animals live in, it is possible to make estimations of how they feel. One way is by studying animals' preferences for certain situations or places over others. This combines an assessment of external factors with an assessment of the animals' behavior. It serves as an indicator of what kind of environments are more likely to make them suffer or feel well.[177]

[177] Kirkwood, J. K.; Sainsbury, A. W. & Bennett, P. M. (1994) "The welfare of free-living wild animals: Methods of assessment", *Animal Welfare*, 3, pp. 257-273; Jordan, B. (2005) "Science-based assessment of animal welfare: Wild and captive animals", *Revue Scientifique et Technique-Office International des Epizooties*, 24, pp. 515-528; Botreau, R.; Veissier, I.; Butterworth, A.; Bracke, M. B. & Keeling, L. J (2007) "Definition of criteria for overall assessment of animal welfare", *Animal Welfare*, 16, pp. 225-228; Brennan, O. (2018) "'Fit and happy': How do we measure wild-animal suffering?", *Wild Animal Suffering Research*, https://was-research.org/paper/fit-happy-measure-wild-animal-suffering [accessed on 30 October 2019].

The ecology of wild animal suffering

We've talked about the need to expand wild animal welfare work so it covers animals living outside of human control. However, this is only a part of the work that could be incorporated within the field of welfare biology. The methods of animal welfare science are focused primarily on the state the animals are in and on how the circumstances they face affect their wellbeing. But it doesn't explain how such circumstances end up the way they are. In order to know this, we need to understand how animals living in the wild are affected by their physical environment and by other living organisms in ways that are good or bad for them. Also, the study of other factors, including their population dynamics and life histories, can help us in making estimations of the average wellbeing of different animal populations or species. This is where ecology is crucially needed.

The study of ecosystems and how they evolve has been approached from many different perspectives by ecologists, giving rise to different fields within ecology, such as population ecology, community ecology, systems ecology, landscape ecology, and many more. The factors that are relevant for each of them are diverse, and together they cover a large portion of the possible ways we could approach the study of ecosystems. However, the wellbeing of animals has not been one of those factors. We still lack an understanding of how ecosystems work in relation to the wellbeing of their members. Welfare biology would fill this gap.

As with animal welfare science, we already have a substantial amount of knowledge from ecology that could be applied to estimate the suffering of animals in different situations. To start with, as indicated above, there are some fields, such as population dynamics and life history theory, that are highly relevant to making estimations about what the proportion of suffering compared to positive welfare in the wild might be. In addition, we've seen that there is a great deal of information concerning different ways these animals can suffer. This information was just a short summary of a few things from a huge amount of scientific literature in biology that can inform us about the lives of animals in the wild. In light of this, we might wonder in what sense the kind of work proposed here would be original. The answer is simple: so far, all the available information that is relevant for wild animal suffering has been

gathered not out of an interest in the animals' wellbeing, but out of other concerns. As a result, while such research already contains information from which it is possible to draw sound inferences about the suffering of animals, such inferences were not previously made. For example, there are scientific articles examining how many animals in a certain population starve to death or die due to the cold in a particular location, but they do not consider the suffering this meant for the animals involved. Nevertheless, given what we know about the suffering caused by dying in those ways, we can infer that the animals involved probably suffered a great deal.

Unfortunately, in many studies, much more information could have been gathered that would have been relevant for estimating the wellbeing of the animals, if there had been an interest in this question. But this viewpoint has been increasingly incorporated in research. In fact, even just literature reviews of the research already done can provide important information.

A cross-disciplinary field

In light of what we have just been considering, we can see that welfare biology can be described as a cross-disciplinary field involving various other disciplines, including especially the sciences of ecology and animal welfare. In fact, these two sciences are already cross-disciplinary. Some other fields would also be involved, such as zoology and ethology, as well as two applied fields, environmental management and what is called "wildlife management." The purpose of these two fields is to guide decisions about how to best act in different ecosystems. To date, the ends of such actions have been to further human interests or conservationist aims. But there is nothing essential to the kind of knowledge associated with these disciplines that restricts its application to the pursuit of these aims alone. Instead, we can apply such knowledge to find the most effective ways to help animals living in the wild. It can also help us to compare different ways ecosystems might evolve with or without our help and how different scenarios would affect the wellbeing of animals. In addition, just like conservation biology, welfare biology could be informed by social sciences.

How could welfare biology evolve?

The current academic system tends to classify knowledge into specialized domains. However, for decades there has been increasing enthusiasm for interdisciplinary research.[178] The point at which a certain field is no longer considered to be just an intersection of other disciplines and is considered a discipline on its own is not clearly defined, although there are some factors that can indicate when it reaches that point. They include the organization of international conferences, the creation of specific academic journals to publish studies on them, the inclusion with their own names as areas of study in academic curricula, and the publication of student handbooks focused on them. After this happens, the cycle continues, and subdisciplines of new fields can start, as well as the creation of new areas of study at the intersection with other fields.

As welfare biology develops, subfields could include, for example, welfare ecology, focused on the part of welfare biology more concerned with how animals' relationships with their environments affect their wellbeing; urban welfare ecology, focused on animals living outside of human control in urban or suburban ecosystems; and applied welfare biology, focused not so much on diagnoses of the wellbeing of animals but on ways to improve it that can guide actual policies and interventions. Wild animal welfare science could be another of these subfields.

[178] Lélé, S. & Norgaard, R. B. (2005) "Practicing interdisciplinarity", *BioScience*, 55, pp. 967-975; Campbell, L. M. (2005) "Overcoming obstacles to interdisciplinary research", *Conservation Biology*, 19, pp. 575-577; Frodeman, R. (ed.) (2017 [2010]) *The Oxford handbook of interdisciplinarity*, Oxford: Oxford University Press.

21

Reasons for promoting academic work in welfare biology

Now that we have seen in some detail what welfare biology is, we can consider reasons why this kind of work could be interesting and useful. There are several, as we will see now.

Concern for animals' wellbeing in contemporary societies

Many people in modern societies agree that the wellbeing of animals is morally important. This is why the discipline of animal welfare science was created a few decades ago. It was not merely the result of academic interest. The development of this field was possible because it received the public funding it needed. This was motivated by the pressure of public opinion in favor of taking the wellbeing of animals seriously.

In the decades that have passed since then, public interest has only increased. Why, then, hasn't there been research about the wellbeing of animals in the wild as there has been about animals living in captivity? One answer may be that there are misconceptions and confusion about the lives of animals in the wild that have led many people to believe there's no reason to worry about what happens to them. Most people don't know about the harms these animals suffer, and are not aware that the majority of animals in the wild die prematurely, in many cases due to painful causes. And people are not always aware that there are many ways of helping them.

However, public concern for the wellbeing of animals could be an important force towards welfare biology work being carried out in academia,

as the example of animal welfare science shows. In fact, given the public concern about domesticated animals, and now that we've seen what the lives of animals in the wild are actually like, there is good reason for the public to support a field that aims to understand and reduce wild animal suffering.

Why research on animals' wellbeing can be of interest to scientists

Scientists working in the science of ecology and related areas are much more familiar than the general public with the situation of animals in the wild. These scientists could be another driving force in promoting research on this topic. There's an explanation for why this has not happened yet. Scientists work within certain paradigms that determine what lines of inquiry are appropriate for science. These paradigms concern, among other things, the key assumptions, methods, and questions that are asked in each field. They are partly theoretical and conceptual, but they also have another component, the final aims of research. Humans are not interested in just any knowledge: while knowing the total number of stars in the universe may be interesting, counting the total number of grains of sand on a beach may not be. While most societies are interested in some questions out of pure intellectual curiosity, in many cases research is undertaken to help to achieve certain goals. This is the ethical component of the scientific paradigm, because ethics has to do with the ultimate goals we try to achieve with our actions.

According to the paradigm that prevailed in ecology for most of the 20th century and that is still strongly influential, the primary goal of research was the promotion of human interests. For the past few decades, conservation has been another important aim for the science of ecology. This might explain, at least in part, why nonhuman animals are not usually treated as individuals with interests. In fact, they are typically seen as important only as functional parts of ecosystems or as representatives of abstract entities, such as species or populations. Within this framework, ecologists in particular, and biologists more generally might see little practical interest in research into the wellbeing of individual animals. They might have trouble thinking of them as individuals with interests, so these questions might not occur to them. Due to this, we

might think that such questions would not be interesting in biology. But there is nothing about this subject that would make it an inappropriate area of study in biology. The fact that animals have lives that can go better or worse from the point of view of their own wellbeing is one of the things that happens in the natural world, and part of a proper description of it. Life scientists, like other scientists, seek to improve our understanding of the world. If we ignore something significant happening within it, such as the fact that animals have wellbeing, we are missing a part of that. This is a good reason for scientists to be interested in studying factors related to the wellbeing of animals living in the wild. It would advance our knowledge, and researchers who are not interested in promoting the wellbeing of animals could find this knowledge useful for other purposes. This could happen in animal ecology, and in particular the study of animal behavior, because animals' wellbeing affects how animals behave. It is also relevant for the design of field studies, because the studies can affect the animals' wellbeing. For example, when animals are made to carry relatively large GPS tracking devices, this would cause them to behave differently, so the results of such studies would be compromised.[179]

Having said this, there is no reason why scientists couldn't also share the values that many people in contemporary society have towards nonhuman animals. Given that in our society, many people do care about animals as sentient beings, and given that some of these people are scientists, there is no reason why this cannot motivate research in biology to improve the situation of animals.

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[179] Linklater, W. L. & Gedir, J. V. (2011) "Distress unites animal conservation and welfare towards synthesis and collaboration", *Animal Conservation*, 14, pp. 25-27¸Cattet, M. R. (2013) "Falling through the cracks: Shortcomings in the collaboration between biologists and veterinarians and their consequences for wildlife", *ILAR Journal*, 54, pp. 33-40; see also Bekoff, M. (ed.) (2013) *Ignoring nature no more: The case for compassionate conservation*, Chicago: University of Chicago Press; Beausoleil, N. J.; Mellor, D. J.; Baker, L.; Baker, S. E.; Bellio, M.; Clarke, A. S.; Dale, A.; Garlick, S.; Jones, B.; Harvey, A.; Pitcher, B. J.; Sherwen, S.; Stockin, K. A. & Zito, S. (2018) "'Feelings and fitness' not 'feelings or fitness'– the *raison d'être* of conservation welfare, which aligns conservation and animal welfare objectives", *Frontiers in Veterinary Science*, 5, a. 296.

Reasons to support welfare biology in academia

Independent individuals and organizations like Animal Ethics can do important work by spreading the idea that wild animal suffering is a serious issue and that it would be good to gain more knowledge about it. This can be done among academics and students, as well as among the general public.

Independent researchers can also play a part in the development of welfare biology by doing research that complements what is done by academics. This research could be just as useful and rigorous as that done by academics. In addition, organizations can do some research that scholars are not carrying out yet, in addition to explaining the practical importance and ethical implications of it. This could be useful for exploring further questions beyond what scholars might be ready to research at a given time.

A way that people and groups concerned about wild animal suffering can have a huge impact today is by focusing on promoting welfare biology research in academia. In fact, there are several reasons why doing this might be necessary in order to be able to meaningfully help wild animals. These reasons include (1) the quantity and quality of the research required, (2) how that research is applied in practice and policy making, and (3) the potential to fundamentally change how people think about the issue.

Regarding the quality and quantity of the research, academics have access to a variety of resources that can help them with their research in welfare biology. Academics are also typically highly specialized and can spend long periods of time working on specific problems. In addition, they can influence other academics to do similar work.

Their work can also affect public policy. When policy makers need to know about the feasibility and implications a certain policy could have, they typically ask scientists and academics. This means that it will be very difficult to implement policies helping wild animals if they aren't backed by scientists. For this to happen, it won't be sufficient for only a few isolated scholars to be working in the field; rather, we need a recognized field of research involving scholars from different institutions around the world.

Finally, the role of academics is especially important when it comes to changing how people think about issues. This is not only due to their general influence in society, but also because scientific paradigms are taught at

universities to new generations of people. If work on the biology of animals' wellbeing is established within academia, it will eventually be taught to new generations of scientists. This will contribute to people's perception of what the lives of animals living in the wild are actually like. It is also likely to increase their moral consideration of these animals.

This doesn't mean that the only work we need to do to promote work in welfare biology is to get involved in or fund academic research. As we have seen above, there are many things that independent organizations working on the subject can do, such as raising awareness or doing their own research about the situation of animals in the wild. Independent researchers can also play a role by doing work on this topic and by helping organizations with their work. These actions will play a vital role; however, what we have seen so far indicates that increasing research about welfare biology in academia is crucial, and that our efforts to improve the lives of wild animals are not likely to be successful without it.

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Promising areas for welfare biology research

We have seen different types of intervention to help animals in the wild, and we've seen the kind of welfare biology research that can be done. We will now consider several criteria for judging how promising a certain line of research in welfare biology is.

(1) It has the potential to raise interest among scholars

(2) It has the potential to inform policies that can be carried out now or in the near future

(3) It is likely to be supported by the general public

(4) It has the potential to help a large number of animals

(5) It has been (or is being) put into practice already

In the long term, it seems that the fourth criterion will be the most important and the fifth will no longer be relevant. Currently, however, it seems that the first three are more important for the purposes of developing welfare biology, especially the potential to raise interest among scientists.

We will now see several topics in welfare biology that fulfill all or most of these criteria. These aren't the only promising topics; they are just some very clear examples.[180] We have already seen two of them: wild animal vaccination and rescuing animals affected by weather events. We will also consider two

[180] An example that does not fulfill the fourth criterion but scores very well on the rest of them is helping stranded marine mammals.

others: helping wild animals in urban environments and helping large herbivores. These are all fields of research that both the general public and scientists usually support.

Vaccination

Let's start with the advantages of doing research on vaccination. We already know this is one way of helping a large number of animals. We also know that it can be considered quite reliable, because it has been implemented for several decades with excellent results. Vaccination efforts have been primarily for anthropocentric reasons — to prevent wild animal diseases from being passed on to humans or to domesticated animals. But they also have a very positive impact on the vaccinated animals. What's more important: their current use and effectiveness provide incentives to promote this research and to consider it a respected field of inquiry in academia. This is a serious advantage.[181]

There's a lot more that can be done in this area of research. More work can be done to prevent animals from suffering from diseases against which they aren't currently being vaccinated. We can also learn more about the ways vaccination can indirectly affect other animals. In addition, we can move beyond researching only diseases that affect human interests. We can try to influence new research motivated by a concern for animals' suffering.

Saving animals from harmful weather events

Another promising area of research is about rescuing animals who are victims of weather events, and taking precautionary measures to protect them. We have already seen that animals can be and, in many cases, are rescued from

[181] Vitasek, J. (2004) "A review of rabies elimination in Europe", *Veterinární Medicína*, 49, pp. 171-185; Turnbull, P. C. B.; Tindall, B. W.; Coetzee, J. D.; Conradie, C. M.; Bull, R. L.; Lindeque, P. M. & Huebschle, O. J. B. (2004) "Vaccine-induced protection against anthrax in cheetah (*Acinonyx jubatus*) and black rhinoceros (*Diceros bicornis*)", *Vaccine,* 22, pp. 3340-3347; Fausther-Bovendo, H.; Mulangu, S. & Sullivan, N. J. (2012) "Ebolavirus vaccines for humans and apes", *Current Opinion in Virology*, 2, pp. 324-329.

fires, floods, and other natural disasters such as hurricanes. In some cases, it is possible to build shelters, where some animals can take refuge during rain or snow, or from extremely cold or hot weather.[182]

Some people object to helping animals when they are suffering due to natural causes, claiming that we should only help when the cause is anthropogenic. This claim is problematic because, for the animals involved, what matters is the harm they are suffering, and not what triggered it. Besides that, the objection no longer applies now that weather events are changing due to human action. That makes related harms no longer purely natural, but partly anthropogenic. Because of this, and also due to the world's increasing attention on climate-related issues, helping animals affected by weather events has great potential to get more support.

The wellbeing of urban animals

Some people are concerned that our efforts might change previously untouched areas in unforeseen negative ways. This expresses a valid concern, which is that we should study the ways that our interventions could affect the animals living in those areas. However, this is something we should consider whenever we try to help animals in any environment, not only in untouched ones. In addition, we may note that there are also many ways to help wild animals that would not change untouched areas. This includes efforts to reduce the harms to animals living in urban, suburban, and industrial areas that are partly natural and partly human-caused. Animals living in these areas typically include birds, small mammals and reptiles, and many kinds of invertebrates. In some regions, they can include larger animals too. These are certainly not untouched areas, and while the ecosystems that exist in them are still complex, it can be easier to study the effects of our efforts there than in

[182] Flueck, W. T. (2011) "Continuing impacts on red deer from a volcanic eruption in 2011", *European Journal of Wildlife Research,* 60, pp. 699-702; White, S. (2012) "Companion animals, natural disasters and the law: An Australian perspective", *Animals*, 2, pp. 380-394, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4494289 [accessed on 14 September 2019]; Palmer, C. (forthcoming) "Assisting wild animals vulnerable to climate change: Why ethical strategies diverge", *Journal of Applied Philosophy*.

wilder areas.[183] Pilot programs can be monitored better, and their indirect effects can be more easily studied. This means that we can more effectively implement policies that reduce the suffering of animals in these areas, and what we learn can then be applied in wild areas.

This particular area within welfare biology can be based on contributions from both the sciences of animal welfare science and urban ecology, and could be called urban welfare biology or urban welfare ecology. This research can be started by studying the ecological interactions that urban animals have with each other as well as with their environments. This will increase our understanding of what the lives of urban animals are like, the harms they face, and ways their suffering can be prevented. Although this topic has not been studied yet, there is already an important body of research that is relevant. Urban ecology is a well-established field. The population dynamics and life histories of many urban animals have been studied, as well as other factors that affect their wellbeing, such as their interactions with other animals, the conditions limiting the growth of their populations, and the ways they are benefited or harmed by urban spaces and elements in urban design.

Some of these animals have been studied because their presence (at least above certain numbers) is unwanted by human beings. Knowledge about this can be used in ways that benefit animals because the existence of large populations of these animals may be negative, not only for humans, but also for the animals of those populations themselves, if most of them have short lives where suffering prevails. A good outcome would be relatively small populations, where the presence of animals who tend to have better lives in these environments is favored over the presence of animals who have more difficult lives.

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[183] Hadidian, J. & M. Baird (2001) "Animal welfare concerns and the restoration of urban lands", *Ecological Restoration*, 19, pp. 271-272; Martinson, T. J. & Flaspohler, D. J. (2003) "Winter bird feeding and localized predation on simulated bark-dwelling arthropods", *Wildlife Society Bulletin*, 31, pp. 510-516; Krimowa, S. (2012) *Pigeons and people: Resource ecology and human dimensions of urban wildlife*, master's thesis, Wellington: Victoria University of Wellington; McCleery, R. A.; Moorman, C. E. & Peterson, M. N. (eds.) (2014) *Urban wildlife conservation: Theory and practice*, Dordrecht: Springer; Adams, C. E. (2016) *Urban wildlife management*, Boca Raton: CRC press.

Improving the overall situation by helping large herbivores

One concern about intervention in the wild is that by helping some animals, we might harm others. Our goal shouldn't be just to help certain animals regardless of any indirect effects on others, but to look for ways of helping that can be net-positive, considering all animals. To achieve this, we have to study ecosystems as a whole. In fact, eventually, the best ways of helping animals will be at the ecosystem level. What we would look for isn't an improvement for a certain group of animals, but a scenario in which the overall proportion of suffering to happiness has shifted in a positive direction.

We currently have what looks like a good example of this. There is much interest in the protection of large herbivores such as elephants. There are also important reasons to support this if we are focused on the wellbeing of animals. Elephants invest a lot in caring for their children and they have high survival rates. This means they tend to live relatively good lives, containing significantly less suffering than most other animals. They also consume large quantities of plants. This plant biomass would otherwise have supported the reproduction of very large numbers of smaller animals. As we have seen, smaller animals typically reproduce by having large numbers of offspring, most of which die, often painfully, shortly after coming into existence. Therefore, protecting large herbivores like elephants tends to improve the overall wellbeing of animals living in that ecosystem.

Whether this is similar for other large herbivores remains to be seen. Studies would have to be carried out on a case-by-case basis for large animals such as hippos and rhinos. The presence of other, smaller herbivores like antelopes or goats who don't consume as much biomass might also make a positive difference. This is a feasible way that we can act to benefit animals. And we are already intervening this way, although with different aims, focused on the conservation of these animals.[184]

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[184] Van Aarde, R. J. & Jackson, T. P. & Ferreira, S. M. (2006) "Conservation science and elephant management in southern Africa: Elephant conservation", *South African Journal of Science*, 102, pp. 385-388; Kerley, G. I. H. & Landman, M. (2006) "The impacts of elephants on biodiversity in the Eastern Cape Subtropical Thickets: Elephant conservation", *South African Journal of Science*, 102, pp. 395-402; Guldemond, R. A. R., and van Aarde, R. J. (2008)

So we can see that there is much promising work ahead. In the short run, academically respected work will increase interest in this issue, which, in the long run, will maximize the expected positive result for animals in the wild. All this gives us reasons to be optimistic concerning the progress that the field of welfare biology can make from now on.

There is another type of research that is very promising for the development of welfare biology: the study of methods to assess the wellbeing of animals in the wild. This can facilitate further scientific work that considers animal welfare when examining wild animals. So, it is focused not on a particular way to help wild animals, but on a way to improve the probabilities of success of other ways. We will see this next, when we examine the relationship welfare biology could have with other cross-disciplinary fields.

"A meta-analysis of the impact of African elephants on savanna vegetation," *Journal of Wildlife Management*, 72, pp. 892-899; Pearce, D. (2015) "A welfare state for elephants? A case study of compassionate stewardship", *Relations: Beyond Anthropocentrism*, pp. 133-152, 3, https://www.ledonline.it/index.php/Relations/article/view/881 [accessed on 11 December 2019].

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Welfare biology and other cross-disciplinary fields

Exploring methods to assess the welfare of animals living in the wild

During the last few decades, scientists have increasingly shown interest in evaluating the wellbeing of animals through the development of welfare assessment methods. Most of these methods have focused on animals used by humans, particularly domesticated animals. Assessments of animal welfare vary, but they often include the evaluation of several parameters of health, physiology, and behavior. They are also often supported by an examination of how environmental conditions can affect animals in different ways. This plurality of methods makes animal welfare science a very interdisciplinary field.[185]

In principle, welfare biology could examine all the aspects related to the wellbeing of all animals. It would not necessarily be focused only on animals who live outside of direct human control. However, for animals in captivity, the knowledge from ecology and from other fields like wildlife management

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[185] Broom, D. M. (1988) "The scientific assessment of animal welfare", *Applied Animal Behaviour Science*, 20, pp. 5-19; Mellor, D.; Patterson-Kane, E. & Stafford, K. J. (2009) *The sciences of animal welfare*, Hoboken: Wiley-Blackwell; Walker, M.; Díez-León, M. & Mason, G. (2014) "Animal welfare science: Recent publication trends and future research priorities", *International Journal of Comparative Psychology*, 27, pp. 80-100; Hemsworth, P. H.; Mellor, D. J.; Cronin, G. M. & Tilbrook, A. J. (2015) "Scientific assessment of animal welfare", *New Zealand Veterinary Journal*, 63, pp. 24-30.

wouldn't be needed, because the lives of these animals are not determined by their ecosystemic relations with other animals or with other elements of a certain ecosystem. Rather, their lives and the conditions affecting their lives are largely determined by the human beings in control of them. So to assess the situation of animals in captivity, the contributions from standard animal welfare science may be sufficient, but not for animals living in the wild. In order to effectively help them, we need to adequately understand how welfare is affected at the level of an ecosystem.

Although welfare assessment methods have usually been designed for captive animals, some have been proposed to evaluate the welfare of animals living in the wild.[186] Their emphasis has typically been on evaluating the harms caused by human activities, neglecting non-anthropogenic welfare issues. But these efforts can be the starting point whether the harms are anthropogenic or not. An analysis of the frameworks, approaches, models, criteria, and indicators already proposed by animal welfare scientists can help provide a foundation for new welfare assessment methods for wild animals. This will help other studies in welfare biology to be carried out more efficiently, by providing them with better tools to appraise whether certain animals are suffering or are in a good situation.

Alternatively, work on the welfare of certain animals not only has the potential to improve the situation of those animals, but also to advance the study of the welfare of wild animals more generally. In particular, it could help to develop or to establish certain methods of welfare assessment. As we have seen, this work needs advancement.

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[186] We have seen this above already, see for example Kirkwood, J. K.; Sainsbury, A. W. & Bennett, P. M. (1994) "The welfare of free-living wild animals: Methods of assessment", *Animal Welfare*, 3, pp. 257-273; Jordan, B. (2005) "Science-based assessment of animal welfare: Wild and captive animals", *Revue Scientifique et Technique-Office International des Epizooties*, 24, pp. 515-528; Kirkwood, J. K. (2013) "Wild animal welfare", *Animal Welfare*, 22, pp. 147-148; JWD Wildlife Welfare Supplement Editorial Board (2016) "Advances in animal welfare for free-living animals", *Journal of Wildlife Diseases*, 52, pp. S4-S13.

Conservation and welfare biology

There are other cross-disciplinary fields from which welfare biology could gain useful knowledge. One that comes to mind is conservation biology. We have already seen the difference between the motivations of the two fields. Conservation biology is concerned with the continued existence of natural entities like ecosystems, populations, or species, rather than with animals themselves as individuals with wellbeing. Technically speaking, a distinction is made between conservationism and preservationism, the first referring to the conservation of biological entities for the benefits this will have for future generations of human beings, and the latter for their own sake. However, it is customary today to use the term "conservationism" to include both.

We have seen already that the different ethical approaches of conservationism and concern for sentient beings can lead to conflicts, such as when the killing of animals in certain areas is proposed, for example, because they are not native to those areas or because they are considered to have a negative impact on a certain ecosystem for other reasons. Despite this, there are also common grounds for joint academic work. We considered one of these earlier. We saw that, among the different ways we can help animals in the wild, some consist of assisting those who are suffering some harm, while others can actually prevent those harms from occurring in the first place, as in the case of vaccination. Another example is the protection of big herbivores like elephants. This is something that conservationists often work to achieve. Those who want to promote the best situation for animals will be interested in attaining this too, because an ecosystem where these animals are present might be better, when we consider the total amount of suffering and wellbeing in the ecosystem. This is related to something we have already seen. We know that the life history traits of different animal species, especially the ones relevant to the animals' reproductive strategies, can also be relevant to their welfare and their suffering. Animals with high mortality rates in infancy tend to have, on average, harder lives containing more suffering than those with higher survival rates.

There are many cases where animals with better life expectancies are *specialists* who are very well adapted to living in a specific niche in some area, and have a hard time surviving in new and changing environments. Such

animals are frequently endemic to the areas they live in, and in many cases conservation biology is concerned with the conservation of these animals. In contrast, *generalists* are able to survive in a variety of environments and tend to colonize new areas when the previously existing ecosystems are disrupted, but they tend to have worse lives. They are often animals who reproduce in large numbers and have lower survival rates, which, as we have seen, means they tend have much more suffering in their lives. Conserving specialists may result in ecosystems with less suffering overall. These are cases of convergence of the aims of welfare and conservation biology that the general public will also tend to approve of.

Also, there are some conservation efforts where much attention is paid to some specific individuals (as when a certain species with only a few members is chosen to be preserved). The goal in this case is to prevent them from dying. Because the same circumstances that typically cause animals to die also cause them to suffer, conservationist research in these cases can provide useful insights about factors that are negative for the animals' wellbeing. This knowledge could, in some cases, be extrapolated to other animals as well.

Compassionate conservation

There are conservation scientists who are concerned about the methods of their discipline when those methods harm animals. They have proposed alternative methods that do not cause such harms. This approach has been called "compassionate conservation."[187] Its goals are different from those of welfare biology. They are more focused on preventing direct anthropogenic harms while achieving conservationist goals, rather than on actively improving the lives of animals. Nevertheless, scientists with this perspective are likely to be interested in methods to assess the welfare of animals in the wild, and possibly also in the conditions affecting it. This means that their work can also help advance research on welfare biology.

In addition to this, those working in compassionate conservation have pointed out that there are cases where factors negatively affecting the

[187] Bekoff, M. (ed.) (2013) *Ignoring nature no more: The case for compassionate conservation*, Chicago: University of Chicago Press.

wellbeing of animals can impede the achievement of conservationist aims. These can be caused by conservationists' actions. One example is harming animals by keeping and breeding them in stressful conditions in captivity. Other harmful interventions include causing discomfort or stress to animals by marking or tracking them in invasive ways, and killing animals that threaten the existence of a preferred species. In order to prevent these kinds of issues, other conservationists would need to consider the welfare of animals. Research on this subject would be similar to welfare biology and would also advance that field.

Conservation welfare

Another cross-disciplinary field could combine the knowledge and aims of conservation biology and animal welfare science, under the label "conservation welfare."[188] This approach would differ from that of compassionate conservation in not focusing on the harms caused to animals in conservationist efforts.

Conservation welfare could address other issues unrelated to how conservationist interventions affect the wellbeing of animals. This could include the assessment of the wellbeing of animals as a result of indirectly anthropogenic or natural harms when conservation can benefit from it. This knowledge could be very useful for the aims of welfare biology, despite the difference in their ultimate goals (conservation welfare would focus more on conservation, and welfare biology on reducing harm to animals). What's more, in some cases it would match the kind of work that would be done in welfare biology.

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[188] Beausoleil, N. J.; Mellor, D. J.; Baker, L.; Baker, S. E.; Bellio, M.; Clarke, A. S.; Dale, A.; Garlick, S.; Jones, B.; Harvey, A.; Pitcher, B. J.; Sherwen, S.; Stockin, K. A. & Zito, S. (2018) "'Feelings and fitness' not 'feelings or fitness'–the *raison d'être* of conservation welfare, which aligns conservation and animal welfare objectives", *Frontiers in Veterinary Science*, 5, a. 296.

24

Responses to criticisms to the ethics of helping animals

We have already seen the case for promoting work in welfare biology, and some examples of promising lines of research and courses of action that could make a difference in reducing wild animal suffering. We will now cover objections to helping animals in the wild and to research that could inform efforts to help them.[189]

Objections of this kind can be classified into two groups. Some of them focus on moral concerns, and discussing them is a matter of ethics. We will look at those now. Others focus on practical concerns about the feasibility of helping animals. We will examine those in the next section.

Lack of concern for what happens to animals

The main opposition is probably the speciesist view that human interests should be our primary or only concern. Regarding this, you can take a look at

[189] For general responses to arguments against helping wild animals, see Torres, M. (2015) "The case for intervention in nature on behalf of animals: A critical review of the main arguments against intervention", *Relations: Beyond Anthropocentrism*, 3, pp. 33-49, https://www.ledonline.it/index.php/Relations/article/view/824 [accessed on 16 December 2019] and Faria, C. (2016) *Animal ethics goes wild: The problem of wild animal suffering and intervention in nature*, PhD thesis, Barcelona: Pompeu Fabra University; Ryf, P. (2016) *Environmental ethics: The case of wild animals*, Basel: University of Basel; Horta, O. (2017b) "Animal suffering in nature: The case for intervention", *Environmental Ethics*, 39, pp. 261-279;

the section about ethics and animals, where we saw how this view can be questioned.

Lack of responsibility

People sometimes argue that we are not personally responsible for the suffering of wild animals, so we shouldn't be very concerned about it.[190] However, the reason to help them is that they need our help, not because we caused their situation. We can see that this argument would also apply to humans in distant places suffering from natural causes, such as earthquakes or hurricanes. If we think we should help humans in those cases and care about their wellbeing as sentient beings, then it follows that we should help animals living in the wild as well.

Demandingness

Another objection is that helping animals in the wild is too demanding of a requirement. Often, those who raise this objection are simply unaware of the many ways it is currently possible to help animals in the wild, and unaware that animals in the wild are already being helped. Large-scale vaccination programs, wild animal hospitals, and rescues of animals in the wild during fires and natural disasters are just a few examples. We saw these and other ways of helping wild animals earlier. Few people object to the effort or cost of these measures, and in fact many people would support increasing and expanding them.

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[190] A moderate version of this view can be found in Palmer, C. A. (2010) *Animal ethics in context*, New York: Columbia University Press.

Commitment to a certain ethical view

In some cases, people think that helping animals in the wild is tied to a particular ethical framework.[191] However, many ethical views would agree with helping them, because the idea of helping those in need is widespread among different ethical positions.

Do animals prefer not to be helped?

Another objection is that by helping animals living in the wild, we would interfere with their capacity to live according to their preferences. According to this objection, animals have a certain *way of life* in the wild, and if we act to help them, we will change that way of life.

This objection only applies to cases where helping animals involves changing certain aspects of ecosystems. It doesn't apply to providing assistance to a small number of animals. The objection assumes that we should either maintain the way animals live even when it is very negative for them, or that it is not good for animals to be helped generally. Both alternatives seem implausible. Just like other sentient individuals, usually when animals are being harmed, they would prefer to be helped, not left alone.

The objection would seem to make more sense if animals were not in situations in which they needed help. But this is far from true. They face great harms for many different reasons. Animals can't just deal with these harms and thrive in the face of natural challenges.

Animal freedom

Another objection is that by helping animals, we would infringe upon their freedom. This objection assumes that animals in the wild are free to do

[191] This and the previous claim are made in Hills, A. (2010) "Utilitarianism, contractualism and demandingness", *The Philosophical Quarterly*, 60, pp. 225-242, for an opposite view see Paez, E. (2020) "A Kantian ethics of paradise engineering", *Analysis*, 80, 283-293.

whatever they want unless we intervene.[192] But this is not the case. Because most animals who come into existence die when they are very young, they are often unable to live as they would like. They can't, simply because they aren't able to live at all. Therefore, if we could help them in ways that remove these natural challenges, they would actually be *more free* to live as they prefer. If animals living in the wild were able to make an informed decision about this, it is quite likely that they would prefer to be helped to achieve the best possible life.

Should we only help animals who are harmed by humans?

Those of us who are concerned about animals might think that there are more urgent ways to help, considering the harms that humans inflict on them. This objection is correct about how bad the harm by humans is. We should certainly do something about that. But this isn't a reason to not help animals in the wild. The number of animals living in the wild is extremely large, many orders of magnitude higher than that of the animals humans harm directly. That makes this cause very important.

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[192] See Donaldson, S. & Kymlicka, W. (2011) *Zoopolis: A political theory of animal rights*, Oxford: Oxford University Press. For responses, see Horta, O. (2013) "Zoopolis, intervention, and the state or nature", *Law, Ethics and Philosophy*, 1, pp. 113-125, https://www.raco.cat/index.php/LEAP/article/download/294784/383317 [accessed on 30 August 2019]; Cochrane, A. (2013) "*Cosmozoopolis*: The case against group-differentiated animal rights", *Law, Ethics and Philosophy*, 1, pp. 127-141, https://www.raco.cat/index.php/LEAP/article/view/294785/383318 [accessed on 30 August 2019]; Ladwig, B. (2015) "Against wild animal sovereignty: An interest-based critique of *Zoopolis*", *Journal of Political Philosophy*, 23, pp. 282-301; Mannino, A. (2015) "Humanitarian intervention in nature: Crucial questions and probable answers", *Relations: Beyond Anthropocentrism*, 3, pp. 109-120, https://www.ledonline.it/index.php/Relations/article/view/821 [accessed on 15 October 2019].

Objections appealing to environmentalist views

Finally, there is an objection that we should not help animals living in the wild because we should not touch nature. Some people might assume that this follows if we accept an environmentalist viewpoint. We will now see if and to what extent it does.

A point that we have seen before is that humans frequently do intervene in nature, so additional action in the wild is not corrupting an otherwise untouched place. Humans usually intervene in order to promote human interests. We can say it is discriminatory not to act similarly to help animals. Sometimes humans intervene to conserve certain ecosystems, species, or populations for their own sake; or to restore a previously existing ecosystem. These examples show us that environmentalist or conservationist positions do not always oppose intervening in nature.

Still, while these views support intervention in nature for ecosystem or species conservation, they would not support it to help animals as individuals. Consider ecocentrism.[193] If what really matters is just that some ecosystems exist, then transforming existing ecosystems so that they contain less animal suffering shouldn't really be a problem. After all, ecosystems will still exist. However, ecocentrists don't think this way. They typically don't mind that old ecosystems were replaced by current ecosystems, and they don't like the prospect of current ecosystems being replaced by new ecosystems. Instead, they typically value *present* ecosystems or sometimes ecosystems of the recent

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[193] Sagoff, M. (1984) "Animal liberation and environmental ethics: Bad marriage, quick divorce", *Osgoode Hall Law Journal*, 22, pp. 297-307; Mikkelson, G. (2018) "Convergence and divergence between ecocentrism and sentientism concerning net value", *Les ateliers de l'éthique/The Ethics Forum*, 13, pp. 101-114, https://www.erudit.org/en/journals/ateliers/2018-v13-n1-ateliers04192/1055120ar.pdf [accessed on 2 September 2019]. The claim that these positions would not necessarily imply opposition to helping wild animals is defended in Cunha, L. C. (2015) "If natural entities have intrinsic value, should we then abstain from helping animals who are victims of natural processes?", *Relations: Beyond Anthropocentrism*, 3, pp. 51-63, https://www.ledonline.it/index.php/Relations/article/view/823 [accessed on 13 August 2019]. The points in this paper would apply to other environmentalist objections as well.

past. At any rate, even from this perspective, intervention in the wild to help animals would only be problematic if it significantly transforms ecosystems.

Another thing to note is that supporters of ecocentrism are not concerned about ecosystems where there is already a large human presence, such as urban, industrial, suburban, and agricultural settings. These ecosystems have already been radically changed. This is important because these ecosystems cover a very large total area, and an immense number of animals live in these areas.

The objection that we should not help animals living in the wild on the grounds that we should not touch nature is also held by environmentalists who have a naturocentric focus on the maintenance of wilderness.[194] These views value not ecosystems as such, but the existence of what has resulted from natural processes. According to this view, it might be immoral to help animals in the wild, because doing so is not "natural," in the sense that it would mean not letting the natural course of things continue. However, this does not apply to urban, industrial, and agricultural ecosystems. There are also ecosystems like forests, grazing areas, and other areas that have been created by human action rather than being the result of untouched nature evolving there. Restored ecosystems are similar in this regard. Compared to the ecocentric view, a naturocentric position could consider it permissible to intervene in an even larger number of ecosystems. As for views supporting the preservation of species or biodiversity, they would oppose only interventions that lead to species extinctions, but not necessarily any other kind.

Finally, let's consider the views from biocentrism. Biocentrism claims we should give moral consideration to all living things. This view implies supporting helping individual animals, because it regards them as deserving of moral consideration.[195] So biocentrism would support intervening for some

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[194] Rolston, H., III (1992) "Disvalues in nature", *The Monist*, 75, pp. 250-278; Hettinger, N. (2018) "Naturalness, wild-animal suffering, and Palmer on laissez-faire", *Les ateliers de l'éthique/The Ethics Forum*, 13, pp. 65-84, https://www.erudit.org/en/journals/ateliers/2018-v13-n1-ateliers04192/1055118ar.pdf [accessed on 23 September 2019].

[195] This point has been made previously in Horta, O, (2018b) "Concern for wild animal suffering and environmental ethics: What are the limits of the disagreement?", *Les*

broadly similar reasons to the sentience-focused position. The difference is that this view would defend intervention to protect individual non-sentient biological organisms such as plants or fungi. It could have negative consequences for animals if non-sentient living things are protected at the expense of sentient animals.

Given all this, we can see that at least some of the most representative objections are much more permissive towards helping wild animals than it may seem at first. We don't have conclusive reasons to not help them. There are, however, strong reasons to do it, given how important the harms suffered by wild animals are.

Ateliers de l'Éthique/The Ethical Forum, pp. 85-100, 13, https://www.erudit.org/en/journals/ateliers/2018-v13-n1-ateliers04192/1055119ar [accessed on 12 November 2019]. See also Palmer, C. (2016) "Living individuals: Biocentrism in environmental ethics", In Gardiner, S. M. & Thompson, A. (eds.) *The Oxford handbook of environmental ethics*, Oxford: Oxford University Press, pp. 101-112.

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Practical objections against helping wild animals

Having seen some ethical objections to helping wild animals, we will now see some practical objections. They are claims of intractability, uncertainty, difficulty in researching issues not related to human interests, and fears of meeting disapproval.

Claims of intractability

One objection is that improving the wellbeing of animals living in the wild is ultimately futile because the huge amount of suffering and death they face would ultimately render our efforts unsuccessful.[196] A response to this objection is that it is missing the point. We might not be able to stop *all* the harms animals suffer, but that doesn't mean we should not try to stop some of them. We should try our best to reach the best possible outcome, all things considered. From the perspective of the animals we *can* help, we will be making a crucial difference.

Another, more radical, version of this objection would be that it is impossible to make any difference at all, that is, impossible to reduce the

[196] For responses to this and other objections see Faria, C. (2016) *Animal ethics goes wild: The problem of wild animal suffering and intervention in nature*. PhD thesis, Barcelona: Pompeu Fabra University; Horta, O. (2017b) "Animal suffering in nature: The case for intervention", *Environmental Ethics*, 39, pp. 261-279; Johannsen, K. (2020) "To assist or not to assist? Assessing the potential moral costs of humanitarian intervention in nature", *Environmental Values*, 29, pp. 29-45.

harms animals suffer in any way. But we can see that this claim is just wrong, as we have seen how it is possible to help animals in the wild, and that this has been done for a long time already.[197]

Another claim is that by helping some animals, we could be harming others, so we'll never know if we are actually having a positive impact. This is a different claim: that the issue is too uncertain for us to know how to act. We'll look at this objection next.

Epistemic problems

There are two different objections claiming that it is not possible for us to attain the necessary knowledge to achieve the aims of welfare biology.

One objection argues that because suffering and other experiences are subjective, they cannot be the proper object of scientific study, so we will never be able to learn about them. This objection conflicts with what most of us believe: that other beings have their own experiences, and we make intuitive guesses about whether they feel well or bad that often turn out to be right. This isn't just with our close friends or other human beings. A lot has been learned about what nonhuman animals experience without having direct access to their thoughts. For decades, the science of animal welfare has been examining the wellbeing of animals, using established indicators that are applied rigorously. Moreover, not having direct access to what you are studying does not invalidate the possibility of carrying out a scientific assessment of it. One example of this is research in natural history; we can't have direct access to how life was millions of years ago.

Another objection is that the complexity of ecosystems means that research into the factors that affect wild animal wellbeing would inevitably be incomplete. As a result, welfare biology would not succeed in making sound

[197] This objection is presented in Delon, N. & Purves, D. (2018) "Wild animal suffering is intractable", *Journal of Agricultural and Environmental Ethics*, 31, 239-260. Throughout this book, we have seen many possible ways in which it is possible to make a positive difference for animals at different scales. See footnotes in the sections about different ways to help animals, and in section about the promising fields of research for welfare biology.

assessments of the ways to alleviate wild animal suffering. One response to this is that it's correct that complexity *does* entail that our actions will have many ramifications, some of which we won't be able to foresee. So, it's a reasonable concern that we could make the situation worse by trying to help some animals without sound knowledge. However, this should not stop us from trying to improve the situation for animals. Most scientific disciplines deal with complex phenomena, but we are still able to use their findings to inform our actions. Their incompleteness is not a significant barrier to this. Also, we already know of many interventions that clearly improve the welfare of some animals living in the wild. We need more research to see if these interventions also indirectly negatively affect other animals. In some cases, it seems more likely that the indirect effects will be positive, such as in the case of protecting large herbivores.

In addition, this objection is being *very pessimistic* about the results our actions could have, probably displaying a bias towards the status quo, while it seems to be quite *optimistic* about the current situation for animals living in the wild. It gives the impression that things are only slightly wrong with the current situation for animals, and that attempts to correct those things are likely to only make other things worse. But this assumption is wrong, because the current situation is actually very bad for animals living in the wild. When humans are seriously in need of help in complicated situations, efforts are often made to study how to best help them, and uncertainty due to complexity is not considered a reason to do nothing. There is no reason not to also apply it when animals living in the wild are in need. Note that this book is not just about helping animals in need, but also about doing the necessary research in a well-informed way.

The claim that only human interests can be promoted in research

According to another objection, there is no point in trying to work in welfare biology, which focuses on the interests of nonhuman animals, because only research that serves human interests is likely to be funded and researched. However, this claim is rendered false by the fact that work in conservation

biology is respectable today in academia, even when motivated only by preservationist concerns about the continued existence of certain species or populations, regardless of their impact on humans. If this is the case with conservationist purposes, it could also happen for the study of animals' wellbeing. Note, also, that in the case of animals there is the precedent of animal welfare science. There is no reason why it should apply to some animals (those used by humans) but not others (those outside of direct human control).

It could be argued that research on the conservation of species or ecosystems, about the welfare of animals used by humans, or about the ways to help animals in the wild, like vaccination, all have anthropocentric motivations. It is true that these different types of research are all carried out partly for anthropocentric reasons. But there is also a concern among the general public about the wellbeing of animals. There is a relative lack of concern for wild animals, but this is due partly to a lack of familiarity with wild animal suffering.

Concerns of animal advocates

We have seen that some animal advocates think that human concern for nonhuman animals should be restricted to animals whose suffering is directly caused by us.[198] But there is another possible concern. Some animal advocates might think that the idea of helping animals in the wild is too new and too hard to accept for the general public, and that as a result our efforts will be unsuccessful. They might also think that if people find this idea too strange, it could hurt the defense of animals in general.

These concerns are, however, based mostly on intuitions, not on actual experience in communicating with the public about this issue. As far as we know, there is no data backing these fears, and our experience at Animal Ethics is that the general public is quite receptive to the idea of helping wild animals in need of aid. Among the people who are concerned about animal

[198] See Morris, M. C. & Thornhill, R. H. (2006) "Animal liberationist responses to non-anthropogenic animal suffering", *Worldviews: Global Religions, Culture, and Ecology*, 10, pp. 355-379.

suffering, most have never heard about the harms animals suffer in nature or the reasons to help them. When this is explained, many of them become concerned. As a result, there are now many more people who agree with helping wild animals than there were just a few years ago. This shows it's possible to change people's minds about this. Of course, for this to happen, we have to communicate effectively with the general public about this issue.

The lines of research we consider likely to be successful are ones that most people will probably find quite acceptable. In fact, as more people become aware of what we can do for wild animals, public attitudes may become an important driver of political and legal action that can help to further promote welfare biology. Actually, most people are much more open to helping wild animals than to other mainstream ideas in animal advocacy, such as giving up the use of animals as resources. This could be because it doesn't require much compared to behavioral changes, such as not using animal products or services. Similarly, raising concern about the moral consideration of animals and speciesism tends to be well received and not met with reluctance or opposition the way advocacy for behavioral change often is. We encourage animal advocates who might still be a bit wary about how the public might receive the message to get in touch with Animal Ethics, and we will be happy to provide ideas and materials to run a small event or campaign to gauge how positive the reception by the public is.

Concerns about negative reactions by scientists

Some people are concerned about the attitudes of scientists towards wild animal suffering. They fear that scientists might view this work as misguided. However, even if the prevailing paradigm doesn't consider animals as individuals, this doesn't mean that scientists won't be interested in learning more about the wellbeing of nonhuman animals. Scientists are in principle in favor of gaining new knowledge and, accordingly, of more resources being employed in research.[199] The discussion that can take place afterwards, about

[199] Two studies carried out by Animal Ethics indicate that many life scientists find this kind of research useful and interesting. See Animal Ethics (2019c) *Scientists' attitudes toward improving the welfare of animals in the wild: A qualitative study*, Oakland: Animal

how to apply the knowledge, is a different question. But scientists don't have to agree with a certain course of action to think it's a good idea to learn more about issues related to it. Also, we have to bear in mind that not all scientists think the same way, and there *are* researchers with an interest in helping animals.

So we have good reasons to support gaining more knowledge about the wellbeing of wild animals and how to best help them. We've also seen that the objections against doing this are not conclusive. In the final chapter, we will consider the importance this research has, especially for the future.

Ethics, https://www.animal-ethics.org/scientists-attitudes-animals-wild-qualitative [accessed on 22 March 2019]; (2020) *Surveying attitudes toward helping wild animals among scientists and students*, Oakland: Animal Ethics, https://www.animal-ethics.org/survey-helping-wild-animals-scientists-students [accessed on 22 March 2019].

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Wild animal suffering and the importance of the future

In previous chapters of this book, we have seen how serious the scale of wild animal suffering is. Moreover, we've seen that the majority of animals who come into existence die very young, often suffering a lot in the process. This is of particular importance given that the number of animals living in the wild is estimated to be many orders of magnitude larger than the number of humans and domesticated animals combined. Preliminary investigation on the population range of various animal groupings places wild mammals over 10^{11}, amphibians and reptiles each between 10^{11} to 10^{14}, different groups of fishes over 10^{13}, and insects over 10^{18}.[200]

The level of neglectedness of wild animal suffering is also very high. It has not been considered a serious issue until recently. Most members of the general public are unaware of the situation of these animals and that they might need our help. In academia, this issue has also received very little attention.

However, despite the neglectedness of wild animal suffering, we've seen great potential for a substantial increase in the tractability of this problem. We've seen numerous examples of how we can help wild animals, and the apparent lack of tractability in other cases is often due simply to the fact that there have been no serious attempts to make progress on them. Getting academic research on this issue started and boosted can therefore

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[200] Tomasik, B. (2015c [2009]) "How many wild animals are there?", *Essays on Reducing Suffering*, http://reducing-suffering.org/how-many-wild-animals-are-there [accessed on 12 October 2019].

exponentially increase our progress. We shouldn't be driven by pessimism to think this can't happen because of the present record of neglectedness. A number of new fields of research have appeared in the 20th century, some in the past few decades, that were not considered relevant areas of study before they emerged, and they are now respected disciplines in academia (including the sciences of animal welfare and a number of subdisciplines in the field of ecology). To encourage work on welfare biology, we must approach scientists and policy makers in an informed way and with proposals they will find sound and fruitful.

At the same time, we can increase the awareness of the general public about this issue so that there will eventually be more public support for helping animals. In particular, we can reach influencers, and find opportunities to make discussion about this issue possible. People may not completely agree with what we say at first, or they might mistakenly think they already know about the issue because they confuse it with something else. For example, many people think that helping wild animals means conserving species, and don't have in mind their wellbeing and suffering. Other people might think that wild animal suffering is just about the harms some animals inflict on others. Others might think that helping wild animals consists of keeping them in nature and refraining from interacting with them. At this point, we know that these are serious and widespread misunderstandings; this is not surprising considering how little information there is about wild animal suffering. There is therefore a lot of room for improving understanding and awareness about wild animal suffering by spreading more information about animals' lives and the arguments for their moral consideration.

Wild animal suffering and the importance of the future

If we start to work on this issue now, then in the future it will be possible to help animals much more extensively. However, there is no guarantee that this will happen. We've seen many ways animals in the wild are currently being helped, but there are other feasible ways to help them for which there is no public support. This problem could become even bigger in the future if there is still little support when we have even greater means to help.

The prospect for helping on a large scale might seem precarious, in that there is still so much to do and so little awareness. However, there has been significant progress. Only 10 years before this book was written, there were very few people who thought this issue deserved attention. There is already a growing and diverse group of people interested in it, including natural science students, animal advocates, effective altruists, and people interested in general in achieving a better world with less suffering. This means there are reasons not just to hope, but to expect, that 10 years from now even greater progress will have been made.

Spreading concern about wild animal suffering is important not only because of what happens today, but also because it will allow us to make a difference to the situation of animals in the future. People tend to focus on what happens in the present, or on what will happen in the relatively near future. But many more changes, advancements, and problems will take place over the long term.[201] This may seem like a trivially true statement, but the implications of it are rarely accepted, and they are very important. While there is currently a very large number of sentient animals in need of help, there will be many, many more in the future. In fact, it's likely that the vast majority of sentient living beings that will ever exist are going to exist in the future. This makes concern for the future crucially important.[202] Thinking about how our

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[201] This is especially the case with wild animal suffering as the possibility of expanding it beyond its traditional limits is increasing. See Oberhaus, D. (2019) "A crashed Israeli lunar lander spilled tardigrades on the Moon", *Wired*, 5 August, http://www.wired.com/story/a-crashed-israeli-lunar-lander-spilled-tardigrades-on-the-moon [accessed on 12 October 2019]; Perry, G.; Curzer, H.; Farmer, M.; Gore, M. L. & Simberloff, D. (2020) "Historical, ethical, and (extra) legal perspectives on culpability in accidental species introductions", *BioScience*, 70, pp. 60-70.

[202] See Eckerström Liedholm S. (2019) "Persistence and reversibility: long-term design considerations for wild animal welfare interventions", *Wild Animal Initiative*, https://www.wildanimalinitiative.org/blog/persistenceandreversibility [accessed on 11 January 2020]. This work presents the case for the importance of considering the future, although it doesn't consider the situation of nonhuman beings as relevant: Beckstead, N. (2013) *On the overwhelming importance of shaping the far future*, PhD thesis, New Brunswick: Rutgers University. On longtermism, see Greaves, H. & MacAskill, W. (2019) "The case for strong longtermism", *Global Priorities Institute*, https://globalprioritiesinstitute.org/wp-

actions impact the future is then essential for people who are concerned about sentient beings.

Although the future is uncertain, we can make some informed guesses about the way some current courses of action could affect it. For example, it is reasonable to expect that spreading concern for nonhuman sentient beings in general, and for wild animals in particular, will make it more likely that the future will be better than it would otherwise be. In fact, if we're considering how we can improve the future, actions like expanding society's concern towards those who are currently disregarded — like wild animals — seems a promising course of action, because it does not depend on any specific predictions of what might happen. However the future is, it seems that having more concern for all sentient beings, and especially for those who are currently the most neglected, is likely to make it much better.

In other words, uncertainty about the future means that we don't know what new problems and causes of suffering there may be in the future. Increasing concern in general for all beings who can feel and suffer would help prevent bad scenarios in the future that could result in immense suffering.

Take action

We have seen that there are various things that can be done to help to make a difference for animals. You can help animals directly if you have the opportunity. You can also help Animal Ethics and other organizations that are concerned about wild animal suffering. If you think this cause is important, you can let others know about it, and encourage them to get more information. If you are involved in the defense of animals, you can include concern for wild animal suffering in your work. And if you are a researcher in natural sciences,

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content/uploads/2020/Greaves_MacAskill_strong_longtermism.pdf [accessed 7 Oct 2019]. On different strategies to influence the future see Reese, J. (2018) "Comparing the cause areas of moral circle expansion and artificial intelligence alignment", *Sentience Institute*, https://www.sentienceinstitute.org/blog/mce-v-aia [accessed on 16 November 2019]. On the risks of future bad scenario see Baumann, T. (2017) "S-risks: An introduction", *Reducing Risks of Future Suffering*, https://s-risks.org/intro/ [accessed on 30 December 2019].

you're in an excellent position to promote work on this issue. Students and scientists can play a crucial role in carrying out research on welfare biology in academia. If you want to know how to do this, or if you have an idea for a promising research project, let us know and we may be able to help you. Anyone else who is interested in getting involved can also let us know and we'll help you get started.

There's much more to learn and to do about the situation of wild animals. This book is just an introduction to the issue. We encourage you to join us in bringing about a better outcome for animals in the wild. They need us all to give them a hand. There is a lot that can be done, not only to affect what happens now, but also what will happen in the future, and you can make a difference.

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