

Human-Wildlife Interactions in the Netherlands: Developing a Survey to Understand Perceptions of Coexistence

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Summary

This research study is working with the WildlifeNL project, and focuses on understanding perceptions of coexistence between humans and wildlife in the Netherlands, specifically large grazing mammals. The increasing population of wildlife in the Dutch landscape has led to some pressures between people and wildlife, needing to reevaluate wildlife management practices. The study focuses on exploring diverse stakeholders and their views on coexistence. The research question for the study is: What are the diverse perceptions and attitudes towards coexisting with large mammals in the Netherlands? To help answer this question, a conceptual framework was created by incorporating four levels of human-wildlife interactions that range from *no coexistence*, *tolerance*, *acceptance* and *coexistence*. The framework also involved eight different archetypes, and was classified in the four levels accordingly. For this research, interviews were conducted with stakeholders that are already affiliated with the WildlifeNL project, and helped gain more insight on human-wildlife interactions, and then to design a survey which will be a tool to help create a dialogue on coexistence amongst the stakeholders. Seven stakeholders were interviewed and when asked about human-wildlife coexistence in their own perspective, their answers were at par with the definition that was used in literature. However, when giving the stakeholder's to respond to dilemmas about different human-wildlife interactions, most of the stakeholder's responses fell in the category of *tolerance* and *acceptance*. The stakeholder's all agreed they wanted a survey to be developed, and gave examples of other human-wildlife interaction dilemmas that would be useful for the survey. Even though the topic of the research was focused on large grazing mammals, the stakeholders wanted a dilemma about the wolf, since the wolf directly impacts the larger grazing mammals. In the end, what was found was that there are diverse perceptions

towards coexisting with large grazing mammals in the Netherlands. It also seemed that different animals gave the stakeholders different perceptions, such as the roe deer is a grazer that was commonly liked amongst the stakeholders, whereas the wild cattle was not seen as a local species and not as well liked. The interviews helped gain insight on how the first draft of the survey was written, and then the survey will be piloted and revised for future research. The WildlifeNL project will continue to create a foundation for stakeholders to come together to work on ways to manage the landscape, and this research was beneficial to know where the stakeholder's current perceptions on coexistence exists, and then from there the project can move towards coexistence.

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Introduction

In our modern world, we are living in the anthropocene epoch, which is when humans have a dominant impact on the climate and ecosystems (Waters et al; 2016). This is also known when wildlife populations decrease and the natural landscapes are overtaken by human populations (International Fund for Animal Welfare 2019). This creates a loss of biodiversity, and biodiversity is essential for the prosperity of humanity (Johnson et al; 2017). In the Netherlands, humans use up to 60 percent of the land, with most of it being used for agricultural purposes (*Netherlands* 2024). In order to stop biodiversity loss in the Netherlands, the Dutch sectors are transforming the land to be enlarged for more natural areas and to expand the ecosystems (EU Biodiversity strategy 2020). As conservation efforts increase in the Netherlands, the existing populations of ungulates and other large grazing mammals get bigger (WildlifeNL). However, this can create human-wildlife conflict, where wild animals take people's resources, such as crops (Snijders et al; 2019). If we want to make sure wildlife can prosper as well as human activities have a place, we need to understand how to share the landscape in a harmonious manner.

The goal of this research is to formulate the perceptions that humans have on how they coexist with wildlife in the Netherlands. The WildlifeNL project is focused on a new approach to wildlife management, by having a more nature inclusive community and to gain perspectives of stakeholders that currently manage wildlife. Wildlife is defined as animals that live separately without any additional help from people and in a natural environment (*wildlife* 2024). The focus is mainly on large grazing mammals in the Netherlands in either recreational areas that are also

used by people, and in agricultural landscapes. The study is needed in the Netherlands because it is not known how stakeholders view coexistence with wildlife.

The wildlife in the Netherlands is beneficial for landscape and creating biodiversity within nature. However, human-wildlife interactions can be perceived differently by different stakeholders. Such as infrastructure vulnerability or opportunity costs with landowners, farmers and foresters affected with crop and tree damage (Linnell et al; 2020). Humans can view wildlife in either a positive perspective (enjoying the presence of wildlife), or negative perspective (discontent with wildlife presence), depending on their individual experiences, values, beliefs, and characteristics (Jürgens et al; 2022).

From the year 1995 to 2022, the mammal population has increased in the Netherlands by 45 percent (Netherlands 2023b). The type of wildlife that is involved in the Netherlands ranges from many sorts of species. For this study it will focus specifically on large grazing mammals. These animals are important because humans tend to interact with them in recreational areas. The wild animals include deer, bison, horses, cattle and boar. In the Netherlands the deer that are commonly found are the roe deer (*Capreolus capreolus*), red deer (*Cervus elaphus*), and fallow deer (*Dama dama*). Deer are important for the ecosystem, because they help disperse seeds with their droppings. Roe deer have a high rate of dispersing seeds that will successfully grow into plants (Veen 2003), which is beneficial for the biodiversity of the landscape. Deer can also come in conflict with human activities. There are for example vehicle collisions with deer, specifically roe deer in the Netherlands (De Vries 2015).

In the National Park Zuid-Kennemerland, the European bison was reintroduced to help manage vegetation and nurture biodiversity in the natural landscapes. The European bison collaborates with Konik horses and Highland cattle to reverse the encroachment of shrub and

grass species, promoting a more diverse and balanced vegetation composition in the coastal dune areas of the Netherlands (Valdés-Correcher et al; 2018). Altogether, these animals are essential for managing the grass and shrub species by their grazing efforts. When recreationists are in the same area as these animals, it is best to keep space of up to 50 meters. Bison and people are generally good with one another, but one report did show a person that got too close to a bison and experienced a minor injury, which resulted in that one bison to be removed from the area (*European bison get used to visitors*). Although apart from negative interactions, most visitors enjoy seeing wildlife and it improves their outdoor experience (Curtin 2009).

Wild boar are also known to help with seed dispersal and manage vegetation. Wild boar are also known for their rooting activity, which helps diminish grass encroachment and revive microhabitats for insects. The wild boar are a prime species to lower grass cover by rooting in grassy areas, which can improve the vacancy of the host plant. The boar has demonstrated its ability to support and rejuvenate the microhabitats essential for the endangered Grizzled Skipper butterfly (*P. malvae*), which positively contributes to the environment (de Schaetzen et al; 2018). Wild boars are also known to cause crop damage, especially in the grasslands that produce hay, and maize fields (Rutten et al; 2020). Wild boars rarely attack people, but when they do it's usually near the animals habitat area, and especially in rural regions (Mayer 2013). In the year of 2023, some people and their pet dogs were attacked by wild boars in Limburg. This resulted in the authorities temporarily closing off this part of the woods for human activity (Sanou 2023).

Overall, large grazing mammals play a key role in the landscape of the Netherlands. People may view these wild animals in different ways when living amongst them in a shared environment.

Conceptually, there are different ways humans can perceive wildlife, because there are multiple perspectives and attitudes that can influence how a human perceives and interacts with wildlife in a shared environment (Pooley et al; 2021). First perspective is *tolerance*, which is the ability to endure the existence of wildlife without actively interacting with or accepting them entirely. Another perspective is *acceptance*, which is a level above *tolerance*, where it involves the acknowledgment of the value of a wild animal and an inclination to coexist with them. Last perspective is *coexistence*, which is a socioecological state where the engagement between social and ecological portions lead to pleasant interactions between humans and wildlife (Glikman et al; 2021). The word “*coexistence*” is becoming a buzzword that can help create change in nature conservation as it is slowly becoming used more by people in academia and theorists to help rethink how people interact with wildlife (Fiasco & Massarella; 2022). However, most research has been focused on tolerance in the framework of human-wildlife conflict. This perceives wildlife in a more negative mindset (discontent with wildlife) and can be unsuitable for human and wildlife interests (Pooley et al; 2021). In the ISI Web of Knowledge database, it was discovered that 71 percent of scientific literature research results focused on human wildlife conflict, 8 percent on neutral interactions, and then only about 2 percent on coexistence. Framing conservation in the term of “conflict” can lead to unfairness in how it can be planned and managed, and skew people’s connection with wildlife (Bhatia et al; 2020). This is because by focusing on “conflict”, it is seen as disagreements amongst people regarding wildlife, and shifts the blame away from people and focuses on wildlife as being the problem (Chapron & López-Bao; 2020).

To emphasize coexistence between humans and wildlife is by addressing human-human conflicts, understanding perceptions of conflict, and bringing together general experiences to

create more harmonious connections. This emphasizes that human-wildlife conflict frequently involves conflicts amongst people with different goals and values. Coexistence should contemplate public perceptions and enable stakeholders to usefully manage conflicts and promote serene coexistence (Madden 2004).

In the WildlifeNL project, the main focus is to manage wildlife in a more peaceful way (WildlifeNL). As wild animals continue to return in high numbers to the Dutch countryside, this can form different types of pressures between wildlife and people. Then this requires a redevelopment of how the Netherlands manages wildlife, since human-wildlife interactions are becoming more frequent. WildlifeNL is working with many different stakeholders that manage wildlife in their own way, such as farmers, hunters, nature conservationists, etc. It is important to understand how each of these stakeholders view coexistence and managing wild animals. This is because different views can possibly lead to different management techniques on how to manage the wild animals. The goal of this study is to develop a survey. Then for future research the survey will eventually be revised and sent to different stakeholders and the general public to see their views on coexistence. Since most previous studies have focused on human-wildlife conflict, this will be a new view of research to focus on coexistence and what it means to coexist.

This goal is to gain a better understanding of the different perceptions there are on coexisting with large mammals in the Netherlands, by developing a survey that can best measure the diverse views on coexistence perceptions of stakeholders. The aim of the study is to develop a survey that can measure the perceptions of the different stakeholders/organizations in the Netherlands. So, the main research question is: What are the diverse perceptions and attitudes towards coexisting with large mammals in the Netherlands? Then to dive deeper the sub-questions that will be asked are, how can we define coexistence with large mammals in a

densely populated area like the Netherlands? How can we best measure different perceptions on coexistence in the Netherlands? What perceptions on coexistence are there in the Netherlands, particularly among the stakeholders in the WildlifeNL project?

Background

2.1. Contextual Background

The stakeholders that are involved with the WildlifeNL projects are a mix of different organizations that are involved with wildlife, landscape, or nature in the Netherlands. To analyze the stakeholders, they were interviewed individually to see what their current views of human-wildlife coexistence.

Below is a map of the following stakeholders that are involved with the WildlifeNL project currently:

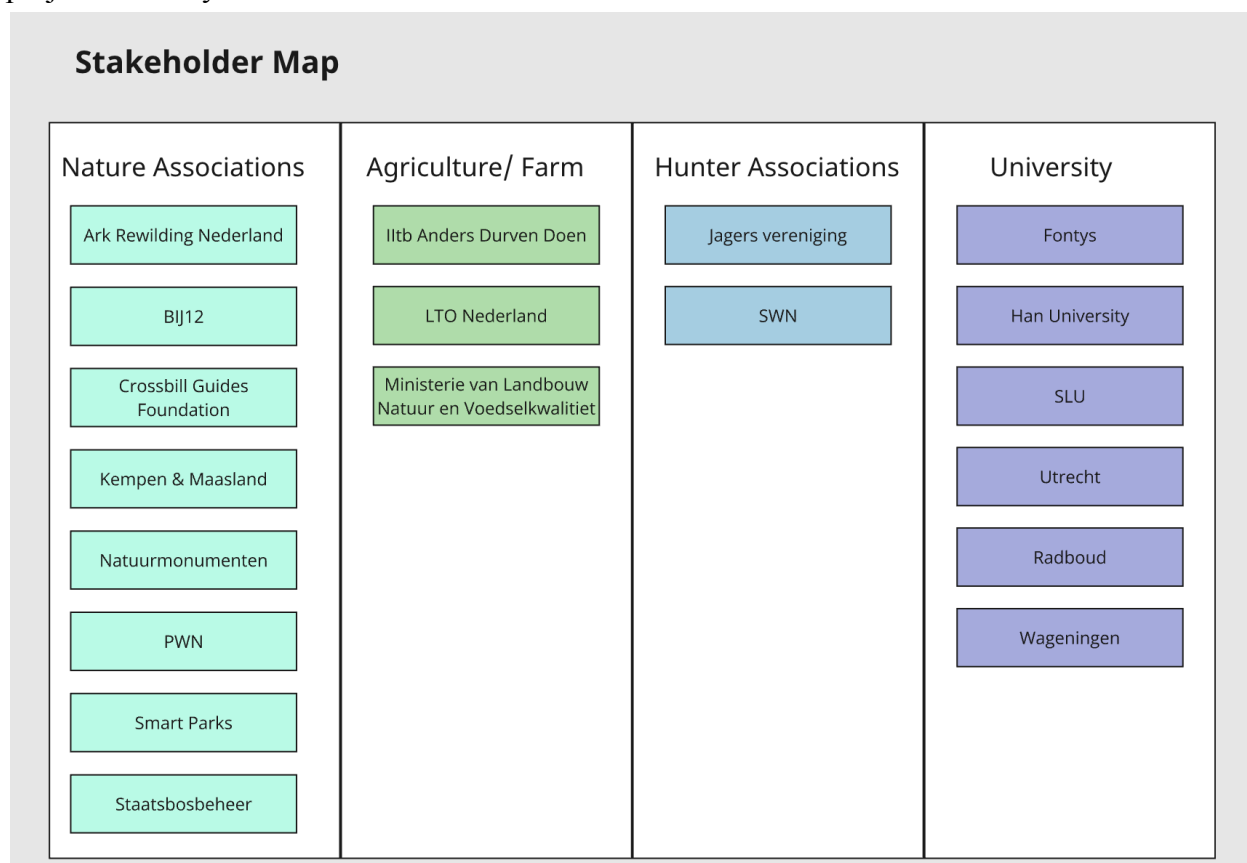


Figure 1. This is a simple map to show most of the stakeholders involved with the WildlifeNL project. Please see (Annex- Stakeholder’s List) for more information on the stakeholders involved in the project.

2.2. Theoretical Background

From an ecological perspective, coexistence is essential for biodiversity conservation. In the lens of wildlife-wildlife interactions, coexistence is important for biodiversity as it promotes the persistence of multiple species within an ecosystem. This helps prevent competitive exclusion and maintaining diversity amongst species. By allowing different wild animals to occupy different places and utilize resources in unique ways, coexistence can encourage ecosystem resilience, stability and overall health (Turnbull et al; 2013). Understanding that wildlife populations need to coexist to thrive, it also seems essential for humans to also coexist with wildlife.

Coexistence can be defined as a sustainable condition in which wildlife and humans can coevolve in a shared space, and their interactions are managed by efficient organizations that can guarantee extended perseverance for wildlife populations (Carter & Linnell; 2016). Coexistence is also part of a wide range of human-wildlife interactions, which includes interactions that are favorable to help preserve wildlife that are endangered, and contain specific deliberation of justice, equity, and power (Marchini et al; 2021).

Coexistence is a relatively new lens in academic research to understand human-wildlife interactions and management, since previous research had focused on human-wildlife conflict, and not human-wildlife coexistence. From the year 2000 to 2019 the term “conflict” in literature was used three times more than “coexistence”. This is most likely that the interactions between humans and wildlife were mainly not a good experience (Chapron & López-Bao; 2020).

Since coexistence is about sharing the same landscape with wild animals, it is important to understand the different perspectives people could have with this. As mentioned in the introduction, a human can either tolerate, accept, or coexist with wildlife (Glikman et al; 2021). Then this can create archetypal outcomes of how humans interact with wildlife. Carter & Linnell, based on their experience, have come up with 8 archetypes formulated from results from a scale of an entire system, concentrating on wildlife populations and human societies. (Carter & Linnell; 2023). The eight archetypes that can be seen in the Figure 4, range from situations that are farthest from coexistence (zero sum losers and eradication), to positions that are closest to coexistence (conservation reliance and sustained co-benefits). The archetypes that are ‘not consistent with coexistence’, have an imbalance of either the human creating the negative impact on wildlife, or wildlife having a negative impact on humans. Whereas, the archetypes that are ‘consistent with coexistence’, there is more balance with the human-wildlife interactions, and there could be overall benefits for both humans and wild animals.

A way to understand how to qualitatively measure human-wildlife coexistence is by looking at the wildlife value orientation model, and wildlife tolerance model.

The wildlife value orientation model is a conceptual framework for studying human values relation to wildlife (Fulton et al; 1996). This framework focuses on understanding and arranging the attitudes and various values of people towards nature and wildlife (Teel et al; 2007). According to this model, people can have multiple perspectives on the significance of wildlife and nature, which can impact their decision-making, behaviors, and relationships with wildlife. In this model the use of domination and mutualism is a way to measure a person’s view on wildlife. Domination is when a human’s well-being should be prioritized over the wildlife.

Whereas a mutualism view sees wildlife as part of an interconnected community, and entitled to rights (Vaske et al; 2011).

The wildlife tolerance model is a way to see how willing a human is to accept the costs of living amongst wildlife. This framework focuses on meaningful experiences, either positive or negative. These experiences are charged emotionally, from when a human has had exposure to a wildlife species. Then there are costs and benefits to this model. Where if the experience is negative there will be a cost, and if the experience is positive then there will be a benefit (Kansky et al; 2016).

In the Netherlands, there have been a few surveys that focused on people's perceptions of wildlife. There has been a survey regarding how the public views the management of wild animals in the Netherlands. This survey was done in Alterra Wageningen UR that focused on the perspective of both members and non-members of Natuurmonumenten, a society focused on nature management. The responses of the survey had varied which could have affected the results. Such as, different groups were either content with the current management of wildlife, potentially resistant, indifferent, or accepting to the management practices. The opinions did differ about how the wild animals should be taken care of in the Netherlands, such as that nature enthusiasts were in favor of making natural areas bigger, and the majority of people agreed to putting down animals that are very sick or hurt. The perspectives of highly engaged individuals with wildlife and resistance to the changes in management practices were farmers and welfare advocates (Buijs & Langers.; 2014).

Another survey was conducted on how different stakeholders viewed large carnivores (fox, wolf, and lynx) in the Netherlands (Van Heel et al; 2017). The stakeholder groups that were focused on were the general public, farmers, scientists, and nature conservationists. The general

public was more supportive of protecting the carnivores, but some had negative concerns on how these animals can impact humans and livestock. The farmers negatively viewed the large carnivores with the concerns of potential conflicts that these animals have on their occupation. Scientists had a more neutral perspective, by understanding that the large carnivores are ecologically beneficial, but could have some possible conflict with humans. Lastly, the nature conservationists had a very positive perception on the carnivores because they see them as important parts of the ecosystem and should be protected.

Both of these surveys gave insights on how some people may perceive wildlife in the Netherlands. However, the surveys did not focus specifically on the coexistence of large grazing mammals in the Netherlands. The survey for this study would like to expand on these previous surveys and look more closely on human-wildlife interactions and coexistence. The focus of this research will combine the knowledge of coexistence, archetypes, and previous surveys to create a better understanding of the diverse perceptions towards large mammals.

The survey for this research will then include questions on perceptions of coexistence and attitudes towards wildlife while interacting with large grazing mammals. This will include questions the partners would like to see on the survey from the interviews. Then to use the conceptual framework to involve how the tolerance model, and archetype model can create a scale of coexistence perception. Also to use similar surveys as a point of reference on human-wildlife interactions, to help structure and create questions. Then also include literature that focuses on human wildlife interactions and coexistence to help build questions as well.

As for the design of the survey the psychometric model will be applied. This consists of steps to be applied in the design of a survey in order to create a valid and reliable measure. In total there are 10 steps. In this research project the first four steps will be applied. (Nyyssölä

2024). The first step is defining the objective and measuring the stakeholders perceptions on human-wildlife interactions. The second step is to rationale the questionnaire by scaling what level the stakeholder falls under (Figure 2). The third step is item generation, which is to generate a cluster of items to create a scale to measure coexistence and human-wildlife interactions. The fourth and final step for designing this survey will be to do a pilot test, to test if the survey of the items are suitable for representing the overall goal of understanding the stakeholder's perceptions on wildlife, and if the survey is measuring coexistence. Considering the time length for this study, the pilot will be done in future studies.

Psychometric Model Steps
1. Defining the Objective
2. Rationale of the questionnaire
3. Item Generation
4. Pilot Testing
5. Statistical Analysis
6. Standardization
7. Reliability and Validity Assessment
8. Culturally free language adoption
9. Regular Updating and Review
10. Legal and Ethical Considerations

Figure 2. Steps 1-4 are the only steps used during this research. 1. Define the objective of the perceptions that stakeholders may have towards wildlife. 2. Rationalize where the stakeholder may fall under, according to the levels of the frame. 3. Create items that can be measured in a scale for the perception of human-wildlife coexistence. 4. Pilot test the survey, but for this study the time was not long enough so the pilot will be done in the near future with a different masters student.

3. Conceptual Framework

The conceptual framework for this research combines both the tolerance, acceptance and coexistence study (Glikman et al; 2021) and the eight archetype study (Carter and Linnell; 2023) studies, as mentioned in the previous chapters. Combining these studies to make a singular framework will help guide the research to understand the different perceptions of coexistence amongst the stakeholders in the Netherlands.

The tolerance, acceptance, and coexistence study (Glikman et al; 2021), can be seen in a visual representation in Figure 3. The study is designed to define how people view the terms of *tolerance*, *acceptance*, and *coexistence* in regard to human-wildlife interactions. The terms are placed in a ranking, where *coexistence* is placed in a more positive position then compared to *acceptance* and *tolerance*. Acceptance is characterized just one level above tolerance, which implies that it is advancing towards coexistence. Acceptance also shows that it acknowledges the value of wildlife, while tolerance is in a position that is more unassertive of agreeing to disagree. Coexistence is portrayed as the most positive (harmonious) outcome, since it indicated a state of cordial coexistence between wildlife and humans (Glikman et al; 2021).

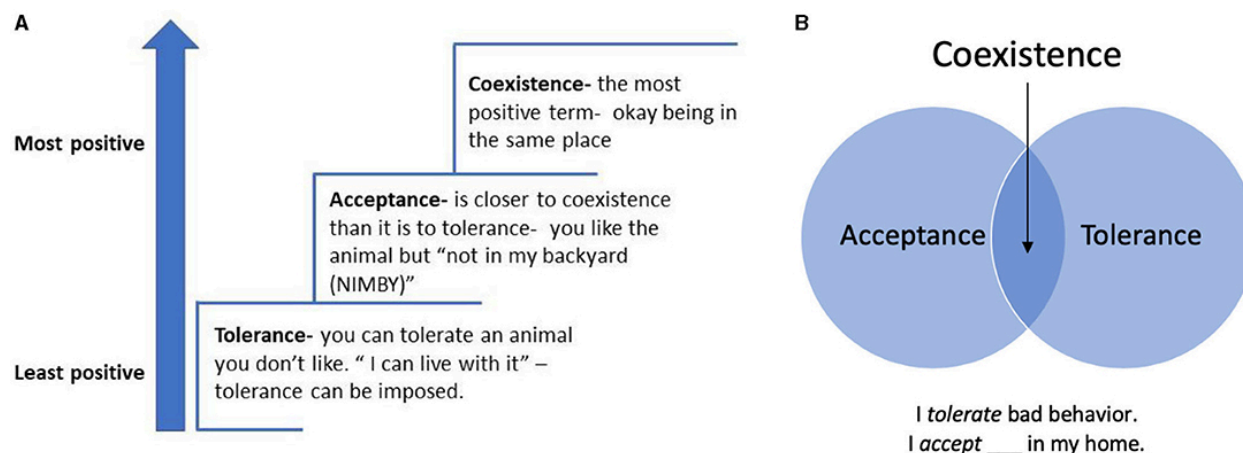


Figure 3. This figure above shows the ranking of how people view the terms tolerance, acceptance, and coexistence when involved with human-wildlife interactions (Glickman et al; 2021 page 3). **Part A** is framed from tolerance as least positive, then more positive is acceptance and most positive is coexistence. **Part B** is the same as Part A showing the function of whether a person will tolerate, accept or coexist with an animal in their home or the animal's bad behavior.

The eight archetype study (Carter & Linnell; 2023) focused on various types of outcomes that humans can have when they interact with wildlife. Figure 4 shows the archetypes that are divided from not consistent with coexistence to being consistent with coexistence.

Starting from the least consistent with coexistence, the archetype is the *zero-sum losers*. This is when wildlife populations decrease from the increase of human development, which is where a human may gain profit but results in a loss for the wild animals. An example explained in the study was how some amphibian species populations can not adapt to the new landscape that humans have developed, such as what was once a habitat for an amphibian is now used for agriculture for people. Next is *eradication*, where humans purposely eradicate wildlife from areas, seeing the wildlife as competition or a threat. This archetype usually focuses on larger carnivores such as wolves and bears, and by hunting these animals to give space for human land usage and for safety purposes. *Reciprocal damages* is when negative impacts only happen near the border of protected landscapes due to human-wildlife interactions. An example of this archetype in the study mentioned how in Montana and Idaho the gray wolf populations have

increased and had caused harm towards people's livestock which financially hurts the people, but then consequences to lower the wolf population hurts the wolf. An example of this would be the wild boars in the Netherlands, where when people do recreational activities too close to a boar's habitat then they could get physically hurt by the animal (Mayer 2013). Lastly, that is least consistent with coexistence is *sporadic nuisance* is when wild animals are either ignored or tolerated by humans, but people's actions do not exactly affect the species populations. As mentioned in the study, raccoons are an example where this animal is well adapted to the urban lifestyle by being intrigued by human food. The raccoon may cause some property damage or transmit disease but people take little to no action towards these animals, and do not affect the raccoon population. Another example in the Netherlands is the beaver, where this species of animal is very beneficial for the landscape by building dams and helping other animals in the ecosystem such as fish and birds. Although beavers have been known to have their dams flood over farmland and destroy crops which can make local human populations frustrated and want to reduce the beaver population (Didde).

Then to be more consistent with coexistence there is *tolerant synanthropy*, which is where wild animals continue to live in a shared environment, but can only adapt to a certain limit due to human disruptions (Carter and Linnell; 2023). In the study it mentioned barn swallows as the example, where these animals benefit from urban buildings to nest upon, and humans find these birds to be charming and help reduce insects. Next is *fragile stability*; this is where wildlife presence depends on keeping the interactions with people without big changes, and it can be easily affected by quick shifts in the environment and society. In the study they mentioned that bats fit this example, where humans and bats do not bother one another but if the landscape were to change then the bat population could face a decline. *Conservation reliance* is when policies

and actions are implemented to lower the negative impacts on wildlife and create species perseverance. The California condor was mentioned that it was on the population decline from either being poisoned by pesticides or hunting and by implementing conservation is the only form to keep this wild animal alive. The last archetype that is more consistent with coexistence is, *sustained co-benefits* is when the financial profits come from conserving wildlife to help promote lifelong coexistence for both wild animals and humans. In the study the moose in Scandinavia was mentioned to fit this archetype where the people in this area find the moose to be a cultural importance, and brings in money to the community by tourism and hunting. These archetypes are always shifting throughout time, depending on political, environmental and socioeconomic factors. Stakeholders can move from one archetype to another depending on these factors (Carter and Linnell; 2023).

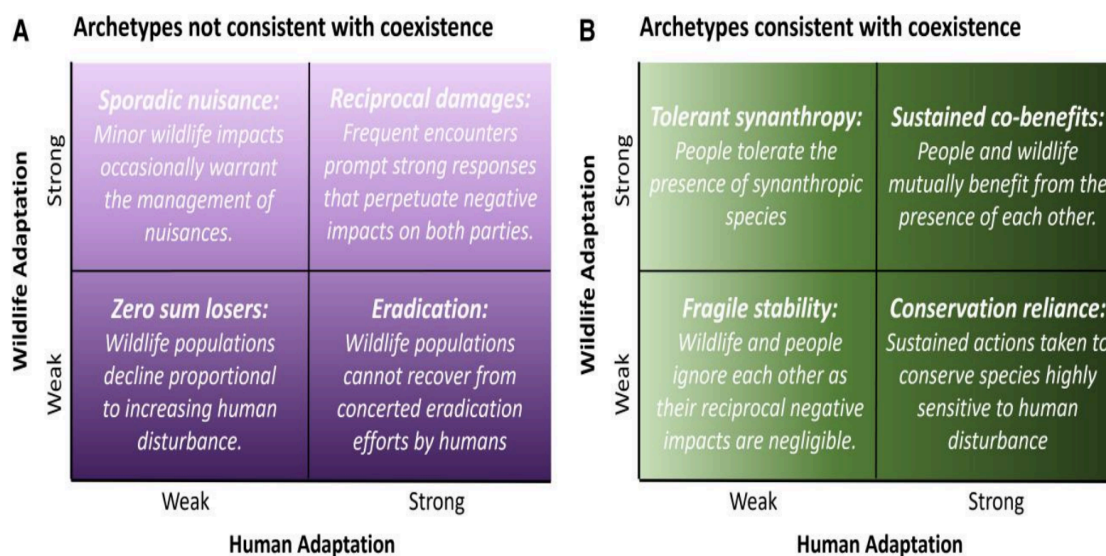


Figure 4. A visual representation of the different archetypes that show either not consistent and consistent with coexistence (Carter & Linnell; 2023 page 2). **1.** In the purple quadrant is when humans and wildlife are not willing to live with one another because of certain conditions (not consistent with coexistence). **Zero sum losers** is when humans choose the landscape for their own benefits and not for the wildlife. **Eradication** is when humans feel threatened by wildlife and reduce the animal population in the environment. **Reciprocal damages** is when wildlife

affects humans by damaging people's property to a certain extent and then that animal species is then removed from their area. **Sporadic nuisance** is when wildlife is typically involved in urban areas but their activity is not too detrimental on humans. **2**. In the green quadrant is where humans and wildlife are more willing to live with one another by implementing specific management (consistent with coexistence). **Tolerant synanthropy** is when humans and wildlife can live amongst each other and the wildlife can benefit from human made environments. **Fragile stability** is when humans and wildlife can live amongst one another in a neutral setting, but if any disruptions or changes to the environment were to happen can affect the wildlife species. **Conservation reliance** is when the help of humans are needed to help preserve a wild animal species in order for it to thrive in the current environment. **Sustained co-benefits** is when both humans and the wildlife can thrive and benefit from one another by sharing the environment.

Now, combining both of these models can create a conceptual framework for the WildlifeNL study to understand people's perceptions of wildlife in the Netherlands on coexisting with large grazing mammals. As seen in Figure 5, is tolerance, acceptance, and coexistence model combined with the archetype model. The archetypes have been divided into either tolerance, acceptance or coexistence, with an additional no coexistence category. The *no coexistence* category fits the *zero sum losers*, *eradication*, *sporadic nuisance*, and *reciprocal damages* since these archetypes keep humans and wildlife separated in the environment. Then the *tolerance* portion includes *fragile stability*, since this archetype shows neither benefits for humans and animals, but can still share some of the environment together with lower repercussions. Next is *acceptance* which fits the archetype of *tolerant synanthropy*, because it accepts sharing the landscape with wildlife, but if big changes were to happen to the environment it could have some effects to the wildlife persisting. Last is *coexistence*, which fits both *conservation reliance* and *sustained co-benefits*, because this is where policies are implemented and financial gains are benefited for both humans and animals when they live in harmony in a shared area.

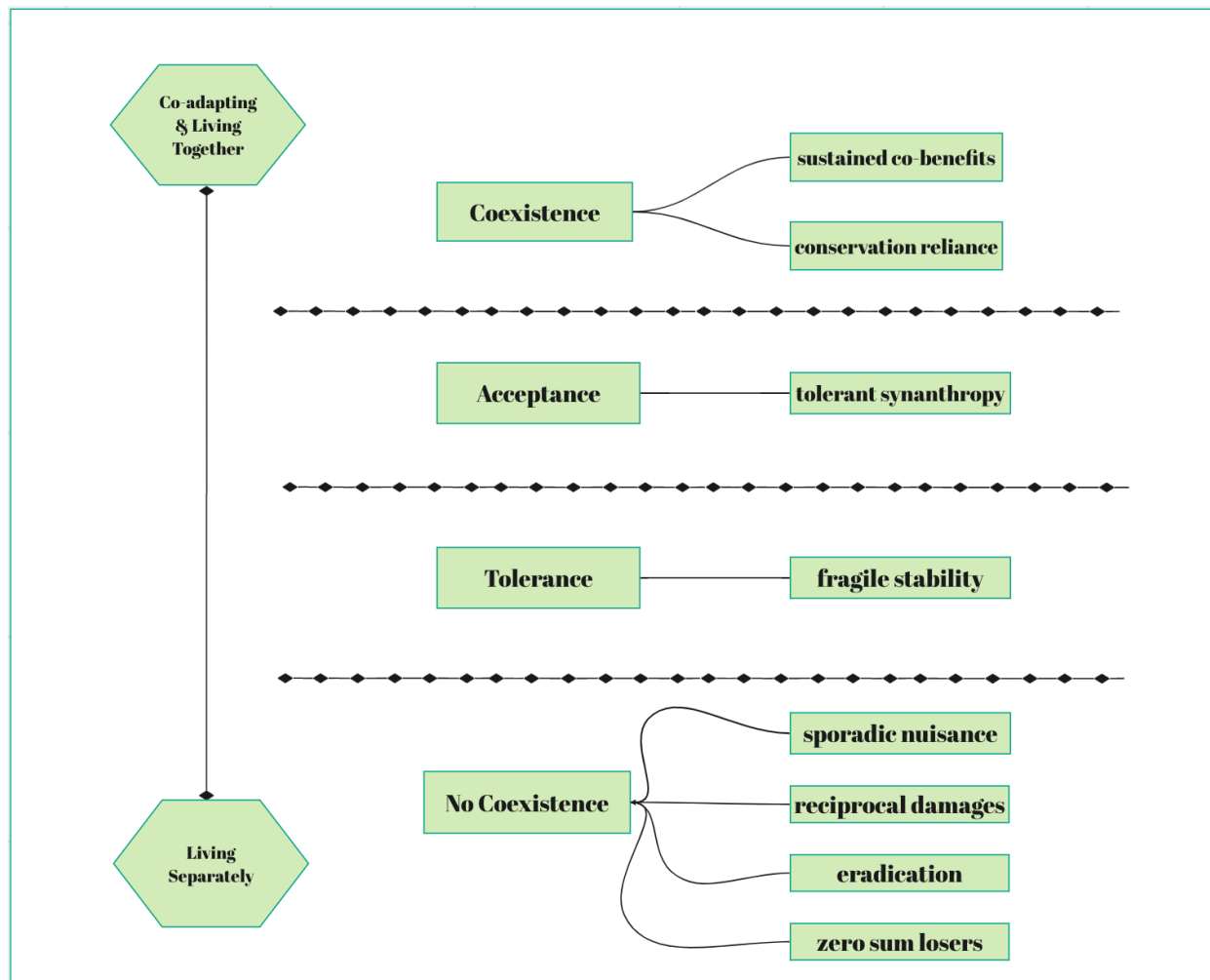


Figure 5. A framework that consists of no coexistence to coexistence, and holds the properly placed archetypes in each category.

Each section has a dotted line between one another, since this will represent the threshold of where a stakeholder might be comfortable with living and sharing landscape with wildlife. The scale is not ranked by negative to positive, but ranked from willing to not share and live amongst wild animals, to willingness to co-adapt and live together.

The survey will then include questions to help find where the stakeholders would be placed on this scale, and they also could have more than one archetype to describe how they perceive and manage wildlife. To measure the scale of coexistence this would consist of questions to see at what point that wildlife is able to share a certain area without any

consequences. For example the willingness to share a recreational area such as National Park Zuid-Kennemerland, but not the willingness to share their personal garden with wildlife. The WildlifeNL is interested to see where the stakeholders set their boundaries with large grazing animals, and to see what level of coexistence they might be.

Level of Living with Wildlife	Archetype/Level	Definition	Animal Example
8	Sustained co-benefits/ Coexistence	when both humans and the wildlife can thrive and benefit from one another by sharing the environment. An action towards land management that benefits both the human and wildlife.	Planting plum trees and letting the woodpeckers use the trees and as well for scavenging food.
7	Conservation reliance/ Coexistence	when the help of humans are needed to help preserve a wild animal species in order for it to thrive in the current environment	California Condor needs human aid in order to keep species alive in the wild
6	Fragile stability/ Tolerance	when humans and wildlife can live amongst one another in a neutral setting, but if any disruptions or changes to the environment were to happen can affect the wildlife species.	Bats rely on the current environment status to thrive, where any disruptions can cause a population decline.
5	Tolerant synanthropy/ Acceptance	when humans and wildlife can live amongst each other and the wildlife can benefit from human made environments	Swallows depend on man made buildings for their reproductivity. They do not bother humans and vice versa.
4	Sporadic nuisance/ No Coexistence	when wildlife is typically involved in urban areas but their activity is not too detrimental on humans	Netherlands beavers can create new ecosystems with their engineering skills, but can cause flooding and damage to nearby farmland.

3	Reciprocal damages/ No Coexistence	when wildlife affects humans by damaging people's property to a certain extent and then that animal species is then removed from their area.	Wolves that can become a threat in a shared landscape in the Netherlands but are protected.
2	Eradication/ No Coexistence	when humans feel threatened by wildlife and reduce the animal population in the environment	In The Netherlands, wild boars can physically harm and damage people and their property if too close, and are known to be culled to reduce swine flu. Muskrats cause holes in dykes and an invasive species
1	Zero sum losers/ No Coexistence	when humans choose the landscape for their own benefits and not for the wildlife	Frogs can be in danger when their habitat is taken over for urban development.

Table 1. This table helps define each archetype and level of human-wildlife perception from the conceptual framework (Figure 5).

Main research question:

- ❖ What are the diverse perceptions and attitudes towards co-existing with large mammals in the Netherlands?

3.1. Sub-questions:

- ❖ How can we define coexistence with large grazing mammals in a densely populated area like the Netherlands?
- ❖ How can we best measure different perceptions on coexistence in the Netherlands?
- ❖ What perceptions on coexistence are there in the Netherlands, particularly among the stakeholders in the WildlifeNL project?

The sub questions were derived from questions that WildlifeNL was particularly interested in. The Netherlands is densely populated, so this only allows a certain amount of space for large grazing mammals. It is important to understand how this can be defined, and how people and wildlife can share the landscape in harmony. The last two sub questions work alongside one another, on how this study measures different perceptions, which will be completely measured in the final survey responses. Then by interviewing stakeholders and implementing the survey this can get a deeper knowledge of what the perceptions are in the Netherlands that are focused on human-wildlife interactions.

Methodology

4.1. Study design/Case selection

The aim of the survey is to see the different perceptions that stakeholders have on large grazing mammals in the Netherlands. The population of the study consists of stakeholders that work in the organizations of Ark Rewilding Nederland, Natuurmonumenten, PWN, and more (Figure 1) (Annex- Stakeholder's List). The stakeholders are already involved with WildlifeNL because they all agreed to be part of the WildlifeNL project to help bring coexistence to the Netherlands, and were recruited through email and scheduling for interviews. The aim is to design a survey with which the opinions of people can be measured regarding the coexistence with large mammals in the Netherlands and understand the threshold of where humans and wildlife can share an environment peacefully.

It is chosen to design a survey for the following reasons which include getting a general understanding of where each stakeholder's perceptions lie, and then the WildlifeNL project uses the data collected to create a foundation for their future research in the project. Overall the

survey is a good starting point to understand the stakeholder's current perceptions on human-wildlife interactions.

An expert meeting was held with the project leaders of the WildlifeNL to go over the conceptual framework. The focus of the meeting was to clarify each level of the conceptual framework and to formulate how the survey should be written. Then to help formulate questions to be asked during the interviews.

4.2. Data collection

The study collects data from the stakeholders, to understand their perceptions currently on wildlife coexistence. The design has a qualitative approach, where it gains a more comprehensive understanding of the partners thoughts. The interviews have a select amount of stakeholders. The interviews are semi-structured consisting of seven partners to gain insight of what they would want to see in the survey. Then there will be a more clear understanding on how to create and implement the survey. Only seven partners were interviewed out of the many that are affiliated with the WildlifeNL project, because of schedule availability. The target was to get a variety of backgrounds from the stakeholders such as agriculture, nature conservation, forestry, and hunting.

Interviews were conducted with seven stakeholders that are partnered with the WildlifeNL project, and will remain anonymous. They were contacted by email, and were given a consent form for conducting the interview, and were signed and emailed back. They all received an information sheet of what the interview was going to entail. The beginning of each interview, each stakeholder was also asked for verbal consent. Each interview followed the same interview guide (Annex- Interview Guide), but interchanging one question depending on the

stakeholder's line of work, to get a more diverse understanding. The question that was changed per interview was Dilemma 2 and Dilemma 2.1. Four partners were given Dilemma 2 which focused on deer and vehicle collision. The other three partners were given Dilemma 2.1 which focused on deer eating the vegetation in a person's personal garden. The dilemmas can be seen in Table 2. The dilemmas were developed by implementing real life scenarios that could happen in the Netherlands.

<p style="text-align: center;">Dilemma 1</p>	<ul style="list-style-type: none"> ● A recreational area in Veluwe is closed off from human activities in order to reduce any physical harm to people and pets from the wild boar in the area. Would this disrupt your day for preplanned activities? ● How long would you allow this area to be closed off till it is safe? ● What type of management would you like to see in this situation?
<p style="text-align: center;">Dilemma 2</p>	<ul style="list-style-type: none"> ● Deer have been spotted near the edge of your village, causing the animal to cross the busy roads that you use to drive to work. Which of the following would you consider to help reduce vehicle collision
<p style="text-align: center;">Dilemma 2.1</p>	<ul style="list-style-type: none"> ● Some deer have been spotted in your garden eating some of the vegetation. Are you willing to take the risk of your flowers and vegetables to be eaten? ● How would you handle the deer?
<p style="text-align: center;">Dilemma 3</p>	<ul style="list-style-type: none"> ● The risks of wild cattle when they get too close to agricultural land and farm animals. Or using farmland to reintroduce them, but is that an issue in the Netherlands? ● The wild cattle population is getting really close to agriculture and farm cows. What is

	the best option for this scenario to be handled?
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Table 2. This table shows the dilemmas that were asked during the interviews to the participants. Partners that worked more closely to animal and road collision were given Dilemma 2. Partners that worked closely with vegetation or conservation were asked Dilemma 2.1.

The data was first collected through semi-structured interviews with a select group of stakeholders. This involved partners from farmers associations, hunters associations and nature conservationists, and other relevant groups involved with wildlife management (Figure 1) (Annex-Stakeholder's List). The interviews were done through Teams. This gave more insight into what kind of questions they would like to see on the survey. Then the interviews were deductively coded, on the constructs of the frame to find similar key concepts from the partners. Then afterwards the survey will be structured accordingly. The interviews helped gain input from the partners on what coexistence should look like, and how they understand coexistence.

The interviews were all deductively coded according to the frame of *No Coexistence*, *Tolerance*, *Acceptance*, and *Coexistence* for their responses. Please see (Annex- Coding Guide), for more details of how the interviews were coded. The subcategories of the frame were not used when coding the interviews, for that will be used for the final survey.

4.3. Data analysis

The data analysis is analyzing and checking the aim of the survey from the interviews to look for the familiar topics of what the partners would like to know exactly about coexistence. Then to analyze and check the frame that has been designed for the survey. Then to develop the study it will be analyzing the feedback from the stakeholders on which questions are working or not. This will be done by checking the aim of the survey, analyzing their views on the frame, and

to get information on appropriate items for the survey. Then after all the items and survey have been designed then the possibility of doing a small pilot of the survey to gain more insight.

Also to use surveys that have been done on similar topics to gain inspiration for structure and questions. Then this will be discussed with experts of the final product.

4.4. Ethical considerations

For ethical consideration, WildlifeNL has a data management plan already made. All data will be secured according to the plan (Annex- Data Management Plan). The interview data will be held with confidentiality and anonymity. When the interviews were scheduled, there was informed consent (Annex- Consent Form). All interviews and survey questions will be done without harm, damage or distress.

To ensure reliability, there were seven people interviewed, and the interviews had an interview guide. Each interview was recorded and had notes being taken. The interviewees were given the three dilemma questions, where the second question was changed for half of the partners to get a more variety of feedback. The questions were from the interview guide to ensure reliability. The interviews ensured validity as the interview guide will help capture and create significant information about the stakeholder being interviewed to gain understanding of their perceptions on wildlife.

5. Results

In this section the results are reporting back to the conceptual framework (Figure 5), and the sub questions of:

- How can we define coexistence with large mammals in a densely populated area like the Netherlands?
- How can we best measure different perceptions on coexistence in the Netherlands?’
- What perceptions on coexistence are there in the Netherlands, particularly among the stakeholders in the WildlifeNL project?

During the expert meeting, the results formulated the finalization of the conceptual framework (Figure 5). The framework helped build questions to ask stakeholders during the interview process. The experts mentioned that to coexist is more of a mental state, where animals are happy to coexist with humans and vice versa (Annex - Expert Meeting). Then the question of how to implement that in wildlife management strategies for the future. To move forward from the expert meeting, it helped clarify what WildlifeNL wanted to see on the survey which is grasping the perceptions of stakeholders views on human-wildlife coexistence.

Then for the interviews, quotes have been added from the participants to further explain their perceptions on coexistence and the dilemmas. As for reasons of anonymity the respondents are referred to P (participant) and a number (Table 3) and their background organization is described simply. These descriptions in the table below were given to help keep each participant anonymous along with the organization they work for, but still give some insight of what their background is.

Participant #	Description
P.01	Forestry
P.02	Nature protection and management
P.03	Agriculture and farmers
P.04	Nature conservation

P.05	Nature conservation
P.06	Hunters association
P.07	Agriculture

Table 3. A list of the participants that were interviewed. Each participant is given an identification with the letter P (participant), then a number following. Then a short description of each participant is affiliated with.

The interviews revealed variations of responses to the potential dilemmas for the survey draft. As for the overall result, the interviews revealed that stakeholders all had varying views on human-wildlife coexistence, and how they would respond to each dilemma. When asked how each stakeholder viewed *coexistence*, 5 out of 7 described it in a more or less similar description of the definition of *coexistence*. However when answering the dilemmas, most respondents fell under the bracket of *tolerance* and *acceptance* when talking about human wildlife interactions. This implies that apparently the way of asking the questions on human-wildlife coexistence is relevant. Below this is summarized in (Figure 6) that shows where each participant was categorized according to how they responded to the dilemmas.

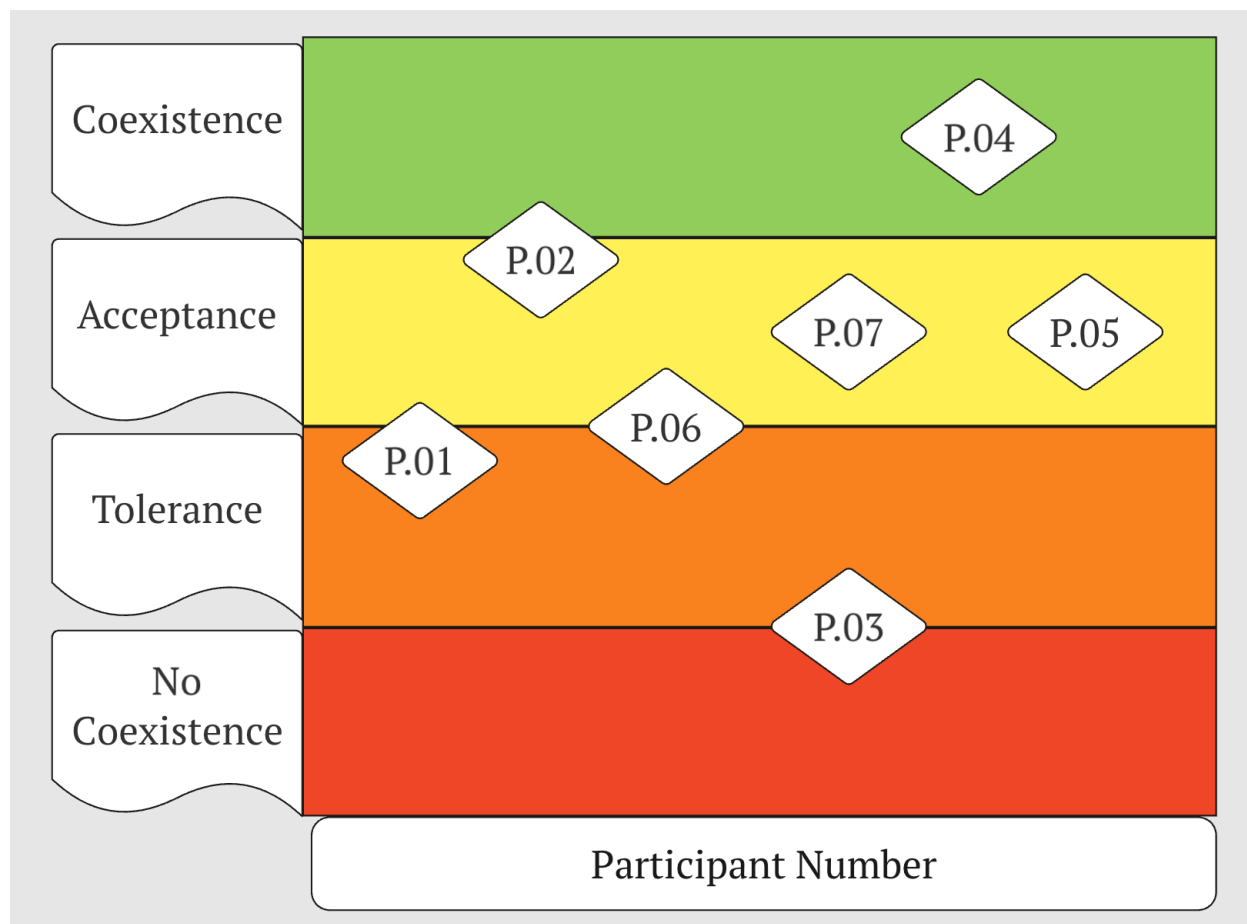


Figure 6. This figure shows a visual summary of where each participant fell on the spectrum of the framework according to their responses to the dilemma questions in the interviews. This is a summary based on the answers they gave. The labels can be found (Table 3). P.01 had more responses to a tolerance level with some acceptance. P.02 had responses to an acceptance level with some in coexistence. P.03 had responses that were equally placed in tolerance and no coexistence. P.04 responded to the majority in coexistence. P.05 responded with a majority in acceptance. P.06 had responses equally with tolerance and acceptance. P.07 had an even amount of responses in tolerance, acceptance, and coexistence but was placed in acceptance overall.

Question on the View of Human-Wildlife Coexistence

The overall finding is described in detail for the perspective of human-wildlife coexistence. The first question for each stakeholder was to give their perspective on the term “*coexistence*” and what it means relating to human wildlife interactions. This helped get a better understanding of the main question of this research: What are the diverse perceptions and attitudes towards co-existing with large mammals in the Netherlands? The responses ranged from tolerance to coexistence.

P.03 response was placed in the category of *tolerance* for this specific question on human-wildlife coexistence, “*In the past, we have lived together with nature and wildlife. That was part of our job in the past million of years or 100,000 of years. So I'm always asking myself, is it realistic to bring back this connection? Is our people waiting for this kind of interaction, because they haven't a totally different mindset about wildlife and being part of it. When people want to be part of wildlife, they will live in forests, in native areas, not in urban buildings, huge villages and cities with a lot of concrete.*”

P.01 response was placed in the category of *acceptance* for this specific question on human-wildlife coexistence, “*But given that coexistence is a way to ensure that there is space, especially in Holland where space is at a premium for both wildlife and humans, and ideally with as little negative impact each way as possible within the context.*”

P.05 response was placed in the category *coexistence* for this specific question on human-wildlife coexistence, “*For me it means that people and wildlife can live in harmony with each other in the same environment. I think there are many different ways to reach this harmony or coexistence, and I think this coexistence or living in harmony is under pressure. And so I think it's one of our main challenges or tasks. I think if we want to give more space to nature, which I think is needed in order to restore resilience to the natural ecosystem.*”

P.04 response was also placed in the category *coexistence* for this specific question on human-wildlife coexistence, “*I notice always when when that topic comes up, I notice that it kind of disturbs me when people think that humans stands like at the top and overrules all the rest of the world, nature wise let's say, and human wildlife coexistence for me means that I will live together. So coexistence, which means that people have to, you know, take a step back to give*

nature space. But also, of course, people need to be safe.” P.02, P.06, and P.07 also had similar responses that placed them in the *coexistence* category.

Questions on Dilemmas

During the interview, each stakeholder was presented with three potential dilemmas that will be written for the survey. The first dilemma (Table 2, Dilemma 1) was given to each stakeholder and was about having a recreational area closed off because wild boar were residing in the area, and could be harmful if people got too close. The question asked was if it would disrupt their day for preplanned activities? Then to see how they would react to this scenario.

P.03 response to this dilemma was *no coexistence*, “*We have farmers around there which have a lot of problems already with the wild pigs and the beaver.*”

P.05 “*I would be annoyed by it or the service and I think it would also reduce my feeling of being part of nature. I would feel like, OK, this is not my area or something. I'm not wanted here.*”

P.07 “*Oh well, I would go somewhere else.*”

P.06 “*Would not disrupt the day, just curious what is happening with the wild boar.*”

P.02 “*Yeah, it would disrupt my experience. Yes, and it would be an unpleasant surprise that I couldn't walk in a certain area. And on the other hand, if there are good reasons for it, I can live with it.*”

P.04 “*I think that me personally I'm quite flexible and I easily take a step back from nature, so if that was my initial plan then I just would look for another plan.*”

P.03 was the only stakeholder to respond with *no coexistence* to this dilemma, where it is more focused on the human's need and not the animals. P.05 and P.01 were both *tolerance* with their response to the wild boar taking the recreation area and disrupting their day. P.02 also felt it

would disrupt their day but was understanding, which placed them under *acceptance* along with P.06 and the P.06. P.04 response was more understanding and giving the boar their space which filled the criteria for *coexistence*.

The interviewees felt this question about the wild boar and recreational areas was relevant in the Netherlands, or perhaps using a different species for example such as the European bison. They all wanted the dilemma to be more detailed as to why the area is closed off, and for how long it will be closed off. This would change everyone's answers, because a few days to a season, to a year of the area being closed off would have a different response from each person. Where someone would be okay with the area being closed off for a few days, but would not be okay with it being closed off for a season. Overall every stakeholder responded that educating the general public on how to safely walk amongst wild boar is something they all desired.

P.01: *“Definitely educate people and on how to deal with the boar behavior, but also on which human behavior is desired.”*

P.06: *“And if it's just because of the interaction between human and animal, and try to educate people to avoid the conflicts.”*

P.03: *“So education in this case, how to act and react, is a very important management tool for the environment.”*

The next scenario was given to one half of the interviewees and the dilemma was focused on deer and road collision. All three stakeholders that were asked this question all agreed that reducing the speed limit would be the best option to reduce vehicle collisions with deer.

P.01 *“And personally my feeling is that lowering the speed is the most effective. And the most effective thing to do, but it's also one which is very difficult to actually implement.”*

P.06: *“There is a relation between density and a collisions, so if you want to avoid collisions, You can do something about the density or you will make protection of the animals along the road, by having an ecoduct (a natural bridge)”*

P.07 mentioned that fences could be built but the deer and other large grazers will just find their way around the fence. A current solution is to have ecoducts which are natural bridges for wildlife to use to cross over a busy road safely. P.01 suggested restructuring the road where the driver has to slow down naturally.

The dilemma that was given to the other half of the interviewees was deer entering your garden and eating the vegetation.

P.02 *“I will be very pleased if the red deer are in my garden from one hand. I think it would create too much conflict if they enter my garden constantly. So then I would fence off my garden.”*

P.04 *“Fine with deer in garden eating vegetation.”*

P.05 *“Would allow deer to eat from vegetable garden. No, I think when it would be in the garden, like a lot of times, I would take measurements like in the fencing or just to make sure that it kind of ends in the garden.”*

P.03 *“As a village person often as inhibitor of this area, I don't think that there's a big deal.”*

The dilemma stated above with deer entering one's personal garden was given to half of the interviewees. These four respondents are: P.02, P.03, P.04, and P.05 all have agreed to have deer enter their garden which indicates *coexistence*. But 3 out of the 4 partners would however build a fence to reduce damage to their vegetation which placed their response more of *acceptance*.

P.03 was content with having a deer in their garden from a personal perspective, but from a farmer's perspective it was more of *no coexistence*. *“But for farmers, it's your money is destroyed. You have to live off this crop, there will be a not a zero tolerance but there still there is a compensation of this reduction of drop or production needed. You won't accept that wild animals will destroy this crop.”*

The last dilemma that was asked to each interviewee besides P.03, was focused on the wild cattle in the Netherlands and if there is a problem of them damaging or disrupting agricultural areas.

P.07: *“I don't think that there's much of an issue with agricultural damage. Because they don't roam freely. With safety for recreation for tourists, that is sometimes an issue, but it's also a matter of educating people well and discouraging behavior that provokes animals to become aggressive or get too close.”*

P.01: *“So everywhere cattle kept behind fences, so that would not be a situation which would happen in practice. And we have one or two areas where we have cattle grids and signs and everything and cattle are allowed to cross the road, but those are generally problem spots in the sense that people feed the cow and then they have damage to the cars because at least to the people who don't feed them, the cattle come and they're generally mixed with horses also.”*

P.06: *“I think wild cattle is useful behind the fence. I'm not fond of wild cattle. They use special types of landscape and we have our own cattle.”*

All six of the partners explained how the wild cattle live behind fences and do not interact with farm animals or agriculture. Two of the partners did describe that educating safety to people on how to be around the cattle is important.

In the interviews a question was asked to formulate ideas for dilemmas that they would like to see on the survey. This question is formulated in order to explore the partners ideas on dilemma's and also receive their input in the final survey to be designed on the basis of the outcomes of the interviews.

The responses followed:

P.01: *“So people just visiting an area and especially people with dogs, because the dogs tend to trigger more defensive behavior from the cattle. Not always, but people with dogs in Holland are not very good at keeping them on the leash, so the dogs will chase the cattle and the cattle will get stressed out and then the next time they see a dog, they all react defensively, which can lead to dangerous situations.”* This respondent had suggestions for people to not get too close to wildlife, because this can cause conflict and aggravate the wild cattle. They wanted to see a dilemma that can explore why people might leave their dogs off leash.

P.02: *“How do people respond to areas that are closed off to European bison?”* This was brought up because European bison are another large grazing mammal in the Netherlands, and this stakeholder would like to understand people's perspectives on it.

P.03: *“People will accept deer in the garden, but what if its another animal like a wild pig or wolf?”*

P.06: *“We've talked about not to have the Wolf and the Beaver in the project, but the wolf will come during the project, so in the next seven years there will be wolves in the Kemper and there will be wolves in (another nature area in Netherlands) that we will have wolves. The question is what are we gonna do when they arrive? How to do we put him in our survey and the whole project. You have to anticipate on it.”*

This respondent, P.06, was concerned about the wolf slowly migrating back into the Netherlands and there has not been any definite answers on how the wolf will be managed. So this respondent would like to see how other stakeholders would respond to this dilemma.

P.02 also mentioned putting a dilemma of the wolf in the survey on how the wolf approaches people and their dogs in the northwest of the Veluwe, and to understand people's reaction from this. It seems to be a topic that three of the stakeholders are interested in, and mentioned they are part of the grazing ecosystem, even if they are not a grazer themselves.

P.06: *“Where is the balance of letting animals be free and humans being the predator to maintain populations?”*

This respondent wants to know how much freedom wildlife should have, since grazing mammals need a predator to maintain their populations, and people could be that predator.

P.07: *“When wildlife is not looking well kept. What point do you intervene? People don't like to go to a nature area and see an animal that looks like a horse or a cow suffering. So how do you deal with that?”*

This respondent mentioned that when leaving wildlife to maintain themselves, it does not work very well, and leaving the general public worried about how wildlife is being looked after.

The findings found in these interviews showed different ideals when living and managing wildlife. P.03 was more focused on the livelihood of how people survive from farming and agriculture, and was placed in more of the *no coexistence* and *tolerance* category. Whereas P.04 comes from a nature conservation organization and was more aligned with sharing the landscape with wildlife, and would rather curate management to mainly benefit the wildlife, hence this partner was placed more in the *coexistence* category of the frame. P.02 bordered *acceptance* and *coexistence*, this was because when faced with the dilemma of allowing a deer in their personal

garden, they felt the need to fence most of their garden off so the deer would not eat all of their vegetation.

The other four partners P.01, P.05, P.06, P.07 all bordered more closely to *tolerance* and *acceptance* with their responses. P.01 P.06 and P.07 were adamant to keeping wild cattle fenced in, and to educate people to not get too close to these animals, especially feeding them. P.06 said they were not fond of the wild cattle, because it is not perceived as a local species and would rather have roe deer and bison graze in the Netherlands landscape. P.05 only mentioned how the wild cattle is fenced currently, but when asked about the deer in their garden, they responded with protecting their garden with a fence eventually.

While the overall question on asking about formulating ideas for dilemmas, it shows clearly that it yields the answer on different dilemmas that are relevant in the Netherlands, the specific dilemma questions give a more of a different picture. Also the respondents are able to come up with dilemma's themselves, indicating that they recognize the topic of the dilemma in relation to the discussion of human-wildlife coexistence. As the dilemma's are supposed to have the function to yield more differentiated views, and to let people reflect on the views, the results indicate that this may be the case. For instance the results indicate that the picture resulting from the dilemma's discussion can be set aside the overall general view question and this may trigger further reflection among participants.

The interviews revealed different perspectives to the dilemmas. Each participant tried to answer as a spokesperson for their organization that they worked for, but also responded from their own personal perspective. Their responses were all useful for developing the survey further as it gave insight into other possible answers to the dilemmas, and also helped create new dilemmas that were not thought of from the start.

These interviews were used as a tool to help draft the survey for proper dilemmas and to get a better understanding of potential statements to be asked. All partners agreed that having this survey drafted would be a good idea, but they would like to see the survey be implemented to the general public after being issued for the partners.

6. Discussion

Human-wildlife coexistence is the objective for the WildlifeNL project. In this research it focused on a select number of stakeholders and their current perception on coexisting with wildlife. After gaining insight from the interviews from the stakeholders, it helped structure the draft of the survey that the WildlifeNL will finalize with a future master's student, and then implement it as a tool to gain further insight on more of the stakeholder's perceptions, and eventually the general public.

The findings from the interviews have found that even though the stakeholder's understand the definition of human-wildlife coexistence, their answers to the dilemmas have placed their current perception closer to *tolerance* and *acceptance* towards wildlife. The dilemmas were written to help gain an idea of how the partner's manage and live with large grazing mammals in the Netherlands. In the conceptual framework (Figure 5), it was categorized into four sections with people preferring to live separately from wildlife, *no coexistence*, then slowly allowing animals to live amongst humans but with repercussions, *tolerance*. Then eventually sharing more of the landscape with wildlife, *acceptance*. Then lastly having human's and wildlife living together in a shared landscape, *coexistence*. The dilemmas that were given to the interviewees were focused on these four categories when analyzing the partner's responses.

Overall what was found was that each stakeholder viewed human-wildlife interactions differently, but the majority fell in the category of *tolerance* and *acceptance*. Some partners valued wildlife mainly in natural areas that they share as recreational spaces for people, but when confronted with wildlife being directly in their own garden is when the partners would build a fence to protect their vegetation. An important finding in this study is that the respondents do not have one unanimously shared view. The respondents were categorized within *tolerance* and or *acceptance*, which the WildlifeNL consortium can use to strategize how to move their stakeholders higher on the framework towards humans and wildlife living together.

To answer the main research question, it was found that there are diverse perceptions from the stakeholders towards coexisting with large mammals in the Netherlands, that mainly ranged from *tolerance* to *acceptance*.

Based on the findings of this study the conceptual framework seems useful to measure different perceptions on coexistence in the Netherlands (Figure 5). Stakeholder's and the general public can be placed in a level of the frame from their final survey responses, which can give the WildlifeNL a foundation of how to go to the next steps with wildlife management strategies. So far the perceptions on coexistence, particularly among the stakeholders in the WildlifeNL project is *tolerance* and *acceptance*, but with the survey will gauge more perceptions from more stakeholders rather than the seven that were interviewed. This will be tackled by sending the survey to all of the stakeholders and their members. This will get more input from more of the consortium that is involved with this project. Then eventually send the survey to the general public, since the stakeholders commented that they want to know what the people in the Netherlands view on human-wildlife coexistence.

How can we define coexistence with large mammals in a densely populated area like the Netherlands? The Netherlands is a unique landscape with a high density of people and wildlife. So the stakeholders had different perceptions on how to coexist with animals, especially when the country is already very urbanized (Hamers & Piek, 2012). According to the responses, wildlife should be valued and have a place to live, but not necessarily sharing someone's personal garden. The partner from agriculture and farming, had the concern that these grazers would damage the farmer's property and lose money on their production and livelihood. The partner from forestry had concerns of human-wildlife conflict with people walking their dogs without a leash and disturbing the wild cattle in recreational areas. Deer and vehicle collisions were mentioned due to the high density of roads and vehicles. It shows that creating a strategy and creating a solution to this problem of density. This can be in the form of either reimbursing costs to the farmers, educating people about how to interact with wildlife, and building ecoducts.

The interviews showed similarities to the survey responses about large carnivores in the Netherlands (Van Heel et al; 2017). The partner in this current WildlifeNL study, that was associated with farming, had concerns with wild grazing mammals damaging crops. In the carnivore survey (Van Heel et al; 2017), the farmers had a similar response but to the carnivores attacking the livestock which was concerned for the livelihood of the farmer. In this WildlifeNL study, partners that were part of nature conservation organizations viewed the large grazing mammals as important for the ecosystem, whereas in the carnivore survey response (Van Heel et al; 2017), the nature conservationists said the same thing about carnivores being essential for the ecosystem.

Referencing back to tolerance being more focused on human-wildlife conflict, and creating a mindset that is not suitable for human and wildlife interests (Pooley et al; 2021). This

seems to come back into play when interviewing the stakeholders. Regardless, the stakeholders are leaning within *tolerance* and *acceptance* in the frame, but this could be from how previous literature and research focused on “conflict” rather than “coexistence” with wildlife. So as further studies and research progress with the view point of “coexistence” this could also change how stakeholders perceive large grazing mammals.

The dilemmas were a work in progress and the interviews helped get feedback on if the dilemmas were relevant in the Netherlands, and if they had any dilemmas they wanted to see on the survey that they might experience in their line of work. It showed that the wild boar in a recreational area and being closed off was relevant, but the participants all responded that the dilemma was quite vague and needed more information. So for the survey draft, the question was reworded, to have the recreational area closed off because it was occupied by wild boar and new piglets, and they need the space to not be disturbed (Annex - Survey Draft). Both deer dilemmas of vehicle and road collision, and entering the garden, remained the same for the survey as it was clear and relevant. The wild cattle dilemma was not relevant, because the current management practices have these cattle fenced in and would not disturb or damage agricultural areas. The recommendations for other dilemmas were dually noted and some were implemented into the survey (Annex - Survey Draft).

When interviewing the partners, the dilemma of the wolf kept being mentioned. It seemed to be a topic that the stakeholders wanted to address. Even though the research was focused on perceptions of large grazing mammals, wolves have a direct relation to grazing (Frank 2008). The wolves have been migrating into the Netherlands from the north and south of the Rhine-Ruhr metropolitan area (International Wolf Center. 2024), and this has caused some questions on how to manage this predator. The wolf can cause damage to the farmers livelihood

by killing their livestock (Muhly & Musiani 2009). As seen in many news outlets, the wolf has become a topic that is being discussed. However, since the Netherlands lack natural predators, the wolf can help by reducing and balancing the wild grazing mammal population. By having a predator, such as the wolf, this can be beneficial to the ecosystem (Weiss et al; 2007). After having multiple discussions on the topic of the wolf, a dilemma was placed in the survey.

In the tolerance, acceptance and coexistence study (Glikman et al, 2021), they discussed how the terms *tolerance* and *acceptance* were perceived closer to one another than to *coexistence*. When making the framework and incorporating these levels of human-wildlife interactions, it also showed some difficulty placing certain perceptions in a defined level. But with the findings, a person can be in multiple levels simultaneously with their perceptions of wildlife. The study of the eight archetypes (Carter & Linnell, 2023), will be more relevant with the conceptual framework when analyzing the survey responses in the future. The survey responses will be placed in a more specific category amongst the four levels of human-wildlife interactions.

There were some strong points and weak points in this study. The strong points in this study was the ease of building rapport with the stakeholders involved with the WildlifeNL project. The interviews all brought out helpful information on answering the research question, and bringing insight to relevant dilemmas for the survey. Another strong point was the foundation that has been researched previously on human-wildlife coexistence to help build a strong conceptual framework that stakeholder's and the general public can be placed in. The weak points of the study is that not all stakeholders were included in this initial study. There was also possible bias in the interviews since the respondents are issued by wildlife, validity, and reliability. Then the views on the wolf are fairly strong since it is related to current events.

Future research for human-wildlife coexistence on large grazing mammals in the Netherlands is to interview the general public alongside with the stakeholders. This will give more intel on how people in the Netherlands perceive wildlife. Strategizing ways on how to implement wildlife management in a way that wildlife can be on the level of coexistence, where it seems to be on the lower levels of *tolerance* and *acceptance*. The WildlifeNL project should have a world cafe that brings together the stakeholders and the general public, and so ideas and thoughts can be discussed further on coexistence in a structured setting.

7. Conclusion

In conclusion, after reviewing literature about human-wildlife coexistence, creating a framework, and interviewing stakeholders, this has shown there are different perceptions towards coexisting with large mammals, specifically in the Netherlands. The stakeholders kept mentioning about the density of human population and animal population in the Netherlands, especially with vehicle collisions. The strategy to coexist or accept wildlife has several outcomes from the different perceptions. Based on the results of this study, the conceptual framework (Figure 5) seems useful to measure different perceptions on coexistence. This is done by gathering information from stakeholders either by interviews and surveys and connecting them to the frame (Figure 5). The perceptions that were found in the immediate results from the stakeholders that are in the WildlifeNL project, is that there is not one strict category that an individual/organization fits in. It is a gradient of mainly either being tolerable and accepting to wildlife.

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9.1 Annex- Data Management Plan

WildlifeNL

General Information

Name applicant and project number

Name: Ine Dorresteijn
Project number: NWA.1389.20.130

Name of data management support staff consulted during the preparation of this plan and date of consultation.

Ing. Vincent Brunst (v.brunst@uu.nl), 30-05-2022

1. What data will be collected or produced, and what existing data will be re-used?

1.1 Will you re-use existing data for this research?

If yes: explain which existing data you will re-use and under which terms of use.

- Yes

1. Internationally available satellite data and The Land Use Database of The Netherlands will be used. This data is either publicly accessible or available through subscription by Utrecht University. We may also use open geospatial data like monitored noise level, wind speed and other environmental parameters; national park borders or administrative unit borders; and data on human population distribution. These are all offered and maintained by Publieke Dienstverlening Op De Kaart (PDOK, <https://www.pdok.nl/datasets>).

2. We may be re-using historic data from mammal sensors (location and activity data) available for our two living labs (NP Zuid-Kennemerland and Kempen~Broek). This data has been collected by our consortium partners (Bij12, PWN, Smart Parks and Natuurmonumenten) as part of their management activities. Terms of use will be determined and agreed upon at the start of the project. This will follow existing procedures that have been in place and previously supported the use of some of this historic data by University researchers and students of Utrecht University.

3. We will use data from historic and ongoing monitoring of wildlife numbers (e.g., species counts) and wildlife impacts (e.g., crop damage, vehicle accidents, browsing surveys) for our two living labs, and The Netherlands in general. This data is collected by and available through several agencies and parties (Bij12, KNJV, FBEs, Natuurmonumenten, PWN, among others) and databases. Most of these parties are currently already part of our consortium. For each dataset, we will use the terms of use as determined by the organization collecting the data. For some of the agencies, this will involve official application procedures related to the use of datasets that are already in place (e.g., FBEs). The

researchers have a lot of experience with these procedures, and will ensure that all official procedures are followed.

4. Historic and ongoing biodiversity monitoring data collected in our living labs, e.g., from existing monitoring programs on butterflies and moths, dragonflies, breeding birds, flowering plants and other vegetation (SNL monitoring). For this purpose, we will work closely with the partners in our living labs, which are part of our consortium (PWN, Natuurmonumenten) and coordinate biodiversity monitoring in their areas. We will also connect to other key Dutch organizations for biodiversity monitoring, such as Vlinderstichting, FLORON, SOVON, and Zoogdiervereniging. With all these organizations, we will follow their terms of use of the data. Biodiversity data might also be accessed through gbif.org, and the NL localized waarneming.nl, which collect biodiversity observation data (precise location, timestamp, observed species, activity notes, photos) via a very active citizen science community.

5. For WP4 we might use existing data on wildlife governance/wildlife management arrangements and their outcomes, such as on previous collaborations and assessments of management/policy. For each dataset, we will use the terms of use as determined by the organization collecting the data. For some of the agencies, this will involve official application procedures related to the use of datasets that are already in place (e.g., FBEs). The researchers have a lot of experience with these procedures, and will ensure that all official procedures are followed.

1.2 If new data will be produced: describe the data you expect your research will generate and the format and volumes to be collected or produced.

The project will gather various kinds of data, including data on mammal movement and activity, human-wildlife interactions, human perceptions of human-wildlife interactions, the governance of human-wildlife interactions, and dialogue between stakeholders. The data will be collected in The Netherlands, with a focus on two living labs in the Kennermerduinen and Kempen-Broek.

The project will collect/produce the following types of data:

1. Data from structured questionnaires: data collected through the use of structured questionnaires with i) residents and visitors of the living labs to identify drivers of (in)tolerance of different wildlife species; ii) residents and visitors of the living labs on human-wildlife interactions using a mobile phone app as part of a citizen science project; and iii) different stakeholders to analyse relations between actors involved with or affected by wildlife management. File type: CSV or XLS; several GB, some raw data on paper. Main responsible consortium member: UU

2. Data from interviews and focus group discussions: compiled responses of participants to open-ended questions in interviews, focus group discussions and philosophical conversations to understand i) the institutional arrangements influencing human-wildlife interactions; ii) understand human-wildlife relations; iii) expectations and retrospective impressions of different stakeholders; iv) ethical views concerning human-wildlife relations. File type: DOCX; several GB; raw data on audio files. Main responsible consortium member: UU and RU

3. Data from workshops: workshops in the project will be held within the consortium and with consortium members and external stakeholders. Within series of workshops the consortium will establish the i) 'safe transformative space'; ii) co-design ideas for novel interventions; iii) develop a framework for monitoring and integrating the project; iv) regularly reflect on the process; and v) evaluate the program. Workshops with external stakeholders will be conducted to i) co-create governance arrangements; ii) co-create mitigation strategies; iii) develop future scenarios; iv) play the scenarios in the serious game; and v) co-create transformation pathways towards a desired future.

The workshops will be documented through textual documentation of the discussions and outcomes and by recording selected workshops. File type: DOCX, several GB; raw data on paper/audio- and

video-files. Personal data of the workshop participants such as gender, organisation, role etc. will be stored in a spreadsheet (XLS/CSV). Main responsible consortium member: UU, RU, SLU, Fontys

4. Data from dialogue between stakeholders: data collected through the observation of real-life conversations and negotiations between stakeholders. File type: DOCX; several GB; raw data on audio files. Main responsible consortium member: RU

5. Data on wildlife movement and activity: from several larger ungulate species in our two living labs we will collect data on their location and activity through sensors placed on collars on these animals. Data includes GPS location data, timestamps, and activity scores. We will also collect image and video data on these wildlife through camera traps. We may additionally collect data on the presence and activity of wildlife through other sensors, such as passive audio recorders and drone-based cameras. File types: image and video file types, audio files, location data in CSV files, metadata in XLS or CSV; likely resulting in TBs of data. Main responsible consortium member: UU, SLU

6. Data on wildlife impact on landscapes and ecosystems: in both living labs we will collect various types of ecological data related to the impact of wildlife on ecosystems and other land uses (e.g., crop fields), such as biodiversity data, crop damage data, browsing surveys. File types: CVS/XLS; several GBs. Main responsible consortium member: UU, SLU

7. Data generated by the users of the apps that we will develop, WildRadar and WildGids. This will include position data of the phones on which the apps are installed and may include questionnaire data on wildlife and nature experiences filled out by the users of the phones. Any personal data coming out of the phones will be pseudo-anonymized and not be traceable to the individual using the phone without given consent of that individual. To guarantee the quality of the collected data, we will take validation and verification measures before, during and after data collection. Some examples of such measures and best practices are using equipment standards, creating clear instructions and user guides, checking for duplication and outliers, peer and expert review, sample validation against reference data. File types: location data in CSV files, questionnaire data using standard app data formats; many GBs. Main responsible consortium member: UU, SLU, Fontys

1.3. How much data storage will your project require in total?

- >1000 GB

Data collected by the wildlife-sensors and mobile phone apps are large and will exceed 1000 GB. Survey, interview, and workshop data will be small in size.

2. What metadata and documentation will accompany the data?

2.1 Indicate what documentation will accompany the data.

All details on the methodology used to generate the data will be provided in the peer-reviewed publications.

The data from the surveys/interviews/workshops will be accompanied with a read-me file that contains information on the coding scheme used to analyse the data and with the interview/survey guide.

The data collected with the wildlife sensors and mobile phone apps will be accompanied with a read-me file containing a description of the dataset(s) and of the steps taken in processing of the data.

The read-me files will also include information about the author including contact details. For each publication we will also indicate whether the data is public or not, and if made public where it can be found.

2.2 Indicate which metadata will be provided to help others identify and discover the data.

All datasets will be accompanied by rich metadata (adhering to DataCite V4 metadata standard), supplemented by discipline specific metadata. In addition, keywords describing the datasets will be added. The metadata is stored persistently along with the data.

3. How will data and metadata be stored and backed up during the research?

3.1 Describe where the data and metadata will be stored and backed up during the project.

- Institution networked research storage

Digital data (both unprocessed, collected data and analyzed, generated data) will be stored at the servers of the universities/HBO involved in allocated project folders with sufficient capacity, while making use of the central backup facilities. Data storage will adhere to the regulations of the universities involved concerning security and privacy protection. Supervisors will have access to data of PhD candidates, to ensure transparency and prevent loss of valuable data in case of emergencies. Each knowledge Institute will use one shared research drive for all project members to share, store, access and use the collected data during the project.

At the RU, data will be stored at the protected ISIS drive. This drive is only accessible by the RU-researchers involved with WildlifeNL, which contains an authorization structure where only users on need-to-know basis granted access to the data. The ICT-department makes daily back-ups of the drive. At the RU we will mainly store data-types 2, 3 & 4 under 1.2.

At Fontys, data will be stored at the Fontys Research Drive, which is a SURF service, a widely used data management solution within Dutch universities. More information about their practices and policies can be found here; <https://www.surf.nl/en/research-drive-securely-and-easily-store-and-share-research-data>

At UU, data will be stored at the protected UU-network drive. This drive is only accessible by the UU-researchers involved with WildlifeNL, which contains an authorization structure where only users on need-to-know basis granted access to the data. The data is backed up on a daily basis and stored in a data center outside the Utrecht Campus. At the UU we will mainly store data-types 1-3 and 5-7 under 1.2.

Data generated by the the phone-apps will be captured using the EarthRanger platform and preserved in their cloud-service. More information on practices and policies, can be found here; <https://www.earthranger.com/>. Exports of the app data will be stored on the UU-network drive mentioned above.

3.2 How will data security and protection of sensitive data be taken care of during the research?

- Additional security measures (please specify)

Utrecht University has a policy on research data which will also be followed in this project. This policy ensures all research data should be stored on secured storage, protected against unauthorized use and loss of data. We will use facilities that include authorisation and back-up features.

Furthermore, the research data will be subject to the Utrecht University's "Information security policy". We will use data classification; each dataset will be classified according to CIA triad (Confidentiality, Integrity, Availability). Procedures to store and get access to data sets will be set according to the CIA-classification.

In addition special precautions will be implemented when collected data is considered to be sensitive. For example, data that includes dialogue between stakeholders on a sensitive topic or interviews about sensitive topics. For data collected with apps we will use privacy preserving techniques in the (platform) middleware layer. All relevant data will be encrypted before it becomes stored. The Work Package PI of the respective data will hold the encryption key and may share it with a limited number of project partners.

When questionnaires, interview scripts and workshops setups are finalized, but initially as soon as possible the privacy organization of the concerning institute will be contacted to carry out a privacy review, which could be upgraded to a Data Protection Impact Assessment (DPIA). Part of the privacy assessment is mapping the security measures that will be implemented for this research project.

4. How will you handle issues regarding the processing of personal information and intellectual property rights and ownership?

4.1 Will you process and/or store personal data during your project?

If yes, how will compliance with legislation and (institutional) regulation on personal data be ensured?

- Yes

The program will collect personal data about the interview and workshop participants. Participants are identified by a code that reflects socio-economic characteristics such as gender, role, organisation and place of origin. Participants of interviews and workshops will be asked for informed consent after careful explanation of the the research project by signing a consent form. Informed consent will also be asked as a question in the case of data collection through the use of the different mobile phone apps we propose to develop and use in the program.

This research needs to collect some privacy-sensitive personal information in order to better understand the relations between people involved in or affected by wildlife management. According to the General Data Protection Regulation (GDPR), we will inform participants of the purpose of the project and our storage plan in advance, and ask them if they agree to use and store data on our servers (informed consent). We will ensure that data is used in a fair, legal and transparent manner.

This means that since the project involves research with human participants, we will fully encode and de-identify the data before making data open-access. Therefore, their personal information will be stored separately from the original data set, only for management and internal use purposes. In order to create an unidentified data set, a unique identifier will be provided for participant data, and all privacy-sensitive data will be deleted in this particular dataset. Thus, privacy-sensitive data or data that could be traced back to an individual and/or organisation despite the de-identification of the data will not be made publicly available without informed consent. Privacy-sensitive data will only be stored in a dedicated separate folder and will only be accessible to project team members during the project life cycle in a prearranged encrypted form.

This research will also follow the policy framework of Utrecht University research data;

https://www.uu.nl/sites/default/files/university_policy_framework_for_research_data_utrecht_university_-_january_2016.pdf.

Photo's taken during the interviews/workshops that contain identifiable people will not be published without informed consent.

4.2 How will ownership of the data and intellectual property rights to the data be managed?

The consortium agreement outlines the ownership and intellectual property rights of the data that is generated during the research.

This does not apply for data which is directly obtained from partners, such as the historic movement and activity data of animals and animal impact data (see above for all types of existing data) collected by the consortium partners in the living labs before the start of our program.

5. How and when will data be shared and preserved for the long term?

5.1 How will data be selected for long-term preservation?

- All data resulting from the project will be preserved for at least 10 years

All (raw) data collected and produced that are necessary to reproduce the published research findings will be retained for at least 10 years at Utrecht University's data storage environment, Yoda (see 5.5).

After 10 years, data containing personal information will be deleted. A participant can request for his/her data to be deleted earlier.

5.2 Are there any (legal, IP, privacy related, security related) reasons to restrict access to the data once made publicly available, to limit which data will be made publicly available, or to not make part of the data publicly available?

If yes, please explain.

- Yes

The data collected through interviews, dialogue and focus groups/workshops contain personal data and may contain sensitive data and therefore unprocessed data will not be made publicly available. Processed or aggregated data may become available when basic requirements with respect to privacy and security are fulfilled.

5.3 What data will be made available for re-use?

- Other (please specify)

If aggregated results from the data collected in interviews, workshops, and through mobile phone apps will be made publicly available, this will be in the form of an excel sheet or word document. These data are de-identified to ensure anonymity of the participants. As described in 4.1 privacy-sensitive data, or data from e.g. interviews that can be traced back to individuals/organisations may not become publicly available. In this case, we can publish the 'metadata' and provide other researchers with the possibility to request further information from the project PIs. Another exception is when existing data becomes used that is not publicly available, secondary data that directly builds on this may not become shared and preserved as well.

5.4 When will the data be available for re-use, and for how long will the data be available?

- Data available after completion of project (with embargo)

Data associated with published articles will be made available at the time of the article's publication. However, we foresee that some articles will get published after the project is completed. Thus, data will become available upon completion of the project for those results that have been published and otherwise after publication of the respective articles.

5.5 In which repository will the data be archived and made available for re-use, and under which license?

The data will be stored in Utrecht University's data storage environment, Yoda. A persistent identifier (DOI) for data citation purposes and permanent public access to the data will be assigned by Yoda. The Creative Commons attribution (CC-BY 4.0) licence will be appointed to the data to specify the conditions of reuse.

Data collected on animal movement will also be made available for re-use through global Data repositories, such as Movebank (www.movebank.org) and/or EURODEER (www.eurodeer.org). In addition, data that is part of peer-reviewed publications will be made available for re-use through common international repositories such as the Dryad Digital Repository.

Data that is still in paper version (e.g. from questionnaires/interviews) will be stored at the archives of the respective knowledge institutes.

5.6 Describe your strategy for publishing the analysis software that will be generated in this project.

All analysis software, platforms and/or apps that we will generate in this project will be made available in an open source manner. The publication will be accompanied by an appropriate licence, which protects the research project and the source code for commercial use.

6. Data management costs

6.1 What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Reusable)?

The services for long-time preservation of research data, archival and storage are already available and can be deployed by the project. Regarding the expected data volume, no extra costs will be expected which need to be covered by the project budget.

The PhDs and postdocs are primarily responsible for managing their data, where the work package leaders have a task 1. to discuss the best way to manage the data and 2. to monitor the unlocking of the data. For the applied universities, the staff members involved have to fulfill all these tasks. The Core Steering Group will monitor the overall progress of the data management and formulate associated actions.

9.2 Annex- Interview Guide

Background of interviewee:
(Place name and organization here)

Introduction:

Verbal consent to record

Hello and thank you for participating in this interview today. A little about myself, I am Nina and I am a current masters student at VU Amsterdam. I am studying Ecology and Evolution biology with a major in science communication. I am currently in the last year of my masters and I am doing my internship with WildlifeNL with Irma Arts.

So for this interview I want to gain more insight on perceptions of human-wildlife coexistence. This interview will help me build and structure a draft of a survey which WildlifeNL will use as a tool to get more insight from their partners and their partner's members.

Why we thought about this survey, in the consortium workshops talked about different ways to talk about wildlife but we are curious to see if there are other people in your organization that might think differently, to capture all the different viewpoints.

Is this clear for you? Do you have any questions so far?

A:

Assure confidentiality and explain any ethical considerations
"This interview will anonymized"

"I will share the full transcript of the interview with my supervisors. Before I send the transcripts to my supervisors, I will send the transcripts to you and you can add any comments."

"Is that okay with you?"

You will be anonymous on the report itself and all the data will be anonymous, however I will share the data with Irma and the core team of WildlifeNL, as stated in the consent form.

Participants Background:

I want to know a little about your background

So I see you are from [insert organization], can you briefly tell me how you got into this line of work?

A:

What do you do in your daily work?

A:

Topic Exploration:

So, I'm specifically looking at the idea of human-wildlife coexistence, can you tell me what you understand about it?

A:

Specific Themes and Subtopics:

So, I am creating a survey to help understand where a stakeholder's current position on coexistence might be. I have some dilemmas that I would potentially put in the survey. I will read a few of them to see if they make sense to you and would like to see it in the survey.

So the first dilemma is:

1. You have plans to have a long walk in the Veluwe but it is closed off from human activities in order to reduce any physical harm to people and pets from the wild boar in the area. Would this disrupt your day for preplanned activities?

How would you respond to this dilemma if this was you in this situation?

How long would you think this would be okay for this area to be closed off for recreation?

- However long is needed to ensure safety for both humans and wildlife
- A month to a few months
- A week
- A few days
- Wildlife management should remove the boar from the area immediately, so you can continue with recreational activities

3b. What type of management would you like to see in this situation?

- Closing off the area
- Educate people on how to walk around wild boar
- Reduce boar population
- Separate walking paths from boar populations entirely to ensure less encounters
- **What would you add?**
- **What kind of management is being implemented now?**
- **What kind of management would you like to see?**

What are your thoughts on using this dilemma to use in this survey? Is this useful scenario to gain insight into what people are willing to allow, or how to coexist?

A:

Next Dilemma that I was thinking of putting in the survey is:

D.2. Deer have been spotted near the edge of your village, causing the animal to cross the busy roads that you use to drive to work. Which of the following would you consider to help reduce vehicle collision (Erik)

- Lower the speed limit to reduce impact
- Create a fence along the road to keep deer and people safe from collision
- Have wildlife management remove deer from this area entirely
- **What is being done now?**
- **How would you prefer to handle it?**

D.2.1. Some deer have been spotted in your garden eating some of the vegetation. Are you willing to take the risk of your flowers and vegetables to be eaten?

- Absolutely not allow
- Not allow
- Might allow
- Allow
- Absolutely allow

Follow up: How would you handle the deer?

- Call management to remove the deer from your area
- Startle the deer with loud sounds in hope it will leave and not return
- Plant extra flowers and vegetables so the deer can eat
- Allow the deer to come and go as it pleases without changing the situation

Do you think that this is an actual dilemma that happens in the Netherlands? What are your thoughts? Answers diverse enough?

A:

Now lastly, one of the dilemmas that we think we should put in the survey is the wild cattle in the Netherlands. We were thinking of *risks* when they get too close to agricultural land and farm animals. Or using farmland to reintroduce them, but is that an issue in the Netherlands?

What do you think is the main dilemma when we talk about living together with wild cattle?

D.3. The wild cattle population is getting really close to agriculture and farm cows. What is the best option for this scenario to be handled?

- Let the wild cattle roam freely in the area
- Put a fence around the border of the farmland to separate the wild cattle and cows from interacting
- Have wildlife management maneuver the wild cattle population away from the farm entirely
- *Use smart technologies to help manage the wild cattle*

A:

Is there a certain scenario you would like to use to get peoples thoughts on?

A:

Probe: specific dilemma that occurred often at work or people that you engaged with?

“The survey we are thinking of has a couple of these scenarios that we talked about today, and there will also be some statements that will help gain perceptions on the level of tolerance that people have towards wildlife.”

Do you think the organization you work for would find the survey useful to gain insight on your members stance on different perspectives on coexistence?

If yes

Add: Would you put through the use of the survey to send to your members?

Do you think it would be possible when the survey is finished, to send the survey out to your organization and or members?

A:

If no

If you are skeptical of a survey, do you have any other ideas that we can get the full scope of different perceptions of coexistence in the Netherlands?

Ask what is the best way to reach their members? Open to anything?

A:

Summarize and Reflect:

Summarize key points

So today we went over a few dilemmas which consisted of wild boar in a recreational area, deer and wild cattle.

Ask the participant if they have any questions or comments

A:

If we keep developing the survey, Would you be willing to look at the survey and run it as a pilot to give another round of feedback?

A:

Thank the participant

Closing:

Ensure confidentiality

Give contact information

Follow up questions/concerns

A:

9.3 Annex- Expert Meeting

The expert meeting was held in a small conference room to discuss the conceptual framework and brainstorm ideas for the survey. By going through the archetypes and the level of *no coexistence, tolerance, acceptance and coexistence*, the experts helped identify better examples to be used.

In the Carter and Linnel study they used a moose for co-benefits as an example, but the experts were confused on how the moose was benefiting the people. As the discussion progressed, it seemed that co-benefits would be more of an action towards land management that benefits both the human and wildlife. An example was planting plum trees and letting the woodpeckers use the trees as well for scavenging food.

For conservation reliance, an example for the Netherlands was meadow birds, geese and spoon bills. These birds require extra attention and care from people, in order to sustain their population sizes.

They also explained that to coexist is more of a mental state, where animals are happy to coexist with humans and vice versa.

Then the conversation shifted away from the table of archetypes and levels and to think more about how to use the framework for the survey. Joris suggested to keep it simple and focus on the four levels of no coexistence, tolerance, acceptance and coexistence for operational questions. Example of, what drives (insert example of animal in Netherlands) to be from tolerance to coexistence? Then Joris mentioned a paper that uses hypothetical examples, and shows how the baseline can be lifted in certain circumstances (paper: [Lifting baselines to address the consequences of conservation success: Trends in Ecology & Evolution \(cell.com\)](#))

The questions that the experts were discussing was; what type of mindset to change? How to fit coexistence in a landscape? Any other forms of management that could be used? Then they explained how the wolves and beaver populations have changed throughout time and could be at *no tolerance* to *acceptance* over the past decades, as in the shift of the baseline discussed earlier. But, also in previous conversations with the partners, the experts have noticed that carnivores are discussed differently than herbivores. Where carnivores tend to have a more negative outlook. Then also the possible thought that a partner might not tolerate any species.

For the survey, the experts want to know if there are other opinions on coexistence then already captured. Then does one or two people for an association actually represent the entire association's views? Then for the survey itself, Ine and Joris mentioned to have 5-7 questions/statements for each level or *no coexistence, tolerance, acceptance, and coexistence*. The statements can be placed in order from positive to negative. Then later to do horizontal clustering to see if any other partners think the same. But for the survey itself to incorporate scenarios and dilemmas. Also for the statement and questions to have a scale. The statements and questions will vary in different groups of people. Have a series of questions of where does

coexistence stop. For the theory and dilemmas it was discussed of having two spatial scales, either neighborhood vs country, or own property vs the neighborhood.

The experts suggested that the first question on the survey was to ask for five key words what the partner thinks about coexistence. This will help get an overview of how they think about coexistence. But they also mentioned that in the survey to drop the word “coexistence” in some areas, and replace it with “sharing landscape with wildlife” or “living together”.

The suggestions for the future interviews is to test out the pilot questions to see if it is understandable to the partner. This will help validate the questions and how it will work with them and their organizations and members. Then this will help fine tune the survey and then I can send it into WildlifeNL.

9.4 Annex- Consent Form

Consent form Internship WildlifeNL – survey development

Before giving your consent to take part in this study, please read the statements below:

- I agree to participate in this research, which aims to understand people's perceptions on wildlife coexistence in the Netherlands. The interview is to gain more insight on potential different perceptions which will help design a draft of a survey that will be used as a tool to create dialogue amongst stakeholders.
- I agree that my participation has been fully explained to me by the researcher conducting the study.
- I give permission for the data collected to be used for research purposes, including publishing and conference presentations.
- I understand that any data relating to me will remain confidential and will be anonymized in any output resulting from this study so that individual participants will not be identifiable. If complete anonymization is not possible, consent will be asked for the publication
- I give permission for the researcher to store personal data, including name and email address, for the duration of the research project and to contact me for follow up questions and/or interviews.

- I give my permission for the interviews to be recorded
 - Yes
 - No

I have read the information above, and have had the opportunity to ask questions about the research and any questions have been answered satisfactorily.

Date

Signature Participant

Signature Researcher

9.5 Annex- Survey Draft



This survey is developed to gain insight on how people perceive human-wildlife interactions in the Netherlands, specifically large grazing mammals. Large grazing mammals in the Netherlands that are wild consist of European bison, wild boar, roe deer, fallow deer, Konik horses, highland cattle and more. This survey is beneficial to help understand people's current perceptions on wildlife, and can help with the overall project for WildlifeNL. Please fill out the survey and answer according to your own perspective. The survey will take approximately 15 minutes to complete. This survey will be anonymous, but please fill out below if you are affiliated with an organization or a member of an organization that is part of the WildlifeNL consortium.

Organization name:

Member of organization:

- Yes
 No, I work at organization stated above

Here, I consent for WildlifeNL to use my responses for data collection:

- Yes
 No

In this section you will be asked certain scenarios that you might face in the Netherlands when interacting with wildlife. For the first question please fill out your answer in the space provided. Then for the rest of the questions in the section please circle **one** answer per question.

1. In your own words, how would you describe coexistence with wildlife? Please state below:

2. Imagine you are walking or biking through Zuid-Kennemerland National Park, and you notice that some wild horses and cattle are about 30 meters away while you are doing your activities. How comfortable are you sharing this area with wild horses and cattle?

- Very Comfortable
- Comfortable
- Neutral
- Uncomfortable
- Very Uncomfortable

- 2a. What should the function of this animal be in this environment?

- Should they be wild and roam freely in this area
- Should they be closely managed
- Should they be considered not wild and be taken care by people

3. You have preplanned activities such as (hiking, biking, bird watching, etc) in the recreational area in Veluwe. However you notice that the area has been closed off because it is occupied by wild boar and new piglets, and they need space to not be disturbed. Would this disrupt your day for preplanned activities?

- Not at all disruptive
- Somewhat disruptive
- Extremely disruptive

- 3a. You go back a few days later to do your activities, but find the area is still closed off. There is a sign saying the area will be closed for the rest of the season to keep the wild boar and piglets safe from recreational visitors. What would be your initial reaction?

- I agree that the area should stay closed off for however long is needed to ensure safety for both humans and wildlife, even if it is longer than just the season.
- I can be patient and wait for the season to end and continue my activities directly afterwards.
- I should have a place where I can do my activities safely, and keep the boar behind a fence/seperated till they are not vulnerable to the public.
- I think wildlife management should remove the boar from the area immediately, so you can continue with recreational activities.

3b. What type of management would you like to see in this situation?

- Keep management as it is, and close off the area till the end of the season.
- Educate people on how to interact with wild boar
- Remove some of the wild boar and piglets to a different area
- Reduce boar population in order to keep recreation available all year

4. Deer have been spotted near the edge of your village, causing the animal to cross the busy roads that you use to drive to work. Which of the following would you consider to help reduce vehicle collision?

- Lower the speed limit to reduce impact
- Create a fence along the road to keep deer and people safe from collision
- Have local wildlife management cull most of the deer to reduce density and vehicle collision
- Build ecoducts (natural bridges) for wildlife to safely across the road

5. Some deer have been spotted in your personal garden eating some of the vegetation. Are you willing to take the risk of your flowers and vegetables to be eaten by the deer?

- Absolutely not allow deer anywhere near my property
- Will not allow deer near the garden
- Might allow deer in the garden
- Allow deer to eat some vegetation
- Absolutely allow deer to freely eat the vegetation

5b. Follow up: How would you handle the deer?

- Call management to remove the deer from your area
- Startle the deer with loud sounds in hope it will leave and not return
- Plant extra flowers and vegetables so the deer can eat
- Allow the deer to come and go as it pleases without changing the situation
- Build a fence to keep the deer out of the garden and maintain vegetation as it is.

6. When encountering a wild animal in a National Park such as bison, deer, or wild boar, what is your feeling towards this animal?

- I enjoy seeing the animal in its natural habitat
 - I prefer the animal to be seen from a distance
 - Wildlife makes me feel uneasy and I walk cautiously away from the animal
 - I am fearful of wild animals when visiting a National Park, and prefer to never see them
7. You are visiting a nature area and you notice someone else is in the same area with their dog and it is off its lead. You notice that the wild cattle in the area seem to be a little bit disturbed by the presence of the dog. How should the owner handle their dog in this situation?
- The owner should find another area to walk their dog
 - The owner should put a leash on the dog and keep their distance from the wild cattle
 - The owner should keep their dog under control, close to them and away from the cattle
 - The owner can keep its dog off the leash, even if it disturbs the wild cattle
 - The wild cattle should be in a separate area away from the walking paths
8. The wolf has been spotted in natural recreational areas in the Netherlands and is constantly moving to different areas. What would be the best management tactic for this situation?
- Use smart technology to track the wolf's location and movement patterns to help predict future movement
 - Let the wolf migrate naturally to where it feels most comfortable with little to no management
 - Educate the public about the wolf
 - Create safety measures when encountering the animal to avoid any conflict
 - Designate specific areas for recreational visitors that is away from the wolf's current habitat

For the last section you will be given statements. Please rate each statement on a scale of **1 - 5**, where **1** is you **do not agree**, and **5** being you **agree** with the statement.

1. Human activities and livelihood should not be hampered by the presence of wildlife
- 1 2 3 4 5
2. When an animal is considered a threat to humans such as damaging property, it is necessary to cull the specific animal to reduce any further threats.
- 1 2 3 4 5
3. It is necessary to hunt, trap or remove a wild animal in order for a human to gain resources for their own personal needs.
- 1 2 3 4 5
4. A wild animal entering a person's property creates damage to their crops or landscape, and it is best to remove the animal from the area before it creates more damage.

1 2 3 4 5

5. Human's should have the right to any portion of land to benefit their needs and not the needs of wildlife.

1 2 3 4 5

6. Do not accept wildlife to destroy or damage their vegetation under any means necessary.

1 2 3 4 5

7. Occasional conflicts where wildlife species may cause damage or cause risk to humans, should require local wildlife management responses, such as culling.

1 2 3 4 5

8. Wild cattle should remain separated from urban and agricultural areas by keeping them behind fences.

1 2 3 4 5

9. We should tolerate some level of nuisance from wildlife such as accepting the costs of damaged property.

1 2 3 4 5

10. It is important to understand and manage occasional conflicts between humans and wildlife, this can help reduce negative impacts for both parties in a shared environment.

1 2 3 4 5

11. It is okay to have wildlife live near people as long they are not being disruptive or damaging people's property.

1 2 3 4 5

12. Human's will allow wildlife to live amongst urban areas as long as the wildlife does not disturb or create damage.

1 2 3 4 5

13. Wildlife should remain separated from human areas, and should be tolerated from a distance.

1 2 3 4 5

14. People recognize that wildlife is valuable and important for the ecosystem.

1 2 3 4 5

15. Humans should be aware of vulnerable wildlife and have management strategies to help maintain the population and well being of the animals.
1 2 3 4 5
16. Deer and other grazing mammals are acceptable to live amongst the neighborhood, but fences are needed to keep the animals out of people's personal gardens.
1 2 3 4 5
17. Wildlife should benefit from human activities.
1 2 3 4 5
18. People should accept a certain amount of damage/nuisance from wildlife.
1 2 3 4 5
19. Humans should be willing to live amongst wildlife by adapting their own behaviors and practices to lower conflicts
1 2 3 4 5
20. Wildlife should be present in landscapes that are shared with humans.
1 2 3 4 5
21. Human's should help preserve all wildlife, especially if a species is protected or endangered.
1 2 3 4 5
22. Wildlife is beneficial for the ecosystem and should be allowed to live in any environment.
1 2 3 4 5
23. People should be open and share their landscape with wildlife.
1 2 3 4 5
24. All wildlife needs to be respected and given their space.
1 2 3 4 5
25. People from various backgrounds (such as agriculture, conservation, hunting, policy, ect.) are needed to work together in order to help conserve wildlife.
1 2 3 4 5

26. Humans and wildlife relationships can be harmonious and share recreational areas together.

1 2 3 4 5

27. Wildlife should be accepted into a mostly shared landscape with humans.

1 2 3 4 5

9.6 Annex- Stakeholder's List

This is a list of most of the stakeholders that are involved with the WildlifeNL project, with a short description of what the stakeholders organization/ association does.

- **Ark Rewilding Nederland** is a process oriented nature conservation.
- **BIJ12** is a province that takes care of nature and the environment.
- **Crossbill Guides Foundation** is a non-profit that focuses on involving the public to help with nature conservation.
- **Dierenbescherming** is an animal protection society.
- **Fontys** is a university of applied sciences.
- **Han University** is a university of applied sciences.
- **Jagers vereniging** is a hunters association.
- **Kempen & Maasland** is an organization that works on projects that focuses on recreational, sustainable tourism, nature and landscape care, and regional development.
- **Iitb Anders Durven Doen** is the farmers and gardeners association.
- **LTO Nederland** is an agricultural association.
- **Ministerie van Landbouw Natuur en Voedselkwaliteit** is a ministry of sustainable agriculture, nature and food.
- **Natuurmonumenten** focuses on nature protection and management.
- **PWN** is an organization that provides clean drinking water and nature conservation.
- **SLU** is a Swedish university that focuses on agricultural sciences.
- **Smart Parks** is an organization that helps protect wildlife and the environment.
- **Staatsbosbeheer** manages the natural landscape in a part of the Netherlands.
- **SWN** is a hunter's association that helps with wildlife collisions.

9.7 Annex- The use of Artificial Intelligence

For this study, minimal artificial intelligence was used as a tool to help develop this research. All literature was sought out through Google Scholar or with the guidance of the VU supervisor and on-site supervisor, which provided some literature for the student via email. Then the student would read the articles accordingly but if the student was confused or needed more clarification on the articles at hand, they used the AI software tool called ChatPDF. ChatPDF was resourceful in helping answer questions about the literature that the student was currently reading, and would help simplify the text and make it more feasible to understand about the specific topic of the research. Text prompts would go as; can you please summarize this article? Or ask specific questions such as; what does the author mean when they are talking about eight different archetypes? This AI tool was used ethically.

9.8 Annex- Coding Guide

Level of Framework	Characteristics
<p>No Coexistence</p> <p>Living Separately</p>	<p>Humans and wildlife live separately. Humans gain benefits from the land for personal use such as, infrastructure or agriculture. Wildlife is commonly seen as a nuisance and management is focused on keeping the population of wildlife low, or possibly eradicate the wildlife that is regarded as a threat.</p>
<p>Tolerance</p> <p>Living separately/ sharing some environment</p>	<p>Humans choose to endure the existence of wildlife without actively interacting with or accepting them entirely. When wildlife inhabits urban areas, their activity is a nuisance towards humans or the landscape. For wildlife to be able to thrive under tolerance of humans they can utilize urban landscapes with little to no interference.</p>
<p>Acceptance</p> <p>Living closer together/ sharing most of the environment</p>	<p>Acceptance of the presence of wildlife involves appreciating the role that a species has in the certain environment. Humans and wildlife can share the environment with one another, but if any changes or disruptions happen to the landscape, it can impact the wildlife. People are more willing to accept to live amongst wildlife and adapt their behaviors to reduce conflict. Wildlife can live in nature areas for example, but not necessarily in their backyard.</p>
<p>Coexistence</p> <p>Living together/ sharing entire environment</p>	<p>Human-wildlife coexistence includes pleasant interactions between human and wildlife while living amongst one another. Human's help to preserve and conserve wildlife in order to thrive in the current landscape. People also promote conservation in a positive way. People agree that wildlife should be able to live amongst them, but are not necessarily actively promoting this shared living. Management is more hands-free allowing wildlife to thrive with little no interference from</p>

	<p>people. People at this level appreciate the presence of wildlife and can accept any level of nuisance. People have a higher level of tolerance towards the risk that is affiliated with sharing an environment with wildlife.</p>
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