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Legitimacy and Biological Integrity of National Parks: A Comparative Case Study of Hardangervidda National Park in Norway and Yellowstone National Park in the United States of America

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DECLARATION

I, María Andrea Zárate Benoit, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work as not been previously submitted to any other university for award of any type of academic degree.

Date: _____

Signature: _____

María Andrea Zárate Benoit

To my parents; Diana L. Benoit Seegrove, Eduardo N. Zárate González and my grandmother Elizabeth Seegrove de la Vega

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ABSTRACT

The United States of America and Norway are two countries with outstanding natural beauty and international high standards of human development. Yellowstone National Park (YNP) and Hardangervidda National Park (HNP) are relevant because of their natural assets. These two parks also represent the academic debate between community conservation and protectionist/fortress conservation; and between anthropocentric and ecocentric values respectively—for the purpose of resource and biodiversity conservation. This study focused on comparing the perceived outcomes produced by the parks in biological integrity and public legitimacy. The study looked at these two drastically different conservation approaches in different contexts to learn from their successes and shortcomings. The findings were based on secondary data sources and to a lesser degree on primary data. On this particular case study it was found that, as anticipated, community conservation appears to produce higher public legitimacy, and protectionist conservation appears to produce higher biological integrity. Interestingly, the difference in the outcomes did not seem to be drastic, which could indicate that bridging these two conservation approaches might not be an impossible deed. In addition, some uncharacteristic qualities of their respective conservation approach were found in each park. Infrastructure and technology in the parks proved to have different effects on the wildlife, suggesting that context, regulations, and the role played by people and the infrastructure, might determine whether these prove to be neutral, positive or detrimental to the ecosystem. The context in which the conservation method is applied, could also matter more for reaching high levels of biological integrity and high public legitimacy, than the conservation method itself. This study highlighted how a protectionist conservation approach (YNP) could potentially borrow from conservation approach methods (HNP), and vice versa, to improve their respective shortcomings.

Key terms: *biodiversity conservation*, *biological integrity, community conservation, fortress conservation, protectionist conservation, conservation, Hardangervidda National Park, protected areas, management, institution, legitimacy, park management, National Park, resource management, Yellowstone National Park, Convention on Biological Diversity, environmental governance, governance*

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LIST OF ABREVIATIONS AND ACRONYMS

ATV	-	All-terrain vehicle
BI	-	Biological integrity
CC	-	Community conservation
DMP	-	Decision-making process
DOI	-	Department of the Interior
EGS	-	Environmental Governance Systems framework
FC	-	Fortress conservation
GC	-	Gateway communities
GYE	-	Greater Yellowstone Ecosystem
HNP	-	Hardangervidda National Park
IGO	-	International Governmental Organizations
IUCN	-	International Union for the Conservation of Nature
NBIC	-	Norwegian Biodiversity Information Center
NP	-	National park
NPS	-	National Park Service
PBI	-	Perceived Biological Integrity
SM	-	Snowmobile
WR	-	Wild reindeer
YNP	-	Yellowstone National Park

CHAPTER 1 – Introduction

1.1 Introduction

"*When one tugs at a single thing in nature, he finds it attached to the rest of the world*" –John Muir

National parks serve to preserve and protect nature and biodiversity. Many national parks have been established under the idea that it is important to keep the country's natural beauty and biodiversity, as well as for serving recreational purposes and research opportunities. In a world were biodiversity loss is a pressing problem (Convention on Biological Diversity, 2019; Rockstrom et al., 2009); national parks represent a way of conserving the beauty and natural national heritage of a nation, and they also aim to provide habitats for endemic fauna and flora. This description is the general spirit and rhetoric under which national parks where initially created. However, in real life or in practice, the road to conservation is not that easy; context plays a critical role in the outcomes of the national parks. It is clear that they should be delivering in several areas, however, which areas, remains contested in academia. Broadly, national parks are meant to contribute to societies' well-being in terms of economy, recreation, and spiritual needs, as well as nature and biodiversity conservation. The traditional—state owned—national park concept, has been contested by several authors (Child, 2004; Jones & Murphree, 2004; Rao, 2005) , who propose that park's goals should primarily be oriented towards serving society, and have a 'community conservation' approach as a means to achieve this. The more traditional/western approach at conservation sometimes referred to as 'fortress approach' to conservation is characterized by drawing a blunt line between humans and animal species within a specific area.

This study analyses and compares two fundamentally different resource governance models, found in important national parks located in two different countries. One is Hardangervidda National Park (HNP) in Norway, and the other is in Yellowstone National Park (YNP) in the USA. National parks can be managed in a variety of ways, yielding of course, different results/outcomes. As mentioned before, the actual and desired outcomes for a national park are also debated in academia. However, two particular outcomes were deemed worthy of analysis and evaluation for this study: a national park's public *legitimacy*, and its perceived

biological integrity. These two outcomes are considered important because of their centrality to the idea of national parks. The concepts of biological integrity and public legitimacy are alluded to on the mission and purpose of several national parks in the world, as well as several international conservation organizations e.g. IUCN, WWF, the Convention on Biological Biodiversity (CBD). This clearly highlights public legitimacy and biological integrity as internationally significant and central to protected areas for conservation.

There are many definitions and ways to understand legitimacy across literature, however, for the purpose of this research, legitimacy will be evaluated using Vatn (2015) criteria: input legitimacy and output legitimacy (see p.9). This specific legitimacy conceptualization was picked because Vatn's (2015) framework is especially tailored for the analysis of environmental governance systems. On the other hand, biological integrity will be defined as a system's wholeness—having or displaying conditions which allow and maintain natural evolutionary and biogeographic processes (Angermeier & Karr, 1994). This definition was selected because it is deemed more comprehensive and accurate in reflecting a system´s capacity to sustain and maintain life and biodiversity. A note on the definition of biological integrity is that this study is specifically concerned with the publics' *perceptions* of the parks biological integrity, not necessarily the actual state of the ecosystem in ecological or biological terms. The concepts for biological integrity will be explained in more detail in the theory section of this study.

Comparing and analyzing the outcomes of two contrasting resource management systems in different developed countries[1], will provide an opportunity to comprehend how strikingly different resource governance systems and contexts, deliver in two fundamental aspects of national parks. The study also tries to find possible areas of opportunity, and recommendations to improve the parks' legitimacy and biological integrity in developed nations.

[1] It is acknowledge that the use of the terms developed/developing country has ensued significant controversy in recent years over several concerns, including how can this be measured and its implications. Nonetheless, the concept will still be used in the study for a lack of a better term that will describe or encompass the relevant disparities in poverty, political stability, GDP, human development index, and primary economic activities of a country, which were relevant for the selection of these cases studies.

1.2 Literature review and theoretical framework

In 2004, a study by WWF in collaboration with the World Bank and the World Commission on Protected Areas, carried out a study on 34 countries over almost 200 protected areas to find out how effective they were, and what good and bad management elements they detected. In addition, different international organizations have also express their concern for evaluating protected areas effectiveness, such as the World Parks Congress (Durban, 2003) and the Convention on Biodiversity (2004). This highlights the global concern with knowing how effective protected areas actually are, as they are a key element for global biodiversity conservation goals. The Convention on Biological Diversity entered into force December 1993, and was created in response to the United Nations Environment Programme (UNEP), which had come to the decision that there should be an international convention to protect biodiversity. Since then, there has been a growing concern with the effectiveness of the polices and approaches adopted by different countries.

There are many forms of protected areas in the world, one of them is national parks. The International Union for the Conservation of Nature (IUCN) lists national parks as category II[2] of protected areas. The IUCN defines a national park as a: "Large natural or near natural area set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational, and visitor opportunities." This same organization also ascertains that the primary objective of a national park is "to protect natural biodiversity along with its underlying ecological structure and supporting environmental processes, and to promote education and recreation". The concept of national parks is relatively new. March 1st, 1872 marked the day President Ulysses S. Grant established Yellowstone National Park in the USA, which is widely held as the world's first NP.

The multiple goals of national parks make them valuable and desirable to have as national assets. However, multiplicity of goals can also make them quite challenging to manage

[2] Category II in the IUCN is a type of protected area that differs from other categories in a number of ways. Some of its distinguishing features are being typically large area that conserves a functioning ecosystem. The area should contain representative examples of major natural regions, and biological and environmental features or scenery, where native plants and animals species, habitats and geodiversity sites are of special spiritual, scientific, educational, recreational, or tourist significance. The area should be of sufficient size to and ecological quality so as to maintain ecological functions and processes that will allow the native species and communities to persist for the long term with minimal management intervention (IUCN, 2019).

due to conflicting interests and goals (Juutinen, Mitani, Mäntymaa, Shoji, Siikamäki, and Svento, 2011). This is why a wealth of debates on different management approaches in national parks have developed over the past 20 to 30 years, see Hutton et al. (2005). Instances such as who should own the parks; whether it should be free and accessible to all, or if a fee for entrance should be due; hunting, fishing and extractive regulations; how much management should be done in the landscape; whether to maintain certain species or not; and the question of species reintroduction; among others, are all aspects of management that tend to reflect the underling values governing the park and the interests that are being prioritized.

Two main diverging models for managing protected areas are the fore-mentioned 'fortress approach'—also known as the 'protectionist approach'—and the 'community conservation' approach. The first one, has underlying biocentric values, meaning they uphold the value of nature for its own sake. Whereas, 'community approach' has underlying anthropocentric values (Jones & Murphree, 2004). Jones and Murphree (2004) further clarify the distinction in fundamental values between the two terms as follows: "*for 'fortress conservation', the conservation is the end and the fulfilment of human needs serves as a means to this end; for community conservation the fulfilment of human needs is the end and conservation is a means to achieving and maintaining this end*". (Jones and Murphree, 2004, p.63). Some of the main characteristics observed in a 'protectionist conservation' approach are: local people dependent—or not—on the natural resource base are excluded; enforcement is implemented by park rangers patrolling the boundaries, using a 'fines and fences' approach to ensure compliance; and only tourism, some types of recreation, safari hunting, and research are considered appropriate uses under this type conservation model (Doolittle, 2007). 'Community conservation' approach is characterized by a notably different set of ends and means; which include: leaving the control of the resources to the communities as opposed to the state, development of community institutions to manage the resources, significant community involvement and participation in decision-making regarding conservation, and legislation or acceptance of property rights within the protected area (Encyclopedia of Environment and Society, 2007). In addition Vedeld (2002) further explains that the objectives of community conservation are mainly, sustainable rural livelihood generally above biodiversity conservation.

As mentioned earlier, the fortress conservation (FC) approach is primarily used in western countries, and although the FC was common in many African countries—mainly during and after the colonial period—community conservation (CC), has today become more

popular in Africa for a number of reasons. This includes concerns over developing goals, and limited state resources for environmental management, among others (Jones & Murphree, 2004). Both approaches try to fulfil the complex goal of both preserving nature, and benefitting society in a number of ways. How effective the methods are at this, has probably less to do with the actual method, and more with the context under which it is applied, as well has how it is being applied—which is the main concern of this study.

When doing a comparative study, the research should focus on contrasting differences or similarities of the cases (Bryman, 2016). In this case, the focus will be put on the differences, that makes Hardangervidda and Yellowstone relevant cases to compare. The two locations have different management systems, which are sure to produce distinctive resource outcomes, both in terms of legitimacy and biological integrity. Hardangervidda is Norway's biggest national park holding Europe's largest wild reindeer population. It also happens to possess a fairly unique management system based on mostly privately owned land, where hunting and fishing are permitted inside, as well as unrestricted camping throughout the park. Hardangervidda is a fairly new park, established in 1981, and it is not a traditional park in the strict sense. Most of its focus centers around locals being able to use the park's resources and provide quality outdoor recreation activities. These characteristics make Hardangervidda more aligned with the 'community conservation' approach. Additionally it is also uncommon to find parks run in such a fashion in the global north, this approache is getting increasingly common in developing countries, where concerns over local communities poverty and development encourage a more utilitarian oriented system. Yellowstone National Park aside from being one of the oldest national parks in the world, is a much more traditionally/western run park. It is 100% state owned and there are very strict regulations on hunting, fishing and other uses and activities inside the park. It is managed under a very different system than Hardangervidda, with major differences being both the decision-making body type, infrastructure and technology, and the overall goal prioritization.

Even though the ambitions and goals of the parks are different, they still hold some important commonalities (landscape conservation, recreation opportunities), and represent the current academic discrepancy of what should be the future for reserves and the parks in general. One park is old, traditional, and has a FC approach to conservation; the other is new, unconventional, and has a CC approach to conservation—also referred to as 'use-it-or-lose-it'

(Freese, 2012). Hopefully this study will be able to pinpoint the best of the old and the new, to inform future policy making.

Based on the ideas here presented about the mechanics and points of focus of CC and FC approaches; it is reasonable to hypothesize that Hardangervidda NP should display a higher public legitimacy level than Yellowstone NP; whereas the perceived biological integrity should be about equal, with perhaps less biodiversity in Hardangervidda, given the objective of CC is mainly, sustainable rural livelihood.

1.3 Problem Statement

Problem statement

Hardangervidda and Yellowstone National Park have two very different resource governance models in terms of hunting and fishing regulations, entrance fees, ownership rights and usage rights, quotas, land tenure, biodiversity monitoring, and budget, among others. They also emanate from very different cultural and political contexts and distinct natural ecosystems. This research wishes to study these differences and evaluate their outcomes in two aspects that are paramount to all national parks: public legitimacy and perceived biological integrity.

1.3.1 Goal

The goal of this research was to map out and compare the environmental governance system of Yellowstone NP and Hardangervidda NP and their perceived results on biological integrity and public legitimacy. This will be achieved by conducting semi-structure interviews with key stakeholders and secondary data sources.

1.4. Objectives and research questions

1.4.1 Objective 1:

Overview of the history of the parks.

Objective 1 was considered necessary because it helps the researcher understand the history of conservation in both countries, and specifically in the national parks in question. Getting a fair comprehension of the history of the areas and the conservation efforts in each of them is key to

understanding the models they use now-a-days and the motivations behind many of the management choices. Putting each of the parks management systems into context is essential in order to understand their structure, operations and outcomes.

Research questions for Objective 1 – Parks history
RQ1.1: For what reasons were the parks established, and what are the parks' goals?

RQ1.2: What was the land use before it became a NP and what were the historical strategies for resource and wildlife management in the area?

1.4.2. Objective 2:

To identify the possible differences between the two parks' environmental governance systems.

The study sets out to find the relevant differences on the parks' environmental governance systems by looking at some key components like, the resource regime, economic actors, different stakeholders, decision making processes and the parks' infrastructure.

Research questions for Objective 1 - Environmental governance systems
RQ2.1: What institutions govern access to resources and regulate the interactions between economic actors in Yellowstone National Park and Hardangervidda National Park?

RQ2.2: Which institutions govern the policy processes of the two parks?

RQ2.3: Who are the economic actors of each park and what are their preferences?

RQ2.4: Who are the political actors in each park and what are their goals?

RQ2.5: What infrastructure and technology is available at each park, and how does it affect the outcomes (legitimacy and perceived biological integrity)?

1.4.4 Objective 3:

To identify the stakeholders perception of the parks biological integrity and its implication for conservation and sustainable resource use.

National parks have the goal to protect or preserve some or several aspects of the natural ecosystem were it was established. Therefore, it is fundamental to determine the stakeholders perception of the park's biological integrity. This allows the researcher to understand what is important for people about the national park, and whether or not in their opinion those aspects are being properly safeguarded by the current management system. Providing a biological assessment on the actual state of the national park is not the goal of this objective; that would be the job of an ecologist or a biologist. The goals of this study is to find out the *perceived* biological integrity of the parks, to get see how this influences or not the different management systems. In this study the biological integrity is considered an outcome-result of the park´s management.

Research questions for Objective 3 - Perceived biological integrity

RQ3.1: How healthy are the parks' ecosystems considered to be by local people, park managers, and park boards?

RQ3.2: How healthy are the parks' ecosystems considered to be by professionals in the field (ecologists/ biologists)?

RQ3.3: How is biological integrity measured in each of the parks by biologists and ecologists, if at all?

1.4.3 Objective 4:

To evaluate the public legitimacy situation in the parks with regards to local people, park users, businesses, park authorities and other stakeholders. (both output legitimacy and input legitimacy).

Legitimacy shows the level of confidence and trust that the public has on the state's processes and institutions. A good level of legitimacy in a national park can signify an appropriate level of involvement from different stakeholders, transparency, accountability,

compliance with the law, and good representation. These are all elements that must be present in any model or system that wishes to endure the test of time. In this study public legitimacy is used as a means of evaluating the governance system of the parks.

Research questions for Objective 4 - Legitimacy

RQ4.1: How appropriate and accepted is the decision making process of the parks with regards to the interest of local people, park managers, park boards and other stakeholders? (*Input legitimacy.*

RQ4.2: Which distributive justice principles do the parks uphold; and how just and effective is the distribution of benefits and burdens across the different stakeholders? (*Output legitimacy)*

RQ4.3: Are the parks considered by the stakeholders to be legitimate and efficient in reaching their set goals? *(Output legitimacy)*

1.4.5 Objective 5:

To identify possible recommendations to improve legitimacy and biological integrity in Yellowstone National Park and Hardangervidda.

Having established the importance of legitimacy and biological integrity in national parks, this study's final step is to comment on the relevant differences between the governance regimes of each park that might be causing better or worse levels legitimacy and/or biological integrity in each particular case. The different management systems are unique and are a response to cultural and historical differences, however, it is still relevant to understand the different outcomes in relation to distinct management strategies.

Research questions for Objective 5- Suggestions

RQ5.1: How can biological integrity be improved through resource governance strategies in each park?

RQ5.2: Can legitimacy be improved in the parks?

1.5 Justification of the study

A great deal of studies and projects focus on protected areas, and the resource management of them in developing countries. Perhaps because of the high levels of biodiversity found in the global south, but also because of the great need to improve people's livelihoods in developing nations while also protecting biodiversity and natural resources. Conversely, this study focuses on analyzing and evaluating how developed countries are targeting the dual and difficult task of preserving biodiversity and natural resources while satisfying the needs of a developed nation. One might argue that in some cases, the protection of natural capital in developed nations might prove to be equally challenging to that of developing nations. Many developed countries have already lost a significant amount of biodiversity and habitats, so fulfilling their pledges to international conservation agreements—e.g. Convention on Biodiversity Agreement—requires reintroductions, habitat restoration and rewilding strategies, which are quite controversial, to say the least. In addition, the increasing stressors—pollution, population growth, expanding global agriculture markets, invasive species, increased park visitation, etc.—being put on national parks has intensified the need for evaluation of their performance in the developed world. Knowing how well or not so well, developed nations are doing the complicated tasks of nature conservation is fundamental and valuable knowledge.

This study is relevant to people involved in the management and decision making bodies of both HNP and YNP, but it is also significant for anyone involved in park management and wildlife management strategies in the developed world. It offers a comparison between two management systems in countries not struggling with extreme poverty, unstable government and governance, or staggering inequalities, which can severely affect the results of a NP management strategy and outcomes. This study facilitates a focus on the problems faced by developed nations when aiming for sustainability and viable resource and wildlife management strategies.

1.6 Definition of terms

Stakeholders: In the case of this study this means park employees, local people, landowners, local authorities, park users, researchers, NGOs, local businesses.

Resources: In this case mostly: wild reindeer, grouse, fish, grasslands, landscapes and scenery, geothermal features, plant life, and other wildlife.

Technologies:. In this study primarily: all-terrain vehicles (ATVs), snowmobiles, helicopters, sea planes, motorcycles, snow coaches, personal vehicles, buses, and motorhomes. Also gillnets, fishing equipment, shotguns, etc.

Infrastructure: In the case of this study mainly: cabins, historical buildings, temporary fences, concrete roads, hiking trails, dirt roads, hotels, restaurants, general stores, water treatment plants, visitor centers, gift shops, service stations, board walks, campsites, bear boxes and poles, and housing lodging.

Outcomes: In this study the outcomes refer to the perceived biological integrity of the national parks and perceived public legitimacy.

Biological integrity - The ability of an ecosystem to support a diversity of animal and plant populations for an indefinite period of time with little to no human intervention (Angermeier & Karr, 1994).

Legitimacy- Justified authority; decisions accepted by those concerned. Abiding to what is considered a good process and outcome, both for the winners and the 'losers' (Vatn, 2015 p.160-169).

CHAPTER 2 - Conceptual framework

2.1 Environmental Governance Systems Framework

To answer research question 2.1-2.5 of objective 2 this study will use Vatn (2015) Environmental Governance Systems (EGS) framework (see *figure 1)*. The EGS framework works by identifying several key elements in environmental governance systems to understand how they function together, recognize where something is falling short of the expectations and/or causing problems in the outcomes and state of the resource. Vatn first establishes the importance of identifying what the governance structure looks like. The *governance structure* is composed of three sets of actors: *political*, *economic* and *civil society*.

In this context a *political actor* has the power to make decisions on matters involving constitutional rules and typically also has the power to formulate resource regimes and act as an intermediary if conflict arises between the different actors. Vatn (2015), further explains that although the most developed and well know political actor is the state; other forms such as village, municipal councils, boards and even clan leaders can display the same powers and serve the same function as some more traditional political actors.

Economic actors are divided into producers and consumers of goods and services—there is generally an element of profit involved. However, it should be noted that not all economic actors produce for the sole purpose of profit, especially if it's the government or an NGOs. It should also be noted that a single actor can be both a producer and a consumer (as in the case of family farm) (ibid.).

The other element on the governance structure are the *institutions that facilitate interactions* between the actors who have access rights to the resources. He identifies the following: *institutions governing the policy process* and the *resource regimes institutions*, the latter focuses on the *rights to the resources* and *rules of interaction*.

The resource regime of a natural asset determines the rules concerning access to the resources and the rules concerning the interactions between the actors who have access to the

resources. There are five aspects of having access to a resource that can be considered (Vatn, 2015):

- *Access*: the right to enter a defined physical property
- *Withdrawal*: the right to obtain the 'products' of a resource
- *Management*: the right to regulate internal use patterns and transform the resource by making improvements
- *Exclusion:* the right to determine who will have an access right, and how that right may be transferred
- *Alienation:* the right to sell or lease either or both of the above rights

Regarding the rules of interaction between the actors, this framework mentions four types of interaction: trade; command; community rules and no rules (ibid).

- *Trade*: Goods and services exchanged for money or some type of payment. The market works this way and the more money an actor has, the more power it has under this scheme.
- *Command*: It involves a hierarchy of power. The rules are determined by the higher levels of authority and passed down in this way. The power to decide over the resource reside on the line of command.
- *Community rules*: Reciprocity and cooperation are the building blocks of this type of interaction rules. Norms also play an important part in this type of interaction rules.
- *No rules:* Today this scheme of interaction is nearly non-existent. When there was still unclaimed land and undiscovered/uninhabited parts of the world, these territories were probably under no rules interaction scheme for a period of time.

The governance structure is depicted in the EGS framework by four boxes surrounded by the civil society oval, to signify that the entire governance structure is, in a way, embedded in the civil society with its values, institutions and actions (see *figure 1*). To complete the framework, Vatn included 4 more elements. The first one is *technology and infrastructure*. Technology can influence the choices of the different actors depending on what they are trying to promote or accomplish. These also affects the resources in different ways, it can have positive

or negative impacts. The second element added is *environmental resources and processes*. This one represents the attributes of the resource in question. Depending on the resource's attributes, the for-mentioned actors will make a choice on the resource regime for that particular resource. In other words, each natural resource has specific characteristics that usually influence the way we interact with them, e.g. renewable resources vs. non-renewable resources. The third element added is *patters of interaction,* which are different among the different groups of actors e.g. political actors have a different set of interaction patters than economic actors. Finally he lays out the box for *outcomes*, which comprise the resource use and, of course, the state of the resource. The arrows allow us to see that the outcomes directly influence political and economic actors as well as the environmental resource and its attributes.

This study puts particular focus on the outcomes of the system. "*The outcomes—the specific states of the resources—are assumed to influence both economic and political choices. Civil society as well as economic actors may, moreover, try to influence the policy process if environmental outcomes are not seen as acceptable…it is the perception—in the case of outcomes—that counts*" (Vatn, 2015). In this study, the *specific state of the resources*, will be conceptualized or evaluated though the concept of perceived biological integrity as well as what this means for the different stakeholders.

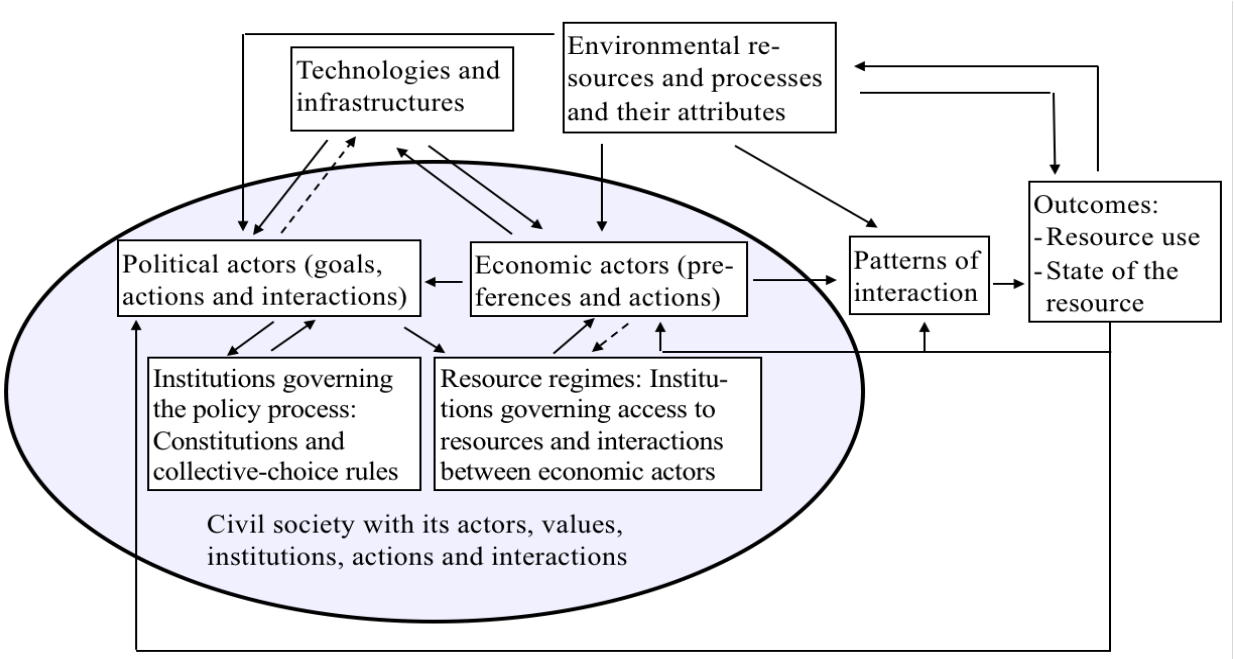


Figure 1 Environmental Governance System (EGS) Framework

Source: (Vatn (2015))

2.2 Biological integrity framework

Research questions 3.1-3.3 in objective 3, were analyzed using, once again, the EGS framework concepts and the following elements of biological integrity (BI) (*see table 1*). Interviewees were first ask to give their own idea of what a completely healthy and functional ecosystem should look like. Later they were also given a definition of BI which included the elements found below. People's perception of the parks biological integrity was understood in terms of what motivates their actions, and what expectations they have of the resource, also considering where they deem the resource falling short of their expectations, or needing improvement, and what aspects are positive and delivering good results. To complete the analysis on the resources' state and attributes, the opinion of experts (ecologists/biologists) on the field was taken into consideration to contrast with the opinions of the general interviewees. Secondary data was also used to get an overview of what is the state of the biological integrity at the parks, according to the available official public reports. While analyzing the secondary data sources (i.e. Vital Signs Report for Yellowstone and two reports from the Norwegian Biodiversity Information Center for Hardangervidda) the elements below were considered when trying to assess the biological integrity.

Biological Integrity Elements	Explanation and composition of the elements
1) Native species and biodiversity[3]	Native species are a good sign. The more native species present the better. The more natural species diversity present the better.
2) Generate and maintain of all trophic levels	Appropriate environment to sustain and maintain life→ large enough[4] area, clean (pollution-free), good nutrient cycles, disturbance levels, soil formation, and energy flows.
3) Human intervention[5]	The more human intervention needed to *maintain* the ecosystem at a certain state, the less biological integrity the ecosystem has. Lees intervention is better.
4) Resilience[6]	Ability to bounce back to previous desired state from disturbances E.g. fires, floods, disease, etc.
5) Ability to exist in the future	Indefinite capacity to continue in time. (Factors like global warming and other anthropocentric pressures diminish it)

Table 1 Biological Integrity Framework

Source: (Adapted from Angermeier and Karr (1994))

2.3 Legitimacy conceptual framework

A fair way of assessing a governance system, is through the evaluation of their public legitimacy (Vatn, 2015). Regardless of how successful the conservation outcomes of a national park are, it can hardly be argued that it has truly succeeded if there is low public legitimacy levels (ibid.). Usually when a governance system displays low legitimacy, many problems can be seen. Some common symptoms of low legitimacy in national parks can be, low compliance with the law, high levels of poaching, low attendance to the park, and lack of public interest in the park. Poor legitimacy can ultimately lead to a complete dissolution of the governance system. On the other hand, high levels of legitimacy are consistent with low poaching levels,

[3] Angermeier and Karr (1994) and other biologists explain there are at least three levels of biodiversity: genetic species and ecosystem. This study considers only species. Assessing all types is out of the scope of this study.
[4] The research of several ecologists have suggested that larger protected areas are better for conservation than smaller ones, due to the fact that larger areas can hold more biological diversity over time. See Newmark (1987); Diamond (1975).
[5] Not to be confused with disturbance or human disturbance of the ecosystem.
[6] Although resilience of the ecosystem is considered an important criteria for determining whether or not the ecosystem has good BI, in this study the sources used did not provide explicit information on the ecosystems resilience capacity, therefore it is not part of the analysis. However, it is still included on this table for the consideration of the reader.

compliance with the law, increased public involvement, stability, and other amiable characteristics displayed by a governance system.

To help answer research questions 4.1-4.3 in objective 4, the framework on legitimacy by Vatn (2015) will be used. Even though there are many different theories and definitions about legitimacy in academia, Vatn's framework has a special focus on environmental resources which makes it relevant to this study. The framework divides legitimacy in two criteria: a) process legitimacy or (input) and b) result legitimacy or (output). The first is concerned with the acceptance of a decision-making process regarding the interest of several actors (ibid.). Some important issues to consider while evaluating the legitimacy of a process are: level of participation of actors in the process, transparency of the process, and accountability of the decision-makers to the rest of the stakeholders.

Input (process) legitimacy

- **Participation→** knowledge of the decisions-making process; accessibility and involvement in the decision-making process.
- **Transparency→** Available channels of information and communication to the public and internally.
- **Accountability→** Related to transparency—level of responsiveness in authorities; reachable, open and accessible authorities.

The second type of legitimacy (output) is focused on three aspects of the results or outcomes of the process: 1) whether or not the goals are reached (effectiveness), 2) the efficiency displayed while reaching the goals and the 3) just distribution of the benefits and costs among stakeholders. This last one, involves also determining which distributive justice principles are used or apply to each park. Vatn (2015) legitimacy framework identifies eight relevant distributive justice principles, which might be used alone or in combination with another:

#	Distributive justice principle	Description
1	Strict egalitarianism	Everyone deserves the same good and services.
2	Rawlsian (or the difference) principle	Economic differences are acceptable only if everyone has a fair chance of getting the position, and if this benefits the least privileged in society.
3	Resource-based principle	Having access to the same amount of resource, allowing for equal opportunity
4	Welfare-based principles	Maximizing social welfare—using a definition for what individual welfare should be
5	Desert-based principles	Reward people according to their effort (work, capital, or loss of income).
6	Libertarian principles	Free individual choice leads to just outcomes.
7	Feminist principles	Equal status for all
8	Compensatory justice	'Make-up' for historical/systemic injustice to the poor and developing countries who bear a disproportionate amount of environmental costs.

Table 2 Distributive justice principles

(Source: based on Vatn (2015), *Environmental governance: Institutions, Polices and Actions, Ch. 7, p. 167)*

Together these set of criteria give a fair basis for evaluating governance and governance structures (ibid). The study tried to look at all these elements of legitimacy detailed in this framework (*see Figure 2*).

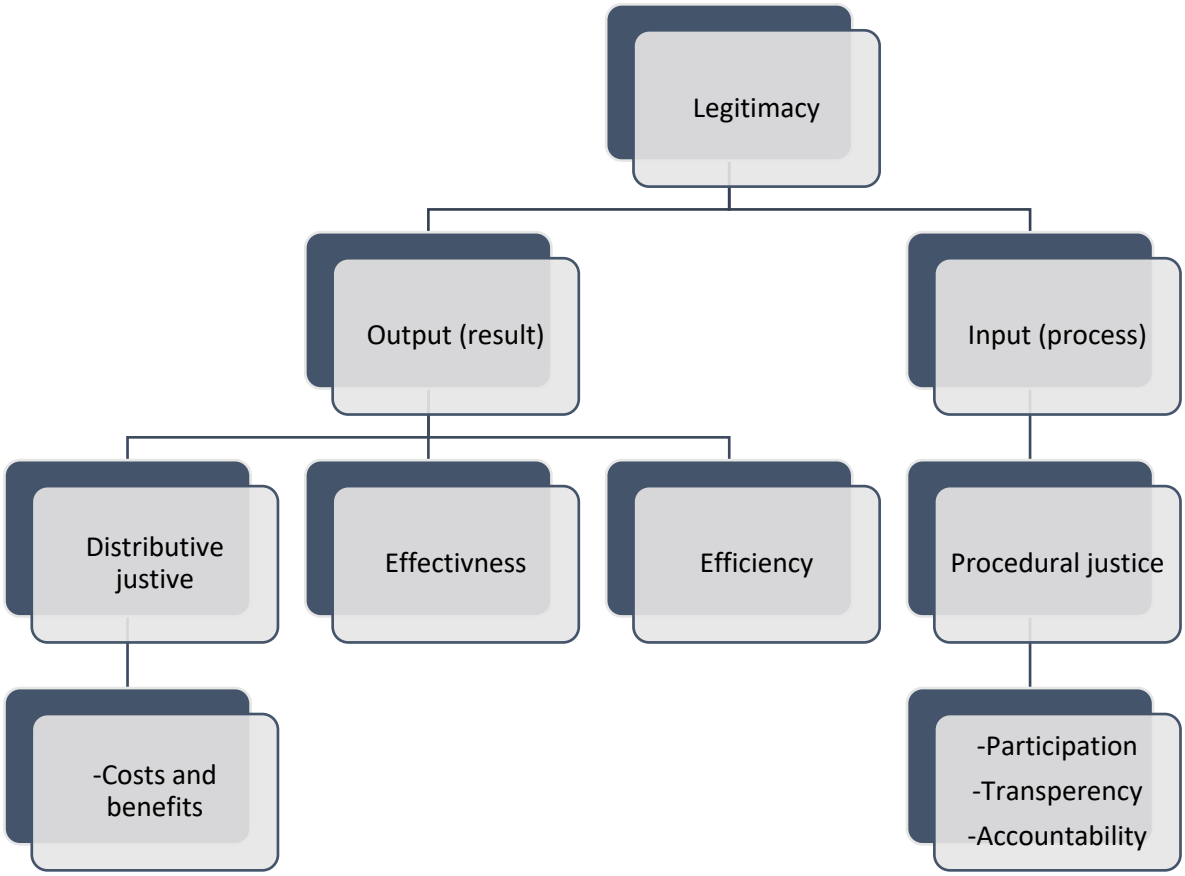


Figure 2 Legitimacy – A conceptual framework

(Source: based on Vatn, 2015, E*nvironmental governance: Institutions, Polices and Actions*)

CHAPTER 3 – Research Methods

3.1 Research design

This study is a social research characterized by having a comparative design of cross-cultural cases. One located in the USA and the other one in Norway. It uses a qualitative approach, which is useful for analyzing regimes and peoples' institutions (Bryman, 2016). Nonetheless, some simple percentages and fractions were also used throughout the analysis process, for describing some of the primary data. Like most comparative designs, a very similar method will be employed to analyze the contrasting cases (ibid.). Both national parks will be studied and compared using the EGS framework, and the legitimacy framework previously mentioned. These frameworks will be used in hopes of understanding the links between the different environmental governance systems in these two parks, and the relevant outcomes of biological integrity and public legitimacy. A qualitative approach is especially useful for achieving the 4rd objective of the study. It entails the identification of key recommendations for improving biological integrity and legitimacy for the actors and stakeholders in the two cases. The data will be obtained through document and literature review, as well as semi-structured interviews (see Appendix II).

3.2 Study areas

This brief section is written to give a quick glance at the study areas. In Chapter 4 a much more detailed background on the areas is provided.

Locations of the study, Yellowstone National Park (YNP) situated in the United States of America see *Figure 3*; and Hardangervidda National Park (HNP) found in Norway see *figure 4*. YNP was established in 1871 for the purpose of preserving the geothermal wonders of the area for the enjoyment of the people, as well as for nature conservation. It is one of the USA's largest and oldest national parks, with an area of 8,991 km^2. It spreads through three USA states: Wyoming, Montana and Idaho.

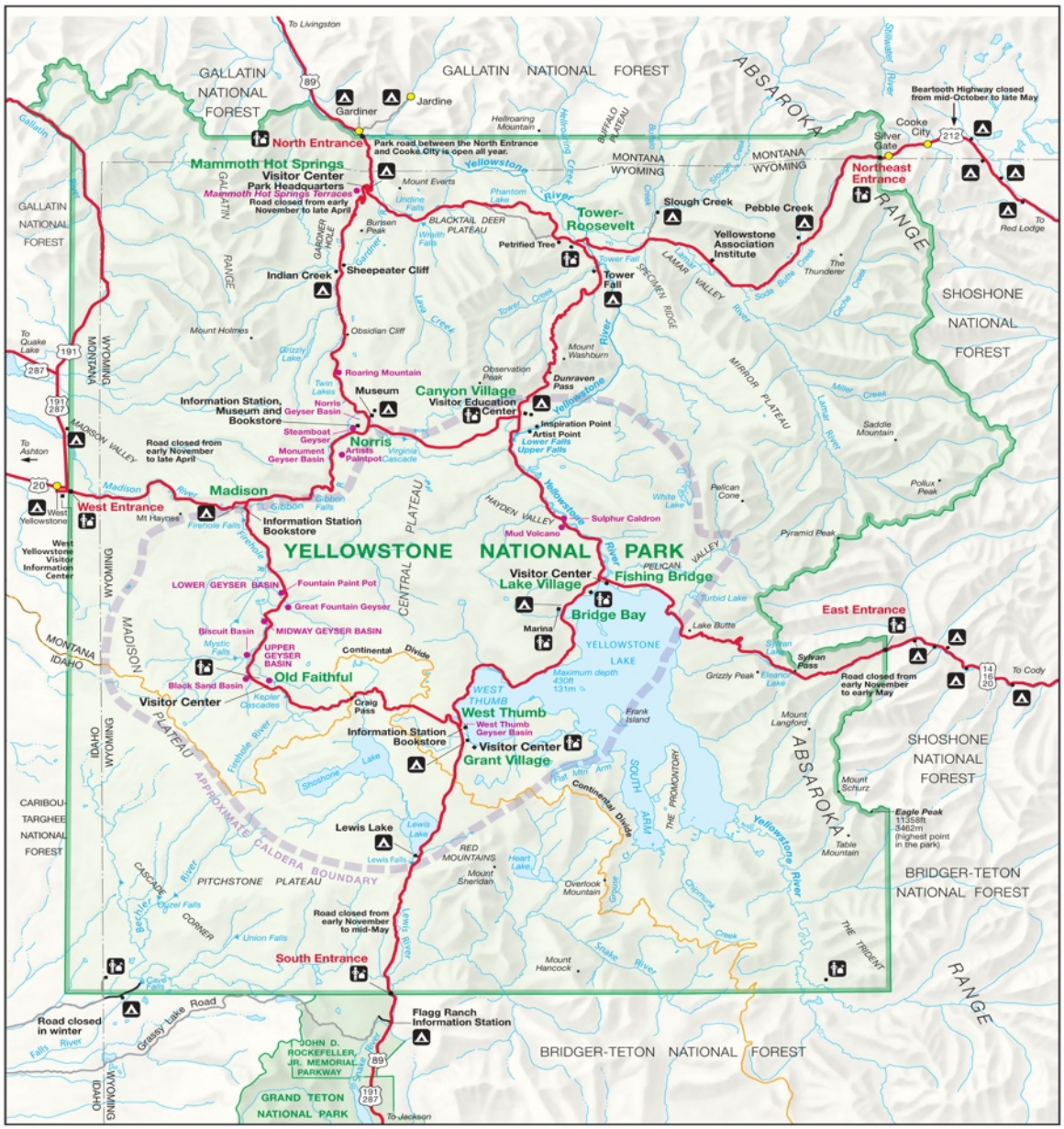


Figure 3 Yellowstone National Park Map in USA..

Source: (Yellowstone Maps, 2018. Accessed: June 16, 2018 https://yellowstone.net/maos/yellowstone-national-park-map7)

HNP in Norway was established as a national park in 1981 for similar purposes as YNP—i.e. nature conservation and providing research and recreation opportunities for the people. It is Norway's largest national park spanning 3,422 km^2 and spreading over three counties: Buskerud, Hordaland, and Telemark.

Figure 4 Hardangervidda National Park Map in Norway

Source: (Norsk Villreinsenter Sør, 2018)

3.3 Sampling approach

This study used a purposive sampling approach. Purposive sampling is useful because it allows to pick cases that are relevant for the research objectives which enable answering the research questions. A purposive sampling is ideal for crucial cases that permit a logical inference about the phenomenon of interests (Bryman, 2016). In this case, the purpose was to compare the outcomes of contrasting protected areas management systems in developed nations. Therefore, the cases had to be handpicked in order to fulfill the setout criteria. The

interviewees were also handpicked in a purposive sampling approach. The research focused on local people, park boards, and park rangers; who can provide the information and insight that is sought after in this study. In addition to purposive sampling approach, snowballing sampling was used too. Snowballing sampling allows the researcher to find interviewees relevant to the study through recommendation of other interviewees. In this particular case this was very useful, people who worked at the parks were already familiar with other people heavily involved with park management, and/or in some way impacted by the park's operations. This method allowed the research to gain a sufficient number of interviews.

The size of the sample was determined through a data saturation criterion. Which means that more interviews and data is collected until no more new information is discovered in the data analysis process. When the information collected starts feeling redundant to the researcher, then, it is a sign that the data collection may cease (Bryman, 2016). This criteria was used for both Hardangervidda NP and Yellowstone NP. The data sample of YNP is smaller than the HNP, primarily because data saturation was researched faster, but there was also time constrains, and other technical challenges that played a role in the different sized samples—this will be addressed in more detail in the limitations and considerations sections of this document.

The selection of these two cases—Hardangervidda and Yellowstone National Park—was made under the following criteria, **1)**Similar country development (developed countries), **2)**Protected areas under IUCN category II (national park) **3)**contrasting governance systems and park management, and finally, **4)**different socio-cultural settings. Each one of these considerations is fundamental for the study. In addition to these four main considerations there are a few more elements that helped support the selection of the parks (*see Table 1*).

The 1st and 2nd criteria which are essentially the similarities both cases possess. Similarities are important because even though the study is aiming to investigate the differences, they still need to be comparable cases. It was imperative that both cases were situated in developed countries because factors such as conflict, significant political instability, and extreme poverty, can greatly affect the outcomes of different resource regimes; due to increased poaching, threat of encroachment, as well as change in land use, etc. (Freese, 2012; t Sas-Rolfes, 2017). Choosing to study developed countries helped control for these variables; allowing for a better assessment of the perceived biological integrity and legitimacy of the parks in the context of their resource regime and governance structure. It was also fundamental that

both protected areas fell under the same IUCN protection category, so that they would have similar goals and similar international expectations to uphold.

The 3rd and 4th criteria are fundamental because they represent their differences. Criteria 3 called for the selection of resource regimes that were different in terms of their conservation approach. Namely one case displaying a 'fortress approach' to conservation, and another displaying a 'community approach' to conservation. Hardangervidda National Park is one of the few or maybe even the only category II (national park) in a developed country with a 'community conservation' approach. Most national parks found in western developed countries have more traditional or 'fortress approach' to conservation.. This made Hardangervidda an ideal choice for the purpose of comparing the outcomes of protected areas with contrasting management systems in developed nations.

Table 3 Criteria for selection of case studies

Main Criteria	**Hardangervidda National Park**	**Yellowstone National Park**
Development	1) Developed nation	1) Developed nation
IUCN Protection Category	2) Category II – National Park	2) Category II – National Park
Management system type[7]	3) Utilization/community approach	3) Fortress/protectionist approach
Socio-cultural context	4) Scandinavian	4) North-American
Additional Criteria		
Illustrative controversies	5) Motorized vehicles controversy (Snowmobile) 6) Problematic species (large predators, wolverines ,etc.)	5) Motorized vehicle controversy (Snowmobile) 6) Problematic species (Bison, wolves)

[7] Neither of the two selected cases possess a pure, 100% 'community approach' or 'fortress approach' respectively. However, most of their regulations and constituencies do favor more one approach over the other, allowing them to be classified as such. Additionally both cases have different organizational structures one (YNP) has a hierarchical structure, whereas the other one (HNP) has a flat organizational structure.

3.4 Data collection and analysis

To collect the primary data, semi-structured interviews were carried out (see *Appendix I*). These were applied to local people, relevant park authorities and rangers in both parks. The semi-structured interviews were done face to face in HNP, and through Skype, Facetime or similar medium, for YNP. Semi-structured interviews were deemed appropriate because even though very specific information was sought after, it was important to allow the participants to elaborate on aspects they themselves considered important about these topics. All interviews were recorded, and later transcribed and analyzed in the light of the selected frameworks and the selected data analysis method.

The transcribed data was analyzed using a thematic analysis approach. This commonly used method involves the identifications of themes. This is typically done by noticing repetition of similar concepts or ideas and then making larger categories to understand and describe the data. After the important themes have been categorized, a comparison is made trying to find links between the themes (Bryman, 2016). The analysis of the primary data for this study was done in two stages. First, the recorded interviews were transcribed. Later on, these transcriptions were used to create a table for each of the interview's 3 sections—infrastructure and technology, biological integrity, and public legitimacy. The tables were used to compare the different answers in a more condensed way and create the categories. At the end of each table there is a summary with the findings from each one of the different question. The lists of findings were later used to write the results of the study and answer the research questions.

Secondary data collection was done through consultation of official documents such as: management plans, foundation documents, regulation documentation, official websites, academic publications, and the like. These were analyzed through content analysis techniques and then contextualized using the EGS framework. Learning about the parks' perceived biological integrity was done by means of semi-structured interviews with local people, park managers, park rangers, and other stakeholders, etc. and by consulting the parks' base line data on biology and other secondary data sources, as well as from interviewing experts on the field (ecologists/biologist). The data on perceived biological integrity was also used as part of the EGS framework analysis, to establish the framework's resource attributes, and the state of the resource. Table 4 below, summarizes the methodology used for the entire study. Note that

objectives 1 and 4 are not included in *Table 4* because they deal with the background, conclusions, and recommendations.

Objective 2	**EGS Framework**	**Where will the info. come from / THEORY**	**Methods**
RQ2.1	*What institutions govern access to resources and regulate the interactions between economic actors in Yellowstone National Park and Hardangervidda National Park?*	Formally sanctioned rules. Conventions. Norms.	-Document review
RQ2.2	*Which institutions govern the policy processes of the two parks?*	Constitutional and collective-choice rules	-Document review -Semi-structured interviews
RQ2.3	*Who are the economic actors of each park and what are their preferences?*	Consumers (visitors, researchers, farmers) and producers (the state maybe farmers as well),.	-Document review -Semi-structured interviews
RQ2.4	*Who are the political actors in each park and what are their goals?*	Public authorities (the state) and international organizations, NGOs	-Document review
RQ2.5	*What infrastructure and technology is available at each park, and how does it affect the outcomes (legitimacy and perceived biological integrity)?*	Use of motorized vehicles, methods for hunting, roads, construction, fences, etc.	-Document review -Semi-structured interviews
Objective 3	**Biological Integrity**	**Theory**	**Method**
RQ3.1	*How healthy are the parks' ecosystems considered to be by local people, park managers, and park boards?*	Biological integrity. Wholeness of the ecological system.	-Semi-structured interviews

		Living up to their expectations or not.	
RQ3.2	*How healthy are the parks' ecosystems considered to be by professionals in the field (ecologists/ biologists)?*	Biological integrity. Wholeness of the ecological system.	-Semi-structured interviews
RQ3.3	*How is biological integrity measured in each of the parks by biologists and ecologists?*	Biological integrity.	-Document review -Semi-structured interviews
Objective 4	**Legitimacy**	**Theory**	**Method**
RQ4.1	*How appropriate and accepted is the decision making process of the parks with regards to the interest of local people, park managers, park boards and other stakeholders? (Input legitimacy).*	Process legitimacy. Participation of different stakeholders in the decision making process. Transparency of the process. Accountability of the decision makers.	-Document review -Semi-structured interviews
RQ4.2	*Which distributive justice principles do the parks uphold; and how just and effective is the distribution of benefits and burdens across the different stakeholders?* (*Output legitimacy)*	Results legitimacy. Distributive justice principles.	-Document review -Semi-structured interviews
RQ4.3	*Are the parks considered by the stakeholders to be legitimate and efficient in reaching their set goals? (Output legitimacy)*	Effectiveness and efficiency	-Document review -Semi-structured interviews

Table 4 Methodology Table

3.5 Limitations and ethical considerations

The study uses a purposive sampling which means the results are not generalizable to all other national park management cases; not even those located in the developed world or the global north. Another important consideration to bring up, is that this study is a social research project, not a biological or ecological study on the parks. This means that peoples' perceptions of the biological integrity might or might not align with reality or the facts. Secondary data was used to evaluate the parks on a more objective BI level, but only for contrasting purposes and to better understand the resources attributes. The conclusions drawn on the park's biological integrity are based on the analysis of the different stakeholders perceptions; the statement made by the professional biologists/ecologist; and on a qualitative analysis of official reports on the parks resources conditions.

The identities of the participants are known by the primary researcher—I. Therefore, they were granted confidentiality—not anonymity. The participants were also fully informed about the different aspects of this research, and its goals. This was achieved by providing them with an information sheet and a consent form *(see Annex 2).* It should be noted that none of the Yellowstone participants signed the consent forms due to restrictions and regulations by the NPS. However, all the Hardangervidda participants signed consent forms. Their personal information however will be keep secret and will not be shared with anyone. All the data will be stored in one hard drive secured with a password, and once the study is finalized their personal information will be deleted. The findings of the research will be delivered to both national parks' authorities to use as they see fit. The intended use for the results of this study is to be submitted to the Norwegian University of Life Sciences to acquire a MSc degree in International Environmental Studies.

This study uses a rather comprehensive framework—EGS framework. For the purpose of this study only certain relevant aspects of the framework were analyzed in detail due to time constraints. The role of civil society was not explored in detail for example. This is also why the interviews carried out focused solely on the themes of biological integrity, input and output legitimacy and the parks infrastructure.

In Chapter 1 it was mentioned that the samples used in this research where of different size—the Hardangervidda sample has nine participants, and the Yellowstone sample has only

four. The original idea was to have two sample with the same number of participants. However because of the U.S government shutdown, from December 22nd, 2018 to January 25th 2019, the time available for data collection was cut short by over a month (35 days). This significantly affected the data collection of Yellowstone, as it was scheduled to be done during the month of January. Yellowstone NP is under the authority of a federal agency—the NPS—so there was no communication possible at all with them during this period. This also affected greatly the ability to get interviewees from other stakeholders outside the NPS, as the NP was going to provide further potential local interviewees through the snowball sample approach. This was dealt by using more secondary data sources for the analysis of YNP.

To carry out research of any kind in Yellowstone National Park, the authorities require that every potential researcher complete the application process. There is a limited number of research spots every year and the application process is long (about 3 months). They require a peer reviewed proposal and an official endorsement from the university. All this took considerable time from the limited research time available for the completion of the study. The research permit obtained from the Yellowstone NPS for this study can be found as an annex in this document (see Annex 3).

Finally, it must be taken into consideration the fact that a significant amount of the secondary data used for Hardangervidda was only available in Norwegian (I do not speak Norwegian fluently). This was worked around by using online translation services and also a personal translation service. Nonetheless, there might be mistakes due to translation difficulties, or omissions due to pieces of information, that were only available in Norwegian. Most of the Norwegian interviewees could speak English fluently. Yet one participant did not, and had to take the interview in written from in Norwegian, which was latter translated to English for the analysis. In total, one interview and two official documents (i.e. Forvaltningsplan, and Regional Plan for Hardangervidda 2011-2025) had to be translated from Nynorsk to English for use in this study.

3.6 Positionality or ontological position

I find it important to state that I am carrying out this research as a Mexican student studying International Environmental Studies in Norway. My home country is an incredibly rich and diverse land, yet one that has suffered the loss of many native species due lack of timely and adequate protection strategies—this I see as a great loss. I would describe my values as more closely aligned with an ecocentric view of the world. I am a person with a lot of respect for animals, and a lifelong passion for the natural world and for biodiversity conservation. As such, I am interested in findings ways to significantly improve biodiversity conservation strategies. In pursue of this question I decided to study two different national parks to get a better understanding of the main approaches to conservation used in the world today.

Chapter 4 – Background of the Study Areas

This section was written for the purpose of answering the research questions in objective 1. It contains detailed information on the selected study areas (Hardangervidda NP and Yellowstone NP). The ambition is to contextualize the research and its findings within geographical, cultural and economic settings.

4.1 Norway

General information

Norway is a Scandinavian country located in Northwestern Europe. Norway's total area is 385,252 km^2, including Svalbard and Jan Magen. It has a population of approximately 5,328,212 people (Statistisk Sentralbyrå, 2019). Norway has an extensive coastline on the North Atlantic Ocean and has several artic islands, including the archipelago of Svalbard near the north cap. Since its constitution was signed in 1814, it divides state power among the cabinet, the parliament, and the supreme court. Norway's values are rooted in egalitarian ideas, which have led the nation to support a welfare model with universal healthcare and a comprehensive social security system (Study in Norway, 2007). Norway is a wealthy nation, with large reserves of petroleum oil and other natural resources such as fresh water, forests, and natural gas. It has had the highest Human Development Index ranking in the world since 2009, and it also scores high in the inequality-adjusted ranking (United Nations Development Programme, 2019). Furthermore, this developed nation is first on OECD Better Life Index (Better Life Index, 2019), and the Democracy Index (The Economist Intelligence Unit, 2019).

Economy

Norway has a stable and mixed economy, with both free market and also large state ownership in important sectors like oil, industry, telecommunications and banking. The economy is largely based on oil and gas exports which constitute more than 20% of the GDP (Statistisk Sentralbyrå, 2019). Another important Norwegian export is fish, Norway is the second largest exporter of fish in the world. Norway accomplishes this by a combination of fish farms and catch. The country also has important minerals, and forest resources and many

hydroelectric powerplants. Norway's agricultural sector accounts for about 2.3% of the national GDP, industry for about 33.7%, and services account for 64%. (Central Intelligence Agency, 2017). Norway has the second highest GDP per-capita in Europe and the sixth-highest GDP per-capita in the world (United Nations Development Programme, 2019). Norway is known internationally for having one of the highest standards of living in the world.

Land management and use

Norway, like many other European countries has a legal system that recognizes most land and natural resources within its national borders as state-owned, or commonly owned but controlled by the state. Norway is traditionally under Nordic Law which has its own unique set of policies and statuses when it comes to land tenure. In general, land that is not state-owned can be privately owned, native-use designated—Sami people—or under one of many forms of common land use (state and rural commons, bygdeallmenning, etc.*).* The specific forms of land tenure found in Norway have been influenced by its long history dating back to the Viking age. Certain public rights—like *Allemannsretten,* dating back thousands of years—are important also today, playing a role in the way people think about land tenure in Norway (Øian & Skogen, 2015).

Before the exploitation of oil in the 70's, Norway had an economy and culture largely based on agriculture and fisheries. Even today, one can see a large number of dairy farms and sheep farms across the countryside. These farms depend mostly on grazing animals, which have had a profound impact on the landscape and ecology of the country; farms go down through generations and farmers learn these values early in life. Most farms are expected to stay within the family, and there is a general negative outlook on selling the farm outside the family (Vedeld et al., 2003). The specific terrain and climate of the country has partly outlined the type of farming carried out. The cold, rough weather and short but intense summers make the land mostly suitable for grazing. Only 3% of Norway's total area is arable land, but about 45% or 138 million acers of land are wilderness areas that can be used for pastures. Today, about 35% of the land area is used through organized grazing schemes (Schärer, 2016). Farmers use their own lands to graze their livestock, but some also use public areas such as Hardangervidda plateau, and common use fields. In some cases farmers will pay to grass their animals in certain private lands, or move their cattle from the main grassing area to a mountain farm called a *sæter,* during the summer. These farming techniques, highlight the importance of pastures in

the country as a limited resource, and set up a stage for controversy over rivalry land uses like for example, nature conservation, predators and habitat for wildlife.

Most of Norway's protected zones are set in mountainous areas (Kaltenborn et al., 1999; Skjeggedal et al., 2016), which are unsuitable for farming (except grazing) or permanent housing. There are other reasons to establish protected zones in such areas, but a key one might be the limited amount of arable land already mentioned. "*Since the beginning of the 20th century Norway has suffered a dramatic loss of wilderness areas due to an increase in human land use through traffic systems, human settlements, agricultural use, tourist infrastructure and installations for hydroelectric power production*" (Falldorf, 2013). The graph below (*Figure 5),* by the same author, shows how land uses have significantly fragmented and decreased the Norwegian wilderness since the 1900 hundreds. As can be seen on the graph, the Hardangervidda plateau is now one of the last remaining sizable wilderness areas in the south of Norway.

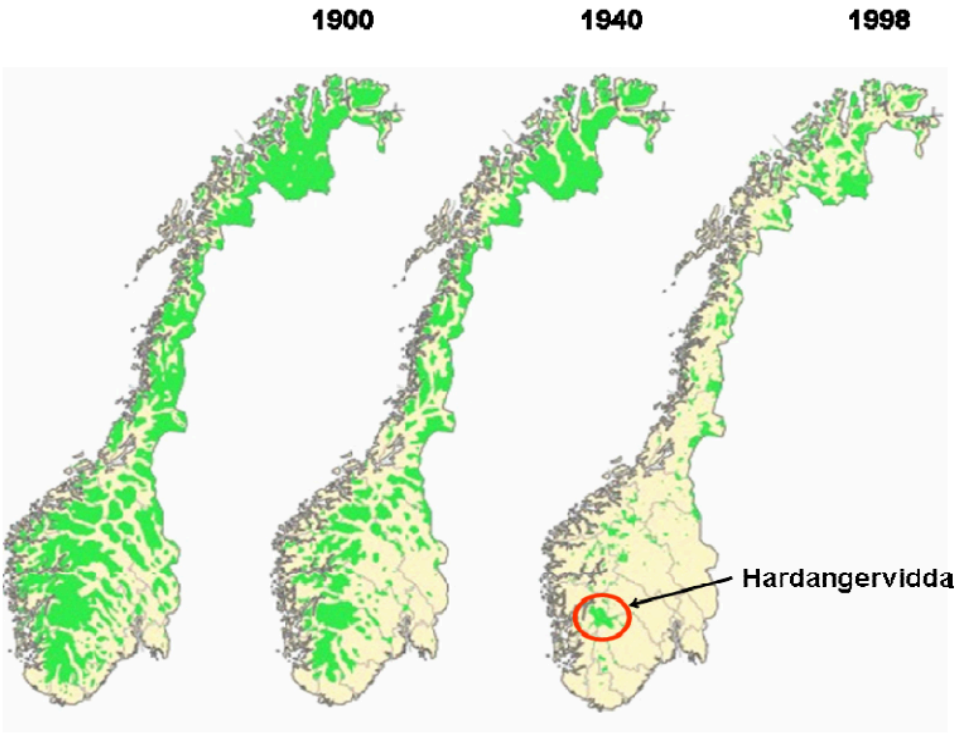


Figure 5 Loss of Wilderness in Norway

Source: (Falldorf, 2013)

Local government

Norway has political and administrative divisions on three levels: state, *fylker* (counties) and *kommuner* (municipalities). In total Norway is divided in 18 counties—previously 19—which are subdivided into municipalities or *kommuner*. There are at present 422 local municipalities in Norway. Each county municipality has two organizations, a *Fylkesting* (county council) which is conformed of community elected representatives that are responsible for matters such as regional planning, public transportation, schools, and culture, among others (Royal Norwegian Embassy, 2019). Additionally, there is the county governor or *Fylkesmannen.* The Fylkesmann represent the government and is appointed by it. He oversees the municipalities, and part of his responsibilities is to receive complaints from the people on different matters (ibid). As a direct government representative, the fylkesmann can help administer areas such as national parks.

Culture and Nature Protection

As previously mentioned, the family farming culture is still an important underlying aspect of the Norwegian rural culture—this might slowly be changing due to people moving into cities and, less young people wanting to become farmers (Vedeld et al., 2003). The family farming culture has been present for hundreds of years, as has fishing. As a result, several national controversies regarding conservation and protection of wild species, have been strongly influenced by farmers perspectives. Issues such as land protection, delimitation of national park boundaries, and large predators have been controversial particularly for farming communities that can be affected by such decisions. A good example of this can be observed in the case of Flåta and Dagali. Two small mountain communities near Hardangervidda NP, that struggled during the park border delimitation (Sømme, 1976). Furthermore, in a country with a small amount of arable land, it is deemed important to try to keep some level of domestic food production and autonomy (TINE, 2019). Current policy is trying to support the Norwegian family farming heritage, as a way to keep the highest possible level of national food self-sufficiency. Despite this, the country only produces about 50% of its total food consumption (TINE, 2019). The country's interest in maintaining family farming active both as a way to protect their heritage and also to maintain the national autonomy, is reflected in the different

policies in place to support family farming, such as subsides and other economic incentives and programs of different types (ibid).

There are a number of factors that influence the current park management system and which are rooted in Norway's agricultural background. First and foremost, Norwegians have traditionally used open fields to graze their livestock more or less freely. When the decision was made to protect certain areas, including the Hardangervidda Plateau, it was a long and difficult process. Finding a strategy that would both serve the purpose of protecting the landscape, but also allowing people to use the land as they have done traditionally proved challenging (Kaltenborn et al., 1999) . The land that was being proposed for protection, already had owners, regular users, and people strongly attached to the place. People were especially concerned about how their rights as landowners, or park/land users would change under the new status/label of national park (ibid).

Right to Roam (Allemannsretten)

Outdoor recreation is another very important part of the Norwegian cultural heritage, one that probably influences the way people think about nature and their relation to it. Some other authors like Øian and Skogen (2015) have written about how Allemannsretten influences the way people think about nature. A very unique characteristic of Norwegians' relation to their natural surroundings is the right people have— and has had since ancient time—to roam freely through uncultivated land, regardless of whom might own it. *Allemannsretten* which translates to Every Man's Right to Roam, ascertains that people are allowed to walk freely through forests, open fields, mountains, along rivers, shorelines, valleys, and any other natural area, freely and unimpaired. It also gives the right to harvest mushrooms, berries, fish, and any other bounty offered by the land. As long as it is for personal use and one doesn't damage the landscape or disturb the wildlife. Another important aspect highlighted by Allemannsretten detailed by the Norwegian Environmental Agency, is the chance to get the sensory experience of being outdoors in nature.

The main principles of the Right to Roam established in the 1957 Outdoor Recreation Act are (Norwegian Environment Agency, 2013):

- Free movement on foot and on skis

- Resting and overnight camping
- Riding and cycling on trails and roads
- Swimming, canoeing, rowing and sailing
- Picking berries, mushrooms and wildflowers
- Fishing without a license for salt water species
- Hiking and skiing

The Right to Roam is relevant for the upkeep and management of national parks because it sets a basic level or standard to which people are entitled to and expect to be able to interact with nature. There are many positive things to say about the effects of this law on people and on the management of natural areas. However, it can also be argued that it can sometimes make management and care of protected areas challenging, as it is hard to monitor people's behavior outdoors. The Norwegian Environmental Agency has tried to minimize the potential negatives effects of the Right to Roam, by publishing pamphlets and other literature on how recreational users should interact with the landscape as to minimize any negative effects and also for safety reasons. Some examples of these guidelines are: to learn to recognize protected or endangered plant species, in order to not pick them, disinfect any fishing gear used in rivers or lakes carrying infectious fish diseases, to use designated fires pits for making fires, to pitch your tent where you won't disturb animals especially during breeding and nesting season, among many other recommendations (ibid.).

4.1.1 Protected areas in Norway

As of 2019, Norway has a total of 3,069 protected areas, which cover an area of 55,645 km^2 in the mainland, and 40,000 km^2 in Svalbard (UNEP-WCMC, 2019). Nature protection in Norway is mostly guided by the Nature Conservation Act[8] adopted in 1970, and by the more recent 2009 Nature Diversity Act[9]. The later holds the basis for most of the current protected areas in Norway (Norwegian Environment Agency, 2013). Norway has been steadily increasing

[8] The Nature Conservation Act (1970), or Naturvernlova is one of the first nature conservation legislations in Norway. Even though the act has been updated, all of the decisions adopted by this act and previous ones are still in force. The act deals with the classification of protected areas in Norway and how the protection is to be carried out among others.

[9] Nature Diversity Act (2009) It is the most comprehensive piece of legislation on Norwegian nature and its management ever adopted. The provisions on protected areas in the Nature Diversity Act are similar to those in the earlier legislation, but protection of areas is now more closely integrated with other types of management, this new legislation also tries to make conservation more effective and clear to all stakeholders involved (Norwegian Environment Agency, 2013).

the number of protected areas since 1884, when its first protected area was designated by the parliament (*storting*).

All protected areas in Norway—including national parks—have a common and straightforward purpose; to safeguard vulnerable and threatened ecosystems and preserve areas of international, national and regional worth (Norwegian Environment Agency, 2013). Despite this being the stated purpose, it is also true that protected areas in Norway are meant to provide recreation and research opportunities for the people, as can be pictured by the existence of the for-mentioned Allemannsretten.

Norway has four different categories of protected areas on land, and one marine protected area category. The categories closely resemble the IUCN Protected Area Categories System[10]. Each one with a specific level of protection and regulations, as well as with specific elements to protect. **1)National parks** are chiefly aimed at protecting several species from extension and keeping an ecological balance, by maintaining a large areas with little to no infrastructure in them. NPs are different form **2) protected landscapes** primarily because they can have buildings and infrastructure in them which is also considered protected as part of the cultural landscape. A protected landscape can have both natural and cultural elements in it. They are also generally intended to maintain the character of the landscape and the public enjoyment of it. A common example of this type of protected areas are agricultural fields. **3) Nature reserves** are different from the previous two categories, for being the most strictly protected area in Norway. Nature reserves are generally established on areas of particular importance for biodiversity, geological features, or scientific interest; generally they also house very vulnerable or endangered species. Finally, there is the **4) habitat management area,** which is characterized by protecting areas which serve a specific function for one or more species. For example, breeding grounds, migration routes, feeding areas, etc. (ibid.) The most common form of nature protection in mainland Norway is national park, as we can see in *figure 6*, whereas nature reserve is the most common form of nature protection in the considerably less populated Svalbard.

[10] International Union for Conservation of Nature (IUCN) created in 1948 is one of the first international organization for nature conservation that harnessed important international cooperation. It has a recognized system for categorizing protected areas which vary in level of protection and aims. The categories are: Strict Nature Reserve, Wilderness Area, National Park, Natural Monument or Feature, Habitat/Species Management Area, Protected Landscape/Seascape, Protected area with sustainable use of natural resources (IUCN, 2019).

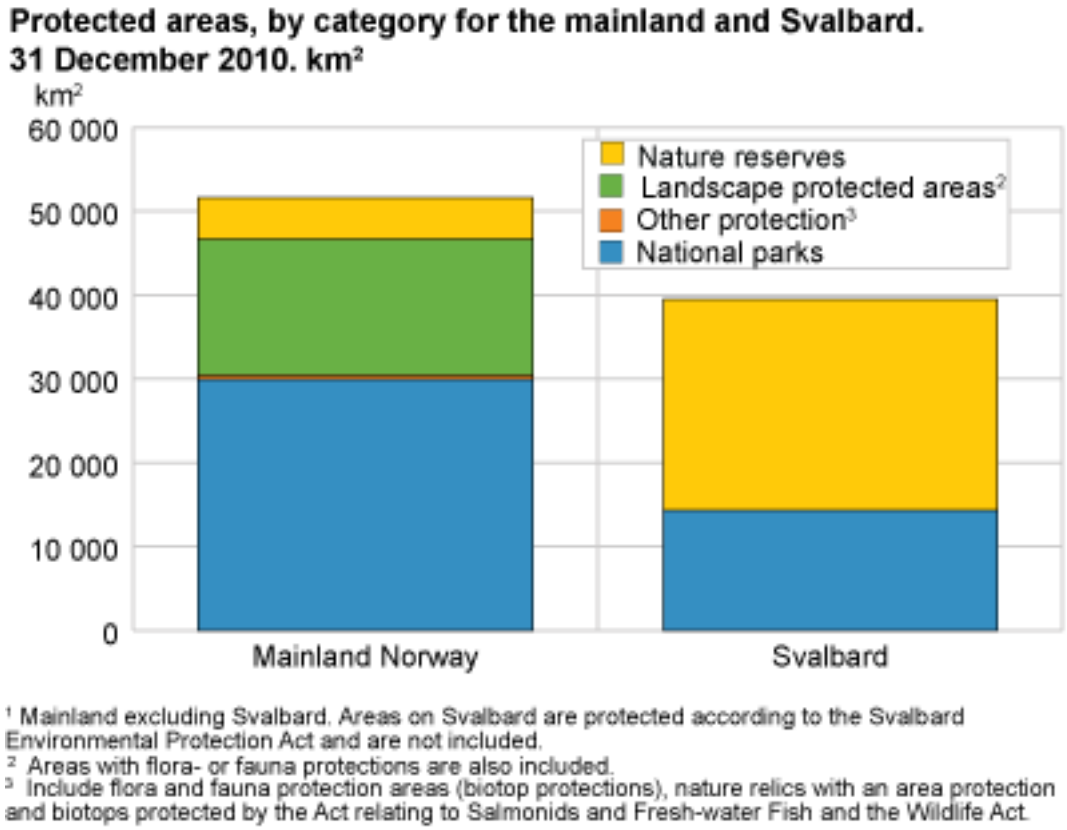


Figure 6 Categories of protected areas in Norway

Source: (Statistisk Sentralbyrå, 2019)

4.1.2 Hardangervidda National Park

The Hardangervidda plateau is known for having the largest NP in mainland Norway—and Scandinavia—only surpassed by Sør-Spitsbergen NP in Svalbard. Hardangervidda National Park (HNP) was established in 1981. As previously stated, it covers an area of 3,422 km^2 and it is located in central southern Norway, spanning over the counties of Telemark, Buskerud, and Hordaland (*see figure 5)*. Its expansion also cover eight municipalities, Odda, Ullensvang, and Eidfjord to the west; Hol, Nore, and Uvdal to the east; and Tinn and Vinje to the southeast. It is classified under the IUNC as Category II (National Park). It is an area of special value in terms of holding the largest population of wild reindeer in Europe, as well as being the largest alpine mountain plateau in Europe. The reasons for establishing the park are very accurately described by the Dynamic Ecological Information Management System - Site and dataset registry:

"*The main purpose of establishing Hardangervidda National Park was threefold: (i) Protect a section of a very valuable high mountain plateau where the natural landscape is home*

to unique artic flora and fauna, and several species have their southern limit in this area. (ii) Protect the cultural heritage and the cultural environment, and allow for sustainable land use such as farming, grazing by livestock and fishing. (iii) Protect and provide an environment for sustainable outdoor life and natural experiences, such as fishing, hunting, education and environmental research" (DEIMS-SDR, 2019).

Hardangervidda has two national park centers; the Hardangervidda Nature Center in Eidfjord and the Norsk Villreinsenter Sør in Skinnarbu which is a center for enabling and promoting the conservation of wild reindeer (Hardangervidda, 2019).

Despite being one of Norway's 47 designated national park areas, HNP is unique in many ways. It differentiates itself from other national parks in Norway and in the world due to the following characteristics. HNP is the only national park in Norway with its own unique management system, based on a complex system of local boards, and local people representation—it will be described in detail in Chapter 5. Another unique characteristic of HNP is that as much as 52% of its land is on private property, while 48% is state owned commons (Styringsgruppa for Regional Plan for Hardangervidda, 2011). This is striking because most national parks both in Norway and the rest of the world, are generally and originally owned by the state in their totality. Hardangervidda is also different, in that it allows hunting and finishing within the park, as well as the grazing of sheep and cattle. This level of extractive use of the park is more commonly seen in other categories of protected areas by the IUCN, such as protected landscape or protected area with sustainable use of natural resources. Therefore, it is quite unique for a protected area under a national protection regime to allow this type of land use. The reason for HNP allowing it, is that the natural resources of the plateau have been of great value to land owners and people on the surrounding villages since long before the it was designated as a national park. This was taken into consideration when establishing the area as a national park.

Fauna, Flora and Climate

In accordance to some of the national laws previously mentioned, Norway has decided to protect the animals and plants which are endemic to the country or that make their home in Norway primarily. Norway is home to a several artic plants and animals that find themselves at their south delimitation in Norway. In Hardangervidda there is at least 120 species of birds and 21 species of mammals registered (Styringsgruppa for Regional Plan for Hardangervidda,

2011). Some of the artic species residing in HNP are, the long-tailed jager, long tailed ducks, the artic fox and the snowy owl (ibid.). However, not all of these arctic species continue to be plentiful in Hardangervidda and for several reasons. Some other species that are quite characteristic of the Hardangervidda area are, mountain fox, mountain hare, stoat, weasel, beaver, wild reindeer, European elk, Norwegian lemming, grouse, and tundra vole (Quinn & Woodward, 2015). Wild reindeer is a migratory species, and they migrate annually from their winter feeding grounds in the east of the plateau—were they feed mostly on lichens—to their summer and breeding grounds on the west of the plateau (ibid).

Due to the topography of the land at Hardangervidda—being a high mountain plateau—there were originally no fish in the lakes and rivers. Only small crustaceans such as amphipods and shield crayfish were found. These were mainly food for the large population of ducks and birds that originally inhabited the plateau. Nowadays, brown trout—which is an invasive species—is found throughout most of Hardangervidda. It is virtually the only type of fish found there. It is a high yielding fish in many fishing areas, and it feeds on the aforementioned small crustaceans. It is important to note that currently there is no viable population of large predators at Hardangervidda NP. The natural predators found in the area were wolverines, wolves, golden eagles, and lynxes; however because of pressure from concerned farmers, populations of large carnivores have been kept at bay at Hardangervidda and other parts of the country (Styringsgruppa for Regional Plan for Hardangervidda, 2011).

The flora at HNP, is what would be expected in an artic-alpine climate. The whole of Hardangervidda is above the tree line which means that its vegetation consists mainly of lichens, pine shrubs, and grasses during the summer months. There are more than 360 flowering plants species, 37 fern species, and more than a 100 species of lichens, mosses, and fungi that grow on the plateau (Quinn & Woodward, 2015). The area is characterized by having significant climate variations in the west and east parts. This in turn also affects the vegetation found on each side. The climate on the west part of the plateau is affected by the ocean and the winds from the west. These factors make the west of Hardangervidda have more precipitation and a milder temperature range than the east. The east, on the other hand, is drier and has more extreme temperatures during the summer and the winter (ibid.). Some anthropocentric factors have had an effect on the vegetation at Hardangervidda throughout its history, there has been extensive grazing done by sheep and other domestic animals and harvesting of shrubs for fire wood have shaped the landscape.

Geology and Geography

The main characteristics of Hardangervidda's landscape are its undulating plains that extend far and wide. Its geographic coordinates are approximately 59° 00'N-61°00'N, 06°30'E--09°00'E (Quinn & Woodward, 2015). The hard bedrock that can be seen throughout the south eastern side of Hardangervidda is the remnants of a more than a 1 billion year-old mountainous landscape (Norwegian Environment Agency, 2013). This ancient mountain area was eroded during the glacier period that also covered Hardangervidda, and some 9,000 years ago the final pieces of ice disappeared and left the plateau we see today after eroding the mountains leaving behind occasional peaks or monadnocks (ibid.). Hårteigen Peak at Hardangervidda is a prominent feature visible throughout most of the plateau. It is a noticeable example of the effect of the glacial period on the area *(see Figure 7)*.

Figure 7 Hårteigen Peak at Hardangervidda NP

Foto: Håvard Berland

4.2 United States of America

General Information

The United States of America, is bordered by Canada on the North and by Mexico on its south border; the state of Alaska borders Canada on the east side and Russia to the west, across the Bering Strait. Its government type is a constitutional federal republic with a representative democracy. It is the fourth largest country in the world, covering 10.1 million km^2. Its expansion crosses over nine official time zones, encompass a vast variety of climates and geographies. This makes the U.S. one of the world's 17 megadiverse countries[11]. The USA is the third most populous country in the world, with a population estimate of 327,167,434 million people as of July, 2018 (US Census Bureau, 2018).

The USA is also a highly developed country. It ranks number 13 out of 169 countries in the Human Development Index (HDI). The USA is also characterized by having one of the largest economies in the world and ranks number 8 in the OECD Better Life Index. Despite scoring highly on several socioeconomic measures, the USA has a large gap between the rich and the poor—20% of the population earns about 8 times as much as the bottom 20% (OECD Better Life Index, 2019). On the democracy index of 2018, the USA scores fair, with a flawed democracy scoring in the ranges of 7.0-7.9 out of 10.0 (The Economist Intelligence Unit, 2019). The USA is known for pioneering and being a global leader in several areas like science, technology innovation, politics and the development of several international organizations like the United Nations, and the World Bank among others. In terms of conservation, the USA is known for establishing the first national park in the world and having some of the most intact ecosystems in the Northern hemisphere (National Park Service, 2019).

[11] Megadiverse country is a classification given by the UN Conservation International to countries with an outstanding wealth of endemic biological diversity. Many of them are located in tropical or subtropical regions. The term was created in 1988, to bring awareness about the importance of biodiversity conservation to countries with high biological diversity (BIODIVERSITY A-Z, 2019)

Economy

The USA has a mixed economy, and is one of the largest in the world; it has the biggest GDP in the world, and also holds one the greatest concentrations of wealth (International Monetary Fund, 2015). Its economy centers mostly around knowledge/information and services, although it also has considerable industry and manufacturing. About, 0.9% of its GDP comes from agriculture, 19.1% comes from industry, and 80% from services (Central Intelligence Agency, 2017). It is relevant to mention that the USA is the third largest exporter of goods in the world, and the number one country in imports (ibid.). Agricultural products include a variety of grains, fruit, vegetables, dairy products, meats, and forest products, among others. The products offered by the USA's industry sector are highly diversified, some of them are steel, petroleum, motor vehicles, chemicals, electronics, consumer good and aerospace (ibid.).

Land management and use

Since its independence from Great Britain in 1776, the U.S has had a common law system based on the English common law at the federal level; almost all 50 states also have a common law based legal systems, except for Louisiana. This means that all land is belonging to the state or to the 'public domain' unless otherwise designated by some form of land tenure, e.g. traditional land tenure/aboriginal title[12], fee simple[13], leasehold, allodial title, common land, life state, etc. Most land management use, distribution and rights regarding some type of land tenure are administered by the Bureau of Land Management (BLM)—which is part of the U.S Department of the Interior. The BLM was created in 1946 from the merging of two previous agencies, the General Land Office, and the U.S Grazing Service. The former one, had its roots back in the westward-expansion area in the 19th century, when the priority for land management was to incentivize westward migration to fulfil the 'manifest destiny' belief held back in the day. This led to the creation of the Homestead Act, which entitled Western settlers to 160 acers 64 hectares of public land after they reside on the land and cultivate it for five years. By 1934,

[12] Aboriginal title is a category of land tenure in which Native American tribes and nations have the right of occupancy of a land for having used it for a long time, right cannot be alienated except to the federal government, and it is different from lands owned by Native Americans through fee simple.

[13] Fee simple is the most complete form of land tenure in common law. Holders can typically freely sell it, rent it, or use it to secure mortgage loan. There is however an obligation to pay a property tax. In modern societies this is the most common form of land ownership

more than 270 million acers (more than 1 million km^2) of public land had been transferred to private ownership (Bureau of Land Managment, 2016).

All national parks in the U.S are considered state-owned which means they belong to the entire population. Like other federal lands, national parks in the U.S have a certain level and type of protection and a specific purpose to fulfill.

Local Government

The U.S has three levels of government, the federal government, the state government, and the local government. Under the 10th amendment of the U.S Constitution it is stipulated that all powers that don't belong specifically to the federal government, fall under the control of the state and the people (White House, 2017). Additionally all state governments are modelled after the federal government which consists of three branches (executive, legislative, and judicial power). Each state in the USA has its own constitution which is considerably larger and more specific than the U.S Constitution (White House, 2017). State constitutions are meant to address everyday situations and specific issues that are the responsibility of the local government. Local governments are generally divided in two levels; counties which are further divided into municipalities or cities/towns. The Municipality's government generally take responsibility for matter such as: parks and recreation services, police and fire departments, housing services, emergency medical services, municipal courts, transportation services (including public transportation), and public works (streets, sewers, snow removal, signage, and so forth) (ibid.). As a representative democracy, power positions such as governors, and city councils are generally elected by the people.

Culture and Nature Protection

One relevant aspect of American culture in regards to nature protection and conservation, is the popular pastime of 'packing up the car and taking the whole family' to see iconic and interesting sites, like the Old Faithful, or the Great Canyon. This tradition among Americans families has help them keep the interest in nature and conservation, and has been passed down through generations. This 'road trips' tradition seem to have stayed popular. However, the interest of Americans in using the outdoors as one of their main pastimes and hobbies has its roots much earlier.

The idea of protecting and preserving nature and natural resources in the USA, was first introduced during the influential Conservation Movement[14] (1890-1902). Thanks to this movement a lot of people were made aware of the value of protecting and keeping nature and natural resources; the influence was such that it was reflected in policy. *"The conservation movement had an important effect on government policy in the United States. Many laws were passed, including those that established national parks, national forests, and policies for protecting fish and wildlife throughout the nation"(Library of Congress, 2018).* Other elements that played a part in this first conservationist wave in America were, the explorers of the American frontier who brought back with them accounts and pictures of the wild west which helped people appreciate the country's natural beauty; and the fact that cities and towns were beginning to get crowded and Americans were starting to engage in outdoors activities such as hiking, bird watching, camping and other outdoors activities to get a respite from the busy towns (ibid.). Yellowstone National Park and Yosemite National Park were founded during this period.

The second most influential conservation wave, was The Environmental Movement of the 1960s' and 1970s'. This movement as the previously stated one, was successful in affecting policy, thanks to several outspoken environmentalist. Especially notorious to this period was scientist and author Rachel Carson. With her book 'Silent Spring' (1962), she managed to bring attention to environmental issues such as pollution and its effects on wildlife, the environment, and ultimately humans. As a result of this period, hundreds of conservation laws were signed into law. Some of the most relevant ones are the Wilderness Act of 1964, the Clean Air Acts of 1963 and 1967, the Clean Water Act of 1960, and the Water Quality Act of 1965 (Dictionary of American History, 2003). Other important environmental laws and actions taken during this period are the passing of the National Environmental Policy Act and the Endangered Species Act of 1973, as well as the establishment of the Environmental Protection Agency, for the purpose of overseeing and enforcing many national environmental programs (ibid.) All of these acts and agencies deeply impact the way national parks operate now a days in the U.S; they serve as the backbone to most large decisions on matters of nature conservation.

[14] The Conservation Movement (1890-1902), sought to preserve and protect America's wildlife, wild lands, and other natural resources. The movement was largely propelled by poets, conservationists and writers—Thoreau, Powell, Muir, among others—whose influential writings helped convinced Americans that protecting nature was an important national business (Library of Congress, 2018).

4.2.1 Protected areas in the USA

As of 2019, the U.S has a total of 34,075 protected areas, with a total—land—area coverage of 1,233,175 km^2 (UNEP-WCMC, 2019). Like with Norway, the USA's categorization of protected areas resemble that of the IUCN. The overwhelming majority of protected areas in the USA are under category V (Protected Landscape/seascape) as seen in *Table 1.* The fact that a large number of marine protected areas fall into this category might be one of the reason why this category is so much bigger than the rest.

Table 5 Protected areas in the USA

IUCN Category	# Protected Areas	Name of the Category	Percentage %
Ia	607	Strict Nature Reserve	1.78
Ib	1,325	Wilderness Area	3.89
II	41	National Park	0.12
III	1,804	Natural Monument or Feature	5.29
IV	755	Habitat Species Management Area	2.22
V	28,414	Protected Landscape/Seascape	83.39
VI	418	Protected area with sustainable use of natural resources	1.23
Not Reported	655	-	1.92
Not Applicable	56	-	0.16

Source: (Based on UNEP-WCMC (2019))

The U.S manages or operates protected zones at three different levels: federal, state, and local level protected areas. Most federally protected areas in the U.S.A fall under the management or authority of one or more of these four organizations: the National Park Service

(NPS), the United States Forest Service[15], the Bureau of Land Management, or/and the United States Fish and Wildlife Service[16]. State protected areas tend to be generally smaller than those managed at federal level, the same is true for locally managed protected areas. However, there are a number of configurations in which different protected areas, might be governed in; which include: federal or national ministry or agency, collaborative governance[17], joint governance, non-profit organizations, individual landowners and sub-national ministry or agency, which is the most common (UNEP-WCMC, 2019).

National parks in the USA are managed under the authority of the National Park Service agency. The mission of the National Park Service is to: "*preserve unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations. The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world"(National Park Service, 2019).* The NPS oversees not only national parks, but also a large variety of protected areas such as: battlefields, monuments, historic sites, seashores, historical parks, among others (ibid.).

4.2.2 Yellowstone National Park

In Chapter 2 it was already mentioned that Yellowstone National Park is regarded as the oldest national park in the world, established in 1872 by President Ulysses S. Grant. Although it is not the largest NP in the country, it is certainly one of the most iconic and visited parks in the U.S; just in 2018 it received over 5 million visitors (National Park Service, 2019). It is classified as category II protected areas by the IUCN, which has the second highest level of protection after nature reserve. Yellowstone was a named a UNESCO World Heritage Site in 1978.

[15] This agency manages and protects 154 national forests and 20 grasslands in 43 states and Puerto Rico. The agency's mission is to sustain the health, diversity, and productivity of the nation's forests and grasslands to meet the needs of present and future generations (U.S Forest Service, 2019).

[16] It is the principal federal partner responsible for administering the Endangered Species Act (ESA). Its main goals are: Protect endangered species, and then pursue their recovery; and conserve candidate species and species at risk so that listing under ESA is not necessary (U.S Fish & Wildlife Service, 2019).

[17] "A governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus-oriented, and deliberative and that aims to make or implement public policy or manage public programs or assets" (Ansell & Gash, 2008) .

One particular characteristic of Yellowstone is that it has several specific attractions inside the park which draw a most of the park's visitors, some of them are: the Old Faithful[18], the Grand Canyon of the Yellowstone, Hayden Valley, Mammoth Hot Springs, Lower Geyser Basin and the Yellowstone Lake. There is an eight shaped road—called Grand Loop—that leads to each one of these attractions, *see figure 8* . There are 5 main entrances to Yellowstone, and each one is at or near a town or community. These towns are called gateway communities/towns and much of their economy is based around the NP. The park also has a total of 8 visitors centers/museums; seven of them are found inside the park and one is located in the gateway community of West Yellowstone in Montana. Additionally, there is one permanent settlement/town inside the park called Mammoth, it has a population of 263 people (US Census Bureau, 2018), and its inhabitants are mostly park employees.

Figure 8 Yellowstone's five main entrances and the Great Loop

Source: (Yellowstone Park, 2019)

[18] The Old Faithful is a natural geyser in YNP that is famous for erupting predictably every 60-90 min.

The park was originally founded to preserve its unique hydrothermal[19] wonders for the enjoyment of the people (National Park Service, 2019). Some of the scenic beauty that set this land apart early on, were its impressive geysers—Yellowstone has the highest concentration of geysers in the world—colorful volcanic soils, hot springs or steaming pools and bubbling mudpots (ibid.). Yellowstone was described by early explores as "a place of wonder". Now a days, Yellowstone is also highly valued for its variety of wildlife and plants. The purpose statement of the park reads as follow (Foundation Document, 2014):

"YELLOWSTONE NATIONAL PARK, the world's first national park, was set aside as a public pleasuring ground to share the geothermal wonders and preserve and protect the scenery, cultural heritage, wildlife, and geologic and ecological systems and processes in their natural condition, for the benefit and enjoyment of present and future generations."

Yellowstone NP is at the heart of the Greater Yellowstone Ecosystem (GYE), which comprises six national forests, private and reservation lands, and designated wilderness areas (Foundation document, 2014). In total the entire GYE covers 91,458 km^2 making it one of the largest protected temperate-zone ecosystems on earth (ibid.). The other protected areas surroundings YNP, are essential to its health and overall success. "*Biological processes within YNP extend far beyond its borders, and activities in one place can have huge implications for the area next to it" (Quammen, 2016).* Below in *Figure 8*, it is possible to see how much larger the GYE is compared to the 'core' that represents Yellowstone NP. It also depicts the different ownership and management agencies involved in the GYE.

[19] The entire national park sits over a large underground volcanic system that fuels its hydrothermal features, and a large part of Yellowstone's plateau sits on a giant volcano crater (Foundation Document, 2014; Quammen, 2016).

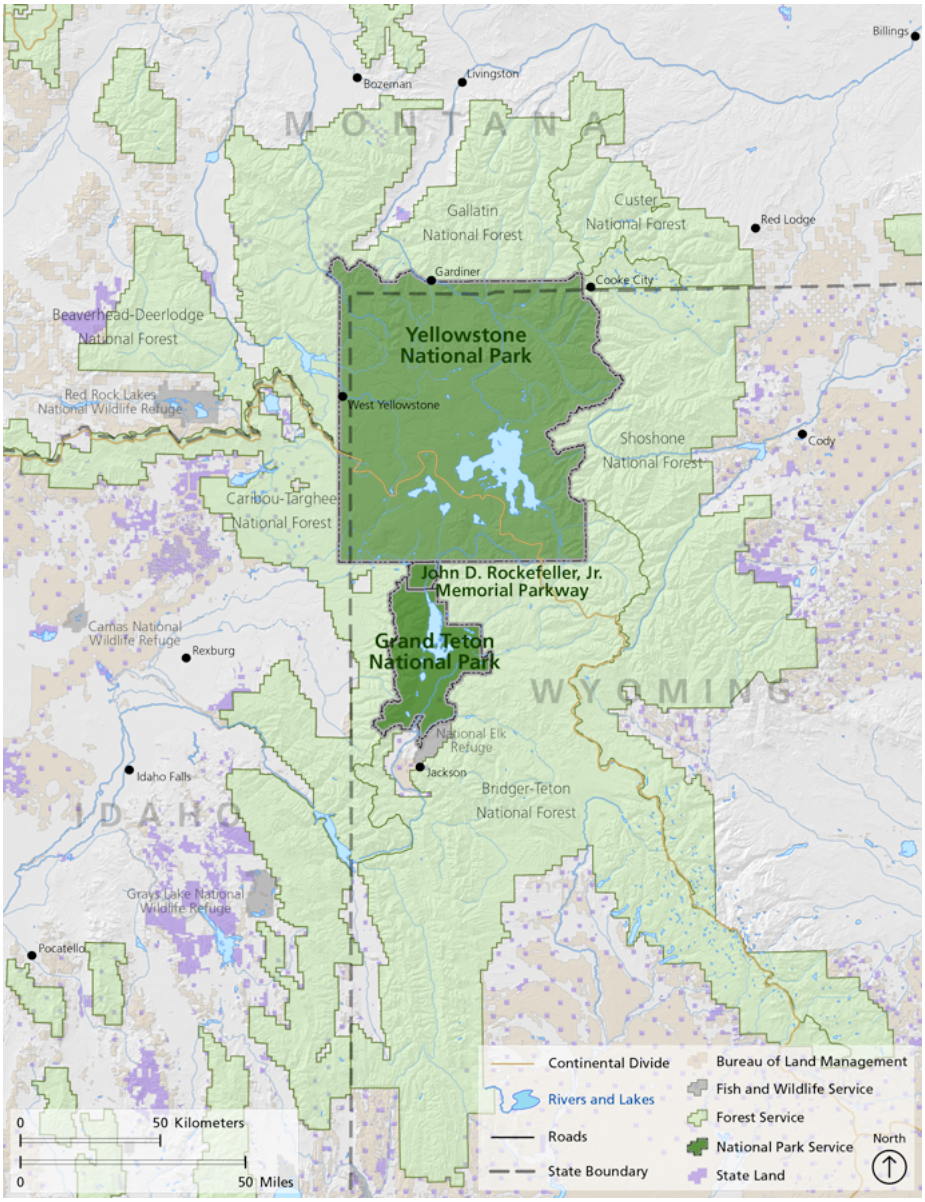


Figure 9 Greater Yellowstone Ecosystem

(Source: National Park Service U.S, 2019)

Fauna, Flora and Climate

As stated before, YNP holds a great variety of animals and plants. It is possible to find nearly 300 species of birds, 16 species of fish, 5 species of amphibians, six species of reptiles, and 67 species of mammals within its borders (National Park Service, 2019). Some of its most notorious species include grizzly bears and black bears, gray wolves, elk, bison[20], bighorn sheep, coyotes, beavers, lynx, mule deer and white-tail deer, as well as several types of

[20] YNP holds the largest free-roaming wild heard of bison in the U.S.

mustelids[21]. The most iconic native fish found in YNP is the cutthroat trout, which in recent years has been battling with other invasive trout species (Quammen, 2016). Yellowstone is a temperate-zone ecosystem that is covered by snow for a considerable part of the year; supporting mostly lodgepole pine forests, nonetheless several types of fir and spruce are also present but in less quantities. Additionally, meadows, grasslands and sagebrush steppe are abundant, and hold a variety of flowering plants (National Park Service, 2019).

Geology and Geography

It has been mentioned before that YNP geological structures are one of its most characteristic and unique features. Most of the park's expansion is located above 2,286 meters in elevation and sits on volcanic bedrock. This is due to the many geological process that have defined the landscape over the past 150 million years (National Park Service, 2019). Geological events such as glaciations, erosion, volcanism and compression have formed the different landscapes seen at Yellowstone (ibid.).

A large part of YNP is an active super-volcano, and the plateaus found inside the park and also near it, are mostly the volcano's calderas left after explosions that happened millions of years ago. Some of the most significant geological features of Yellowstone are (National Park Service, 2019):

- It is one of the world's most geologically dynamic areas on Earth due to a shallow source of magma resulting in volcanic activity.
- More than 500 active geysers
- More than 10,000 hydrothermal features[22]
- Largest volcanic eruption known to have occurred on Earth.
- 290 waterfalls

The park's geography has a great variety of characteristics such as lakes, rivers, canyons, mountain ranges, valleys, forests and meadows. YNP is mostly forested, covering 80% of the land, 15% is grassland, and only 5% is covered by water (National Park Service, 2019). Blow is an example of a valued hydrothermal feature, a colorful hot spring (*see Figure 10*).

[21] Family of carnivores that includes species like badgers, wolverines, martens, ferrets, weasels, stoats, and mink, among others.
[22] Naturally heated water near the earth's crust due to volcanic activity. They can take several forms such as geyser and hot springs.

Figure 10 Colorful Hot Spring at Yellowstone NP

Photo credit: Maarten Otto on Visualhunt.com / CC BY-NC-ND

What is concluded from this chapter is that as the study progresses, it is crucial to reflect on the different economic and cultural differences elaborated on here. A brief summary of relevant contextual elements from the two countries are:

Table 6 Background features summary table

Feature	Hardangervidda NP	Yellowstone NP
Approach at outdoor recreation	Adventurous, hiking, on foot/skis, camping, low-key nature exploration, few commodities	Road trips, commodity/resort oriented
Previous use of the land	Sustenance, resource extraction, private property	Unused land
County governor/fylkesmann	Appointed (represents the government to the people)	Elected (represents the people to the government)
National economy	Oil, and natural resources (forests, fish, etc.) - previously agricultural	Knowledge/info. and services
Ecosystem	Alpine	Temperate

Source: (Own field work 2018-2019)

CHAPTER 5 – Environmental Governance System

Chapter 5 describes the two parks environmental governance systems (EGS). As mentioned before, it focuses on the aspects of the framework that improve the understanding of perceived biological integrity and public legitimacy of the parks, in relation to the management systems. This section uses primary and secondary data sources. The primary data on which findings are partly based, come from semi-structures interviews collected during the period of December 2018- February 2019. The research questions 2.1-2,5 of Objective 2 are answered in this section. At the end of this chapter the two park regimes are captured and compared.

5.1 Hardangervidda National Park Environmental Governance System

5.1.1 Environmental resources and their attributes

The EGS of Hardangervidda NP, has some resources which are used in a typical extractive manner, such as reindeer, fish, grouse, and various types of pastures. There are other resources like for example the 'view' or the landscape, where the conceptualization is a bit more abstract and the use of it is not so easily valuated. Although there are hundreds of animal and plant species at HNP, only the ones that made a significant appearance during the data collection will be described in detail. This also lays out which resources are considered important for the stakeholders and what the management system at HNP mostly focuses on. The five main resources identified were: 1) wild reindeer, 2) willow grouse, 3) brown trout, 4) grasslands, and 5) the landscape.

Perhaps the most well-known resource at HNP is the wild reindeer (Rangifer tarandus). The wild reindeer is a migratory spices of ungulates that require vast extensions of land. In Norway, wild reindeer are considered a common property resource, although the land they inhabit encompasses private property, state property, and communal property (Brata, 1995). Many different stakeholders benefit from the wild reindeer at Hardangervidda, they are valued for their meat, pelts, and the overall hunting experience they provide. Keeping a stable and sustainable population of wild reindeer at the park has been a main concern for its different stakeholders, even before the park was formally established. Achieving this goal, however, has not been an easy or straight forward process. The Hardangervidda wild reindeer herds have

experienced extreme peaks and lows in its population size throughout the decades. This was caused by a variety of management problems ranging from erroneous calculated hunting quotas, complicated land ownership structure, and animal and hunter behavior that often prevents quotas from being met (Bjerketvedt et al., 2014). Although, today the Hardangervidda wild reindeer population appears to be relatively stable and healthy, there are still general concerns for the sustainability of the population in the future, especially over anthropocentric pressures and global warming.

The wild reindeer was a frequently reoccurring theme during the primary data collection, and also during the secondary data collection. Every single interviewee mentioned the wild reindeer at one point or another, and many did several times during the interview. The information about wild reindeer was also abundant in academic literature and on the different relevant webpages, like for example the Hardangervidda villreinutval (2018). This shows how important this resource is for the stakeholders at HNP. It is also a pretty emblematic and charismatic species which might also add to its prominence. The logo of the national park displays a wild reindeer on it. In general, the focus and discourse around wild reindeer was neutral to positive, by most interviewees. Comments such as *"The trail network should probably be changed to accommodate the reindeer and not hinder them"* were made when asked how would they like to see the park improved. Another interviewee also said, *"The hunting season is very important to people around here…"* when asked about the main benefits the parks offers. However, a few interviewees expressed negative feelings towards the strong focus the park has on wild reindeer. Here is an example of a statement made by an interviewee: *"We made a draft of a visitor's guide and it again focused on reindeer, reindeer, reindeer."* latter on he also added, *"So if you have seven priorities on the Hardangervidda it is all reindeer. And that is a bit narrow minded. I would be very happy if we could expand our focus."* Another interviewee mentioned that: "*He couldn't only talk about the wild reindeer"* when he was asked about the health of the park.

The grouse or ptarmigan (Lagopus muta), is a medium-sized bird belonging to the pheasants family that is also quite characteristic of the park. It is hunted for its meat in Norway and other northern countries like Canada and Iceland. Grouse were a reoccurring theme in the study alongside the wild reindeer and the trout. They are a hunted species, and they get special attention in the park for the purpose of monitoring their population and to avoid an unwanted decline in its population. Sometimes grouse is hunted in Norway with the use of pointer dogs

during the permitted hunting season which goes from September to February. Like the reindeer, grouse are considered a common property resource and hunters must have a valid hunting license to have access to this resource. The ptarmigan was also mentioned several times but not nearly as many as the reindeer, some interviewees didn't mention ptarmigan at all.

Fish, especially the brown trout, is an important asset of the park. HNP is known for its many lakes and rivers which, as mentioned before, are sometimes characterized for their high yields. The trout however, is an introduced and invasive species at HNP. Brown trout is the largest species of fish found at Hardangervidda weight up to 15 kg (Norway Powered by Nature, 2019), making it popular among fisherman. Fish populations at Hardangervidda are also being monitored by biologist for the same purpose of keeping them at a healthy population size. Despite trout largely being considered a positive animal at Hardangervidda, some interviewees expressed concern for the effects this large predators have on species at the park which are actually native, such as the several duck species. Biologist have reported a dramatic decline of certain duck populations. This is mainly due to trout eating the primary food source of the ducks—small crustaceans and also by the ducks getting trapped in the gillnets by accident.

Fishing is generally allowed at the park, you do not have to be a landowner to be able to get a sport fishing license. Licenses range in prices depending on how many days you are expecting to fish, 100,00 kr for a day 150kr for 2 days, 250kr for 3 days and so forth. It is also possible to get a seasonal permit for 700,00 kr. Getting fishing licenses in Norway can be done at specific fishing stores, or online (Fishspot, 2019). In some specific areas of HNP—as mentioned before—gillnets are allowed for fishing. Although most gillnet fishing is used for personal consumption there are a few instances in which it is allowed for commercial use. In these cases, the fish is used to be sold as fermented fish (rakfisk). Fishing is an important resource at Hardangervidda, both local people and the state benefit economically from it.

Grazing areas are also considered a very important resource at the Hardangervidda plateau. Local farmers let their sheep and in some cases cattle graze freely along the plateau in either private or Statsallmenning[23] areas. Aside from providing for resources for the local people's, is also considered an important cultural and landscape characteristic of the national

[23] Is a specific area/zone in Norway that belongs to the state, but in which local people have strong usage rights e.g. state forests, some grasslands, etc.

park. However, a few interviewees were concerned about the large number of domestic animals grazing in the plateau. One pointed out that sheep are essentially an invasive species, and that there is no way of really knowing how they might be affecting the ecosystem. Others, expressed their concern about the effect the domestic animals might have on the wild animals on the plateau, especially the reindeer. It was also mentioned that although domestic animals were introduced to the area, they are a wanted invasive species, just as the Brown Trout. Sheep help maintain the area open through grazing, which is something many stakeholders appreciate.

The landscape of HNP is important for its stakeholders. Landowners, locals, and tourists alike regard the plateau as a beautiful cultural landscape which benefits people by providing recreation opportunities. Although the 'view' or the landscape itself is not something one can actually carry out of the park—except in your memory—it needs various management strategies, polices and regulations to be preserved it e.g. limit and specify the type of cabins allowed in the park. In the case of HNP, there are many building regulations to keep the landscape looking the way it looks, and there still seems to be some debate as to what cabins should look like inside the park—e.g. modern vs. rustic. The landscape is primarily enjoyed through hiking trails and paths, camping, and of course the fore-mentioned hunting and fishing activities. The park is most heavily used during the summer and spring, and has significant less traffic during the winter and autumn months. The majority of the interviewees see the park as a pristine looking area and express their desire to keep it that way. In general, participants expressed concern about the increasing number of large DNT tourist cabins and the effect this might have on the landscape by the increased number of tourists. A few also mentioned that the use of motorized vehicles 'ruins' the experience of being out in the wilderness.

5.1.2 Resource regime

Based on Vatn (2015) EGS framework, it can be said that Hardangervidda's resource regime consists of a mix of national, county, and local rules and laws that regulate the access and use of the resources. These are influenced by the traditional rights of landowners to use the area as a grazing site for their livestock, and hunting and fishing for their own consumption; as well as by laws such as Allemannsretten and Statsallmenning.

Under the HNP management system, it is possible to distinguish two categories of actors who have access to its natural resources: landowners and other stakeholders—national and

international tourists, occasional park users, hikers, researchers, local authorities, board members, and NGOs—The reason this distinction can be made, is because landowners are the only group of stakeholders at Hardangervidda who have a wider set of rights when accessing the resources. Landowners at HNP distinguish themselves from other actors who also have access to the resource, by having at least 4 *access* rights out of the 5 that were described in Chapter 2. Only landowners—except for a few other authorized personnel e.g. police officers—can use a range of motorized vehicles to *access* the park—with the appropriate permits. Most motorized vehicles (MV) like snowmobiles, tractors and all-terrain vehicles (ATVs) are forbidden for recreational purposes. This means that it is mostly landowners who get to use them when exercising their rights to hunt and manage their properties inside the park.

The right of *withdrawal*, is the right to extract or obtain 'products' from a resource area. In HNP this is mostly done by landowners as well. Hunting and grazing are managed by a system of local licenses. Landowners have the right to shoot a certain number of wild reindeer depending on the size of their estate. The bigger their estate the higher the number of animals they can hunt—this is also influenced by the annual quota—. Landowners can use these licenses for themselves (personal use) or sell their right to friends, other locals, and in some cases tourists, although this last one is not very common or well-accepted in the local communities (Brata, 1995; Øian & Skogen, 2015). This ability to sell, lease or transfer their rights is called the right of *alienation*, which once again resides solely with the landowners. Landowners who have livestock, also have the right to graze their sheep freely throughout the plateau. If someone who is not a landowner, and wants to make use of the grasslands for their livestock, they must pay a fee. The right of *exclusion* is also covered by the ability of the landowner to sell hunting licenses and other assets. This bestows them with the capacity to determine who will have access to the resource.

The right of *management*, is not exclusive to the landowners, this right is shared with political actors and governmental authorities. It is essentially the right to regulate internal use patterns and transform the resource (Vatn, 2015). A good example of landowners and farmers exercising their right of *management* is by the decision of controlling carnivores in the plateau by means of trapping. One landowner pointed out:

"It is important that the predators do not get the upper hand and destroy the ecosystem. These should be regulated by capture." Another land owner also said: "*We have had some problems*

with wolverines in the past, but the government has responded and hunted them down. They have helped us with that problem."

The ability to influence and manage for specific species within the park clearly shows the landowners right of management of the resource.

Besides private land, the other type of land management system found in HNP are the rural commons or the Statsallmenning. Under this land management strategy, the hunting and other usage rights belong to other local people in the three counties (Buskerud, Telemark, and Hordaland) who are not landowners. Originally, access to the resources through Statsallmenning was exclusive for people who had lived at least a year in areas subject to the Statsallmenning. This has changed, and now Norwegians form other parts of the country and even foreigners can apply to hunt and use the resources of the area—however local people still have preference to access the resources. The managing of the resources in Statsallmenning areas is done by the mountain boards (Fjellstyret) (Hunters of Europe FACE, 2019).

Fishing is an important economic and cultural activity in HNP. The institutions and local rules that regulate access to this fundamental resource are complex. All rivers and lakes within in HNP are subject to some kind of ownership, while the fish are a common property resource. Some are privately owned which means that getting access to fishing, requires getting a permit directly with the owner or locals; in some cases this might also be done through private fishing organizations (Fishspot, 2019). The permits are generally not costly, but must be renewed often and are valid in very specific areas (ibid.) As it was defined earlier, Statsallmenning is a tenure system which technically belongs to, or is under the control of the state, where locals also have a strong rights of usage. Within HNP there are Statsallmenning areas which belong to the three municipalities it covers. All the inhabitants of these municipalities—whether they own land inside HNP or not—are allowed to use gillnets within the Statsallmenning areas for their municipalities. Each area makes its own fishing rules and regulations. For example, one interviewee explained how in "*Ullensvang statsallmenning, everyone may use 10 gillnets. They have to pay for the permit, but at a very low price".* This also means that different lakes and rivers inside HNP might have different fishing regulations decided locally by the appropriate boards (Fjellstyret).

This might look like a long list of usage and extraction rights for the landowners within HNP. However, in other areas in Norway, the local rights have become increasingly restrained by national rules and regulations. These has been executed in the areas after becoming a national park. Some of the interviewed landowners reported feeling like they are not heard enough by the authorities on certain matters, such as building and transportation regulations inside the park. During the period when Hardangervidda was being contemplated as a potential national park, several concerns regarding how the new status of the area would affect local people—especially land owners—became a focal point of research and discussions in politics and academia (Sømme, 1976). Once Hardangervidda became a national park, it indeed imposed a whole new set of restrictions and expectations on landowners. Now landowners can exert their rights but within the frame of a the national laws and regulations of a national park. One landowner and sheep farmer expressed his feelings about this situation: "*I am not an owner of my own property. I don't decide on my own property."* This particular interviewee gave the example of having to consult and send an application to the governmental authorities to do as he puts it: "*anything on my own property*", from building and doing a renovation, to how many times a year he could use a snowmobile to go up to his property. The landowners and farmers managed to keep many of their traditional rights as users of the area, but as the place became a national park some of these rights were changed and use became increasingly supervised and in some cases restricted by the authorities; particularly in the area of building and transport.

Unlike the reindeer and fish resources described above, when it comes to the access to the actual landscape at HNP, it is safe to say that none are excluded. As mentioned on several occasions, the Allemannsretten guarantees everyone who is legally in Norway, access to the park. No fees are required, no off limits grounds or especial management areas—for the most part. The park is open 24 hours a day, 7 days a week throughout the year. People can access the park on foot, skis, bicycle, horse and the other ways described by the Allemannsretten in Chapter 4. The idea of the landscape at HNP is a very especially one. Despite the fact that all the park's land is subject to some type of ownership, the Allemannsretten may give the illusion that 'the landscape' is under an *open access* regime. However, upon analysis it is clear that that is not the case. The type of *interactions* that regulate it are so few and lenient, that it makes it seem that way. As a matter of fact, if someone went into HNP just for the purpose of hiking, it would be difficult for them to realize that a significant portion of the park is privately owned. This is because of the lenient type of interaction rules (i.e. Allemannsretten) that govern the park and the Norwegian outdoors.

To conclude, it can be said that the *access* to the landscape at HNP has just a few command regulations and limitations—described by the for-mentioned law—while at the same time, being a combination of private, state, and common property (*See Table 6*). The hunted or harvested wildlife (reindeer, grouse, fish) can be subject to private ownership rights, as is the case of animals in private land, or they can be subject to common property rights as is the case of many fish stocks, and animals in common rural property land (Statsallmenning). These all have some trade, command and community rules types of interactions that regulates the use and access to them regardless of their use right/property rights (*see Table 6*).

Table 7 Idealized resource regime of the main resources at HNP

Type of property/use rights **Type of interaction**	Private property/use rights	State/public property/use rights	Common property/use rights	Open access
Trade	-Grassland -Wild reindeer (e.g. sell of licenses by landowners) -Fish -Grouse	--	-Grassland -Wild reindeer (i.e. sell of licenses by Fjellstyret) -Fish -Grouse	--
Command	-Landscape (i.e. Allemannsretten)	-Landscape (i.e. Allemannsretten)	-Landscape (i.e. Allemannsretten)	--
Community rules	-Wild reindeer (e.g. sell licenses/permits only to other locals and friends)	--	-Wild reindeer (i.e. Fjellstyret approving hunting permits)	--
No rules defined	--	--	--	--

(Source: own fieldwork; based on Vatn's (2015), *Idealized resource regime table p.143*)

It should be noted that Table 6, as its the name suggests, is an *idealized* regime table. Therefor it is just to summarize and exemplify where the *rights of use* are generally placed, and the types of interactions governing them. In practice, the distinction or line between state and common property/use rights is somewhat blurred. E.g. local mountain boards (Fjellstyret) can make decisions about how many licenses to approve, and to whom to sell such licenses. The state however, still hold the power to restrict hunting in several ways for regard to animal stocks, if deemed necessary. So the resources are not under a purely common *property/rights of use regime* or purely *state/rights of use regime*.

5.1.3 Institutions governing the policy process: Constitutions and collective-choice rules

As previously mentioned, most of Norway's regulations regarding nature protection and management are stipulated in two main acts: the Nature Conservation Act (1970) and the Nature Diversity Act (2009). These are important to mention because often park rules are based on or tailored to follow these larger national level legislations. At the same time, these national acts find part of their foundation in some international conventions and agreements which the country has subscribed itself to over the years. The most relevant international agreement which has helped shape Norway's main conservation and diversity legislations is the Convention on Biological Diversity[24] and the UN Sustainable Development Goals. Since ratifying such international agreements, Norway has tried to adapt legislation to promote the fulfilment of these goals and the international responsibilities to upkeep biological diversity. This has brought discussions about polemic species like large carnivores including wolverines, wolves and bears, and attempts to determine what should the target population size for this type of animals in Norway. In such a way that can be accepted locally, nationally and also satisfy the international responsibilities acquired.

The institution and law of Allemannsretten is an element that affects how the people perceive their relationship to nature, and it also has an effect on the management and regulation of protected areas in Norway. The data shows that most people conceive of Allemannsretten as a positive law. It brings people closer to nature, makes them care about nature, and recognizes the right that all people should have access to outdoor recreation and the benefits of being out

[24] The Convention on Biological Diversity is a multilateral treaty put forward for signing in 1992. Its main goals are: the conservation of biodiversity; the sustainable use of its components; and the fair and equitable sharing of benefits arising from genetic resources (Convention on Biological Diversity, 2019).

in nature. However, there were also some adverse aspects associated with this law. The main concerns expressed by some actors were about how it can constrain the managing of protected areas, since it makes it harder to prevent people from going into certain areas. As one interviewee shared:

"Allemannsretten makes it hard to regulate the hiking and the tourism because you can't tell people not to got to certain areas."

A second interviewee also pointed out:
"Those things (kitting, dog sledging, etc.) are not easy to control with the Norwegian legislation, because as long as you can call it an outdoor activity, even if it is a new type of it, it is protected by the Allemannsretten…we need better regulation on those kinds of activities".

Finally, in the case of Norway as a parliamentary constitutional monarchy, most of the rules governing the political process are constitutional and collective-choice rules. However, this had little effect on the everyday management of Hardangervidda NP. Most of the management decisions are left to the different local boards. Especially matters that would modify the actual resource and the right of use of the resources. The biggest national laws that now affect the park are the protection laws on national parks which ban much development of the area, to protect the landscape and the cultural heritage.

5.1.4 Economic actors

As described by Vatn (2015) economic actors are divided into producers and consumers. In the case of HNP there are some private economic actors like the landowners, who can sell or rent products within the park, such as fishing licenses, hunting licenses, cabins, etc. There are also private firms or organizations of several owners who mostly organize for the purpose of selling fishing licenses and other goods and services related to sport fishing. The primary desired outcome of this production is mainly profit. However, many 'products' generated on private property in HNP are typically for self-consumption. In this case, the economic actor is both the producer and the consumer. The state itself counts as an economic actor in a national park because it is creating or trying to deliver a public good by establishing a national park; in this case the producer is the state and the consumer is the general public/citizens. Finally, one more type of economic actors were identified in HNP. Areas that fall under the Statsallmenning,

have production of goods on state or public property. People who fish for profit in this areas could be classified as both consumers and/or produces since they have to pay a small fee to the state to use the area, but they can sell their products externally without any additional fees. People who use this areas for their own consumption can be classified as consumers too.

At the moment, other types of economic activities at HNP is not allowed[25]. Tourist tours, ecotourism and other common economic activities based around natural resources are either not allowed or almost exclusively reserved for Den Norske Turistforening (DNT)[26] or Norwegian Trekking Association. DNT can be considered as two different entities: part of the civil society and also being an economic actor. It is an important civil society actor because it displays the values of the larger portion of the population in regards to the outdoors experience and the natural world. This NGO has been allowed so much activity inside HNP because it is regarded by the public as a good organization that promotes values such outdoors activities and preserving the natural landscape and nature. It is also mostly run by volunteers and through its many staffed, self-service, and unstaffed cabins. It helps making HNP accessible/convenient for many tourist which otherwise might not visit the park.

On the other hand it also serves a role as an economic actor, because although it is a non-profit NGO it does produce services and outdoor experiences within HNP; same that are enjoyed by its members. DNT offers guided tours, with overnight accommodation and food for reasonable prices to its members. The association also marks a large number of routes and ski tracks as part of their volunteer work. This organization has the largest infrastructure found in the park, which constitute large staffed cabins where each can house around 50 people at a time (Den Norske Turistforening, 2019). During data collection, interviewees repeatedly mentioned DNT as a prominent actor in Hardangervidda. The majority of the participants referred to DNT in a neutral manner when asked about the prevalent infrastructure inside the park. Some had a more negative connotation of the organization in the park. The main concern participants seems to have regarding DNT cabins were the increasing number of tourist they attract and the

[25] This might change very soon. As of April 8th 2019 I have become aware of a new ski resort (alpinlandsby) project set to be constructed very near Hardangervidda, aka around the buffer zones.
[26] DNT is Norway's largest outdoor life non-profit organization, with more than 260,000 members. A lot of DNTs activities area based on volunteer work. Its mission is to: "promote straightforward, active, versatile and environmentally-friendly outdoor activates and to preserve the outdoors and the cultural landscape" (Den Norske Turistforening, 2019).

possible negative effects this might have on the environment and the wildlife. For example, interviewee 2 pointed out that:

"*The DNT cabins make the park worse and worse over the years to come. If they don't do anything with some of the cabins I am afraid that the number of people who will go into the park will just increase and make the problem worse, first of all for the reindeer*".

On the other hand, a participant did mention how he thinks DNT helps people care about nature and the environment by bringing them closer to nature.

Regarding the preferences of the different economic actors found at HNP, it is safe to say they have their own agendas, and their own preferences as to what the resources should succeed in offering them. Interviewee 9 had this to say about this matter:

"Different kinds of groups who use the park, the fishers, hunters, cabin owners, DNT, local people. Each group has their own agenda and their own feelings of what is necessary for them. The discussion goes around those groups about how much they should be allowed to use the park and their varying interests".

Some, especially landowners and framers, prefer the park to be managed for certain species and to be able to support activities such as hunting, fishing and sheep grazing. Their preferences are also being able to perform as many economic activities within their properties, and some would like to be able to profit more. Other economic actors, such as some authorities, recreational users and some hunters, would like to see a more complete ecosystem that would enhance the experience of being out in nature and would add to the wild nature adventure that many expect when going into Hardangervidda.

5.1.5 Political actors and management system

According to the EGS framework, there are two types of political actors worth mentioning for an environmental governance system analysis. The first one are public authorities and the second one is international governmental organizations (IGOs) (e.g. IUCN UN, etc.). More on this theory on Chapter 3.

The main authority involved in supervision and regulation of Hardangervidda is the state, which is directly represented by the county governor or fylkesmann. The fylkesmann is in charge of several types of decisions at HNP. The most prominent ones that came up during the data collection were receiving and processing of building permits and all other decisions regarding infrastructure, such as adding new buildings to the park, renovations on already existing buildings, or getting rid of buildings. He also serves as a middle ground man and helps solve conflicts between the different actors and the three fylker at HNP. On the other hand, decisions directly involving the use of the resources at HNP i.e. quotas, hunting licenses, fishing permits, grassing rights, etc. are taken by the different boards and councils that together make up the park's very complex management system.

The Tilsynsutvalget (the supervisory committees), makes all decisions about transportation in HNP. This includes deciding how many times people can use certain MVs inside the park. This was one of the most polemic topics encountered, especially the subject of use of snowmobiles by landowners. There are three different Tilsynsutvalget in HNP, one representing each county found within the boundaries of the park. Its members are elected by each Fylke every 4 years. Each Tilsynsutvalget also has employed secretaries who help them do their work. Below is a table of the different political actors involved on the main decisions and responsibilities at HNP.

Table 8 Political actors and resources at HNP, 2019

Building, infrastructure and transportation regulations	**Hunting, fishing, grazing and other land use regulations**
Fylkesmannen	Grunneigarsamskipnad or Landowner association
Tilsynsutvalget or Supervision committee	Hardangervidda Fjellstyre or Mountain board along with its fjelloppsyn (union of the 6 Statsallmenningane)
	Villreinutvalg (has both members of the mountain board and landowner association)
	Private landowners
	Statens naturoppsyn

Each one of the different boards and committees on the table above, has distinct responsibilities and goals. The Fjellstyret or Mountain Board's main purpose is to supervise the correct or agreed upon use of the resources—mostly hunting, fishing, and grazing—in the Statsallmenning areas. They do this by employing mountain surveillance (Fjelloppsyn, naturoppsyn), who have some of the same capacities as police in Norway (Norges Fjellstyresamband, 2019). All relevant resources within a Statsallmenning area have rules and regulations decided by a the Fjellstyret. They emit and supervise hunting permits, fishing permits, grassland use and other land uses. Some tourist cabins are also under the supervision of the fjellstyet (ibid.).

The Hardangervidda Villreinutval is an organization constituted by eight remembers, four represent the Hardangervidda private landowner association (Hardangervidda Grunneigarsamskipnad), and the other four representing the mountain board (Fjellstyret) which essentially represents the rest of the locals in the eight municipalities who also hold usage rights in the area (Hardangervidda villreinutval, 2018). The goal of this cooperation body is to safeguard the interest of rightsholders in regards to wild reindeer management at Hardangervidda (ibid.). The Villreinutval takes responsibility for setting quotas and monitoring the state of the wild reindeer population at the plateau, they also look at diseases such as the chronic wasting disease and other concerns regarding wild reindeer management. Note that the Villreinutval does not issue hunting licenses for wild reindeer. This falls under the authority of the individual private land owners and the Fjellstyret.

As its name suggests, the landowner association (Grunneigarsamskipnad) is the organization of landowners that own land in HNP. Its main goal is to safeguard their interests and protect their rights as landowners at Hardangervidda. Since landowners have various rights inside HNP, it is useful to have an association to discuss important matters related to the use and regulation of HNP. Their specific goals are (Hardangervidda Grunneigarsamskipnad, 2012):

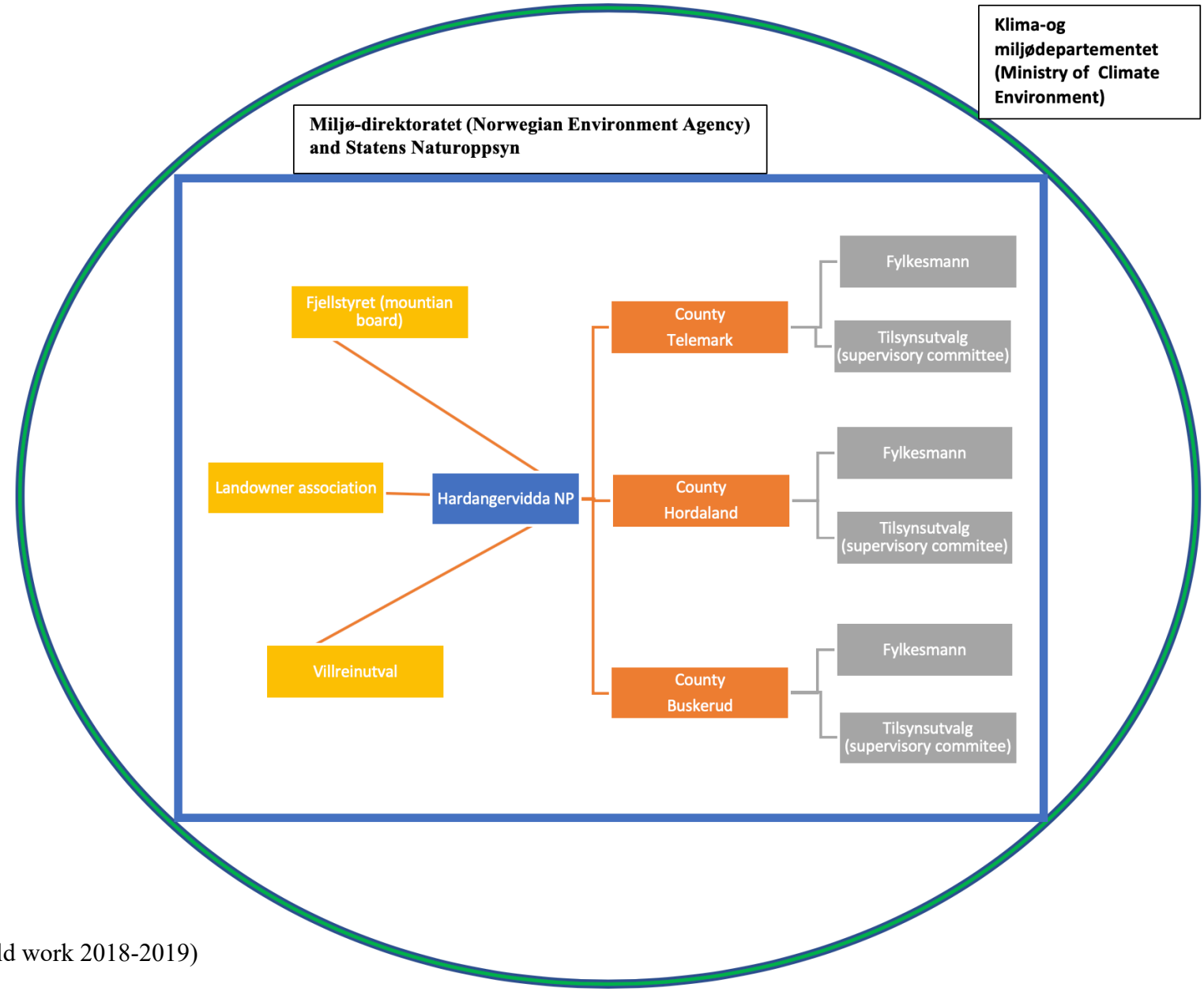
- To communicate the landowners stand on the commercial exploitation of Hardangervidda
- Work to care for and protect Hardangervidda's nature
- To accommodate the public need for recreation and outdoors recreation at Hardangervidda as far as the economy allows
- Work to ensure that regulations, administrative rules, and management of Hardangervidda, in form and practice do not hinder business activities for private landowners at Hardangervidda

(Translated from Bokmål Norwegian)

There are also other authorities that emanate from the state and have authority over HNP, such as the Ministry of Climate and Environment and its subordinate agency Miljø-direktoratet. The Ministry of Climate and Environment was created by the Norwegian government to carry out the environmental policies for the government. This Ministry has the seven following subordinate agencies: ENOVA, Norwegian Environment Agency, Svalbard environmental protection fund, The Directorate for Cultural Heritage, The Norwegian Biodiversity Information Center, The Norwegian Meteorological Institute, and The Norwegian Polar Institute (Regjeringen, 2019). However, the Norwegian Environmental Agency is the one that has the most authority over HNP. The statens naturoppsyn, is part of the Norwegian Environmental Agency (Miljø-direktoratet). Their main task is to supervise the following of several environmental laws[27], both on private and public grounds. Another main task is to document instances of predators causing losses on local peoples' domestic animals (Norwegian Environment Agency, 2013). Below there is a diagram which shows the general management system of HNP with all its most relevant political actors.

[27] Out Doors Living Act, the Nature Diversity Act, the Motor Traffic Act, the Cultural Heritage Act, the Wildlife Act, the Salmon and Inland Fisheries Act, the Land Act, and the Small Boat Act (Norwegian Environment Agency, 2013).

Figure 11 Hardangervidda NP political actors and management



(Source: Own field work 2018-2019)

The Hardangervidda NP management system is not hierarchical. There are some decisions that ultimately fall under the power of the Fylkesmann but they are few—as described above. The Fylkesmann is also constrained by legislation and laws that come directly from the Norwegian Environmental Agency and the Ministry of Climate and Environment, and ultimately the parliament. The blue square and green oval represent the legislative framework under which the rest of the actors make decisions. The majority of the decisions regarding the practical management of the resources are done by the three yellow boards and associations of landowners and rightsholders. There are, however, other actors that can have *some* influence over the decisions taken by the actors depicted in *Figure 10*. Some of the most prominent ones are the Villreinsenter (which is an NGO), DNT, and NINA[28]. These last actors can be heard at annual meetings, gatherings or contacted for a specific reason, they tend to use their expertise on different matters to influence the decision making. This was corroborated by data collection. Two participants, one belonging to academia and the other to the Villreinsenter gave accounts of their own involvement in decision making at HNP:

Interviewee 5: "*We don't make decisions on daily management, that is between the local landowners and the fylkesmann…there is one meeting a year where all stakeholders get to express their needs e.g. ecological organizations, DNT, Norges Jeger og Fisker Forbund, etc. we usually give a presentation of the research done on the area and on different species".*

Interviewee 6: "*On one occasion a mountain board wanted to kill the common seagull. I was contacted to give a scientific opinion on whether it was necessary to kill the seagulls. They were concerned that the birds carried parasites that infected the fish. But it wasn't the case and it wasn't done"*

What can be concluded is that the HNP has a non-hierarchical system, which divides decisions about the park into a) resource management and b) infrastructure and transportation management. The first one is the responsibility of the boards and councils and the second one falls on the hands of the Fylkesmann and Tilsynsutvalget. One reason this division my exist is that usage of the resource has been given to landowners and rightsholders by law so therefore they have most of the say in how it is managed, but infrastructure and transportation represent

[28] "The Norwegian Institute for Nature Research (NINA) is an independent foundation for nature research and research on the interaction between human society, natural resources and biodiversity"(NINA, 2019).

the regulations imposed on the area for being a national park, so therefore they falls under the supervision of the state—Fylkesmannen. Additionally, it can be said that other (no right-holding) stakeholders such as research organizations and civil society have some channels to participate and get involved in decision making, although they are limited.

5.1.6 Infrastructure and Technology

In Chapter 2 it was explained that the type of infrastructure and technology, can affect the outcomes (state and use of the resource) of an environmental governance system. The actors—specifically political and economic actors—can also directly influence the type of technology and the infrastructure used.

Primary data collection showed that the main transportation technology used at HNP are snowmobiles, helicopters, tractors, seaplanes, and ATVs. Eight out of nine interviewees mentioned snowmobiles as one of the most used motorizes vehicles (MV) inside the park; six out of nine mentioned helicopters as the most prevalent transportation method at the park; five out of nine also mentioned tractors, four mentioned seaplanes, and only two mentioned tractors.

The different transportation vehicles mentioned here, are used for a variety of purposes—mostly by landowners trying to access their estates and performing maintenance and management activities on their properties. However, hunters and fishers are also allowed to use MVs in the park for the purpose of carrying out the heavy carcasses and/or their catch—the specific regulations vary depending on the area and/or the hunt e.g. only people hunting for reindeer are allowed to bring in MV, (those hunting for grouse are not). For hunting, shotguns and rifles (small arms) from .17 and up are allowed for small game (grouse to red fox) and 6,5 × 55mm and up for reindeer. Bow and arrow for hunting is not allowed, and neither is using a dog. Dogs must remain on leash at all time inside the park. For fishing regular sportfishing gear is allowed; gillnets are allowed in certain areas under Statsallmenning at HNP. It is interesting to see that the use of certain 'technologies' for hunting are not allowed at Hardangervidda because of they could confer too much of an advantage for the hunter; tracking dogs are one of these, as well helicopters. Helicopters nonetheless, are allowed for the purpose of carrying out reindeer hunt. There are some other technologies that have changed the dynamic of hunting and fishing at HNP over the years. A few interviewees mentioned the use of radios and mobile

phones among hunters to share information about where the herd is. The use of snowmobiles for hunting has been controversial too.

Regarding the effect of technology on the animals and the environment, most of the interviewees reported they believe MVs caused the biggest disturbance or adverse effects on the wildlife, especially the wild reindeer (WR). Some of the main concerns expressed by the participants regarding the use of MVs was during certain times of the year and in certain areas which are particularly important for the reindeer. A good example of the main concerns expressed by participants is summed by Interviewee 4:

"*It definitely disturbs the animals and the ecosystem, we know that for sure. So the question is how much will we allow our activity to disturb the animals and the ecosystem. That is why we don't allow motorized vehicles during the calving season and in the feeding are of the reindeer".*

On the other hand, two interviewees mentioned that they believe that a limited used of MVs do not affect the wildlife or the ecosystem at all; and two interviewees mentioned that people on skis, campers and hikers presented more of a disturbance for wildlife than the use of MVs. The reason they gave for this, was that unlike most MVs, hikers, skiers, and campers were allowed to go wherever they liked because of Allemannsretten, whereas ATVs, and tractors had to stay within the paths or roads. Snowmobiles, on the other hand, do not need to stay within specific roads or trails to move, so not surprisingly, these represented the most controversial MV at the park; another factor that makes them controversial is the fact that they are the only vehicles that allow access to all parts of the park all year around, which can come into conflict with the WR. Six out of nine interviewees mentioned snowmobiles as the most controversial technology at HNP, followed by the use of tractors, and only one person mentioned ATVs as a controversial technology. The reasons expressed for controversies around tractors and ATVs was the fact that tourists and hikers sometimes complain that: a) they don't have the right to access the park themselves with MVs and/or b) that they are unsightly and noisy and ruin the experience of being outdoors in nature.

According to the primary data collection, the most common infrastructure encountered at HNP are hiking trails. Seven out of nine interviewees mentioned them as the most prevalent infrastructure. The next most common infrastructure are cabins; of which three types can be

distinguished: a)private cabins, b)DNT cabins, and c)Mountain board (Fjellstyret) cabins. Eight out of nine interviewees mentioned some type of cabins as the main type of infrastructure at HNP. However, there was mention of some other types of infrastructure in low numbers, these are: Støler or historical farming buildings (not in use anymore); a few dirt roads for the use of tractors, the main concrete roads that cross the park, and a few fishing boats.

In regards to how infrastructure is perceived by participants inside the park; more than half of the participants reported having a positive or neutral opinion towards the way infrastructure affects their—or others—experience of the park. Only two participants said the infrastructure was decidedly negative in terms of their experience of the park. Here are two examples of neutral/positive comment and a negative comment towards infrastructure at the park, respectively:

Interviewee 8: "*The cabins attract a lot of people but the people disturb the reindeer. But on the other hand, cabins and infrastructure attract people to nature and help people experience and care about nature. However, I don't think there should be any more cabins".*

Interviewee 1: *"The less infrastructure the better. Infrastructure affects the park negatively. It affects the experience of being out in nature".*

Despite the few negative comments about the way infrastructure affect the experience of the park for people; in general infrastructure for the purpose of bringing people closer to nature is perceived as quite positive and in some cases necessary. However, when asked about how infrastructure affects or disturbs the ecosystem and the wildlife, the majority of the participants believed that infrastructure inside the park has some degree of negative effect on the ecosystem and/or the animals. Only one interviewee said that infrastructure had very little impact on wildlife or the ecosystem.

To conclude, there are several ways in which stakeholders perceive that technology and infrastructure can affect both the experience of people at the park (mostly positively), and also the outcomes of HNP (mostly negatively). It is important to note that many of the participants said they hold such views about the effect of infrastructure and technology on wildlife and the ecosystem based on copious research that indicates that this is the case. For example, biologists have pointed out that the use of gillnets in the park allows for a high catch of fish, but as an

unintended consequence it traps and kills the native duck species. Additionally, there are several researches that address how human activity is negatively impacting the wild reindeer, see for example (Panzacchi et al., 2013; Rannow, 2013). Panazacchi et al. (2013) carried out a study in which they measured the impact that different types of infrastructure had on the wild reindeers' decision to use or stop using a certain area. Some of the infrastructure that they tested during the study were roads, cabins (private, DNT, and Fjellstyret), powerlines, trails and dams. They all seemed to have some degree of negative impact on WR. However, their most relevant results were that tourist (DNT) cabins had a strong and direct negative effect on reindeer decrease in use of traditional movement corridors. They concluded that the presence of just one cabin, was responsible for the complete abandonment of the area (ibid). There is little research on how infrastructure and technology impact other species—other than the wild reindeer—at Hardangervidda.

5.2 Yellowstone National Park Environmental Governance System

Primary data collection of YNP was cut short for reasons outside the control of this research (see p.23 on Limitations and ethical considerations). Therefore a larger proportion of secondary data was used to answer this section, in comparison to the HNP Environmental Governance System.

5.2.1 Environmental resources and their attributes

Yellowstone National Park has identified fundamental resources and values which are described in detail in the park's Foundation Document (2014). In Yellowstone NP these are defined as "*those features, systems, processes, experiences, stories, scenes, sounds, smells, or other attributes determined to warrant primary consideration during planning and management processes…*" (Foundation Document, 2014). Therefore, what is considered a resource in YNP encompasses actual natural assets, like species and geological features, but also certain cultural, and historical elements, as well as certain experiences provided by the park.

In the Foundation Document, seven such resources are mentioned: geothermal wonders; dynamic geologic processes and features; hydrologic systems; its temperate ecosystem; cultural resources; visitors' amenities and accessibility features; and the 'wild' experience. The 'temperate ecosystem' of Yellowstone—with all its plants and animal species—represents a

central resource of the park. It is also the natural/environmental resource that this study refers to primarily when talking about Yellowstone's resources. For its evaluation and management the National Park Service (NPS) has installed a monitoring plan for the Greater Yellowstone Network which oversees certain animals, plants and ecological conditions that function as indicators for the park's ecological health (National Park Service, 2019). The results of this evaluation are compiled in a report commonly known as the Natural Resource Vital Signs report. There has been four publications of this report 2008, 2011, 2013 with the latest one 2017 (Yellowstone Center for Resources, 2018). The report distinguishes between resources which are used to measure the overall health of the park—namely vital signs—and selected resources which are typically individual species (e.g. wolves and grizzlies) which although not considered a vital sign alone, they are part of a larger vital sign category e.g. large carnivores. (ibid.).

When refereeing to the resources in YNP, the discourse and several secondary data sources refer to a comprehensive mixture of natural and cultural assets which together form the YNP resources. During primary data collection there was no evidence to suggest that one species or a selection of species are considered more important than the others. However, some problematic species where referred to several times during interviews. Additionally, some species also seem to get more focus because they are characteristic of the park or attract significant tourism. This is true of big fauna such as bears, wolves, elk, and bison. Although there is no hunting allowed in the park, some of the mentioned species attract much of the tourists. There is arranged 'safari' tours to see wolves and bears in the park (Quammen, 2016). The only extractive activity allowed at YNP is recreational fishing, with the use of traditional fishing gear such as rod and reel. Therefore, fish, especially the Yellowstone native cutthroat trout (Oncorhynchus clarki) and the larger invasive lake trout (Salvelinus namaycush) are particularly valued. The second one, mostly by sport fisherman, though.

Some of the most emblematic resources species at Yellowstone are: grey wolves (Canis lupus), grizzly bears (Ursus arctos horribilis), American bison (Bison bison), elk (Cervus canadensis) and pronghorn (Antilocapra Americana). Furthermore, some of the most emblematic geothermal and geologic resources are the Old Faithful geyser, Grand Canyon of the Yellowstone, Hayden Valley, Mammoth Hot Springs and the Yellowstone Lake.

5.2.2 Resource regime

The resource regime of YNP is guided by national laws and policies, and by the NPS policy-level guidelines. The enactment of Yellowstone as a national park was the first formal action taken by the government that began to shape the access rights to the park. Yellowstone NP in its entirety, is a property of the government of the United States by the YNP enabling legislation of 1872. As property of the government, Congress has the authority to develop laws governing the management of the national park system (National Park Service, 2006). However, once the federal level laws and policies are enacted, the appropriate federal agency—in this case the National Park Service—is entrusted to implement, interpret and develop polices to address the ambiguities of the law (ibid).

Some of the relevant legislation and polices guiding rule-making and regulations inside the park are: the Yellowstone National Park enabling legislation of 1872; NPS Management Polices 2006; National Environmental Policy Act of 1969, the Endangered Species Act of 1973; National Invasive Species Act of 1996; the Wilderness Act of 1964; and the Federal Noxious Weed Act of 1974; among many others (ibid). Because of the nature of the property—state property—determining the use rights is straightforward. All five types of access rights—access, withdrawal, management, exclusion, alienation—are held by the state, and state-authorized representatives make the specific decisions concerning resource use (Vatn, 2015). Also as a state property, YNP is owned by the people of the U.S and no individual shares can be distinguished (ibid.). This type of property is also identified by being multi-objective, which in this case, is to protect natural resources and provide the public with a host of benefits such as recreation, and research opportunities, among many others.

The type of interaction rules found in YNP are mostly command rules. Which have been decided at higher levels of government and management, and have been passed down the line of command. There are few, if any trade and community rules directly affecting the resources of the park; the few existing ones, are in some way related to command rule as is the case of bison huntined by American Indians (see. Table 5). Two good examples of how command rules work in Yellowstone are the entrance fee system, and wolf reintroductions. The fee system is based partly on the NPS Management Polices (2006) under section (1.9.5.1 Financial Sustainability). While the fundaments for wolf reintroduction can be found on the Endangered

Species Act of 1973, as amended. These are all based on legislation that goes all the way up to the Supreme court, and enacting legislation of the national park.

Table 9 YNP Resource Regime

Type of property/use rights / **Type of interaction**	Private property/use rights	State/public property/use rights	Common property/use rights	Open access
Trade	--	Commercial private guided tours	--	--
Command	--	YNP ecosystem (fauna and flora resources)	--	--
Community rules	--	Bison hunting by American Indians[29]	--	--
No rules defined	--	--	--	--

(Source: own fieldwork; based on Vatn's (2015) *Idealized resource regimes table*)

In the case of YNP, anyone is allowed inside, regardless of nationality, sex, race, age, etc. There is no exclusion of individuals on any basis, except for their ability to pay the mandatory entrance fee or fees. Different permits, fees and regulations are applicable, depending on what the person intends to do inside the park, and their means of accessing it e.g. personal car, snowmobiles, RV, etc. YNP is never closed in its entirety; however there are different facilities, and entrances that close during certain times of the year for management reasons. There are also specific areas inside the park which might be more tightly regulated

[29] All important legislation and policy documents recognize the federal government special responsibilities toward the American Indians. Therefore, bona fide tribes with ancient ties to the land have rights to hunt bison. No other group of people are allowed to hunt bison.

than others. For example, bears and wolves management areas[30] have a special set of regulation to help minimize dangerous encounters between humans and large carnivores.

To help visualize the wide variety of entrance fees, the table below is provided. It should be noted that it is not a complete table of all the different modules available for gaining entrance to the park. There are also National Park System passes that are valid in Yellowstone and different fees for citizens who, served in the military, were volunteers, etc. This table is just meant to give a general idea of the prices and the variety of the entrance regulations at YNP.

Yellowstone established entrance fees as of 2019:

Type of entrance	**Cost (USD)**	**Validity**
Private, non-commercial vehicles	$35	7 days
Motorcycle or snowmobile	$30	7 days
Individual (foot, bicycle, ski, etc.)	$20/person	7 days
Commercial tours	Varies depending on the size of the vehicles from $25, plus $20/person to $300.	7 days
Non-commercial buses/vans with 16 people or more	$20/person	7 days
Person 15 or younger	No fee	7 days
Annual pass	$70	Annual
Selected festive days (Veterans Day, Martin Luther King Jr. Birthday, etc.)	No fee	One day

(Source: National Park Service, 2019)

[30] Bear/wolf management areas are zones with a high density of elk and bison carcasses which leads to high numbers of large carnivores activity. These areas are subject to several additional restrictions to minimize human-wildlife encounters. Some of the extra restrictions of these areas are: no off trail walking, minimum of 4-5 people groups, and day use only. These areas might also be closed all together during certain times of the year (National Park Service, 2019).

Furthermore, there is also copious regulations on the type of activities that can be done inside the park. The following activities require a especial permit and/or corresponding fee: backcountry use (camping); boating; fishing; horseback riding; commercial filming and/or photography; weddings and other ceremonies; scientific research; ash scattering; commercial use authorization (tourism activities) and commercial travel through the park (National Park Service, 2019). It is also relevant to mention that if a new type of recreational activity is to be allowed in the park, it must go through an appropriate use assessment to wager whether it will be allowed inside the park or not, and if so under which type of regulations, conditions and permit/fee scheme. Below is a diagram from the NPS Management Policies (2006) of the decision making process in regards to adding new activities to the list of already recognized and categorized recreational activities allowed in the park.

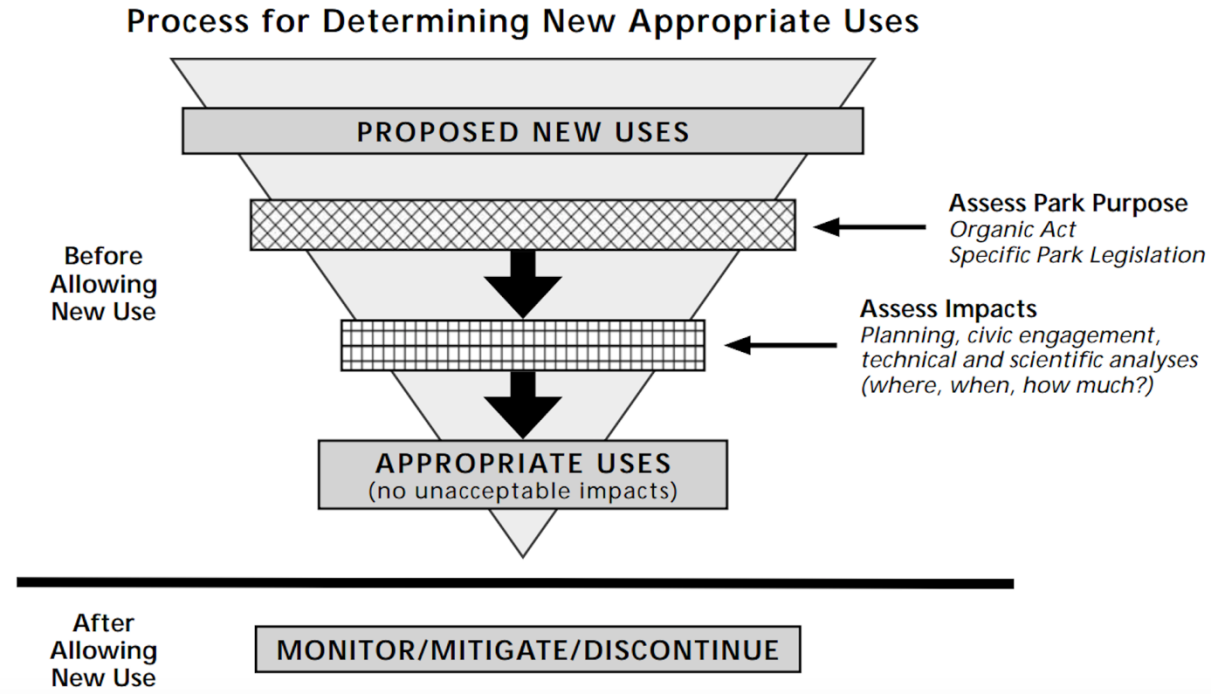


Figure 12 YNP activities appropriateness consideration process

(Source: (National Park Service, 2006)

This diagram shows how potential new recreational activities must first pass through a series of filters—the various relevant park legislations—then through an impact assessment to determine, when, where, and how much can take place of the new activity. Finally, after approval, it must undergo monitoring to see its development, adjust for mitigation activities if necessary, and discontinue, also if necessary. However, in instances like the snowmobile

controversy, this process is sometimes not so straightforward and easy. Local interests and several political forces have proven to greatly influence the process (Dustin & Schneider, 2004).

5.2.3 Institutions governing the policy process: Constitutions and collective-choice rules

As it was mentioned earlier, YNP works under the NPS rulemaking framework. At the same time, the NPS operates within the Department of the Interior (DOI) (Cook, 2014). Both the NPS and the DOI are federal agencies; and thus, must comply with the Administrative Procedure Act of 1946 (APA). In addition, agencies within the DOI, must also comply with the National Environmental Policy Act of 1969 (NEPA)(ibid.). Both rulemaking and decision-making procedures (APA and NEPA) provide time for public commenting. Several political bodies are allowed in the discussion, and some are actively incentivized to give their opinion and input during the different stages of decision making. At YNP this is particularly true in the case of big decisions—e.g. building of a new hotel, and species reintroduction. This type of significant actions have to go through the long process of deliberation and analysis described by NEPA. All the park employees interviewed for this study mentioned the NEPA as an integral part of decision making. This is true for both infrastructure decisions and also resource management in general. The NEPA process can be considered the most relevant *collective-choice rule* in the decision-making at YNP.

The law requires that any action done on federal land, as is the case of YNP, must go through the NEPA process. The process can be short or very extensive depending on the type of action or activity proposed. NEPA has three stages: 1) Categorical Exclusion determination; 2) Environmental Assessment; and 3) Environmental Impact Assessment. Small actions may be excluded from a detailed environmental analysis process; in which case the NEPA process stays at the first stage. If the action is not excluded from the assessment, then it goes to the second stage, and if on the second stage it is determined that the action will cause some environmental impacts, then it moves on to the third stage, where the environmental impact assessment is carried out (United States Environmental Protection Agency, 2017).

A relevant aspect of the NEPA process is the creation of alternatives to a specific action and the public comment period. It is during the public comment period that different stakeholders and interest groups may get involved in the processes through commenting on the different alternatives and pointing out any missed alternatives or missed negative effects. This

is one of the few ways in which the general public and several interests groups may participate in the decision making process at YNP.

Finally, it is safe to conclude that in the case of YNP, constitutional and collective-choice rules all derive from national legislation and policy making—specifically APA, NEPA and the for-mentioned relevant legislation (see p.72). There are specific periods of time called *public commenting* when stakeholders and interest groups may affect the policy process, which is determined by law (Cook, 2014). There was no evidence of rulemaking based on, or meant to comply with international agreements, either on the primarily data collection or secondary data analysis.

5.2.4 Economic actors

One of the main economic actors at YNP is, of course, the state. As the sole landowner, the state is delivering a public good by establishing and maintaining a national park. Local people, especially park employees and people running private tourism businesses inside the park, are prominent economic actors who provide a service based on the national park grounds and resources. This type of businesses must comply with the appropriate regulations and pay the stipulated fees, but they are allowed to run tourism enterprise inside the park (e.g. wolf and bear 'safaris'; overnight camping trips; and guided snowmobiling trips).

Other locals whose economy is mostly based on the national park (e.g. guest ranchers, hotels, cabin lodging, restaurants, rentals) can also be considered economic actors because their activities are closely related to the park's resources. Some previous studies like that of Reading et al. (1994) were already showing that the primary economic activities of the gateway comminutes were slowly but surely shifting from resource extraction, and agriculture towards tourism centered activates. This shift was observed almost 30 years ago, and today, it seems as though it has almost entirely shifted. Interviewee 1 said:

"Here in Gardiner almost the entire economy revolves around the park, people employed at the park, but also hotels, restaurants, it is all based on tourism. The park brings millions of dollars to the gateway communities. I'd say the park is the primary economic driver".

Interviewee 2:

"…we also benefit locally because of the tourism, the whole area benefits economically from the park". Both the primary data collection, and secondary data analysis, done for this study pointed at this change in the economic activity of the area. There still seems to be some resource extraction and ranching in the areas near the park, but not nearly as much as tourism focused economic activities.

Park users and tourists are also economic actors, from the consumer point of view. Park users and tourists 'consume' a large variety of products at YNP. From entrances to the park to guided tours, merchandise, rentals, food and another amenities offered at the park and at the gateway communities. Park 'consumers' can be local, tourists from other parts of the country or international tourists.

The discovered preferences of the different economic actors seem to be varied. The government for example tries to balance the use of the park for recreation with the protection of the park's resources. Most of its management strategies and action plans center around finding this balance. Local people whose economic activity depends on the park, seem to appreciate the park and accept the inconveniences that a tourism based economy brings along, like crowds during the summer and increased traffic in certain areas. They also seem to have accepted the sporadic but potentially dangerous wildlife-human encounters. Park employees, on the other hand, seem to prefer keeping the park as usable and uncongested as possible for staff management purposes. Too much tourism is beginning to hinder their ability to run and manage the park efficiently. A significant part of their efforts is now focused on finding ways to properly handle higher rates of visitation, that are cause significant traffic jams, and prevent park employees from getting around the park. This concern with traffic jams and congestion, does not seem to be shared by the tourists or park visitors. Park visitors seem to mostly want to be able to see fauna and the main attractions, such as the Old Faithful and other geothermal wonders which is often not hindered by large amount of visitors or congested roads. Several of the interviewees explained that on the contrary, tourists seem to be happy to stop their cars if "they think they can see a bear or bison on the road".

5.2.5 Political actors and management system

The principal political actors at YNP are the Superintendent and Deputy Superintendent and they are the highest authority inside YNP. They are entrusted to solve conflicts, they hold the responsibility for the park's decisions, and make most decisions regarding regulations and rules for the park—always under the umbrella of the NPS and DOI agencies guidelines. The NPS Management Polices 2006 do state that "*It is important that the superintendent be familiar with the enabling legislation to determine whether it contains explicit guidance that would prevail over service-wide policy*" (National Park Service, 2006). Aside from the clear responsibility to abide by the NPS and DOI regulations and guidelines, the superintendent holds most of the political power inside the park. All interviewees also confirmed that. However, they can get their opinion and input put forth.

Another significant political actor in YNP is the NPS Intermountain Region Office Director, which is the section of the NPS to which YNP belongs to. A number of important decisions at YNP have to be ultimately approved by the Regional Director of the Intermountain Region. However, the Superintendent can recommend different management plans, strategies and decisions for approval by the Intermountain Regional Director.

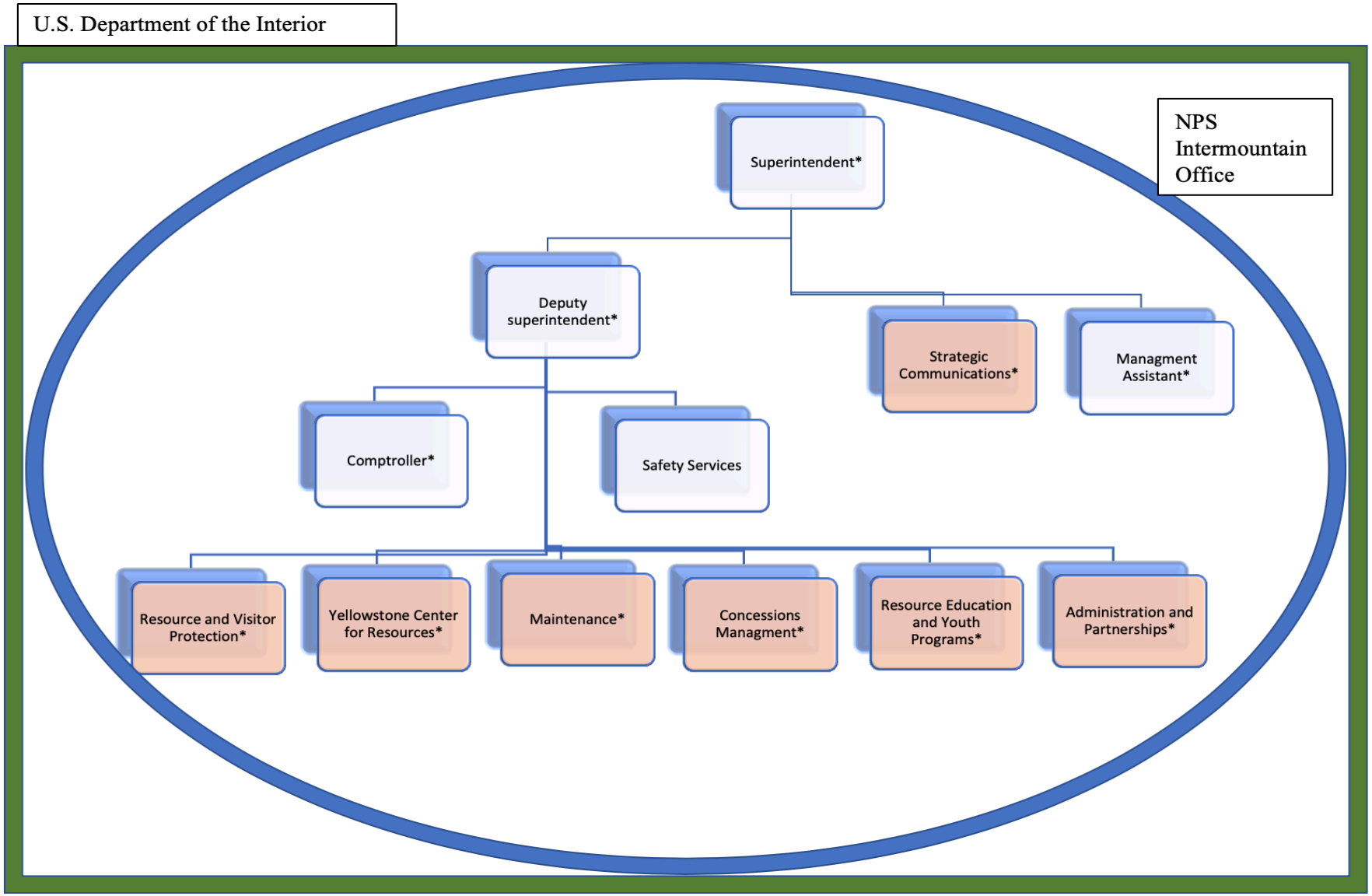
YNP management system has a decidedly hierarchical and bureaucratic structure, with a strict line of command for decision-making. However, a few interviewees reported that there are times for everyone's opinion and concerns to be heard, and that those who feel more invested in certain topics and contribute to the decision making process at the appropriate times. Decisions made by the superintendent are usually made with the help of the senior management team, which is conformed of ten members who represent the different divisions. The senior leadership team gives advice, informs, and help the superintendent make decisions. As one Yellowstone NPS employee explains it:

"The superintendent is the one who is ultimately calling the shots, but he does solicit advise and deliberation from his executive team".

Below (*Figure. 12)* the management system of YNP can be visualized, as well as the seven special divisions of the park which are colored light orange. The asterisks show the positions or divisions who have a representative in the senior management team. Additionally

the green square represents the framework of the Department of the Interior and the blue oval represents the policy and guidelines from the NPS Intermountain Regional Office.

Figure 13 Yellowstone NP Management Organizational Chart



(Source: Own fieldwork; based on *Yellowstone National Park Employee Handbook 2018*)

In conclusion, the political actors of YNP are closely tied to the line of command which extends all the way up to Congress, passing through the DOI, NPS Intermountain Region and Yellowstone's superintendent. Controversial decisions that will have a large impact on the resources or the locals (e.g. wolf reintroduction, bison culling) tend to involve higher levels of command, whereas smaller decisions are usually taken by the superintendent with advice and input from the senior management team. Other stakeholders who might want to influence the park's policy-making can exert some level of political power at the appropriate times during the NEPA and APA process, and also through legal action if need be (i.e. law suits). YNP has significant specialization in each area. Almost every aspect of the park has one or more full-time employees, which was described by park employees as useful for managing such a large and complex area.

5.2.6 Infrastructure and Technology

Research question 1.5 aimed at answering what is the infrastructure and technology at each park and how does it affects the outcomes. In the case of YNP, the most common and noticeable technology reported by the interviewed Yellowstone NPS Employees were personal cars, snowmobiles, and snow coaches. However, two interviewees also mentioned tour buses, shuttle buses, RVs, and motorcycles as common inside the park.

The impact of MVs on wildlife and the ecosystem in YNP was said to be almost insignificant by two participants, and minor by the two other interviewees. The positive and negative effects of technology on the fauna and flora described by participants were classified into the following categories: *habituated wildlife, soil erosion/compaction, animal collisions,* and *dangerous/fatal animal encounters. Habituated wildlife* was reported by two participants and it was seen as a general positive thing. A Yellowstone NPS Employee explained:

"Since the roads are often built in the lowline river valleys, they are in what would be the migration corridors, so the wildlife, like elk and bison, sort of adapted to using the roads as their corridors now…so in a sense, it is part of their ecosystem in that it is part of their migration route. It makes it easier for them to move. A lot of the wildlife are pretty habituated so they don't really care about the cars, they can be in the roads for hours".

A second interviewee also mentioned *wildlife habituation* as one of the main effects of the use of these technologies inside the park. It should be noted though, that *wildlife habituation* to park visitors is considered negative in the case of large carnivores. It is specifically listed as a cause of concern by the Yellowstone Center for Resources (2018) division, on their 2017 Vital Signs report.

Two interviewees mentioned some minor negative effects. Soil erosion and compaction along the roads (people stopping and getting off their cars to see animals) which mainly affects vegetation in the area. Collisions on the roads with large animals were mentioned as a negative effect by one participant. However, these were not reported to be common. Dangerous or potentially fatal animal encounters were also mentioned, but are also not considered common or a considerable problem. These mostly occur when people get off their vehicles to approach an animal at an unsafe distance—despite the park's safety recommendations.

Participants were asked about significant controversies involving the use of MVs inside the park. The most relevant one, was the use of snowmobiles inside the park which was mentioned by three participants. One participant mentioned the considerable increase in traffic jams in the park, and the overall crowded park facilities, which has started to be a problem. Although the snowmobiles controversy was repeatedly referred to as one of the biggest controversies the park has ever seen, it has at least for now been resolved (Dustin & Schneider, 2004; National Park Service, 2019).

Later on, interviewees were asked to mention the most prevalent infrastructure inside the park. According to interviewees, this is paved roads. The park has an extensive 8 shaped road network, which is commonly referred to as the Great Loop. It goes to all the 'attractions' and developed areas inside the park. The park also has 5 different entrances, North Entrance; Northeast Entrance; East Entrance; South Entrance; and West entrance (see *Figure 8*). Mini villas or developed areas (see *Figure 13)* along with historical buildings were also mentioned as significant park infrastructure. There are nine lodges[31] or mini 'villas' and twelve campsites inside YNP; each of them have all the necessary infrastructure—water treatment plants, bathrooms, powerlines, gift shops, hotels, lodging, restaurants, gas stations, bending machines,

[31] There are more than 2,000 rooms inside Yellowstone were visitors can stay.

etc.— the mini villas are considerably far apart from each other, in some cases hours long drives.

One interviewee, mentioned the presence of boardwalks along the geyser areas, backcountry campsites, bear boxes and poles[32], cabins, gravel roads, and trails. An interesting observation regarding the large amount of paved roads is that, as mentioned before, they form a system that reaches all the developed areas as well as the park most popular sites or 'attractions[33]'—geysers, hot springs, Yellowstone lake, the canyon, etc. This facilitates visitors to go to the interest areas, where they typically gather or in cases congest.

Figure 14 Aerial photo of the Canyon Village Development

(Source: *Aerial Yellowstone Canyon Village*, 360 Engineering Inc., 2019)

[32] Especial boxes and poles that bears cannot open or reach. There are generally used in backcountry campsites to keep food out of the reach of bears and also away from the sleeping areas.

[33] Yellowstone NP has a list of 11 'attractions' or hot spots were most of the natural wonders the park has to offer are near the small developed areas. Most tourists congregate in these 11 areas: Old faithful, Madison, Norris, Mammoth Hot Springs, Tower-Roosevelt, Canyon Village, Fishing Bridge, Lake Village, Bridge Bay, West Thumb, Grant Village.

The interviewees were asked about how they think all this infrastructure affects the general experience of the park. A majority answered that most visitors still perceive YNP as a wild place, and didn't mind or complain about the amount of infrastructure found inside the park. It was also emphasized that the perception on this matter varied greatly depending on where the visitors were from, and what they were expecting when visiting the park. One Yellowstone NPS Employee shared:

"We have made a lot of social science studies on the visitors' experience of the park and they do remark that it is crowded but that they expected it to be, so it doesn't detract from their experience".

This remark generally supports what other interviewees said about the lack of complaints by visitors—about traffic and other crowded facilities—it seems it is all part of the experience for the visitors; whereas for park employees it is a troublesome circumstance. Park employees reported feeling like the traffic jams and crowded areas were beginning to hinder their ability to do their jobs effectively and efficiently. This will be discussed more in depth in Chapter 6.

Finally, the participants were asked to give their opinion on whether they thought the park's infrastructure was affecting the ecosystem or the wildlife in any way. All interviewees said that there are little to no negative effects caused by the infrastructure to the animals or the ecosystem. Interviewees remarked that the animals have adapted to the existing infrastructure and that it now forms part of their habitat. Other points of view were that infrastructure is absolutely necessary for achieving the goals of the park as well as for the purpose of actually protecting the park's resources. One interviewee explained how having enough park rangers in the field is crucial to protect the park, and that the only way of having a sufficient amount of rangers is to be giving them places to live inside the park. Some other interesting perspectives on the impact of infrastructure on wildlife and ecosystem, centered around less visible species. Like for example, this Yellowstone NPS Employee shared:

"If you just look at the large animals populations, I would say that it is not affecting them; but with smaller animals we don't know how much the park's level of development is affecting them. There are less studies on smaller species. Larger species have adapted to having

people inside the park and they have also adapted and gotten used to the infrastructure inside the park".

Although the employee statement is consistent with other statements that wildlife has become habituated to the infrastructure and therefore is not affected by it, they also point out the need for more research on maybe less visible species. This concern for the loss of less noticeable species is supported by studies like that of Berger (2008) who focus on undetected species losses in the Greater Yellowstone Ecosystem (GYE). On the other hand, another interviewee who also concurred on the notion that wildlife is not affected by the park's infrastructure, did so for different reasons. Yellowstone NPS Employee 4 said:

"To build something inside the park is a long process and very studied and controlled. I don't think I've witnessed an animal be impacted by the infrastructure inside the park".

In this case the employee is referring to the NEPA process, previously discussed. It is clear that this particular employee considers the NEPA process thorough and adequate enough that in the end any infrastructure built inside the park will have little negative effects on the wildlife.

To conclude, primary data collection suggests that although there is considerable infrastructure inside the park, it is not perceived as having any significant negative effects on the wildlife or the ecosystem. Participants gave different reasons for arriving at this conclusion, such as wildlife habituation and the effectiveness of the NEPA process. Technologies (cars, RVs, SM, etc.), were considered slightly more negative to the wildlife and the ecosystem. Primarily because of collisions and the concern with soil erosion and compaction. However, these concerns were minor and mentioned by only one of the interviewees. It was also found through both primary data collection and secondary data collection, that the use of MVs in YNP is copious, the park receives around 4 million visitors a year (National Park Service, 2019) mostly accessing through some type of MVs.

5.3 Comparison between HNP and YNP environmental governance systems

This section will address the key differences found between the EGS of Hardangervidda NP and Yellowstone NP.

A relevant difference found between the two parks was their respective political actors. It was found that the political actors (people with the power to make decisions) of YNP were mainly government employees in a hierarchical system. In YNP the decision making is in the hands of a few government officials, who must abide by the NPS framework and established conservation guidelines by the relevant acts of legislation mentioned (see p. 74). On the other hand, the political actors of HNP encompass a much larger variety of actors, comprising local people representatives, landowners, and government representatives, all with different agendas and goals. The HNP political actors are similarly compelled by conservation guidelines stipulated in the Naturvernloven and the international agreements mentioned earlier (i.e. CBD).

Instances were observed in both HNP and YNP were the interests of local people were given priority over the mentioned national or international conservation guidelines, but also instances where the opposite was true—conservation guidelines prevailed over locals interests/rights. In Yellowstone, for example Dustin and Schneider (2004), described the long and controversial snowmobile debate, where at times the scientific evidence regarding the negative effects of snowmobiles on the environment where disregarded by the NPS, and at other times the snowmobiles where banned completely from the park by a court order. In the snowmobile case in Hardangervidda, conservation guidelines have taken priority, as no recreational use of snowmobiles is allowed in the park, except for management reasons and even that use type is heavily controlled. However, as a key informant explained during the interviews, sometimes dispensation will be given to landowners to use the snowmobile inside the park if they properly justify their need for it.

The next significant difference found between the two parks was the considerably different infrastructure and technology regime found inside the parks. HNP has strict construction rules and very particular expectations of what the landscape should look like. Therefore, there is little infrastructure visible inside the park. As elaborated earlier on this chapter, in HNP there are mostly modest cabins and trails. Inversely, YNP has entire mini-villas inside the park, complete with hundreds of rooms and all the infrastructure and facilities that a small resort might need. In fact there are nine of these small developed areas, there is also a lot

of paved roads inside the park, that doesn't just cross the park, but in fact lead to all the most important tourist areas or 'attractions'.

What was most remarkable about this stark differences, is the fact that in YNP, the infrastructure and technology was considered benign, or causing little to no negative effect on the ecosystem and the wildlife. Whereas, in HNP, the infrastructure and technology were considered, decidedly negative and causing considerable distress on the wildlife and pressure on the ecosystem. These different perceptions, on the effect of infrastructure and technology, might have several explanations. Some were rooted in scientific research, and some were more rooted in personal preferences/values. Most HNP interviewees mentioned scientific evidence of the negative effects of infrastructure on reindeer. The Americans also made reference to scientific research and stated having trust in their procedures (NEPA) to determine the impact of infrastructure. Another possible explanation for these stark differences on the perception of infrastructure and technology, might be based on the interviewees own expectation and personal opinion of the effect of the infrastructure, which can be strongly affected by culture and personal values. Here is an example of two contrasting ideas on the purpose and adequacy of infrastructure inside the NP. Yellowstone NPS Employee:

"My personal opinion is that our mission is to share our park with the public. Without some limited development we can't fulfil the mission of the park…and even for protecting the park because it's hard to protect the park if you don't have places for the park rangers to live in and ways to get around within the park".

Hardangervidda stakeholder:

"Personally I don't like motorized vehicles inside the park. I walk when I go reindeer hunting and I carry back the carcass myself without the car… I have personal reasons for not liking the use of MVs. It doesn't look particularly nice and it ruins the feeling of wilderness and silence".

As it is observable by the statements of the two participants above, some people might perceive infrastructure and technology as negative or positive for reasons completely different that of how it affects the outcomes and resources. Some people have very personal reasons for not wanting further development of an area or, conversely, having sufficient development of an

area. For the Yellowstone NP Employee infrastructure was seen as a means to achieve their mission of sharing the park with people, whereas the Hardangervidda stakeholder, felt rather negative towards it because it affects his experience of the park.

The way infrastructure and technology impact the biological integrity of the parks might also have roots in another significant difference found between the types of infrastructure, and the way they are used. At Yellowstone NP there are tourist 'focal points', which attract most of the park's visitors, leaving most of the other areas which are not highlighted, mostly undisturbed. Yellowstone NPS Employee said:

"*Something like 95% of our visitors never get further from their car or the road than 20 ft. Very few visitors take advantage of the backcountry and go hiking*".

The fact that a large percentage of the tourists at Yellowstone stay within the developed tourist areas, might help the rest of the park stay as undisturbed as possible, and reduce the potential negative impacts of the high volumes of tourism and visitation they get each year. Inversely, HNP has a more spread-out impact of visitation and tourism. Despite the fact that there are some large tourist cabins, which undoubtedly attract most of the tourism; there are laws (i.e. Allemannsretten) which allow people to walk and camp freely anywhere. Also, one might argue that Norwegian culture supports a more 'adventurous' approach at experiencing nature which also encourages a more spread-out use of the park. It might be worth considering the possibility that the type and amount of infrastructure, but also the way it is used might affect differently the biological integrity of a park.

The use of technologies in the parks, specifically MVs, had a similarly perspective as that of infrastructure. In YNP, cars and other MVs, were considered inconsequential for the most part. With some interviewees going as far as calling cars and roads new elements of the animals habitat. As it was mentioned earlier in the chapter, animals in YNP have been reported to be habituated to people, MVs, and infrastructure. Whereas, in HNP—especially the reindeer—display a lot of fear and disturbance in the face of people and vehicles. There might be several reasons for this distinctly opposite behaviors of animals towards people in the two parks. Hunting might be a reason in the case of HNP; and the habituation that comes from seeing so many people every day, at the same spots in the case of YNP. Some animals have started to become so fearless and habituated that it has been reported as a problem in YNP—

especially in the case of bears and wolves. These two opposite problems regarding wildlife have its positive but also negative aspects. Having habituated and fearless wildlife towards cars and people is convenient in the sense that having more visitors is not a concern for wildlife, and is also convenient in the sense that visitors who want to see wildlife can do so easily. On the other hand, it increases the incidence of dangerous or potentially fatal human-wildlife encounters and collisions with cars, which as key informants reported, are problems almost non-existent at Hardangervidda NP.

The constitutional rules and collective choice rules of both parks also displayed significant differences that might reflect on the biological integrity of the parks. The main difference found was that the relevant legislation and frameworks leading the political process and decision-making in the parks stem from different sources. In the case of the HNP it is based on *international agreements* and legislations (i.e. convention on biological diversity) that were internalized and translated into laws and then applied to the national parks. In the case of the USA, all relevant legislation and policies are strictly *national*. What fueled them were not international agreements but rather national movements (i.e. Conservation Movement 1890-1902; Environmental Movement 60's-70's) which ended up leading to federal level acts of legislations. This is a considerable difference, and although it is out of the scope of this research to investigate the possible effects of this on for example compliance and legitimacy, it would be an interesting line of study at a later point.

Blow, a table is provided with the significant differences found on the two environmental governance systems. The elements with an asterisk, are the ones found to have a possible direct impact on the biological integrity of the parks for the reasons stated above.

EGS element	Hardangervidda	Yellowstone
Conceptualization of the 'resource(s)'	Two main discourses identified: *complete ecosystem* and *sustainable harvesting*	One conceptualization of the resources: *complete ecosystem*
Resource regime	Mixed (private and state) with community rules and command rules	State with mostly command rules of interaction
Constitutional rules and collective choice rules	Convention on Biological Diversity 1992 (International)	Endangered Species Act 1973; Environmental Movement; etc. (National)
Management structure	Flat organization, community/boards	Bureaucratic and hierarchical
Economic actors	State and landowners	State and local people
Political actors	Mainly local people and landowners as well as state representatives (Fylkesmann)	-NPS (Superintendent) -Intermountain regional office (Director) -DOI -Whitehouse (President) -Congress
Technology and infrastructure	-Mostly considered detrimental to the resources -Spread-out impact of visitation	-Not considered detrimental to the resources. -Focal impact of visitation

Table 10 Comparative EGS elements table of HNP and YNP

(Source: Own research 2018-2019)

Chapter 6 - Perceived Biological Integrity

In *Chapter 6, the research questions 3.1-3.3 of Objective 3 are answered. It shows the analysis done on the parks' comparative biological integrities. Biological integrity was studied and analyzed in three ways, a) the perception and opinion of the stakeholders regarding the park's BI was described and analyzed, b) the professional opinion of biologists and ecologist on the state of the BI of each park was described and analyzed, and c) official natural resources reports (i.e. the Vital signs report and two reports from the Norwegian Biodiversity Information Center) were analyzed and compared. The concept of biological integrity is defined and detailed in Chapter 1 and Chapter 2 (See Table 1).*

It is important to note that in this chapter, the term resource will be used to refer to the ecosystem as a whole, and not about individual species. The reason this distinction has been made is because although the participants where not asked about specific species of the park at all, it became clear from the HNP answers that only certain species and aspects of the area were actually thought about in terms of resources. For the purpose of assessing the perceived biological integrity of the parks, participants were specifically asked to talk about the whole ecosystem as a unit, rather than to give their assessment of the specific species or aspects of the landscape.

6.1 Hardangervidda NP Outcomes: Resource use and state of the resource

HNP biological integrity was assessed in the following way. Participants were asked to share their opinion on what the park's main outcomes should be according to them. Later on, they also shared their perceptions and opinions on the overall level of biological integrity[34] of the park, and talked about their concerns regarding the park's long term sustainability. Then, there is a section where participants who had a background in ecology or biology were asked to give their professional opinion on the biological integrity of the park. Finally, there is a brief analysis of the two reports (i.e. Norwegian Red List of Species; and Environmental Conditions and Impacts for Red List Species) on the state of ecosystems in Norway, created by the Norwegian Biodiversity Information Center (NBIC). These documents were analyzed by

[34] The ability of an ecosystem to support a diversity of animals and plant populations for an indefinite period of time with little to no human interaction (Angermeier & Karr, 1994).

searching for information that would inform on the criteria laid out for BI in Chapter 2 (*see Table 1*).

6.1.1 Perceptions and opinions of stakeholders on HNP's biological integrity

The first question was about what they thought the national park should offer or ought to offer. There was various responses, which could be classified into two main categories: *'sustainable harvesting'* and *'complete ecosystem'*. Three out of nine participants had a sustainable harvesting viewpoint, and four out of nine fell under the complete ecosystem outlook. The remaining two participants did not answer this question. There are other authors who have identified similar discourses around the underpinnings of community conservation and fortress/protectionist conservation (see Vedeld et al. (2003); Hutton et al. (2005))

Participants with a *sustainable harvesting* viewpoint, repeatedly mentioned hunting, fishing, and livestock grazing as important uses the park should be able to offer them, and other people. They also emphasized the idea that there should be a somewhat stable and sufficient number of animals available for the purpose of hunting and fishing, and that it all should be done in a sustainable way to ensure the existence of the resources for the future. This last aspect is why the word sustainable was used along with that of harvesting. Here are two sustainable harvesting viewpoint responses. Interviewee 6 said:

"If you can keep on hunting, fishing, grazing, and so on, then the ecosystem is healthy"

Similarly, interviewee 4 said:

"Pretty much like it is today…I think that nature giving people the possibility to go hunting and fishing is important."

Although this is just a fragment of the total answer, the themes that stood out in similarity were the right to hunt, fish and graze, now and in the future. On the other hand, participants with a *complete ecosystem* point of view were easily identifiable by their use of words and phrases such as: 'complete', 'all native species', 'all the natural species of the area present', and the like. Here are two examples of responses from interviewees displaying a *complete ecosystem* outlook. Interviewee 2 said:

"That the animals that belong there are able to be there…now they are trying to reintroduce some species to keep the ecosystem, since they were there earlier"

Also, interviewee 3 said:

"*Complete with all its animals. As complete as possible. Native species in good numbers, the natural".*

Participants with a complete ecosystem point of view, also communicated the importance of sustainability in their *complete ecosystem* outlook, as part of the national park outcomes. However, their view on what sustainability should be for, diverged into the two mentioned themes. The complete ecosystem vs. sustainable harvesting points of view were not consistent with people being hunters or not. There were some hunters and fishers with a complete ecosystem point of view, as well as a sustainable harvesting viewpoint. The variables that might have affected the viewpoints were not tested using any regression software, however this is something that would be interesting to test in the future.

On the second question, participants were asked to state whether they thought the ecosystem at Hardangervidda fit the given definition of biological integrity (see p. 10). It was interesting to discover (during data analysis), that interviewees with a *sustainable harvesting* outlook, all consistently, said YES when asked this question; and remarkably that all interviewees with a *complete ecosystem* outlook consistently replied NO to the same question.

Although the qualitative nature of the this study doesn't allow for generalizations of any kind, this is nonetheless an interesting point to reflect on, and maybe consider pursuing other forms of analysis such as quantitative to further analyze the issue. What can be said, from a qualitative point of view, is that perhaps those that consider the function of the park as providing *sustainable harvesting*, probably saw little to no reason to think the park didn't fit the definition, since their main focus was clearly 'harvestable' species, which are present at reasonable numbers at the park. On the other hand, those with a *complete ecosystem* outlook, probably felt inclined to answer no, because they were thinking about all the missing species at the park, and also probably focused more on the human intervention part of the definition. For example, one of the participants with a *complete ecosystem* outlook said:

"It does need intervention, fish populations and crustaceans for examples. And you can say reindeer hunting is a human intervention, since we don't have wolverines"

From the data collected, this seems to be one of the most plausible interpretations of the interesting relationship found between these two questions.

The next subject participants were asked to share about, were their worries regarding to the park's long term sustainability, if any. Data collection showed that all the interviewees expressed some degree of concern over at least five different topics. The most commonly reported cause of concern for the park's sustainability was the increasing and /or too permissive human activity inside the park; this was closely followed by the concern for the loss of the parks buffer zones[35]. That is caused by development in the surrounding areas of the park. Surprisingly, only one participant talked about climate change as a concern for future sustainability, and also just one talked about other competing land-uses for the park in the future.

A relevant observation to make about the most common concern—increasing and permissive human activity—was that this category included the mention of the Allemannsretten, either directly or indirectly. Here I present a few examples of indirect and direct mention of Allemannsretten as a concern for sustainability. Interviewee 7:

"I am worried that the political government puts outdoor life interests and the use of Allemannsretten above the protection of nature and animal life".

Likewise, Interviewee 5 said:

"I am worried that too many interest are allowed there, for human activity. Everyone wants to do their own sports activities, hiking, hunting, farming…Everyone wants to do their thing and everyone is allowed to, that is a concerning thing, I believe"

[35] Buffer zones in the case of national parks usually mean the area(s) between a protected area and a developed one, which typically has an intermediate level of protection and development between the protected one and the developed one. Buffer zones are considered very important for conservation purposes because they provide the animals with more area to roam, and make the 'core' area harder to access for people, among a host of other benefits.

The main message transmitted was that it complicates the protection of the park in terms of wildlife disturbance. People cannot be kept out of certain areas of the park .

The other type of human activity mentioned was increasing tourism, mainly caused by more tourist cabins being constructed and just overall increasing truism inside the park. Finally, when asked if they had any other type of concern the majority reported none; only the four participants with a background in biology and/or ecology mentioned extra concerns, these were: the disappearance of some small species from the plateau, acid rain and mercury contamination, and two people mentioned the unknown effects of radiation from Chernobyl.

Overall it is concluded that there are two prevalent points of view about what the main function of the park should be—complete ecosystem and sustainable harvesting—of which the former is slightly more common within the participants of this study. It can also be concluded that here are significant concerns about the long-term sustainability of the national park, primary related to the increase and permissive human activity with in the park, and development of the buffer zones. Other minor concerns include, pollution of the bodies of water, loss of small species, and contamination by radiation (Chernobyl). Finally, there is slightly more interviewees who do not think HNP ecosystem fits the definition of an ecosystem with biological integrity, however the difference was made by just one person. It should also be considered that the reason some agreed and some didn't, might be influenced by the reasons previously discussed—relating to what aspect of the park they are focusing on.

6.1.2 HNP Perceived Biological Integrity – Professionals

The four ecologists and biologists that were interviewed for this study, were asked to talk about the methods currently used at HNP to evaluate biological integrity (BI) or the health of the ecosystem as a whole. Then they were asked to give their own professional assessment of the biological integrity of the Hardangervidda ecosystem. The reason for this was to get some perspective on what professionals on the field had to say about the actual state of the ecosystem in question.

The results were these: two out of four professionals interviewed, said that there was no comprehensive ecosystem evaluation method in place at HNP; two mentioned specific research projects done at the area, mostly PhDs and MSc, and some specific projects by NINA (e.g.

reintroduction of the artic fox). In addition, all professionals said that there was nonetheless, monitoring done on some key species. The species mentioned as having permanent monitoring programs within Hardangervidda were: the wild reindeer, the grouse, and several types of fish. About this finding, it is relevant to point out that all of the permanently monitored species at HNP, are distinctly harvestable and possess some significant economic value for people.

The four professionals interviewed, gave different evaluations of the biological integrity of HNP. The responses given were particularly short compared to other sections, however, it is still safe to say that the ecosystem is perceived as superficially healthy, or healthy but with some species lacking. The results can also be described by saying that two biologists evaluated it relatively positively, and the other two evaluated it negatively, which makes the results somewhat inconclusive.

6.1.3 Norwegian Biodiversity Information Center

HNP does not have a specific or single report that analyses the health or state of the park's ecosystem as whole, or at least there isn't one available to the general public at present. However, it was possible to obtain some relevant information on the state of the ecosystem and on several species, from the Norwegian Biodiversity Information Center (NBIC). Two reports were analyzed; the Norwegian Red List of Species (2015) – Methods and Results, and the Environmental Conditions and Impacts for Red List Species (2010). Based on the five BI framework criteria (*see Table 1*), the following was established. It should be noted that no relevant information was found on criteria 4) *resilience of the ecosystem* for HNP.

6.1.3.1 Native species and biodiversity

Although it cannot be said with certainty due to the lack of a report specifically on Hardangervidda; the Henriksen and Hilmo (2015) report on Norwegian threated[36] species, identifies the southeastern parts of Norway as the ones with the highest number of threatened species. This would include at least part of the Hardangervidda area. Two of the areas with most endangered species are Telemark and Buskerud which are two of the counties that Hardangervidda NP encompasses. In this two areas combined, there is a total of 1,345 species threatened (ibid). The report explains that the reason for this is that some of these areas are also

[36] Species that are assessed as being at risk of extinction in Norway (Austrheim et al., 2010).

populous compared to for example the northern regions of the country. The report also states that four game species (the mountain hare, ptarmigan, willow grouse and the common eider) have all been placed on the Near-Threatened category in 2015, from 2010 when they were all under Least Concern category. These are all species native to Hardangervidda. As it has been reiterated several times, since the report does not focus on HNP, it is impossible to say if this is the case of the Hardangervidda plateau or not, however, it does offer an idea about the state of the threatened species in the whole area.

6.1.3.2 Systems that generate and maintain all trophic levels

There was limited information found on the evaluation of *systems that generate and maintain trophic levels* on the Hardangervidda plateau—at least not in English. However, some general observations that can be made is that the area is quite large with 3,422 km^2. This is considered a positive trait for a protected area, that would enhance biological integrity for a number of reasons e.g. giving animals the possibility to migrate long distances, and in general support larger biodiversity levels. On the other hand, *energy flows* and *nutrient cycles* of the area might be currently compromised due to extraction practices in the park (e.g. carrying out entire animal carcasses), to which level this might affect the BI of the area, it is out of the scope of this study. Pollution levels in the park are also mostly unknown, although there does not seem to be much concern from what was learned from the interviewees with biologists/ecologists—fish stocks have been tested for mercury according to one interviewee who has worked on the matter. The Austrheim et al. (2010) report suggest that pollution by nitrogen (Fertilization uses) poses a threat to 2.5% of threatened and near threatened alpine species (ibid).

6.1.3.3 Human intervention to maintain the ecosystem

The following was learned about human interventions in the park, mostly through primary data collection. Human intervention takes place for at least five known species at the park. Wild reindeer must be hunted for lack of natural predators (they are also managed to control the chronic wasting disease); the few artic fox which have been reintroduced must be fed by humans to survive in the plateau due to lack of carcasses to feed on (they are mainly

scavengers)[37]; there are efforts being made to eradicate the invasive trout in some lakes to benefit the native duck species[38]; the willow grouse population has started to be monitored for hunting purposes; and wolverines and lynxes are culled to maintain a very low population due to concerns over sheep and farmers.

6.1.3.4 Ability of the ecosystem to exist in the future

The report by Austrheim et al. (2010) on environmental conditions, suggest that land fragmentation, building of summer houses (hytter), land use changes, increasing number of roads and an increasing amount of tourism in the margin of mountainous areas are all threatening the integrity of the alpine ecosystems in Norway. Other significant concerns for threatened spices and the ecosystem were climate change, and utilization (hunting, trapping and collecting) which threatens 3.2% of threatened or near threatened alpine species (ibid).

In conclusion, the ecosystem at HNP, is considered as unhealthy or lacking BI by a majority of the interviewees. This was neither supported nor refuted by the available secondary analysis given the available reports did not focus specifically on HNP. However, from the secondary data it was concluded that the southeastern region of Norway is facing a decline of several native species and a host of anthropogenic pressures that could also be affecting HNP. The professionals on the field interviewed, appeared to have widely diverging opinions on the health of the HNP ecosystem; some graded it as quite good while other said it was bad. This lead to an inconclusive assessment of the BI of HNP by professionals. It was also found that HNP has monitoring systems of certain species for the purpose of calculating hunting and fishing quotas i.e. wild reindeer, willow grouse and trout.

6.2 Yellowstone NP Outcomes: Resource use and state of the resource

Biological integrity was evaluated in the same way in YNP. Participants were asked to share their opinion on what the park's main outcomes should be according to them. Later on,

[37] This information was acquired during a visit to the Villreinsenter in Skinnarbu, during a conversation with a center employee.
[38] Information obtained during primary data collection with key authorities.

they also shared their perceptions an opinions on the overall level of biological integrity[39] of the park, and talked about their concerns regarding the park's long term sustainability. Then, there is a section where participants who had a background on ecology or biology were asked to give their professional opinion on the biological integrity of the park. Finally, there is a brief analysis of the official report on the state of the ecosystem at YNP—i.e. the Vital Signs Report. This document was analyzed by searching for information that would inform on the criteria laid out for BI in Chapter 2 (*see Table 1*).

6.2.1 Perceptions and opinions of stakeholders on YNP's biological integrity

On research question 2.1—how healthy are the parks' ecosystems considered to be by local people, park managers, and park boards?—the three interviewees who answered this question, had a *complete ecosystem* point of view. They described the general function of the park as that of displaying as many native species as possible, and having all trophic levels. Additionally, one interviewee also mentioned that a healthy ecosystem should have good resilience and biological rhythms[40]. Here is an example of the way one participant described what a healthy ecosystem should look like. Yellowstone NPS Employee:

"I think a healthy ecosystem has a lot of its native species richness, we work a lot towards that—trying to maintain and restore native species".

Similarly, secondary data analysis pointed at YNP having a complete ecosystem viewpoint at the institutional level. Fundamental documents which hold the guidelines, and values upon which YNP is founded on (e.g. Foundation Document 2014) refer to its biodiversity as a whole, as one of the aspects for which it is deemed valuable and worth of conservation. A good example of this is how the NPS refers to Yellowstone's ecosystem as "*one of the largest mostly intact temperate ecosystems in the world" (Foundation Document, 2014).* As several of the interviewees corroborated, the park has several programs that aim at maintaining the diversity of native species. These efforts go from gillnetting of invasive species such as the lake trout, to large carnivores reintroductions and close monitoring of other invasive

[39] The ability of an ecosystem to support a diversity of animals and plant populations for an indefinite period of time with little to no human interaction (Angermeier & Karr, 1994).

[40] By biological rhythms the interviewee meant being able to predict where certain species (elk, bison, etc.) where going to be at certain times of the year. Animal populations fall into certain patterns of land use that are consider indicators of a healthy ecosystem.

species such as mountain goats. Yellowstone Employees seem to be pleased with the wildlife management strategies and approaches being used at the park. As one Yellowstone NPS Employee puts it:

"Something I really like about the park is our wildlife management. It is very good, we have a good diversity and even carnivores. We have ecosystem processes that support wildlife".

The participants were later asked to state if they thought Yellowstone ecosystem fit the definition of high biological integrity given to them. All of them said they believed that Yellowstone's ecosystem did fit the definition of biological integrity. One interviewee mentioned that the recurrent management efforts made to preserve some of the native species in the face of non-native species invasion as not being enough—especially plant species. The rest of the participants all gave a firm yes to this question.

Two main documents were used as secondary data sources for complementing the primary data for evaluating the BI of YNP: the *Foundation Document* (2014) and *The Sate of Yellowstone Vital Signs and Select Park Resources* (2017) report. In these documents the state of the overall biological integrity is mostly regarded as stable and healthy. Likewise, in the Foundation Document (2014), it is stated under *current condition* of the resource, that the ecosystem as a whole is mostly healthy. *"Overall, the ecosystem is healthy and natural, mainly due to its diversity" (Foundation Document, 2014).* The more recent and detailed information on the condition of the resources (Vital Signs report) supports this claim. With the exception of a few species which seem to be declining—mostly birds species due to visitor disturbance (Yellowstone Center for Resources, 2018). More detailed information on the Vital Signs report will be provided below (see p. 99)

Participants were asked to talk about some of their worries regarding the park's long term sustainability. The main worry expressed by the park employees was global warming. All four interviewees mentioned it; especially in regard to the loss of the snowpack and the possibility of a more intense and frequent fire regime[41]. Only one interviewee mentioned invasive species as a considerable concern for the park's future sustainability.

[41] Yellowstone ecosystem has a fire regime which is consider natural and part of the renewing forces of the ecosystem. There has been several big fires in the NP it is normal occurrence that is observed almost every year.

In regard to the parks monitoring systems of the resources/ecosystem, it was found that there are robust monitoring programs of different species at the park. There is a division of the park called Yellowstone Center for Resources (see p.79) which specializes in researching, monitoring and evaluating the health of the ecosystem and the different species inhabiting the park. Some of the monitoring techniques used by the division are: counts, sightings, footprints, blood draws, radio collars and tracking. This division is also in charge of elaborating the Vital Signs report which holds the summary of the status of all the resources at the park.

6.2.2 YNP Perceived Biological Integrity – Professionals

Only two participants in the Yellowstone sample had a background in biology and/or ecology. When asked what their professional opinion was about the state of the park's ecosystem they both rated the ecosystem as pretty good and stable. They had already stated some of their reasons. They believe there are stable populations of most animals and that the ecosystem as whole is able to support wildlife.

6.2.3 Yellowstone NP Vital Signs Report

The *State of Yellowstone Vital Signs and Selected Park Resources* (2017), also known as the Vital Signs report is the official document emitted by YNP to provide a public assessment of the state of the resources at the park. It was possible to find information to inform every criteria of the BI table, except for resilience. Based on the four BI criteria, the following was established.

6.2.3.1 Native species and biodiversity

The Vital Signs report features a table with a selected number of resources (species/classes) and their current state. The ones picked to be in the report are presumed to be good indicators of the overall health of the Yellowstone ecosystem. The list includes: amphibians, beavers, shrub-steppe communities, whitebark pine, artic grayling, westslope cutthroat trout, bald eagles, bighorn sheep, bison, common loons, elk, gray wolves, grizzly bears, colony nesting birds, peregrine falcons, pronghorn, songbirds, trumpeter swans, and the Yellowstone cutthroat trout. Of these 19 resources mentioned, 15 are considered stable or improving, and only 4 are considered to be declining or stable to declining (Yellowstone Center

for Resources, 2018). Overall Yellowstone's biodiversity has increased over the years, the reintroduction of the wolf has boosted the populations of several key species like the beavers and brought back several native plant species which had declined like willows. There are concerns specially for invasive plant species and there is missing data from some important species like bats, and insect populations (ibid).Overall, however Yellowstone displays most of its native species and good levels of biodiversity are reported.

6.2.3.2 Ability to generate and maintain all trophic levels

There was relevant information found on the Vital Signs report to inform this BI criteria (ability to generate and maintain all trophic levels), under the report's *ecosystem drivers* and environmental *quality* categories. The 'vital signs' or elements mentioned in this category are: climate, fire regime, geothermal systems, geomorphology, river and stream hydrology, air quality, and water quality. Four out of these seven indicators are considered stable or improving. Out of these seven 'vital signs', water quality, geomorphology, geothermal systems, and fire regime are considered stable or improving. However, air quality and river and stream hydrology are considered declining or stable to declining. According to the document, air quality is stable during winter but declining during the summer probably because of wildfires and increasing Western U.S nitrogen and other emissions (ibid). The biggest concern seems to be over climate change, the report states that the current status is that the "*average temperatures are exceeding the historical norms*" (Yellowstone Center for Resources, 2018). This also appears to be related or affecting the river and stream hydrology. Which now raises concerns over the increasing temperatures, earlier snowmelt down, and shifts in precipitation patters (ibid).

Regarding *soil formation* and *nutrient cycling*, it was listed as a possible concern for air quality criteria. Nonetheless, from primary data collection, it was learned that nutrient cycling is taken seriously at YNP. It is against the law to remove any organic or other elements from the NP grounds—without the appropriate permissions. e.g. when visitors pick up and take home fallen antlers it is considered poaching in Yellowstone; in addition when the invasive lake trout is caught and killed to help the native cutthroat reestablish itself, the fish is slit open and returned back into the river. This is due to concern over nutrients cycling in the ecosystem. Overall, the current conditions of the majority of the ecosystem drivers and environmental quality signs at Yellowstone NP seem to be stable.

6.2.3.3 Human intervention to maintain the ecosystem

There are some instances of *human interventions* in ecosystems in Yellowstone, the majority related to invasive species control. Every year there are significant efforts done to reduce the population of the invasive lake trout, and also some management is done to try to control de amount of invasive plant species. However despite the efforts to control invasive plant species they seem to be spreading and increasing. The control for invasive lake trout on the other hand seems to be working well, as the lake trout appears to be decreasing (Yellowstone Center for Resources, 2018). Currently there is also annual bison culling at the Montana border of the park due to pressure from locals' to keep the population low outside the park. Currently they are either culled or taken to temporary quarantine ranches (ibid). It should be noted that the large level of infrastructure in YNP is not a human intervention in the sense that it is not built to try to fix or maintain the ecosystem at a certain state. The infrastructure is there for the sake of the people.

6.2.3.4 Ability to exist in the future

Information about the *ability of the ecosystem to exist in the future* can be found in the Vital Signs report under the category *ecosystem stressors*. Some have been mentioned above in the *human intervention* section regarding invasive species, however there are three main stressors not related to invasive species which the report mentions. These are land use, visitor and recreational use, and wildlife diseases. Land use is described to be stable, the report states that there are *"no known changes since 2010"* (Yellowstone Center for Resources, 2018). However, there are concerns for possible changes in private land use outside the park, which affects the buffer zones, and concerns over development of mineral, gas or geothermal industries in the surrounding area of the park (ibid). Visitor and recreational use is described as stable in the backcountry, but considerably increasing in the rest of the park. The concerns around increasing visitation are wildlife habituation and potentially dangerous interactions, invasive species brought in by the visitors, and increases in human wastes and water contamination (Yellowstone Center for Resources, 2018). However, it should be noted that this are concerns and not a reality of the park right now. Finally, wildlife diseases is a stressor which is also considered to be stable to increasing. The main diseases causing concern are brucellosis

in bison and elk, chronic wasting disease in mule deer and elk, chytrid fungus, ranavirus prevalence in amphibians (ibid).

In conclusion, the ecosystem at YNP, is considered stable and healthy by the interviewees. This was supported also by secondary data analysis of the official Yellowstone Vital Signs report. Several professional in the field, both the ones interviewed and on secondary sources also agreed that the ecosystem is fairly healthy and whole—with some concerns and exceptions, of course. It was also found that YNP does have an established monitoring system for evaluating the biological integrity if the park. Which is a nationwide program to evaluate the state of the resources of all national parks, designed by the NPS. The report uses indicators called vital signs, which include ecosystem drives such as climate and hydrology, as well as specific resources such as individual key species and trophic levels.

6.3 Comparison between perceived biological integrity in HNP and YNP

This section discusses the comparative results of the BI of the parks. The evaluation and the key differences on the BI of the parks, is summarized in Table 10 below.

Biological Integrity (BI) evaluation		Hardangervidda NP	Yellowstone NP
a) Perceptions and opinions of stakeholders		Slightly more negative than positive	Positive
b) Professional opinion		Inconclusive or mix	Positive
c) Official government or park statement on the ecosystem's conditions		Source: Norwegian Biodiversity Information Center: -Environmental Conditions and Impacts for Red Lists Species (2010) -Norwegian Red List of Species (2015)	Source: Yellowstone Center for Resources: -Vital Signs Report (2017)
BI Framework criteria	**Native species and biodiversity**	-Evidence of some declining populations of native species -Lack of a few native species from the ecosystem	-Most species are stable or improving with exceptions -Good biodiversity level (displays most native species)
	Ability to generate and maintain all trophic levels	Presumed good (but more research is needed)	Good (with concerns mainly for climate change)
	Human intervention	Significant human intervention	Moderate human intervention
	Ability to exist in the future	Good (with some stressors detected)	Good (invasive species appear to be considerable cause of concern)

Table 11 Perceived Biological Integrity Comparative Table

(Source: Own research 2018-2019)

It is important to attempt to understand peoples' opinion and perception on the BI of the parks because, as the EGS framework states, the perception of the state of the resource can affect the rest the governance system in many ways. Perceptions are important in relation to the EGS framework because potential changes to the EGS framework can arise from a change in the people's perception of the state of the resources (Vatn, 2015).

Yellowstone appeared to have a better overall BI than Hardangervidda. However, on criteria a) *Perception and opinion of stakeholders*, there are a number of possible reasons and explanations for this outcome, which are not all necessarily related to the actual state of the resources. On the HNP stakeholders opinions, it was clear that people had very different perceptions about the biological integrity of the same set of resources. It seems as though what they were focusing on was the decisive factor to whether they perceived the resource as healthy or not. The participants who had a *sustainable harvesting* outlook, appeared to be focusing on

the type of resources they could extract and directly benefit from, such as the reindeer, fish stocks and the willow grouse; and therefore all rated HNP ecosystem as healthy or displaying good biological integrity, since these animals are plentiful at HNP. On the other hand, it could be that people holding a *complete ecosystem* point of view, focused on the missing or dwindling species in the ecosystem, like the wolf, artic fox and the native duck species; and therefore all rated HNP ecosystem as unhealthy and not displaying biological integrity. In the case of YNP, there seemed to be only one outlook or point of view among the participants (see p. 23 for limitations) , and that was *complete ecosystem* point of view. All YNP interviewees rated the ecosystem as healthy and having good biological integrity. In summary the first difference between the two parks was the different conceptualization of what the main purpose of the park should be. In one park (HNP) two conceptualizations where identified while on the second park (YNP) only one conceptualization was evident. Additionally, it appears as though the different conceptualization of the purpose of the park affected how healthy or unhealthy the participants deemed the park, regardless of the physical realities of the park's ecosystem.

Finally, both parks have monitoring programs in place. Yellowstone's monitoring programs are run by the Yellowstone Center for Resources (YCR), which is a division within its management system. On the other hand, Hardangervidda's main monitoring programs are run by the Villreinutval and the Villreinsenter (which are NGO's). As the name suggests, the Villreinsenter and Villreinutval are strongly focused one species—wild reindeer—whereas the YCR has a more wholistic approach at monitoring. Once again, the main difference is the focus. Both monitoring systems seem to be giving positive results in managing and maintaining the animal populations they target respectively.

CHAPTER 7 – Evaluation on Legitimacy

This chapter presents the results and the analysis on the evaluation of public legitimacy in both national parks (HNP and YNP). Research questions 4.1-4.3 of Objective 4 are addressed in this chapter. As mentioned earlier on Chapter 2, the public legitimacy of the parks was analyzed through the Legitimacy conceptual framework by Vatn (2015), using both primary data and secondary data sources for the input legitimacy and output legitimacy criteria. The primary data on which findings are based, came from semi-structured interviews collected during the period December 2018-February 2019. The secondary data sources used were official legislation and management plans for both HNP and YNP. For Yellowstone, several academic articles and research studies where used in addition, to try to balance the absence of certain stakeholders from the primary data collection (as discussed in the limitations). At the end of this chapter there is a comparative section, with tables that help visualize the main differences of the parks' public legitimacy.

7.1 Hardangervidda NP Public Legitimacy Evaluation

In order to evaluate the public legitimacy of HNP, participants were asked to answer a series of fifteen questions (see annex 1). Six questions were about input legitimacy and ten were about output legitimacy, there is more specific information about these concepts in Chapter 2 (see p. 15). As part of the output legitimacy evaluation the *distributive justice principles* present at each park were identified using secondary data sources i.e. Naturvernlova and the Hardangervidda NP Forvaltningsplan.

7.1.1 Input Legitimacy

Input legitimacy generally refers to the acceptability of the decision-making process (DMP) by the various stakeholders. It is evaluated on three main criteria, its accountability, transparency and participation.

7.1.1.1 Participation

In general, the HNP interviewees had a good level of involvement and knowledge about the decision-making processes (DMP). A 100% of the interviewees reported knowing, or at least having an idea of what the DMP was regarding permits and infrastructure. Eight out of nine interviewees reported having some knowledge about the DMP on matters other than infrastructure and permits. Also more than half of the interviewees said that they consider that there are effective channels to get involved in the DMP at HNP. Whereas, only two out of nine interviewees considered that affecting the decision-making process of the park was difficult. This gives the picture that Hardangervidda's stakeholders are generally well informed about the parks procedures and also that they feel there are ways to influence the processes. It also shows that there seems to be a good level of participation—at least in the sample selected and taking part in for this study. Here is an example of three stakeholder who perceive Hardangervidda's decision-making processes as providing accessible channels of participation and influence.

HNP stakeholder 1: *"Each kommune has two representatives in the tilsynsutvalget, they are elected every four years, there is a system through which you can get involved"*.

HNP stakeholder 2: *"Not in daily management, that is between the local landowners and Fylkesmannen, but there is one meeting a year where everyone gets their needs heard for all the stakeholders"*.

HNP stakeholder 3: *"Interest groups don't directly participate, we have this law in Norway called Forvaltningsloven which says that third parties can complain about the official government decisions. So through that they will be able to contribute"*.

Although they might not get to participate directly in the day to day decision making, these stakeholders felt like their and other people's needs were adequately heard through at least three different channels—annual meeting; Forvaltning law; and representative government. Most interviewees who said that there was appropriate channels of participation in the decision-making process at Hardangervidda, did acknowledge the lack of direct participation, but they still considered participation appropriate and accessible. Conversely, here is an example of a participant who feels that the park does not have accessible channels for participation:

HNP stakeholder: *"The administration also consists of local management boards that represent land owners and local politicians, but it is probably not easy to affect the process".*

From this example we can see that the interviewee recognized the representatives and different people involved in the decision making process, yet suggest that despite of these techniques they feel like affecting the process is probably not easy and as mentioned before, this was definitely the minority of interviewees, with only two assessing the participation channels at HNP as poor.

Regarding actual involvement of the participants in the DMP of the park, it was found that more than half of the interviewees had been involved in the DMP at one point or another. Four out of the nine participants reported never being involved in the DMP. It should be noted, that most of the participants who were not involved in the decision making process did not have any interest in being involved or participating in the process. Some common reasons were wanting to stay out of the discussion, and also feeling like it was not their place or right to be involved in the DMP. Here is an example of a participant who found the idea of being involved in the decision making appealing, yet he didn't feel eligible to be part of the DMP.

HNP stakeholder: *"Yes, I would like to decide what happens in the national park but I don't think it's my right,…kind of. As just an occasional user of the park I don't think I should decide".*

On the other hand, the two interviewees who did want to get involved in the decision making process wanted either to have more say in regards to construction regulations in the decision making process, or wanted to be part of it because they felt they were particularly good qualified for it. In general however, people were happy with their level of involvement and more often than not would prefer not be involved in the process.

7.1.1.2 Transparency and accountability

Participants were then asked about the park's available information channels. They were specifically asked how they go about obtaining information they needed or considered important about the park. Five out of the nine interviewees said that the best way to get the information they needed was through direct contact with the appropriate people/authorities. The

majority also pointed out that although it might be easy for them—personally—to get information, this might not be the case for everyone else who might be interested. In addition, three participants said that there are no appropriate channels to get information. The information that is available is scattered and not consolidated in one place (website), making it hard to access. The channels of information available mentioned by the participants were webpages, the national park centers and newsletters. A few interviewees emphasized the need to create a single webpage containing all the information, to make it easier and faster to find for everyone. Below is the response of a participant who exemplifies well, the gist of several answers about information accessibility in the park.

HNP stakeholder: *"There are some annual reports, but they are fragmented and not put together. The websites are also not very good. They are working to try to have all the information in one site, as opposed to being fragmented and hard to get. You have to find them and ask them, it is not a good or easy system of information".*

Although there is some information available, the accessing is not very practical at the moment. HNP has several stakeholders groups with political power, and this might reflect on the lack of a consolidated source of information for the public, since there isn't a single official organization to manage the park. In regards to the accountability of the park, four out of nine interviewees reported that they consider the authorities to be accessible and accountable to everyone; whereas three perceive the authorities as mostly accountable to right-holder stakeholders.

In conclusion, the input (process) legitimacy at HNP is generally considered good. All interviewees appeared to be satisfactorily informed about the parks DMP; most also think there are accessible participation channels and had participated in the DMP at some point. In addition, participants said there are available channels of information—although they might not be consolidated or practical at the moment—most say that at least for them, it is relatively easy to get the information they want by directly talking to the right people. Finally, all participants said the authorities where accountable and accessible at least to them; although three said they are not accountable to the public in general.

7.1.2 Output Legitimacy

Based on Vatn (2015) legitimacy framework, output legitimacy refers to the acceptance and appropriateness of the results of a system. These results are evaluated on the basis of what are the costs in relation to the benefits generated by the governance system; how are they allocated and whether costs outweigh the benefits or vice-versa. On this section the type(s) of distributive justice principles (see Chapter 2, p. 15) underlying the EGS system are identified and evaluated in terms of effectiveness and efficiency.

7.1.2.1 Costs and Benefits

The majority of the HNP interviewees reported some kind of benefits generated by the park—that they or someone else receives. Only one interviewee said that he didn't receive any benefits at all from the national park. The mentioned benefits, were grouped in four categories: *nature experience/recreation; hunting and fishing opportunities; halted development of the area;* and *economic benefits.* The majority reported receiving benefits belonging to the *nature experience/recreation* category, six out of nine participants mentioned these type of benefits. *Hunting and fishing opportunities*, as well as *halted development of the area,* were also mentioned by two participants, and only one person reported receiving economic benefits from tourism.

Afterwards, participants were asked to mention any negative effects or costs generated by the park (on them or others). The two most common negative impacts mentioned were too much tourism and traffic in the area, and the limitations on the way the area can be used for economic gain. A few examples of these concerns are provided here.

HNP stakeholder 1: *"I think that the increasing tourism and hiking. There is already too many people…the tourism is too high, especially during the summer".*

HNP interviewee 2: *"The National Park is a quality sign. But on the other hand, the national park limits tourist activities and profiting on tourism inside the park".*

Other less common negative aspects were that the wildlife was affected negatively; and one person did mentioned domestic grazing and the use of MVs in the park as affecting the hunting and fishing experience of the national park. There was however, two interviewees who said they didn't perceive any negative effects of the park at all. In general, there seems to be more benefits than costs related to the park.

After having each of the participants think about what were the costs and benefits generated by HNP, they were asked to consider whether they thought the benefits outweighed the costs or vice-versa. The results were that the majority of the interviewees said that the benefits outweigh the costs generated by the park. Only two participants out of nine concluded that the costs were greater than the benefits. The ones who considered that the costs of the park outweighed the benefits appeared to be overwhelmed by the amount of tourism and park visitation, and the restrictions the park puts on development and landowners. The rest however, were quite positive about the park, and although they acknowledge some of the same problems, they still considered the park's benefits outweighing the costs.

To get a better understanding on what HNP stakeholders participants considered as lacking or falling short of expectations, they were asked to mention improvements they would like to see in the NP. Their answers were classified into five categories; of which the most prevalent was *stricter human activity control;* followed by *reduced MVs activity* (which in a way are related). The other three were just mentioned once, they were: having a *wider focus* (complete ecosystem outlook), *improve the communication strategy* of the park, and having *a bigger say in construction and infrastructure inside the park.* The most common shortcoming mentioned by the participants (need for *stricter human activity control)* conveyed the idea that right now the park is too permissive in the ways people can use it, and that it is now perceived as affecting the outcomes of the park. Here are a few examples of these concerns:

HNP Stakeholder 1: *"More focus on the total ecosystem and not only parts of it, and I also want to say that some kinds of new recreation activities should be controlled…there is enough activities as it is. New recreational activities are hard to control in Norwegian legislation because as long as you can call it a recreational activity it is protected by the Allemannsretten".*

HNP Stakeholder 2: *"They really need to get a good plan on how to manage the park's visitors…there are some areas with problematic amounts of visitors and it has consequences for the ecology in those areas, such as the wild reindeer".*

HNP Stakeholder 3: *"I think it is fine as it is now, but maybe have more regulations for the people who use tents during the summer. They can put them anywhere and that can also affect the reindeer…".*

The majority of the participants who felt HNP should have more strict human activity regulations mentioned the reindeer as the primary affected resource of the park. However, some also mentioned the landscape and the experience of being outdoors as being deteriorated by increasing and too permissive human activity.

Regarding how they felt others were affected by the parks operations, six mentioned landowners as a particularly affected group of stakeholders. Only one interviewee mentioned hunters as an affected group by the park's polices. Participants named the following causes affecting landowners: the most common complaint are the building regulations inside the park, followed by the number of SM trips they are allowed to make each winter, and a lesser concern for large carnivores.

Overall, it seems that for most participants the benefits of the national park do outweigh the negative aspects. The main benefits considered were nature experience and outdoor recreation, preservation of the landscape and/or halted development of the area, and finally the opportunity to hunt, fish and benefit from the land directly. The prominent negative aspects were too much tourism and increasing congestion, and the restrictions on economic activities in the area. However, all things considered, there were only two interviewees who said the costs outweigh the benefits for them—for the reasons previously discussed.

7.1.2.2 Distributive justice principles of HNP

The underlying distributive justice principles identified in HNP are based on relevant legislation and management plans (i.e. Naturvernloven, HNP Forvaltningsplan) as well as primary data analysis. To decide which distributive justice principles the system displayed, evidence of that type of principle was looked for in the aforementioned documents. If a type of principle is not on the table it does not mean that it is not present at the park. It only means that during the data analysis, there was no evidence of that particular justice principle found. A combination of three different principles was detected: welfare-based, desert-based, and egalitarianism principles (see p. 15 and 16).

Distributive justice principles	Example of the justice principle in HNP
Welfare-based	No entrance fee to HNP, opened 24/7 – The belief that everyone is entitled to recreation in the outdoors because it increases welfare i.e. Allemannsretten
Desert-based	-Landowners are entitled to a certain number of reindeer depending on the size of their estate. -Farmers get compensated for the loss of livestock to large carnivores. -Everyone can buy fishing permits from the appropriate authorities to exercise their right of collecting the land bounty for a fee. Some locals are allowed to use certain types of technologies for fishing i.e. gillnets.
Strict egalitarianism	In this case, every individual should have the same access to recreation in nature / guaranteed by Allemannsretten.

Table 12 Distributive justice principles HNP

7.1.2.3 Effectiveness and Efficiency

This section attempts to evaluate the effectiveness and efficiency of HNP governance system, taking into consideration the distributive justice principles upon which it is built on. The costs and benefits, currently seem to be distributed according to the above principles. Allemannsretten is upheld in all of the country and people do not face difficulties in accessing the landscape for recreation. In that sense the strict egalitarian principle is being effective, this also fulfils the welfare-based principle. As the examples given in *Table 11* show, the Desert-based principles mean that people get what they have worked for, or put in capital. Under the current system, this is possible to achieve. The landowners get more right/benefits from the park as it has been discusses, because they also have put their land into the National Park, therefore under this principle they are entitled to more access rights and extractive benefits than

other users of the National Park. The several rights and benefits of the landowners, have also been covered in Chapter 5. Hardangervidda's output legitimacy, is quite effective under this set of principles.

To supplement the analysis on distributive justice, the participants of this study where asked about their personal opinion on the effectiveness and efficiency of the park achieving its goals. Specifically, they were asked if they thought the goals were being fulfilled and if they thought there were issues in how the goals were being fulfilled. There results were as follows. The majority of the participants think that the park's goals are being fulfilled. Here are two examples of HNP stakeholders expressing what the goals are, and what they personally think is the level of fulfillment. HNP Stakeholder 1:

"Taking care of the nature and have it as it is. To not change it with roads, have it as pristine as possible"

Another HNP stakeholder expressed:

"The traditional way of using the nature is important and also, that there must be a chance for sheep and cattle to be there…when the park was established it was said that the farmers have the right to have the animals inside the park. That is something that has to continue as it is now".

In the responses above we can appreciate how the participants think that the current state of the park is appropriate, because it achieves the goal of maintaining the landscape and it gives the farmers and local people the opportunity to exert their rights of using the resources. Interestingly, there was also a few participants who felt the goals were being fulfilled only partly, or that some goals were being fulfilled, and others were not. Here is what two of them had to say. HNP Stakeholder 8 explained:

"In teaching and learning they are doing really well. I've been to one of the National Park Centers and that was really nice, so I think they are doing a good job there. In terms of conservation I think they could possibly do better…the recreation part of the park is also being fulfilled. It is quite easy to access the park and make use of it"

Another HNP Stakeholder said:

"Internationally, a national park will be to protect the wildlife, and we do that in the purpose of the park, we write that when we argue why we need a new national park, but we haven't done much for the wildlife, except for the type of wildlife you can utilize".

These two interviewees expressed how there are certain areas in which they think the park could be doing better, specifically conservation. However, other aspects of the park were asses by these interviewees as doing well, like for example the access and recreation opportunities and the management of the main species (wild reindeer, trout and grouse). As it was discussed in Chapter 3 (Research methods) the primary data of this study is not in any way meant to be have statistical validity, but rather serve for reflection, contrast, and to supplement the secondary source analysis of the park's legitimacy.

Participants were also asked about their opinion regarding the parks efficiency and use of its economic. Most interviewees expressed that resources at the park are being used in an efficient way, but that resources are currently not enough for such a large area. Here are a few examples that capture well the gist of the responses about efficiency. HNP stakeholder 4:

"The resources are used effectively and efficiently, but there needs to be more money to deal with more visitors coming into the park. Making some visitor centers, and better informative signs"

Another HNP Stakeholder explained:

"Yes, they are used efficiently but the problem is that he budget is too small for such a large area. They should have more money to manage the area"

There was not much financial information available from HNP to contrast the answers given by the interviewees so no conclusion will be formed on the efficiency of the parkin terms of use of economic resources. It is known however, from talking from a key informant that economic resources are considered low that there are plans to modify the system to allow more funds to be acquired for running the park.

Form this information it can be said that the goals most participants considered being fulfilled are those grounded or based on the distributive justice principles of the park i.e. equal access to outdoors recreation, research opportunities, capacity of the landowners to use and benefits economically from their land. The goals which are not inherit of the distributive justice principles proper of the park, but are rather grounded on international agreements (i.e. Convention on Biological Diversity) are considered—by some participants—as being partially fulfilled, or not fulfilled.

Additionally it was also found that the levels of poaching at HNP are very low or negligible, now a days. Talking to a key informant whose job is to monitor Hardangervidda's hunting season, said poaching is very low, with only five instance reported last year—mostly cases where the person shot the wrong kind of animal e.g. older male instead of young individual. As it was explained earlier, low levels of poaching signify an overall good level of legitimacy in a national park.

To conclude, Hardangervidda's input legitimacy appears to be good. There are several channels in which different stakeholders can participate in the decisions making process such as representative boards and annual meetings. The local people are also strongly and actively involved in the decision making process and there seems to be some available channels of information and communication with authorities. The distribution of benefits and costs (output legitimacy) is based on the identified justice principles, and was found to be effective as well. Although a more in depth analysis was out of the scope of this study, it can be concluded from the secondary data sources that at least the conditions are appropriate for the distribute justice principles to be uphold. Meaning there are laws and regulations in place that would allow for an egalitarian access to outdoors recreation, and a distribution of costs and benefits based on the input or capital of the actors. This was further supported by most of the primary data collection.

7.2 Yellowstone NP Public Legitimacy Evaluation

The evaluation of Yellowstone's public legitimacy was done in the same way as that of the HNP. Participants were asked to answer the same series of fifteen questions. Six questions about input legitimacy and ten about output legitimacy. However, given that the data sample for Yellowstone is considerably smaller than the one from HNP, there was more secondary data

sources used for answering this sections (i.e. Yellowstone's foundation document, management plans, Yellowstone NP Employees Handbook, a book on Yellowstone, and several academic articles).

7.2.1 Input Legitimacy

The input (process) legitimacy of YNP was also assessed on three elements: participation, transparency and accountability. They were asked the same set of question as the HNP participants (see annex 1).

7.2.1.1 Participation

All interviewees knew the DMP for matters on infrastructure and technology fairly well, and also on matters other than infrastructure and technology—such as reintroductions, species management, and visitor strategies. The mentioned key guidelines for decisions regarding infrastructure and technology are the NEPA process, and the Freeze the Footprint Act[42].

All participants reported that certain 'big' and controversial decisions are not decided by the park's management entirely. These larger decisions involve a wide set of actors, of which the most prominent are: several environmental agencies (e.g. U.S. Fish and Wildlife Service, Bureau of Land Management, etc.), the Intermountain Regional Office, the National Headquarters, and in some cases even the Whitehouse. In addition it was discovered that aside from the variety of actors involved in important decision-making, overall wildlife management is often based on relevant legislation e.g. National Environmental Policy Act (1969); Endangered Species Act (1973); to name a few. Less controversial and 'small' everyday management decisions are generally made by the Superintendent and Deputy Superintendent, with support from the park's senior management team (see Chapter 5, p. 80-81). It was established from the primary data collection that there is no direct participation of stakeholders in the DMP, but that there are designated times when input is welcomed and opinions are heard. This information was also was corroborated in the National Park Service (2018) in the *Yellowstone National Park Employee Handbook,* 2018, and NEPA Act.

[42] It is a 2013 executive order by President Obama in which it is stipulated that no new buildings should be constructed until all needed maintenance gets done on the existing buildings (U.S Department of the Interior, 2018).

Participation among the Yellowstone interviewees had a clear distinction between internal participation (Staff, park employees) in the DMP, and external participation (public involvement). Internal participation among the interviewees was good. All four participants had been involved in the DMP in their respective area of expertise. Out of the four people interviewed two felt their level of involvement in the DMP was appropriate. However, one participant, felt that outside her division she has no participation or say at all. Here is her statement. Yellowstone NPS Employee:

"In some themes I have no say at all if I am not in that division, because that is the way that we are structured. I feel like in the USA National Parks there is less collaboration between divisions. If you are not part of that division you have no say at all in the matter".

From the park organizational chart (see p.81) and the semi-structured interviews, it was detected that there is a very compartmentalized decision-making approach. Yellowstone has a lot of specialization in each area. Almost every aspect of the park has a fulltime employee for it. This also means that employees are expected to be experts in their area, but don't get much involvement or say about other areas—as the park employee above conveys.

In terms of external participation, most participants described YNP as having sufficient and appropriate channels of participation for the public. Part of the literature review on the YNP public participation, showed that there is an institutional concern with public participation in decision-making. Studies like that of Force et al. (2002) conclude that in a democratic country like U.S., the public expects and actively seeks to be involved in the DMP of their national parks. In order to be able to provide this, the different governmental agencies need to find appropriate channels of participation—without becoming co-management[43] or something resembling a community conservation approach. Dr. Force et al. (2002) further discusses the differ tools being considered by the NPS of the U.S, which are public comments, surveys, public hearings, key informants and the like. Once again, without reaching shared decision-making authority with the public.

[43] Involving some combination of local-level and government-level management of resources (Force et al., 2002)

On the other hand, authors like Robbins (2006), and Freemuth and Cawley (1998) argue that there are certain groups and stakeholders excluded from the decision-making process at YNP. Robins (2006) points out that hunters and local ranchers are groups of stakeholders (at YNP) that are particularly excluded from the DMP. Their knowledge about nature is often disregarded as 'phony science', or 'barstool science'. In addition Freemuth and Cawley (1998) point out that entire scientific disciplines have been excluded from the main scientific models to manage the U.S public lands. Ecology, they explain, has taken priority over forestry, range management, wildland recreations, etc. Another point to take into consideration throughout the *participation* analysis of Yellowstone, is that in other parts of the US some citizens and companies tend to think that the government is holding onto too much land resources and restricting use in excess. In a few cases this has led to protests and sometimes even armed standoffs. As it was in the case of Cliven Bundy in 2016. He had refused to pay grazing rights to the state of Nevada for over a year in protest of grazing restrictions in lands he had previously used for that purpose. The conflict ended up escalating to the point where Bundy's two sons, lead an armed standoff at the Malheur National Wildlife Refuge. They took over a ranger station for 28 days with a few others. Their goal was that the government return property to the ranchers and farmers. The standoff resulted in several arrests and unfortunately one death (Levin, 2016).

Although such conflicts are rare, it is nonetheless something that must be taken into consideration when assessing Yellowstone's legitimacy. Clearly there are some actors who feel excluded from the DMP. They feel like their rights to benefit from the land are not being respected or are not enough.

7.2.1.2 Transparency and accountability

The available channels of information at Yellowstone were considered very good by most Yellowstone NPS Employees. Participants mentioned the Strategic Communications Office at YNP, as the division that specializes in preparing both internal communication and external communication of the park. The external (to the public) communication entails mediums such as news media, social media, the official webpage, the visitor centers, as well the actual park rangers in the field. Their internal communication (Park employees, volunteers, etc.) is also done by the Strategic Communications Office (SCO) and it entails e-mails, memos, newsletters, and other similar internal communication strategies. Here are a few examples of what participants said about information channels. Yellowstone NPS Employee 2 said:

"The communications division takes care of it, and they are doing a pretty good job. Before it wasn't that great because it depended on the people in each division to do the communication of their area, but now there are strategic communication division who specializes in it and has now a more consistent approach to external communication…"

Transparency and communication appear good at Yellowstone. Information is plentiful and easy to find on the webpage. Primary data also suggested that external and internal communication in YNP is managed in a methodic and systematic way to make it easier for interested people and other stakeholders to access and understand information.

Accountability of the park was studied in terms of level of responsiveness in authorities; reachable, open and accessible authorities. In the interviews the participants expressed feeling there was a good level of accountability from the authorities. The reasons they gave for this were: 1) the possibility of the public to use the park; 2) decisions made in accordance to the law and public policy—possibility to directly contact the authorities of the park; and 3) good and accessible channels of information. Here are two good examples of answers given by park employees when asked about their perception of the park's accountability.

Yellowstone NPS Employee: *"The superintendent is ultimately accountable for the park's decisions, so we try to make decisions following law and polices, that we can stand behind and explain to the public".*

Yellowstone NPS Employee: *"The park belongs to every person in the country. People can sue the park and they do so, so there is a lot of accountability to the public. In terms of accountability of staff, that is a little harder for us to do very well, because we have a very hierarchical and bureaucratic organization".*

For these participant in specific, the park's external accountability was pretty good, but internal accountability was falling short. However, the majority of this study's interviewees regard the park's accountability as fairly good. It should be noted that all the participants of this study are Yellowstone NPS Employees, therefore their views, clearly do not represent that of other key stakeholders like the ones previously mentioned (e.g. hunters, farmers, ranchers, etc.). In addition, as government, and park employees, their conceptualization of accountability

seems to align with the ability to follow the law and being able to explain and back decisions in the established laws and polices passed by the U.S.A's Congress. As well as having channels and procedures for people to complain and express their dissatisfaction with any decisions or laws. For other stakeholders, like for example some hunters, the accountability of the park might not be considered good even if the park's authorities follow and comply with the established laws and regulations. There are several authors who analyses the discourse on the epistemological debate on whether the State should be allowed to own and manage public lands, and to which extent—see for example Freemuth and Cawley (1998). However, for the effects of this study legitimacy of the park was evaluated based on its effectiveness and efficiency in achieving its goals based on its professed distributive justice principles (*see Table 12*, p.127).

Participation and transparency are considered quite good by the participants, which was attributed mainly to the work of the park's division SCO. It is stipulated in the National Park Service (2006) *Management Polices* document that there is no direct participation in decision making by employees and stakeholders. However, the interviewees felt like their participation and involvement level in the DMP was appropriate and generally enough. The amount of involvement that each actor and stakeholder has in the DMP is determined by the fore-mentioned rules and legislation, and these are generally accepted and uphold by the four interviewed park staff and locals. Evidence was found to suggest that the input (process) legitimacy might have little acceptance among other stakeholders, and also that certain stakeholders are excluded and probably underrepresented in the DMP. Additional studies should be conducted in relation to YNP internal and external accountability and transparency to further understand and inform these results.

7.2.2 Output Legitimacy

The output (results) legitimacy of YNP, will be address in the same way as HNP output legitimacy. The park employees were asked about the costs and benefits they and others get from the park as well as to consider whether they perceive the benefits outweigh the costs or vice-versa. Throughout this section the distributive justice principles of YNP were also identified and latter evaluated in terms of their effectiveness and efficiency.

7.2.2.1 Costs and Benefits

All Yellowstone interviewees reported perceiving several types of benefits generated by the park. They were classified into five main categories: *recreation opportunities; wildlife viewing; job creation; local economic benefits;* and *property value enhancement.* Participants talked more about *job creation* and the *recreation opportunities* the park provides. Some people also mentioned having personal satisfaction and pride in working to protect a place like YNP. Below is an example of the type of answers encountered about the main benefits YNP generates.

Yellowstone NPS Employee: *"Recreation, outdoors life, public accessible land close to my family; we also benefit locally because of the tourism and the whole area benefits economically from the park".*

Job creation was mentioned by all the participants, and it was emphasized that it creates jobs through direct employment by the park—YNP employs more than 800 people (National Park Service, 2018)—but mostly through a wide number of tourism related activities such as hotels, restaurants, guest ranches[44], snowmobile rentals, among others. This perception was also supported by other sources such as Quammen (2016), and the official webpages of the Yellowstone GC. Here is the official statement of one of Yellowstone National Park's GC. *"The Gardiner Chamber of Commerce serves our community through developing local tourism while endorsing stewardship of the Yellowstone Ecosystem"*(Gardiner, 2019). Many other Yellowstone gateway communities have similar statements, and make it very clear that the park is central to their local economy.

Participants were later asked to talk about some of the negative effects the park might have on them or on others. The most common answers were conflicts with wildlife—specifically bison and wolves—and the congested and crowded summer season. One interviewee also referred to an inaccessible housing market due to lack of housing and the intense summer visitation period. However, the most pressing problem expressed by the interviewees seemed to be the bison and wolf controversies which supports what was found though secondary sources such as Quammen (2016) and the Foundation Document (2014). One interviewee described it in this way:

[44] These were regular cattle ranches in the beginning, but eventually turned to mostly guest or visitor oriented accommodation, some still have cattle and other production but are more focused on tourism. They might offer services such as guided tours, rentals and accommodation and food.

Yellowstone NPS Employee: *"The bison problem is the most controversial issue right now. Bison migrate and they don't stay inside the park. Ranchers are concerned with the spread of brucellosis transmitted to their cattle. The Bison are culled every year for this reason. Depends on who you ask, people have different tolerance towards the bison".*

Worries about disease is just one of the reasons bison are not exactly welcomed outside the national park. It was found that their large size also makes locals uneasy to have them as neighbors and in their backyards. Bison are also incredibly strong and can easily destroy people's fences and damage cars and other property. Furthermore, bison are not allowed to be hunted by anyone except the Native American tribes (National Park Service, 2019), given even less incentive for locals to tolerate them. Elk for example, are also quite large and tend to roam outside the national park. However, elk hunting is allowed and quite popular in Montana (Quammen, 2016), which might be a reason why locals do not complain about them leaving the park.

Wolves, on the other hand are unwelcomed mostly by ranchers because they tend to take down livestock. There is also a few people who are overall fearful and unsympathetic towards wolves. Despite this, wolves have become one of the trademark species at Yellowstone. Several GC offer wolf tacking tours, which makes the controversy over whether they should be allowed to be hunted outside the park even more heated. It should be noted that not all ranchers consider wolves pests or unwelcomed animals. Below an interviewee explains this. Yellowstone NPS Employee:

"Not all ranchers are against predators, they are trying to manage their cattle in a way that allows predators to live in the area…they appreciate the ecology around them"

This notion was further supported by other sources. David Quammen (2016), in his book *Yellowstone: A Journey Through America's Wild Heart,* talks about the different controversies surrounding wolves, bison and grizzly bears. He explains how some ranchers are trying to manage their cattle in a way that allows predators to live in the area. In other words, through nonlethal deterrents such as bear spray, cattle dogs, colorful fladry lines[45], as well as

[45] Fladry lines serve as visual deterrents to wolves. They are essentially lines of rope mounted on a fence or used as a fence with colorful fabric strung to them. Fladry have been used for centuries and are considered good temporary carnivore deterrent.

keeping constant vigilance on their flock. The use of all these nonlethal techniques however, may take a toll on ranchers in terms of resources and time, which is something not all ranchers might be willing or able to do.

After having considered the benefits and costs generated by the NP, interviewees were asked to weight them against each other, and consider which outweighed the other. All four interviewees said that, at least for them, the benefits of the park outweighed the costs. It should be considered that these were all park employees, and that maybe a rancher would have had a different opinion. However, considering the information collected about how some ranchers profit from wildlife and tourism, there might be a smaller number of ranchers who feel very negative towards the park.

Next, to get a general perspective as to what the participants think should be the main concerns or projects the park focuses on right now, they were asked to mention ways in which they would like to see the park improved. The aspect interviewees would most like to see improved right now are the *visitor management strategies*, given the current problems with overcrowding, and traffic jams. Participants also mentioned wanting the internal communication of the park to be improved, as well as having more focus on controlling the spread of invasive plant species and fish species. These concerned are also listed in the official Yellowstone webpage, and the Vital Signs repot (2017).

In conclusion, the benefits generated by YNP seem to offset the costs or negative effects generated. Benefits include, job creation and significant local economic benefits, outdoors nature recreation, and wildlife and landscape viewing. However, there are some problematic aspects of Yellowstone. Such as bison and wolf controversies, the crowded summer period for the locals, and the losses and extra time and resources ranchers need to put in, in order to live among large predators. All things considered, locals and other stakeholders appear to be fond of the park and greatly appreciate having it, despite the problems and controversies discussed here. This can also be appreciated on the willingness many locals and ranchers show to find ways to coexist alongside the predators and other large wildlife.

7.2.2.2 Distributive justice principles of YNP

The underlying distributive justice principles identified in YNP are based on relevant legislation and management plans (i.e. Foundation Document (2014); Management Polices (2006); Wilderness Act (1964); and Yellowstone National Park enabling legislation (1872)) as well as primary data analysis. To decide which distributive justice principles the system upholds, evidence of them was looked for. If a type of principles is not on the table it doesn't mean that it does not exist in the NP, only that during the analysis of the data there was no evidence of that particular justice principle found. A combination of four different principles was detected: welfare-based, compensatory justice, desert-based, and the Rawlsian principle (see p. 15 and 16).

Distributive justice principles	Example of the justice principle in YNP
Welfare-based	The founding legislation of YNP and its core values clearly mentions the establishment of the park to enrich the well-being of everyone and for the enjoyment of the people, as one of its main cornerstones.
Compensatory justice	The NPS and DOI honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities (National Park Service, 2006). -E.g. only American Indians are allowed hunt bison.
Desert-based	The park entrance is not free. There are specific fees to comply with for the type of vehicles, time spent in the park and even type of activity (see p.75). This means people get to enjoy the park's resources depending on their ability to pay.
Rawlsian principle	Only a limited number of SMs can go in the park during winter[46]. To make it fair this is decided through a lottery system. This benefit to some was deemed acceptable because in this way some can enjoy the park fairly without degrading the environment for everyone.

Table 13 Distributive justice principles YNP

Source: (Own fieldwork 2018-2019)

[46] One of the biggest controversies YNP has ever had was the snowmobile controversy which involved snowmobilers against environmentalists and took over 10 years to find a suitable solution that would satisfy the parties involved (Dustin & Schneider, 2004).

7.2.2.3 Effectiveness and Efficiency

This section attempts to evaluate the effectiveness and efficiency of YNP governance system, taking into consideration the distributive justice principles upon which it is built on. Participants were asked whether they thought the park was being effective at fulfilling its goals. In general, the interviewees mentioned the large and increasing number of visitors as a growing problem for fulfilling the goals effectively. Another problem mentioned by the interviewees regarding the effectiveness of the park, was the allocation of the resources not being as effective as it should and/or timely. Below are two examples of the answers received from the participants. Yellowstone NPS Employee 1:

"I think we are doing the best that we can. It is difficult to have so many visitors and to protect resources, in particular the ones that are near the roads. I think we are trying to balance our dual mandate, but it is difficult".

Similarly, Yellowstone NPS Employee 2 said:

"I think they are trying to do that, but it is hard with so many visitors and limited personnel and funding".

These two statements by the park's employees refer to increasing visitation as a main concern for achieving the park's goals. This was also supported by secondary data sources. The Yellowstone Center for Resources (2018) classifies *visitor and recreational use* of the park as a stressor and concern for the park's resources. Although the mission and goals of the park were considered as being achieved fairly well by the interviewees. Participants recognize that there are some increasing pressures which are starting to compromise the effectiveness of the park. Namely, increased park visitation, and lack of sufficient employees and funding to face the increased vitiation. Once again this general view was supported by the secondary data sources, *"While visitation has climbed dramatically since 2000…the number of full-time National Park Service employees has not changed significantly"* (National Park Service, 2019). This is currently considered a main issue, however, restrictions in budget and employee housing have difficulted the hiring of more park staff.

Concerning the efficiency of the park, the interviewees considered that there is some room for improvement. Specifically in the form of better prioritization of resources, and also having a larger budget for things like hiring more personnel and for doing maintenance. Another important point that was brought up about efficiency was the need to improve the communication between the park's divisions, to have a more efficient resource spending. As one interviewee states. Yellowstone NPS Employee:

"Each division gets is own allocation of money, and often times they make decisions about how they spend that money within their own division, and what we don't do a good job at is looking across division prioritization. That is much more harder to do and something we are working on".

In conclusion, there seems to be an important need for more staff and a better prioritization and allocation of resources. However, more studies are needed to further determine Yellowstone's NP level of efficiency in regards to resources allocation. Additional research can also help better understand the results produced by this study.

Out of the four distributive justice principles identified in Yellowstone NP, three appear to be able to be uphold with the current legislation and laws. These are the compensatory justice, desert-based, and Rawlsian principle (examples of each one can be seen in Table 12). Inversely, the welfare-based principle stated on their mission and their Foundation Document (2014), appears to be difficult to be fulfilled under the current scheme. In addition, some groups opinion seems to be undermined in the DMP, and also some types of recreation inside the park like hunting are not allowed. Although the park is meant to be for 'the welfare and enjoyment of the people', clearly the people that cannot pay the entrance fee, cannot recreate inside the park. Free entrance on some festive days, and guidelines for accessible entrance fees are currently in place and it could be argued, that these mitigate the situation to some extent. But regardless of this, it cannot be said that the park is accessible to all.

Finally on the indicator on poaching. All interviewees said that although poaching might happen every now and then, it is really not a significant problem. One interviewee said that in the past it had been a problem but it is not anymore. YNP, quite like HNP have very low levels of poaching, so low than participants consider it as negligible. In both cases this is considered

a good thing and a sign of good legitimacy. One interviewee said the following about poaching in Yellowstone. Yellowstone NPS Employee:

"I don't think it is a problem. I am sure it happens, but I don't think it happens a lot. I have heard of people taking the fallen antlers of the elk inside the park. Even though you are not supposed to take anything out of a national park. So people poach antlers, but it is very rare that people would poach an animal, like you hear it happening in African parks. That kind of thing really doesn't happen here".

In conclusion, the input (process) legitimacy at Yellowstone NP had mixed results. The primary data indicated good participation, transparency and accountability from the park employees. This was supported by some secondary data sources but challenged by several other secondary data sources as discussed in section 7.1.1. This could indicate that internal input legitimacy at YNP might be good, but external input legitimacy might be challenged. More research should be done on Yellowstone's internal and external input legitimacy to have a more complete picture of the situation. Output legitimacy in Yellowstone was found to have three out of four distributive justice principles as able to be uphold under the current management scheme (except for the welfare-based principle). Also primary data pointed at participants perceiving more benefits than costs from the park. This seems to be party supported by secondary data sources, like for example, job creation and large economic benefits generated by the park, among others. However, more research is needed to explore the costs experienced by other stakeholders who were deemed as excluded by several secondary sources—particularly, local ranchers, and hunters—and also to determine whether they are a minority or not.

7.3 Comparison Between HNP and YNP on Legitimacy Levels

This section compares the key differences in public legitimacy of HNP and YNP.

Neither of the parks appeared to have a decidedly poor public legitimacy level. Comparatively, HNP seems to have higher public legitimacy than YNP, specifically in two criteria *participation* and the *distributive justice principles effectiveness. Transparency* however, appeared to be higher in YNP. Both parks seemed to have relatively equal levels of legitimacy on the rest of the criteria. However, more research is needed to reach a firm

conclusion. Below is a comparative table that summarizes the public legitimacy level of both national parks.

Public Legitimacy Element		Hardangervidda NP	Yellowstone NP	Considerations
Input (Process)	**Accountability**	**Good**- especially towards landowners and other rights-holders.	**Good**- congruent with the law but might exclude certain stakeholders.	More research is needed
	Participation	**Good**- several channels of participation and involvement -Public representatives share some decision making authority with the government	**Low**- few available channels of participation, although mostly well accepted and trusted. -Stakeholder participation is based on information exchange and commenting	The participation channels are decidedly different. HNP includes many more stakeholders in the DMP
	Transparency	**Fair**- better towards stakeholders and rightsholders.	**Good**- copious and easily accessible information for internal and external stakeholders.	YNP has particularly consolidated information channels. All information can be found on the official webpage. HNP information is scattered in many different official webpages for the different board and some info. is not available to the public.
Output (Results)	**Procedural justice principles**	Welfare-based, desert-based, and strict egalitarianism principles.	Welfare-based, compensatory justice, desert-based, and Rawlsian principles.	Welfare-based and desert-based are shared by both NPs
	Effectiveness	**Good**-all three distributive justice principles could be fulfilled under current management scheme.	**Fair**-Three out of four distributive justice principles could be fulfilled under current the management scheme.	--
	Efficiency	**Fair**- primarily in need of more economic resources	**Fair**- primarily in need of more staff	More research is needed
	Poaching	**Good**- Not significant (positive)	**Good**-Not significant (positive)	--

Table 14 Public Legitimacy Comparative Table

Source: (Own fieldwork 2018-2019)

7.3.1 Additional differences between HNP and YNP

The analysis on the park's public legitimacy, led to identification of many interesting and surprising contrasts between the two parks. The ones which are the focus of this study are summarized in the above table (*Table 13*). However, there were some more thought-provoking differences which could be reflected on. They stem from the EGS analysis and the Public legitimacy analysis. They will be briefly summed up in the Table 14, below for the consideration of the reader.

Table 15 Additional differences between HNP and YNP

Significant differences with possible effects on the EGS and the resources	Hardangervidda NP - Community conservation approach	Yellowstone NP – Protectionist conservation approach	Considerations/Reflections
Park polices and regulations around tourism economic activities	Restrictive, very few tourism oriented activities allowed (none by locals)	Mostly allows tourism economic activities by locals	Surprising given what is expected/characteristic of a CC approach and a FC approach.
Most valued benefits generated by the park	Recreational experiences, hunting, and fishing	Wildlife and landscape viewing	One benefit mentioned by YNP participants, but not by HNP participants was wildlife viewing. This is significant, because wildlife viewing could potentially have important ramifications in the way the resources are conceptualized, leading to for example to a complete ecosystem outlook.
Economic benefits for the locals	Resource extraction	Mostly tourism	HNP has plenty of tourism as well, however it doesn't generate many economic benefits for the locals.
Concern areas for interviewees	Nature conservation and biodiversity	Park visitors strategies and employee housing	YNP interviewees felt the ecosystem and animals were doing well, they had more concern over increasing visitation and employee housing. Inversely, HNP participants seemed more concerned over the park's fauna and flora.
Infrastructure and technology	-Fauna is very fearful of all infrastructure, technology, and people. -Little amount of infrastructure	-Fauna has near complete habituation/little to no fear around infrastructure, technology, and people. -Plenty of infrastructure	The NPS attributes the lack of fear of the fauna to the no-hunting regulations and strong wildlife habituation by exposure to people and infrastructure.

Source: (Own fieldwork 2018-2019)

CHAPTER 8 – Conclusions and Recommendations

8.1 Conclusions

Both parks' environmental governance systems have been described and analyzed. The perceived biological integrity of each park has been evaluated and contextualized within each EGS and compared between each country, and the public legitimacy evaluated and compared. Now the findings will be looked at in the context of the discourse of two main conservation approaches in protected areas—namely *community conservation* approach and *protectionist (fortress) conservation* approach (see Chapter 1 p.4). The first observation to make is to reiterate that this study parted from the suggestion that the parks (HNP and YNP) were good examples—although not the epitome—of *community conservation* and *protectionist conservation* approaches respectively. After analyzing and mapping-out each park's governance system, it is safe to say that they do indeed represent these two types of conservation approaches.

HNP is a good example of *community conservation* in the West. It has clear utilitarian and anthropocentric values; the control of the resources remains mostly under the jurisdiction of the community or local people; there are several community institutions and organizations to manage the resources of the park (e.g. Villreinutval, Fjellstyrene); there is significant community involvement in the DMP; and there is recognition of property rights or ownership rights over the land.

YNP on the other hand, fits the *protectionist conservation* approach well. Its underlying values are mostly ecocentric; the appropriate or permitted resource uses are mainly tourism, recreation, and research; people were excluded from the resource base at one point (i.e. Native Americans were removed from the area); there is a 'fines and fences' scheme for compliance; and it is solely state owned.

This study also found that—as hypothesized in the beginning (see p.5)—HNP had higher legitimacy than Yellowstone, specifically in *participation* and distributive *justice principles effectiveness.* As anticipated, YNP, had higher overall biological integrity, demonstrably in *species diversity*, and less *human intervention* in the ecosystem. With this, we

can conclude that the original hypothesis put forth was correct. However, several identified differences between the two parks were striking and uncharacteristic of the specific conservation approach each park represents (CC and FC respectively). In the larger discourse around these two topics it was clear that fortress conservation was portrayed as unable to generate local economic benefits. This however, has turned out to be false, as can be appreciated in the Yellowstone case. This fortress conservation has generated around 800 jobs directly, and brings an estimated of $333 million dollars annually (National Park Service, 2018), to the gateway communities through tourism. On the other hand, community conservation was portrayed in the academic discourse as able to provide significant local economic benefits, which was partly supported by the Hardangervidda case. In Hardangervidda tourism activities are generally not allowed (except for DNT), however, people do get economic benefits from selling hunting licenses, fishing and grazing their livestock.

Interestingly, the types of *infrastructure and technology* was another uncharacteristic difference found between the two park. Community conservation, as a more 'people friendly' or anthropocentric approach at conservation could have been expected to support more infrastructure inside the park for the purpose of accommodating the users; and an ecocentric approach such as YNP, could have been expected to favor a more 'pristine' looking nature with very few buildings and constructions inside the park. This however, could have not been further away from the facts. HNP, as previously discussed, favors a 'pristine' looking nature and has very strict construction and MVs regulations, as well as practically no paved roads inside the park. YNP, on the other hand, has copious infrastructure inside compared to HNP. Shockingly, Yellowstone interviewees said that the infrastructure needs to be there for the sake of the people, and Hardangervidda interviewees said it must remain wild-looking to preserve nature. The reasons behind this surprising difference are mostly cultural, and also have to do with different benefits and activities expected from each park.

A relevant proposition to put forward based on the results of this study is that *community conservation* is effective at conservation, under the premise that the locals want to keep the species in question present in the ecosystem. As the HNP case showed, *community conservation* can be very effective at managing natural resources—as is the case of the wild reindeer, willow grouse, and trout—but the communities can also opt to eradicate a particular species that might not be of use to them, considered threatening, or an inconvenience (e.g. large predators). An entirely utilitarian/anthropocentric approach at conservation can also makes it hard for

recovering lost species and/or protect species that are not directly useful to local people e.g. artic fox. The main problem with a community deciding to eradicate a specific species from the ecosystem, is that it is in direct opposition with biodiversity conservation principles—both national and international—and it can have unpredictable consequences for the rest of the ecosystem.

These two conservation approaches are both well-meaning, and although displaying different fundamental values and strategies to deliver in legitimacy and biological integrity, they both can succeed at doing so. Though, based on this research it would be sensible to say that how effective a park's conservation method is, will depend more on how and where the method is applied than on the type of conservation approach itself. Community conservation seems to be well suited for cases or situations where subsistence resource use is important, or where the land or resources are already under private property ownership. This is also supported by the study of Force et al. (2002). In contrast, the protectionist conservation approach is well suited for situations where there is very vulnerable resources at stake, and also in cases where the resources are not of immediate or obvious value to the communities.

Lastly, this study has also help emphasize that although there are very strong and divergent opinions on what set of values and which set of conservation strategies might yield the best results; these cases suggested that context matters. The situation and background of the place, history, customs, traditions, local knowledge, and robustness of the ecosystem are all fundamental aspects to determine whether a certain conservation approach will be successful or not, and considered legitimate or not. The same can be said of the level of infrastructure and visitation in a park. These cases have highlighted that there might not be a right or wrong amount of infrastructure and visitation inside a park, but rather that the regulations and role played by the infrastructure and visitors will determine if they prove to be neutral, beneficial or detrimental to the park's flora and fauna.

8.2 Recommendations

Based on what has been observed in Chapters 5, 6, and 7, the following recommendations will be put forth, for the improvement of BI in HNP and YNP. To begin improving biological integrity in HNP, it is recommended that a holistic monitoring program is set in place, in addition to the permanent monitoring programs for wild reindeer, grouse, etc.

Once the ecosystem as whole starts being assessed and monitored, it might be easier to identify 'small' changes people can live with, that might have a strong positive environmental impact. E.g. hunters could leave behind some reindeer meat for the artic fox, as a typical predator would, instead of removing the whole carcass. Another relevant action, could be exploring strategies to help internalize the international biodiversity agreements Norway as a nation has ascribed to, so that it will be something local people and communities are both familiar with, and interested in upholding. At current there seems to be a disconnect between the international polices the government is trying to uphold in the park, and what some of the locals and other rightsholders intend to get out of the park. Interviewees however, seemed satisfied with the accessibility of the park and the possibility to continue using the resources for extraction purposes (hunting, fishing, grazing), so this is something that should remain to the extent possible.

Yellowstone's biological integrity appeared to be good, but could benefit from a more intensive invasive species control—especially plants. Also, YNP could ensure that the park's BI remain high by exploring new ways to educate the public on the effects of disturbance on vulnerable populations, and try to educate visitors on the fishing management strategies to reduce conflict and increase success.

Regarding public legitimacy, Yellowstone's external legitimacy could improve by carrying out research into human-wildlife interactions. Particularly regarding bison, and perhaps considering allowing locals to gain more direct benefits from bison i.e. hunting permits, might help increase the legitimacy of bison management and reduce the controversial culling each year. Yellowstone certainly has room for improvement in ways to increase participation and take into consideration the opinion of stakeholders who are currently undermined or alienated. A way of doing this without infringing on constitutional acts and legislation, could be to have in depth focus groups with different stakeholders particularly those that feel excluded to begin finding some common ground.

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ANNEXES

Annex 1: Semi-structured questionnaire

Part A – General Information / background

Questionnaire number:
Date:

1. **Gender**: o Male o Female o Other	4. **Village/home place**:
2. **Country**: o Norway o USA	5. **Job description/profession:**
3. **Age**:	6. **Time involved with the National Park:**

7. **Please select you connection with the park (all that apply):**

- o Land owner
- o Park employee (Position__, Department_____)
- o Authority or elected official (Position_____, Department_____)
- o Stakeholders group. Please specify which E.g. Hunters, tourism, etc.: ___Hunter and fishing
- o Other, please specify: _____

8. **If you are a park authority, park employee, or part of a stakeholders group, please briefly describe what your position/job/membership entails.**

Part B- Infrastructure and technology

9. **To the best of your knowledge and/or personal experience which types of vehicles (E.g. snowmobiles, trucks, cars, motorcycles, bicycles, etc.) are used in the park, whether it is for administrative and management purposes or recreation?**

10. **What is your opinion about the use of motorized vehicles in the national park with regards to nature conservation and disturbance of ecosystem or animals?**

11. **Has there been disagreements or controversy about which vehicles should be allowed in the park? If so, please elaborate.**

12. **To the best of your knowledge, what type of infrastructure (e.g. cabins, fences of different types, dirt roads, concrete roads, research facilities, buildings, toilets, etc.) is present at the park?**

13. **What are your thoughts on how roads, buildings, vehicles and other infrastructure affect peoples' perception of and interaction with the park?**

14. **What are your thoughts on how roads, buildings, vehicles and other infrastructure affect the ecosystem and animal populations of the park?**

15**. Do you know how the park administration makes decisions in regards to buildings and infrastructure in the park? If so, please give a brief account of your understanding.**

Part C- Input legitimacy

16. **Do you know how the parks administration makes decision on topics other than infrastructure? If so, is it possible for you to participate in the decision-making process**?

17. **Have you ever been involved in the decision-making process of the park in some way? If you have, please give a brief account of your experience.**

18. **If you are not involved in the decision-making process would you like to be, or not? Please state the reasons why, in either way.**

19. **Are you aware of any way you can get information about matters important to you regarding the park (i.e. reporting systems, annual reports, transparency policies, quotas, etc.)?**

20. **Do you consider authorities to be accountable for what goes on in the park? Do they respond to inquiries? Is there clear and accessible channels to contact the authorities?**

Part C1- Output legitimacy- *Costs and benefits*

21. **Describe the way(s) in which you benefit from the park, if any (e.g. job, recreation, spiritual needs, added property value, truism, job generation, fishing, etc.).**

22. **What are some of the ways in which the park impacts you negatively or limits your activities?**

23. **Do you think that the benefits that you experience from the park outweigh its costs/negative impact on you?**

24. **Is there any aspect of the park you would like to see improved? If so, please elaborate on them.**

25. Are you or anyone you know being affected negatively (e.g. crop destruction, wild animal encounters, too many tourists, not being able to benefit from the park's resources, etc.) by the park's operations? Please elaborate.

26. **Are you aware of any other common or otherwise prominent complaints/problems related to the park?**

Part C2- Output legitimacy- *effectiveness*

27. **In your opinion what are the goals the park should be fulfilling? In your opinion, are they being fulfilled? How or why not?**

28. **Do you see any issues in the way in which goals are being fulfilled in the park (e.g. too much money spent on certain projects, problems not being targeted in the right way, etc.)?**

29. Do you think the park uses its resources in the most efficient way possible?

30. **Are you aware of any poaching in the park? If so could you elaborate on: Which animal populations are targeted; the perpetrators; has it increased/decreased; and reasons why it might be done.**

Part D- Biological Integrity

31. **What is important to you for a wholesome national park ecosystem to offer?**

32. **Do you consider the park's ecosystem able to support a diversity of animal and plant populations for an indefinite period of time with little to no human intervention?**

33. **Are you worried about any aspects of the parks sustainability or overall wellbeing, present or in the future? If so, what are they?**

34. **Are you aware of any problems with pollution, overharvesting, wildlife-human encounters, fires, etc. If, so please elaborate.**

Part D1 –Biological integrity *professionals*

Only answer if you are a professional biologist or ecologist.

35. Which methods are used to evaluate the parks health and biological integrity, if any?

36. What is the parks biological integrity overall now? Please elaborate on any positive or negative aspects of the parks ecological integrity at the present moment.

Annex 2: Consent form and information sheet

Note: Yellowstone NPS Employees were only handed the information sheet in this consent form. No Yellowstone NPS Employees signed the consent form due to their institutional rules and regulations.

Norges miljø- og biovitenskapelige universitet

Informed Consent Form for: _____

Name of Principle Investigator: Maria Andrea Zarate Benoit
Name of Organization: Norges miljø-og biovitenskapelige universitet (NMBU)
Name of Sponsor: NMBU, LANDSAM
Name of Project: Legitimacy and Biological Integrity of National Parks: A Comparative Case Study of Hardangervidda National Park in Norway and Yellowstone National Park in the United States of America

This Informed Consent Form has two parts:

- **Information Sheet (to share information about the study with you)**
- **Certificate of Consent (for signatures if you choose to participate)**

You will be given a copy of the full Informed Consent Form

Part I: Information Sheet

Introduction

My name is Maria Andrea Zarate Benoit, and I doing a MSc in International Environmental Studies at Norges miljø-og biovitenskapelige universitet, better known as NMBU. I am doing research on Hardangervidda National Park management system and Yellowstone National Park. This study is especially concerned with two outcomes of the management system—public legitimacy and biological integrity of the park—. I am going to give you information and invite you to be part of this research. This consent form may have words or concepts that you do not understand. Please feel free to ask me at any time if you have any questions.

Purpose of the research

The aim of this research is learning about what are the benefits and costs of being near the park, whether a park employee, living near it, owning land, or simply using it for recreational purposes. The study is also concerned with the publics' perception of the parks biological integrity or ecological health and wholesomeness. Finally, I am interested in the phenomenon of poaching in the park, and any other forms of rule breaking that might occur occasionally or rarely at the park. I believe these instances are of interest because they can be key elements when trying evaluate whether or not peoples' expectations and goals for the park are being met.

Type of Research Intervention

This research will involve your participation in a semi-structured interview that will last about 35-40 min. Depending on your location, this might be done remotely, via Skype or video conference, or a face to face interview.

Participant Selection

You are being invited to take part take in this research because of your knowledge and experience as a national park stakeholder. You might be a park employee, a land owner, hunter, or local. Your personal knowledge and expertise about the park is the reason you were selected as a participant of this study.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. The choice that you make will have no bearing on your job or on any work-related evaluations or reports. You may change your mind later and stop participating even if you agreed earlier.

Procedures

A. In this research you will be asked to help the researcher learn more about your perceptions and experience as a stakeholder in the national park. You are invited to take part in this research project. If you accept you will be asked to:

B.

Participate in a semi-structured interview with myself—Maria Andrea Zarate Benoit. During the interview, I will sit down with you in a comfortable place at the location of the interview. If it is better for you, the interview can take place via Skype or Facetime or if you are not comfortable with the English language you can take the questions home and answer them there if need be. If you do not wish to answer any of the questions during the interview, you may say so and I will move on to the next question. No one else but the interviewer will be present unless you would like someone else to be there. The information recorded is confidential, and no one else except myself, Maria Andrea Zarate Benoit, will have access to the information documented during the interview. The entire interview will be tape-

recorded. The tape will be kept at a locked drawer within NMBU's grounds. The information is confidential, and no one else except myself will have access to the tapes. The tapes will be destroyed after 26 weeks after the study is completed.

Duration

The research takes place over 6 months in total. During that time, I will interview you once and the interview will last for about one hour. Alternatively, you might be answering the questionnaire in written form.

Risks

There is a risk that you may share some personal or confidential information by chance, or that you may feel uncomfortable talking about some of the topics. However, I do not wish for this to happen. You do not have to answer any questions or take part in the interview if you feel the question(s) are too personal or if talking about them makes you uncomfortable.

Benefits

You participation is likely to help find out more about how to improve legitimacy and biological integrity in the national park. It also may help develop a way of assessing national parks success in delivering positive results.

Confidentiality

This research project will not handle sensitive or personal information in general. However, I wish to assure you that I will not be sharing information about you to anyone outside the research team. The information collected from this research project will be kept private. Any information about you will have a number on it instead of you name. Only I will know what your number is and will protect that information with secure password.

Sharing the Results

The knowledge that we get from this research will be shared with all the involved participants if they so desire and relevant authorities. Nothing that you tell us during the interview will be attributed to you by name unless you specifically want that to happen.

Who to Contact

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact any of the following: Maria Andrea Zárate Benoit, Postboks 527, 1432, Ås, Norway/ mazarate@nmbu.no. The proposal for this research has been approved by the Thesis Review Board of NMBU at the Faculty of LANDSAM.

Part II: Certificate of Consent

I have been invited to participate in a research about stakeholders' perception of biological integrity and legitimacy in national parks. As a participant, I will be interviewed and granted confidentiality.

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study.

Name of Participant_____
Signature of Participant _____
Date _____
Day/month/year

Statement by the researcher/person taking consent

I have accurately provided or read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that the following will be done:

1. He will be interviewed and the interview will last for about 40 min. to an hour.
2. The interview will be recorded and safely stored.
3. The results of the interview will be shared with the participant once the study is over.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this ICF has been provided to the participant.
Print Name of Researcher/person taking the consent: Maria Andrea Zarate Benoit

Signature of Researcher /person taking the consent: Maria Andrea Zarate Benoit

Date _____
Day/month/year

Annex 3: Yellowstone National Park Research Permit

SCIENTIFIC RESEARCH AND COLLECTING PERMIT

Grants permission in accordance with the attached general and special conditions

United States Department of the Interior
National Park Service
Yellowstone

Study#: YELL-08092
Permit#: YELL-2019-SCI-8092
Start Date: Jan 01, 2019
Expiration Date: Dec 31, 2019
Coop Agreement#:
Optional Park Code:

Name of principal investigator:
Name: Dr Arild Vatn **Phone:**+47 67231303 **Email:**arild.vatn@nmbu.no

Name of institution represented:
Norwegian University of Life Sciences

Additional investigators or key field assistants:
Name: Maria Andrea Zarate Benoit **Phone:** +47 923 25051 **Email:** mazarate@nmbu.no

Study Title:
Legitimacy and Biological Integrity in National Parks: A Comparative Study Between Resource Regimes & Countries

Purpose of study:
The purpose of this comparative study is to understand the different manifestations of national parks and nature protection under different cultural and contextual settings and their outcomes (perceived legitimacy and biological integrity of the park). Another important aim of the study is to identify good practices and areas of opportunity in park management, and to hopefully inform policy making.

Subject/Discipline:
Social Science

Locations authorized:
No physical entrance to the park will be required. The interviews will be done remotely via phone or skype.

Transportation method to research site(s):
N/A

Collection of the following specimens or materials, quantities, and any limitations on collecting:
No samples/specimens will be collected from the park. Interviews will be carried out with various stakeholders. This permit will cover the interviews of ~4 Yellowstone NPS employees. Interviews of stakeholders from local communities or other agencies do not require a Yellowstone research permit. Researchers are responsible for obtaining any other necessary permission. The interviews will follow the approved list of questions provided to the Research Permit Office. They will last ~30-35 minutes. Interviews will be recorded and later transcribed and analyzed. Researchers will also collect data by reading management plans, park regulations, etc.

Name of repository for specimens or sample materials if applicable:

NPS General Conditions for Scientific Research and Collecting Permit (available at the RPRS HELP page) apply to this permit. The following specific conditions or restrictions, and any attached conditions, also apply to this permit:

CONDITIONS SUBJECT TO PERMIT #8092

Please pay special attention to Yellowstone permit condition #12.

1) Coordinate with the Research Permit Office to finalize a list of interviewees. The RPO will provide a list of staff who agree to be interviewed and their contact information. Interviews with staff are approved but not guaranteed. While the park will try to make staff available for interviews, we may not be able to grant some interviews due to time and resource constraints. Interviews will be scheduled directly with the researcher as time permits.

2) Provide interviewees with basic information about the study, including how the data will be used. We recommend you prepare a one-page informational form on institutional letterhead.

3) NPS employees do not sign consent or release forms for interviews.

4) The names of the NPS interviewees may not be included in any final reporting. Researchers will quote NPS staff as a "Yellowstone NPS Employee".

CONDITIONS SUBJECT TO ALL YELLOWSTONE NATIONAL PARK PERMITS

1. You are responsible for the research activities of your staff. Ensure that field staff adhere to all conditions of your permit. Field staff must possess a copy of your permit at all times while in the field.

2. You are required to post your research trip itineraries online no later than the Sunday prior to your trip at https://irma.nps.gov/rci/. Once in the park, report all emergencies by calling 911.

3. You are required to have a Safety Plan on file that addresses the range of activities you will encounter while working in Yellowstone. All field staff must review the Safety Plan prior to beginning work. At a minimum, a safety plan shall cover a) training requirements and documentation that personnel have received appropriate training (e.g. bear safety, bear spray use, thermal area safety, fording streams); b) work party size (hiking in groups of 3 or more is recommended in bear country); c) safety equipment (e.g. bear spray for each person, rain gear, heat resistant gloves, extendable pole for sampling hot springs); d) trip itinerary with daily activities and travel patterns; e) worker check-in. Note: in addition to completing the online researcher check-in per Yellowstone Condition #2, it is advised that all field personnel designate an emergency contact (e.g. supervisor, co-worker) whom they will check-in with at the end of each field day or session. This designated emergency contact will know the trip details and will contact emergency services (911) and the Research Permit Office (307-344-2239) in the event field staff fail to make contact.
4. While conducting fieldwork, researchers are prohibited from possessing firearms (unless authorized by the Superintendent). Researchers are also prohibited from bringing firearms into government buildings or government vehicles (cars, boats, aircraft).
5. Unless authorized on your permit, you must conduct research out of public view. If you have obtained permission to work in public view, it will be noted in your permit-specific conditions. Please consult these conditions for further guidance.
6. If you are approved to collect specimens (either to be permanently retained or destroyed through analysis), contact the Yellowstone Curator's Office (307-344-2565) to report your collections annually. Specimens must be tracked and an inventory provided to Yellowstone (count, type, and location) by February 28th following the permit year. Prior to collecting specimens, a repository form must be completed and on file. Any permanently retained specimens must bear accession and catalog numbers, and include the required metadata per the NPS's catalog system.
7. All equipment left in the field, including plot markers, must be specifically authorized in advance. Label all equipment with your name, phone number, and the words "Research Study #XXXX." You must record equipment coordinates with GPS.
8. Your research permit does not authorize you to enter closed or restricted areas in Yellowstone. Examples include most service roads, carcass dump sites, bear management areas, thermal areas, some bird nesting areas, wolf den sites, and trout spawning areas.
9. Cultural resources must not be adversely impacted by your research activities. Ground disturbance (e.g. digging) must be specifically authorized in advance. Report any archeological findings (artifacts, historical trash, rock cairns) to the Research Permit Office.
10. The Permittee agrees to notify the Chief of Resources of Yellowstone National Park (YNP) of every subject discovery or invention that relates in any respect to research results derived from YNP research studies or use of any research specimens or other materials collected from YNP, or that may be patentable or otherwise protected under the intellectual property (IP) laws of the United States or other jurisdiction. Notification must occur within sixty (60) days of the time that an inventor or other agent of the Permittee reports such a subject discovery or invention to the person(s) responsible for patent or other proprietary rights matters in the Permittee's organization. Additionally, the Permittee agrees to notify the Chief of Resources of Yellowstone within thirty (30) days of filing any patent application or other IP claim in the United States or other country that relates in any respect to research results or other discoveries or inventions derived from YNP research studies or any research specimens or other materials collected from YNP. For purposes of this paragraph, the term "subject discovery or invention" means any discovery or invention related to or derived from YNP research studies, or research specimens or other materials collected from YNP. All invention disclosures shall be marked as confidential under 35 U.S.C. Section 205.
11. Any use, including social media, websites, newspapers, periodicals, etc. of photos or videos from within closed areas or of research taking place in closed areas is prohibited without prior NPS approval. All filming associated with this permit must be reviewed and approved in advance by the park's Film Permit Office. A Film Permit may be required. Filming of certain research activities may be used for education in a classroom setting or on private educational platforms which are password protected and the footage must clearly state that the research was conducted under a Yellowstone Research Permit. For more information, contact Rachel_Cudmore@nps.gov or 307-344-2722.
12. Each year, investigators are required to submit electronic copies of journal articles, theses, and dissertations that result from your permit to the Research Permit Office.

CONDITIONS SUBJECT TO ALL NATIONAL PARK SERVICE RESEARCH PERMITS

1. Authority - The permittee is granted privileges covered under this permit subject to the supervision of the superintendent or a designee, and shall comply with all applicable laws and regulations of the National Park System area and other federal and state laws. A National Park Service (NPS) representative may accompany the permittee in the field to ensure compliance with regulations.
2. Responsibility - The permittee is responsible for ensuring that all persons working on the project adhere to permit conditions and applicable NPS regulations.
3. False information - The permittee is prohibited from giving false information that is used to issue this permit. To do so will be considered a breach of conditions and be grounds for revocation of this permit and other applicable penalties.
4. Assignment - This permit may not be transferred or assigned. Additional investigators and field assistants are to be coordinated by the person(s) named in the permit and should carry a copy of the permit while they are working in the park. The principal investigator shall notify the park's Research and Collecting Permit Office when there are desired changes in the approved study protocols or methods, changes in the affiliation or status of the principal investigator, or modification of the name of any project member.
5. Revocation - This permit may be terminated for breach of any condition. The permittee may consult with the appropriate NPS Regional Science Advisor to clarify issues resulting in a revoked permit and the potential for reinstatement by the park superintendent or a designee.
6. Collection of specimens (including materials) - No specimens (including materials) may be collected unless authorized on the Scientific Research and Collecting permit.

The general conditions for specimen collections are:
- Collection of archeological materials without a valid Federal Archeology Permit is prohibited.
- Collection of federally listed threatened or endangered species without a valid U.S. Fish and Wildlife Service endangered species permit is prohibited.
- Collection methods shall not attract undue attention or cause unapproved damage, depletion, or disturbance to the environment and other park resources, such as historic sites.
- New specimens must be reported to the NPS annually or more frequently if required by the park issuing the permit. Minimum information for annual reporting includes specimen classification, number of specimens collected, location collected, specimen status (e.g., herbarium sheet, preserved in alcohol/formalin, tanned and mounted, dried and boxed, etc.), and current location.
- Collected specimens that are not consumed in analysis or discarded after scientific analysis remain federal property. The NPS reserves the right to designate the repositories of all specimens removed from the park and to approve or restrict reassignment of specimens from one repository to another. Because specimens are Federal property, they shall not be destroyed or discarded without prior NPS authorization.
- Each specimen (or groups of specimens labeled as a group) that is retained permanently must bear NPS labels and must be accessioned and cataloged in the NPS National Catalog. Unless exempted by additional park-specific stipulations, the permittee will complete the labels and catalog records and will provide accession information. It is the permittee's responsibility to contact the park for cataloging instructions and specimen labels as well as instructions on repository designation for the specimens.
- Collected specimens may be used for scientific or educational purposes only, and shall be dedicated to public benefit and be accessible to the public in accordance with NPS policies and procedures.
- Any specimens collected under this permit, any components of any specimens (including but not limited to natural organisms, enzymes or other bioactive molecules, genetic materials, or seeds), and research results derived from collected specimens are to be used for scientific or educational purposes only, and may not be used for commercial or other revenue-generating purposes unless the permittee has entered into a Cooperative Research And Development Agreement (CRADA) or other approved benefit-sharing agreement with the NPS. The sale of collected research specimens or other unauthorized transfers to third parties is prohibited. Furthermore, if the permittee sells or otherwise transfers collected specimens, any components thereof, or any products or research results developed from such specimens or their components without a CRADA or other approved benefit-sharing agreement with NPS, permittee will pay the NPS a royalty rate of twenty percent (20%) of gross revenue from such sales or other revenues. In addition to such royalty, the NPS may seek other damages to which the NPS may be entitled including but not limited to injunctive relief against the permittee.
7. Reports - The permittee is required to submit an Investigator's Annual Report and copies of final reports, publications, and other materials resulting from the study. Instructions for how and when to submit an annual report will be provided by NPS staff. Park research coordinators will analyze study proposals to determine whether copies of field notes, databases, maps, photos, and/or other materials may also be requested. The permittee is responsible for the content of reports and data provided to the National Park Service.
8. Confidentiality - The permittee agrees to keep the specific location of sensitive park resources confidential. Sensitive resources include threatened species, endangered species, and rare species, archeological sites, caves, fossil sites, minerals, commercially valuable resources, and sacred ceremonial sites.
9. Methods of travel - Travel within the park is restricted to only those methods that are available to the general public unless otherwise specified in additional stipulations associated with this permit.
10. Other permits - The permittee must obtain all other required permit(s) to conduct the specified project.
11. Insurance - If liability insurance is required by the NPS for this project, then documentation must be provided that it has been obtained and is current in all respects before this permit is considered valid.
12. Mechanized equipment - No use of mechanized equipment in designated, proposed, or potential wilderness areas is allowed unless authorized by the superintendent or a designee in additional specific conditions associated with this permit.
13. NPS participation - The permittee should not anticipate assistance from the NPS unless specific arrangements are made and documented in either an additional stipulation attached to this permit or in other separate written agreements.
14. Permanent markers and field equipment - The permittee is required to remove all markers or equipment from the field after the completion of the study or prior to the expiration date of this permit. The superintendent or a designee may modify this requirement through additional park specific conditions that may be attached to this permit. Additional conditions regarding the positioning and identification of markers and field equipment may be issued by staff at individual parks.
15. Access to park and restricted areas - Approval for any activity is contingent on the park being open and staffed for required operations. No entry into restricted areas is allowed unless authorized in additional park specific stipulations attached to this permit.
16. Notification - The permittee is required to contact the park's Research and Collecting Permit Office (or other offices if indicated in the stipulations associated with this permit) prior to initiating any fieldwork authorized by this permit. Ideally this contact should occur at least one week prior to the initial visit to the park.
17. Expiration date - Permits expire on the date listed. Nothing in this permit shall be construed as granting any exclusive research privileges or automatic right to continue, extend, or renew this or any other line of research under new permit(s).
18. Other stipulations - This permit includes by reference all stipulations listed in the application materials or in additional attachments to this permit provided by the superintendent or a designee. Breach of any of the terms of this permit will be grounds for revocation of this permit and denial of future permits.

Recommended by park staff(name and title): RP-C.

Reviewed by Collections Manager:

Yes ____ No X

Approved by park official:

Date Approved: 2/4/19

Title:

Chief, Yellowstone Center for Resources

I Agree To All Conditions And Restrictions Of this Permit As Specified

(Not valid unless signed and dated by the principal investigator)

(Principal investigator's signature) 01.02.19 (Date)

THIS PERMIT AND ATTACHED CONDITIONS AND RESTRICTIONS MUST BE CARRIED AT ALL TIMES WHILE CONDUCTING RESEARCH ACTIVITIES IN THE DESIGNATED PARK(S)

Norges miljø- og biovitenskapelige universitet
Noregs miljø- og biovitskapelege universitet
Norwegian University of Life Sciences

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