

Master's thesis



# Wilderness and human influence in the Hornstrandir Nature Reserve

- A preliminary study of wilderness perceptions

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## **Declaration**

I hereby confirm that I am the sole author of this thesis and it is a product of my own academic research.

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Student's name



# Abstract

The Hornstrandir nature reserve in Westfjords, Iceland is planned to become a Wilderness reserve, an Ib category park as defined by the International Union for Conservation of Nature (IUCN). This study examined the appropriateness of the IUCN category for the reserve, by gathering stakeholder opinions on how much different human impact aspects present on the reserve affect their wilderness experience. The vast majority of the stakeholders considered wilderness experience easily achieved in Hornstrandir, despite the presence of old farmsteads and summer houses. However, concerns were raised over the presence of motorized vehicles, especially low flying aircraft, as well as the growing number of tourists. The introduction of the official IUCN categorization was considered by the stakeholders as an auspicious tool for enforcing control over potentially harmful human influences.

However, the presence of the farmsteads and summerhouses is somewhat in conflict with the category Ib definition. It is recommended that zoning is used, to exclude these most built-in areas from the category assignment. These areas can then be used for the necessary visitor infrastructure, such as campsites and ingress sites for providing instructions for “wilderness-friendly” visiting.



*Dedication*

*To my parents, to my sister and to Jukka, for their unconditional support.*

*Even if they thought I was out of my mind.*





# Foreword

When I originally arrived to Iceland to start the Master's program at the University Centre of the Westfjords, I had a vague impression of Iceland as a kind of ecological paradise, full of clean, untouched wilderness. Already upon arrival I was impressed by the natural environment of the Westfjords but at the same time I was somewhat surprised by the relative ignorance of the Icelandic people regarding nature conservation and sustainability.

During our core courses, the perhaps most discussed topic was the stakeholder interaction. Having formerly studied sociology as a minor subject, I found the dilemma of getting groups of people with different agendas to cooperate extremely interesting. It is also an issue regularly faced by most of us, regardless of profession.

When I took up this topic, suggested to the University Centre by the Icelandic Environmental Agency, I was delighted at the opportunity to study the different stakeholder opinions in the context of an actual, ongoing issue. Additionally, it was an opportunity to get a better sense of how much the Icelanders actually know and feel about preserving of their own wilderness. I was also more than happy to find a way I could give something back to the Westfjords community, from which I have received so much during the past one and half years.

Writing this thesis has taught me much about both human intercommunication and human interaction with nature. I hope it will also give something to its readers.



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# 1 Introduction

The unique nature of Iceland attracts a growing number of international visitors every year (Icelandic Tourist Board, 2009). Yet, like the other first world countries, it is simultaneously battling the dilemma of preserving versus harnessing its wilderness. During the past years, the country has seen significant parts of its wilderness sacrificed to industry (Icelandic Nature Conservation Association, 2002), while in other areas the growing amount of visitors threatens the sustainability of the environment (Ólafsdóttir and Runnström, 2011).

In the Westfjords, the northwestern corner of the country, the Hornstrandir Nature Reserve remains as one of the wilderness sanctuaries of the island. Established in 1975, the reserve is treated as a wilderness area (Umverfisstofnun, 2004), yet its wilderness status is not entirely unequivocal. Inhabited from the 9th century to the 1950s, there are still numerous permanent human constructions around the peninsula, and many of them are used regularly as summer houses (Umverfisstofnun, 2004). This also brings boats, dogs and motorized vehicles to the area. Additionally, the area consists of a fairly narrow peninsula, characterized by bays, hills and wetlands, giving it a relatively long coastline compared to the land size. In human footprint models coastlines are considered as decreasing factors to the examined area's wilderness (Sanderson et al. 2002), as they bring boat traffic and other human influences with them.

At present, the plan of the reserve management is to turn the park officially into a Wilderness area, by the official categorization of the International Union for Conservation of Nature (IUCN) (J. Björnsson, personal communication). The purpose of this thesis is to look into the IUCN definition and examine how well Hornstrandir fits to it, as well as to study how the different stakeholder groups involved with the reserve view its wilderness. To assess and evaluate the potential assignment of this IUCN Category by the Icelandic Government to the Hornstrandir, the study will also look into the different definitions of wilderness, as well as park and wilderness management in general. The current status of Icelandic wilderness and wilderness preservation will also be examined.

This study presents a literature review, as well as a description of the Hornstrandir area, its history and biology. The latter part of the study will present the survey methodology used in this evaluation, the achieved results, and the discussion with suggestions for future research.

## 2 Literature review

Wilderness and wilderness management have been subjects to a substantial amount of scientific studies during the past decades. Many of these studies discuss the human relationship with wilderness, the description of wilderness, and the dilemma of keeping wilderness wild while still allowing people access to it. This section will describe and discuss some notable papers and publications that offer particular insight and relevant information regarding this study.

### 2.1 Defining and preserving wilderness

All issues regarding wilderness and its management begin with the dilemma of defining what exactly does the term ‘wilderness’ include. This is a question that has been debated among scientists throughout decades.

Watson (2004) has discussed the definition of wilderness and the human relationship with the concept. He emphasizes the dilemma of defining the “character” of wilderness, and suggests that it is something that is quite different to different people. He also points out that, partially due to this dilemma, while most parties agree on the importance of wilderness, they are in disagreement over how to protect it. Watson notes that there are notable differences between the two leading definitions of wilderness, the IUCN classification and the U.S. Wilderness Act of 1964. He states that:

*[M]uch of the literature on wilderness, and even terminology within the U.S. Wilderness Act, commonly attempts to define wilderness through a single universal set of purposes, each of which could also be received in many locations besides wilderness, and which may not be received in every area protected as wilderness. (Watson 2004, p. 4)*

Watson also suggests that the very dilemma, even impossibility, of defining wilderness might be the very reason why it is so attractive and appealing to humankind. He insists that we should not even try to define wilderness too precisely, but rather to focus on the human relationship with wilderness. Additionally, Watson notes that as wilderness is difficult to define, so it is also difficult to identify who are the stakeholders in wilderness issues. So,

*who* is wilderness protected for, is just as difficult a question as *what* is protected, or *why* is it protected.

Watson's views seem to be quite "western". He does discuss the attitudes of indigenous people, but fails to acknowledge the fact that especially in the developing countries there quite certainly are people who, instead of being attracted by wilderness for appropriate wilderness recreation opportunities, live in these areas, and often have for millennia, and rely on wilderness resources for their cultural and physical subsistence. His approach is applicable for the Hornstrandir nature reserve, however, as it is a very 'western' area of wilderness, with no indigenous population.

Jones-Walters and Čivić (2004) also discuss the difficulty of defining wilderness through ecological and biodiversity issues, as opposed to the human values. They note the European Parliament resolution calling for increased protection of wilderness areas, passed in February 2009, as the cause for wilderness becoming a policy issue and gaining significantly more visibility in the European agenda. Consequently, a scientific definition was called for.

Jones-Walters and Čivić discuss the lack of clear-cut definition of wilderness, and the fact that wilderness tends to be defined through philosophical values. In their own words, "perceived wilderness defines a state of mind and does not provide a definition of ecological status" (Jones-Walters & Čivić 2004, p. 1). They also state that conservation biology in general has as much to do with values as it has with scientific precision. As an example they compare the IUCN definition of wilderness, "A large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition", with the US Wilderness Act of 1964, defining wilderness as an area "untrammelled by man, where man himself is a visitor who does not remain". The European PAN Parks foundation also has their own definition of wilderness, "An area of at least 10,000 ha of land or sea, which together with its native plant and animal communities and their associated ecosystems, is in an essentially natural state -- those lands that have been least modified by man, they represent the most intact and undisturbed expanses of

Europe's remaining natural landscapes". In addition there are several national definitions of wilderness in Europe.

McDonald (2001) has studied the changes in attitudes towards wilderness in the United States from the beginning of European settlement, using the book *Wilderness and the American Mind* by Roderick Nash. Nash demonstrates how the human attitudes are shaped by events and ideas of history: The American attitude was originally shaped by the European history, where the word 'wilderness' in Teutonic, Norse and Old English referred to the "condition of being lost, confused, or out of control" (p. 4), and where Judeo-Christian mythology presented wilderness primarily as a place of evil and suffering (in the Bible, both the Israeli and Jesus Christ himself were tested by forces of evil in the wilderness). The European settlers saw it as their duty to bring the Godly order to the American wilderness and to the wild savages of the continent.

However, the attitudes in America slowly changed as the frontier moved further and further away from the settlers on the east coast. As first Enlightenment, and then Nationalism, with the American Revolutionary War, arrived, the American wilderness was seen as "bigger and better" than areas on the European continent considered to be wilderness, and the future birthplace of a grand culture. Soon after, the first laments began over the looming disappearance of these wilderness, and from there plans for wilderness preservation were conceived. In the early 1900s at least some of the Americans were ready to set wilderness ahead of human development, as first movements against harmful industrial developments began. In the end, the National Wilderness System was signed into law in September 1964, designating 9 million acres of land as wilderness. However, some of the old arguments against wilderness still gain fresh support, mainly from Western 'pioneer mode' people, working in timbering, mining and ranching. (McDonald 2001, p. 10.)

The development presented by Nash and McDonald is seen all across the western world. The so-called First World cultures see wilderness as a place out of human control, and where a person can become physically and spiritually lost, even return to a savage condition. As development moves us further away from wilderness, it becomes less a threat and more something precious that needs to be preserved.

The papers presented here make it clear that the concept of wilderness is somewhat flexible, even vague, which must be taken into account in related discussion. More specific definitions exist for management purposes, but the responsible governing body must make a clear choice which definition to follow, to avoid confusion and vague regulations.

## **2.2 Managing wilderness and tourists**

Hendee et al. (2005) note that managing wilderness might sound like a paradox to some, as 'management' is often associated by control over nature. Wilderness, in contrast, should be controlled by natural processes. However, wilderness management does not include the stereotypical human control. They summarize wilderness management as following:

*Wilderness management is essentially the management of human use and influence to preserve naturalness and solitude. It includes everything the persons responsible for a wilderness do in administering the area; for example, the formulation of goals and objectives for individual areas and policies, standards, and field actions to achieve them.*

(Hendee et al. 2005, p. 6.)

When wilderness becomes protected by reserves and parks, part of the agenda generally is to allow visitors to spend time in the wilderness, and to gain 'the wilderness experience'. This creates challenges for management, in the form of recreational impacts. Presence of tourists, no matter how regulated, inevitably has some effect on the environment. The dilemma of wilderness management is to find the line between tolerable and intolerable level of impacts. (ibid.)

Leung and Marion (2000) have reviewed a body of literature on the topic written mainly about the United States, focusing on research conducted after 1985. They state that the recreational use of wilderness is constantly growing - a trajectory that might have changed after the year 2000, when the paper was published - and with it, the environmental, economic and social implications. They list the four primary affected resource components as soil, vegetation, wildlife and water, noting that these components are also interrelated, leading to the spreading of impacts across the components. Even localized impact might be harmful in larger scale, for example with firewood usage, disruption of nutrient cycling,



and soil loss. The impact on the components reflect success in meeting the two primary goals of wilderness management: resource protection and providing recreation.

In addition to environmental impacts, Leung and Marion note that the visitor experience can also suffer from the recreational impacts. Visible damage to the environment can degrade the quality of visitor experience, for example by diminishing the 'wilderness experience'. The impacts of one kind of recreational use, such as horseback riding, can also cause stronger reactions in other user groups, which may lead to undesirable friction.

Hendee et al. (2005) note that unlike many recreation areas, the definition of a wilderness area does not allow much engineering or structural solutions for visitor impact management. However, the management is left with a few tools for influencing the visitor impact. The management may restrict numbers of visitors, alter the distribution of use (by redirecting people who may not desire the completely undeveloped conditions), time the use by attempting to avoid sharp peaks in use (by sharing information or by regulations), regulate party sizes, regulate the length of stay, and as probably the most important method, influence the visitor behaviour.

Higham (1998) has studied the physical and social dimensions of wilderness tourism in New Zealand. As the number of tourists in the country is growing, the tourist demands are also shifting. More and more tourists in New Zealand are no longer satisfied with established tourist routes and high profile attractions. Instead, there is a growing demand for possibilities of independent travel and wilderness experiences.

In 1998, New Zealand witnessed approximately 1.5 million annual visitors, which equals to half the resident population of the country, and the growing rate of 8% per annum (Higham 1998, p. 1). Higham claims that the wilderness research in New Zealand is poorly represented, and the country relies on research made in other countries.

Higham also brings up the often discussed issue of 'tourism destroying tourism', overuse causing the landscapes to lose their tourist values. Additionally, in an environment such as the New Zealand wilderness, increasing tourism raises concerns for the safety of the

tourists. Both of these issues require management attention, and that is potentially best provided with the help of local research.

Higham cites several studies from New Zealand and elsewhere, agreeing that the management of wilderness has become a necessity, even if it contradicts the basic idea of wilderness as something untouched and private. He quotes Dubos (1980, p. 138):

*'[W]e have reached a paradoxical situation, that we can save some of the wilderness experience only by introducing into wild areas the ordering and discipline that is becoming increasingly objectionable in civilised life'.*

Higham presents a study on different wilderness tourist demands and preferences. He introduces two ways to classify the visitors. First way divides them into three groups, namely 'back country comfort seekers', 'back country adventurers' and 'remoteness seekers'. This kind of classification gives the possibility to offer each visitor the kind of back country setting that best serves their demands.

The other classification is based on tourist perceptions of wilderness. Via surveys in which the respondents were asked to rate the degree of desirability of certain recreation-related variables in wilderness (such as distances, facilities and flora and fauna present), a wilderness purism scale was created. Consequently, the visitors were classified as 'non-purists', 'neutralists', 'moderate purists', and 'strong purists'. 'Moderate purism' was found to be the most common attitude, with 45% of the sample. The older the visitor, the more likely he or she was to lean towards 'strong purism'. There were also certain national differences, with Japanese visitors falling mostly into the category of 'non-purists', central Europeans into 'moderate purists', and Australians into 'strong purists'.

Combining these two classifications makes it easier for wilderness and tourism management to direct the visitors to appropriate locations. They also indicate what kind of artefactualisms visitors find acceptable in wilderness setting, and how enormously the visitor perceptions of wilderness can differ. With the awareness of international differences, it is also possible to estimate how demand for wilderness experience fluctuates as the international tourism market fluctuates.

Viriden and Brooks (1991) have studied wilderness manager perceptions. Aware of the difficulty of balancing protection and recreation, they measured the degree of the managers' anthropocentric or biocentric orientation. Such philosophical orientation can be expected to affect management decisions in the 'gray areas' that are not fully covered by policies or guidelines.

Viriden and Brooks introduce the anthropocentric and the biocentric orientations as two ends of a continuum. According to their definition, anthropocentric orientation views wilderness from sociological, human-oriented perspective. Wilderness is seen as a resource for human pleasure and benefit, and recreational use is given benefit over preservation. Biocentric orientation in turn emphasizes the preservation and maintenance of natural systems at the expense of human use. Wilderness is seen as having intrinsic value outside human use.

The study of Viriden and Brooks was conducted in the Southwestern Region of the USDA forest service, via personal or telephone interviews. The forty wilderness managers who responded were found to reflect a fairly even split between biocentric and anthropocentric orientations. Most of the managers were found to hold both views, yet, anthropocentric values were identified slightly more often, creating a slight bias towards the anthropocentric end of the continuum. It was found that the more experienced managers were slightly more likely to lean towards the biocentric orientation. The paper notes that it should not be suggested that a manager's personal philosophy is the dominant influence on management practice, as several management aspects are unrelated to manager's philosophical orientation. Things such as experience of payoffs gained from environmental managers was suggested to be one of the motives for manager actions. (p. 82.)

Through these studies, it becomes notable that significant level of reactivity is required from wilderness management, as well as up-to-date information about the demands of both the environment and the tourism industry. The management needs to be able to respond to changes quickly, to avoid significant harm to the wilderness areas. As for the Viriden and Brooks paper, the managers should also be aware of their own motivations, and how they affect their management decisions.

## 2.3 Why wilderness reserves?

One relevant question is ‘are nature reserves an effective way to protect the environment?’ Studies mentioned above have pointed out that wilderness parks might be the only way to preserve the wilderness experience for the future generations. How they should be managed to guarantee effective protection for the biodiversity as well, is another question.

Gaston et al. (2006) have discussed the ecological effectiveness of all types of protected areas - not just wilderness - in the United Kingdom. They point out that protected areas are generally considered to be central to the strategies for conserving biodiversity, and that almost 12% of the global land surface is currently covered by protected areas. However, they note that determining how effective the protected areas are in conserving biodiversity is a vital challenge, and that a surprisingly limited number of studies explicitly addresses this effectiveness.

According to Gaston et al. the ecological effectiveness of protected areas can be “considered in terms of different biodiversity features and at number of different spatial scales” (p. 2). Everything from genes through populations, species and habitats to ecosystems should be considered, as well as their associated processes. Additionally, protected areas must grant the biodiversity buffers from processes threatening its persistence. They further suggest that ecological effectiveness can be considered for the individual protected area, the collection (portfolio) of protected areas, and a functional network of interacting protected areas.

Each ecological effectiveness assessment requires a specific baseline, be it genetic diversity, species composition or population viability. Gaston et al. emphasize that this baseline is not necessarily the targeted state of the protected area, and that conservation policy should not become trapped by past motivations, but look for the most suitable baseline. However, shifting baselines can easily make the study of effectiveness difficult. Recently set baselines yield different results than long-time set. Additionally, changes in biodiversity may happen more slowly inside the protected areas than outside, providing fallacious results in short-term observations.

Finally, Gaston et al. claim that all conservation strategy evaluations should compare with alternatives and situations outside the protected areas. They also note that such comparisons are seldom presented in the scientific literature. They suggest that in the developed countries, where nature is becoming increasingly important, legal protection of specific areas may no longer be necessary and instead may become counterproductive.

In terms of this study, Gaston et al. discuss protected areas on a fairly generic level, making no distinction between different categories of conservation. The issues they present are, however, important for any protected area study. Additionally, they provide material for the Hornstrandir professionals survey, discussed below.

## **2.4 Managing wilderness across territorial and social borders**

The current leading philosophy in all kinds of resource management is collaborative management. Several studies have indicated that this should also be the goal in wilderness management. Lockwood (2009) has noted that the previously dominant top-down management is today contested by all forms of collaborative management options, involving local communities, individual land holders and NGOs. Different variations of governance have been major focus especially since the 2003 IUCN World Parks Congress, and the recognition of different governance types has been incorporated in the IUCN protected area management guidelines (IUCN 2008, 10). Lockwood discusses the association and distinction between governance and management, listing the powers, authorities and responsibilities exercised by both organizations and individuals under the former, and resources, plans and actions that are a product of applied governance under the latter. According to him, the strong association between these two means that good governance is an absolute prerequisite for effective management, and a framework for the assessment of governance should relate to the effectiveness of management.

Lockwood also discusses the meaning of ‘good governance’; particularly what it means in terms of ethics, morality and rationality. He lists the good governance principles as legitimacy, transparency, accountability, inclusiveness, fairness, connectivity and

resilience. Governance that utilizes all seven can be expected to achieve quality governance and consequently quality management. Additionally, the governance must take into account what is happening outside the borders of the protected area, to account for the connections to the surrounding environment and its use.

In terms of legitimacy, Lockwood emphasizes that the acceptance and justification of shared rule should come not only from law or democratic mandate, but it should also be earned through the acceptance of stakeholders. Earned legitimacy adds important support to the legitimacy acquired through democratic processes. This can happen through efforts at leadership, effectiveness, or through having a long-standing connection to the protected area.

Regarding the next three, transparency is mainly a matter of ethics. Lockwood states that stakeholders have right to know about decisions affecting them. All decisions should be available to them. Accountability is fairly self-explanatory, but Lockwood notes that decentralized governance might weaken accountability with opaque and ill-defined responsibilities. Inclusiveness refers to both giving all stakeholders opportunities to meaningfully participate, and governments actively seeking for input from all sources. Lockwood emphasizes the need to place additional emphasis on keeping the marginalized and disadvantaged stakeholders involved.

Fairness refers also to the stakeholder treatment. According to Lockwood:

*Treating stakeholders with respect and supporting their dignity is both a moral obligation and rational strategy for gaining wide acceptance and support. -- Fair governance requires that an authority gives genuine regard to all rights and moral duties, makes every attempt to satisfy all claims, and where this is impossible seeks ways to compensate for any disadvantage caused. (2009, p. 8.)*

Connectivity is one of the vital aspects of sustainable management, as most management issues are interdependent. The governance and management must coordinate both between and within different levels of governance, as well as other actors relating to the protected area. According to Lockwood, this is best done by implementing both long-term vision and short- and medium-term objectives.

Resilience refers to the management's ability to withstand challenges and threats. This, according to Lockwood, requires a good balance between flexibility and security. One important issue is to acknowledge that our understanding of socio-ecological systems will always be incomplete. Consequently, the management needs to be open to new information, and ready to change their views, should conditions so require.

Lockwood's above mentioned points are relevant for any management discussion, but most relevant for this study are the stakeholder views. Hornstrandir Nature Reserve hosts tourists as well as summertime residents, scientist and other workers, and, consistent with the points raised by Lockwood, an attempt was made to seek out the views and perceptions of all stakeholders in this area.

Schaller's (2010) thesis discusses stakeholder involvement in protected area management in Iceland and Japan. Having interviewed respondents about wilderness and protected area related issues, he concludes that the Icelandic people consider that consensus in Protected Area management "ought to be based within the local community directly affected by the decision-making" (Schaller 2010, p. 79), and that the participants of the study value communication as a tool in achieving better understanding among stakeholders, especially in conflict situations. Schaller discusses the use of communication as the tool to use in moving from conflict to consensus, as opposed to legislation and regulation. Additionally, he notes the importance of taking stakeholder information, behaviour and emotion into account in conflict solving.

Schaller also notes that some of his Icelandic interviewees express concern about the low information flow from the (Vatnajökull) national park management, making them concerned about both existing and potential future conflicts. He implies that proper sharing of information would reduce the unnecessary worries of the stakeholders. He also notes that the stakeholders express an obvious wish to be able to express their visions and feelings about the management of protected areas, and that they would like to be acknowledged in decision-making process. Schaller concludes with suggesting the formation of an advisory board, consisting of several different stakeholder groups, to be afforded the opportunity to make suggestions to the management.

Jones-Walters and Čivić (2004) discuss the developing pan-European approach to wilderness conservation. Following the European Parliament resolution calling for increased protection of wilderness areas, passed in February 2009, a conference on wilderness developed a publication emphasizing the need for a pan-European approach towards wilderness management (Jones-Walters and Čivić 2004, 339). This included, among other things, the need for clearer definition of wilderness, as well as the need for internationally co-ordinated protection, compilation of wilderness and wild area registry, and the increase of legal protection for wilderness qualities.

Even if one of the defining features of Iceland, especially Hornstrandir, is its remoteness and the fact that it is cut off from both continents around it, one cannot completely ignore the international wilderness protection. Developing pan-European wilderness protection is only going to help Iceland, especially as the country is undergoing the process of joining the European Union. The protection agenda needs to be consistent across the continent, including even the most remote corners like Iceland.

Lupp et al. (2011) also have European perspective in their discussion of wilderness protection. They note that wilderness legislation comparable to the US Wilderness Act is lacking from the Central European countries. Additionally, there are very few sizable areas left in Central Europe that would fulfill the American standards. In Central Europe, most of the land has been under intensive use for millennia. Consequently, the title of 'wilderness' is most often given to areas fallen out of (mostly agricultural) use, because of infertile soil or other such reasons. As a conservational strategy, wilderness is a fairly new concept.

Lupp et al. introduce some of the attempts to give a definition to European wilderness. Some have been influenced by the US Wilderness Act, such as the Italian definition of wilderness as an area with no roads, infrastructure or mechanized use of the land. Characterizing wilderness according to area size has also been proposed, such as Diemer et al. (2003), who suggested National Parks for over 1000 ha, Urban Wilderness to under 1000 close to cities, Urban or Rural Rewilding Sites for under 500 ha and Rewilding Microcosms for 'several ha'. This kind of classification takes into account the difference between abandoned urban/agricultural land and 'authentic' wilderness. Other authors have



made differences between area types such as ‘artificial wilderness’, ‘temporary wilderness’ and ‘wilderling’ (Scherzinger 1996, cf Lupp et al. 2011, p. 4).

To map the layperson’s view on wilderness, a visitor study was carried out in the Müritz National Park, Germany, where a number of areas remain without direct human impact, and a number are under reforestation. Visitors were asked to define wilderness as a general concept, and to state whether they consider it a positive, negative, or ambivalent attribute. They were also asked whether they considered Müritz to be a wilderness area. 87% of the interviewees considered wilderness to be a positive thing. They most commonly defined wilderness as “no human intervention”, “untouched” and “rich in wildlife”. 58% considered Müritz to be wilderness, 37% said no, and 3% ‘not yet’. “Too much human interference” was the most common reason given for Müritz not being wilderness, followed by “too many people visible” and “too much infrastructure”.

Lupp et al. point out that in Central Europe, the term ‘wilderness’ is used in park management mostly to indicate that areas are allowed to develop unhindered. As many of these areas are former agricultural or otherwise used lands, the landscape and biodiversity have changed, sometimes radically, from what the area was before human interference. The areas may be dominated by non-native species, and the habitats may also be disturbed to the point where native species can no longer thrive.

The study shows that even areas that have previously been heavily disturbed by humans can provide at least a partial wilderness experience, as well as solitude. However, Lupp et al. suggest careful use of the term wilderness, to avoid both misunderstandings and visitor disappointment.

Hornstrandir is vastly different from the Central European Parks in terms of the extent of human interference. At a smaller scale, however, Hornstrandir has also seen the abandonment of agricultural areas, leaving little less than the houses standing. The question of how much these remnants of human influence affect the visitors’ wilderness experience is the main focus of this study.

Bastmeijer (2008) discusses the protection of polar wilderness, noting that the polar regions are considered both as regions with relatively much wilderness left, and as regions facing relatively fast-growing human pressure (oil and gas exploration, fisheries and tourism as examples). According to him, biodiversity conservation, hand in hand with sustainable development became important pillars for international Arctic cooperation, already before the establishment of the Arctic Council. He cites the Arctic Environmental Protection Strategy of 1991, the basis of much of the Council's work, as:

*The eight Arctic countries will each seek to develop more effective laws, regulations and practices for the conservation of Arctic flora and fauna, their diversity, and their habitats in close cooperation with Arctic indigenous peoples. (Arctic Environmental Protection Strategy, Rovaniemi, June 1991, as cited in Bastmeijer 2008, p. 10.)*

And the Declaration on the Establishment of the Arctic Council, adopted 1996, as:

*Affirming our commitment to sustainable development in the Arctic region, including economic and social development, improved health conditions and cultural well-being; Affirming concurrently our commitment to the protection of the Arctic environment, including the health of Arctic ecosystems, maintenance of biodiversity in the Arctic region and conservation and sustainable use of natural resources; (41 Declaration on the Establishment of the Arctic Council, Ottawa, September 19, 1996, as cited in Bastmeijer 2008, p. 10.)*

However, Bastmeijer notes that the Arctic Council itself rarely uses the term 'wilderness'. Wilderness protection is not an explicit policy aim of the Council, but has become such in the national policies of several Arctic states. Among those is Iceland, with its Nature Conservation Act of 1999.

It appears that stakeholder involvement is considered important in contemporary resource management. Not only is it the ethical way to manage Nature Reserves, but it can also be a tool to avoid unnecessary conflict. Another tool considered valuable in today's management discussion is cross-border management and management conventions. International coordination and terminology in wilderness management would, among other things, help to avoid confusion and misunderstandings.

## **2.5 IUCN categories - a much-needed international language for wilderness management?**

International Union for Conservation of Nature first introduced its six Protected Area Management Categories in 1994. The intention was to provide a common language and avoid confusion in protected area discussion within and across borders. As the use of the categories broadened considerably after 1994, the guidelines were reviewed and revised in 2008. (IUCN, 2008.)

### **2.5.1 General category guidelines**

The IUCN categorization acknowledges the vast range of protected areas and protected area management approaches. Different measures are needed in different situations, but some kind of common terminology is required for cross-borders discussion. This is considered especially important in the modern world, as reserve management is becoming more and more multilateral, involving different stakeholder groups. (IUCN, 2008.)

IUCN defines a ‘protected area’ as the following:

*A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. (IUCN 2008, p. 8.)*

IUCN divides the protected areas into six categories:

- I      Strict protection
  - Ia) Strict nature reserve
  - Ib) Wilderness area
- II     Ecosystem conservation and protection (i.e. National park)
- III    Conservation of natural features (i.e. Natural monument)
- IV    Conservation through active management (i.e. Habitat/species management area)

V Landscape/seascape conservation and recreation (i.e. Protected landscape/seascape)

VI Sustainable use of natural resources (i.e. Managed resource protected area)

Notable in the categorization is that its basis is the management objective, it is not supposed to be a commentary on management effectiveness. (IUCN 2008, p. 4.) IUCN lists as the most important purposes of the categorization the following:

*“Facilitating planning of protected areas and protected area systems*

- To provide a tool for planning protected area systems and wider bioregional or ecoregional conservation planning exercises;
- To encourage governments and other owners or managers
- of protected areas to develop systems of protected areas with a range of management objectives tailored to national and local circumstances;
- To give recognition to different management arrangements and governance types.

*Improving information management about protected areas*

- To provide international standards to help global and regional data collection and reporting on conservation efforts, to facilitate comparisons between countries and to set a framework for global and regional assessments;
- To provide a framework for the collection, handling and dissemination of data about protected areas;
- To improve communication and understanding between all those engaged in conservation;
- To reduce the confusion that has arisen from the adoption of many different terms to describe the same kinds of protected areas in different parts of the world.

*Helping to regulate activities in protected areas*

- To use the categories as guidelines on a national or international level to help regulate activities e.g., by prescribing certain activities in some categories in accordance with the management objectives of the protected area.” (IUCN 2008, p. 6.)

As purposes that are becoming common, and that are supported and advised by IUCN, are listed the following:

- “To provide the basis for legislation – a growing number of countries are using the IUCN categories as a or the basis for categorizing protected areas under law;
- To set budgets – some countries base scales of annual budgets for protected areas on their category;
- To use the categories as a tool for advocacy – NGOs are using categories as a campaign tool to promote conservation objectives and appropriate levels of human use activities;
- To interpret or clarify land tenure and governance – some indigenous and local communities are using the categories as a tool to help to establish management systems such as indigenous reserves;
- To provide tools to help plan systems of protected areas with a range of management objectives and governance types.” (IUCN 2008, p. 6.)

And to assure that the categories are used beneficially and ethically, IUCN lists the following as purposes it officially opposes:

- “To use the categories as an excuse for expelling people from their traditional lands;
- To change categories to downgrade protection of the environment;
- To use the categories to argue for environmentally insensitive development in protected areas.” (IUCN 2008, p. 6.)

### **2.5.3 Category 1b: Wilderness area**

The category Ib is primarily defined as following:

*Category Ib protected areas are usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.*  
(IUCN 2008, p. 14.)

The primary objective of the category is to protect the long-term integrity of areas undisturbed by significant human activity. These areas are free of modern infrastructures, and dominated by natural processes. The intention is to preserve such areas to future generations. Other objectives include making the area available to public in a manner that preserves the wilderness qualities, enable the traditional lifestyle of indigenous

communities, to protect the relevant values of both indigenous and non-indigenous populations, and to allow low-impact educational and scientific activities in necessary. (IUCN, 2008, p. 14.)

IUCN lists the following as the distinguishing features of category Ib:

“The area should generally:

- Be free of modern infrastructure, development and industrial extractive activity, including but not limited to roads, pipelines, power lines, cellphone towers, oil and gas platforms, offshore liquefied natural gas terminals, other permanent structures, mining, hydropower development, oil and gas extraction, agriculture including intensive live- stock grazing, commercial fishing, low-flying aircraft etc., preferably with highly restricted or no motorized access.
- Be characterized by a high degree of intactness: containing a large percentage of the original extent of the ecosystem, complete or near-complete native faunal and floral assemblages, retaining intact predator-prey systems, and including large mammals.
- Be of sufficient size to protect biodiversity; to maintain ecological processes and ecosystem services; to maintain ecological refugia; to buffer against the impacts of climate change; and to maintain evolutionary processes.
- Offer outstanding opportunities for solitude, enjoyed once the area has been reached, by simple, quiet and non- intrusive means of travel (i.e., non-motorized or highly regulated motorized access where strictly necessary and consistent with the biological objectives listed above).
- Be free of inappropriate or excessive human use or presence, which will decrease wilderness values and ultimately prevent an area from meeting the biological and cultural criteria listed above. However, human presence should not be the determining factor in deciding whether to establish a category Ib area. The key objectives are biological intactness and the absence of permanent infrastructure, extractive industries, agriculture, motorized use, and other indicators of modern or lasting technology.

However, in addition they can include:

- Somewhat disturbed areas that are capable of restoration to a wilderness state, and smaller areas that might be expanded or could play an important role in a larger wilderness protection strategy as part of a system of protected areas that includes wilderness, if the management objectives for those somewhat disturbed or smaller areas are otherwise consistent with the objectives set out above.” (IUCN 2008, p. 14-15.)

#### **2.5.4 IUCN category criticism**

Despite its good intentions and relatively wide usage, the IUCN categorization system has not fully escaped criticism. Leroux et al. (2010) have discussed whether or not the IUCN categories actually match the conditions in the current assignments. They used the Sanderson et al.’s (2002) Human Footprint scale to determine whether the IUCN categories are interpreted consistently across the world, or whether the mean Human Footprint of protected areas differ significantly among the categories.

They discovered that the protected areas with low mean Human Footprint are generally found in regions with low human population density, such as the boreal region. They also discovered that the category 1a actually has higher mean human footprint than the categories 1b or III. In conclusion, the existing designations do not correspond to their expected degrees of naturalness. Apparently the categories are not interpreted consistently across the globe. This also indicates that the global protected areas network lacks large, strictly protected areas with high degree of intactness.

Leroux et al. point out that the IUCN categories may not be applied according to the official guidelines, as the category designation is administered either by local or national governments, not by any standardized central body. The protected areas may also be designated based on intended future use, not present condition. They admit that in this case, differences in the timing of establishment among the categories might account for some of the observed variation. Additionally, if the areas have originally been assigned according to intended future use, they may not in the end have been managed according to the original intended objectives. (p. 614.)

Leroux et al. bring up relevant questions for this study. They emphasize the need for careful evaluation of the area before the category designation. They also point out the relative ease of gaining a low mean Human Footprint in an area with low human population density, such as the Hornstrandir nature reserve. It is also worth noting that according to their study, the category 1b is in fact the one with the smallest mean Human Footprint in a global scale, perhaps together with the category III.

Fitzsimons and Wescott (2004) present another kind of evaluation and criticism of the IUCN categorization, with emphasis on the situation in Australia. They discuss the need for a functional and comprehensive classification system, for informed, accurate and coherent management decisions. Having a broad and all encompassing categorization for protected lands also allows comparison of different protection categories and mechanisms around the world.

Fitzsimons and Wescott introduce the IUCN Protected Area categorization as a response to the growing number and type of protected areas. They also briefly introduce the history of the categorization, as it has gone through several changes to better respond to the changing world of protected areas. They point out that at least in theory the protected areas are designated to the categories according to management aims, not legal titles. A 'national park', for example, may be categorized as III Natural Monument, instead of II National Park.

The IUCN guidelines have been adopted in Australia, which has to compare more than 40 different terrestrial and 11 different marine protected area categories across the federation. However, Fitzsimons and Wescott point out that the categories have been applied inconsistently, as the application is up to the jurisdictions. Additionally, in Australia a significant amount of conservation lands are private, and assigning IUCN categories to private protected lands has until recently been uncommon.

Fitzsimons and Wescott criticize the IUCN categorization system of inconsistency, and suggest that a broader classification system is needed. They want that system to be based on the IUCN category principles, but to be broader to account for the variety of different area types and private protection mechanisms. Their proposition places more emphasis on



tenure and/or management land and protection mechanism than the IUCN categorization. Similarly to IUCN, their proposition uses the intent of management as the key, not the actual reality of management.

Fitzsimons and Wescott discuss primarily the issues in Australia, but although the distance could hardly be greater, the issues are not so different from those in Iceland. The presence of a broad categorization is important also in a small Nordic country. The purpose of this study is not to focus on IUCN criticism, but it is important to be aware also of the potential weaknesses of the studied system.

## **2.6 Wilderness in Iceland**

In 2001, the Icelandic Ministry for the Environment and The Icelandic Institute of Natural History (IINH) published their National Report to the Convention on Biological Diversity, under the title *Biological Diversity in Iceland*. The report described the unique characteristics of the Icelandic nature, as well as the policies and responsibilities designed to protect that nature. In this chapter a brief overview of the report will be provided, insofar as it has to do with Icelandic wilderness and Hornstrandir. This chapter will also look into relevant parts of the Icelandic Ministry for the Environment's National Strategy for Sustainable Development.

### **2.6.1 An overview on Icelandic nature**

This section provides a summary of the comprehensive overview of the Icelandic nature provided in Icelandic Ministry for the Environment and IINH (2001, p 5-20).

One of the main notable things about Iceland's nature is that as the country is isolated from other landmasses (290 km from Greenland, 970 km from Norway), it is difficult to flora and fauna to disperse to the island. The island consists of mountainous inland, surrounded by coastal lowlands, valleys and fjords. Geologically young, the island is still constantly changing.

Around 60,000 km<sup>2</sup>, almost two-thirds of the surface of the island, has sparse vegetation. 11,000 km<sup>2</sup> is covered by glaciers and 6,000 km<sup>2</sup> by rivers and lakes, most of which are small. A quarter of the island surface, or 26,000 km<sup>2</sup>, is covered by continuous vegetation. Out of that, 16,000 km<sup>2</sup> is dry-land vegetation and 10,000 km<sup>2</sup> wetlands. 25,000 km<sup>2</sup> is covered by arable land, partly vegetated and partly barren, and only 1,000 km<sup>2</sup> is covered by the remnants of the old woodlands.

The clearing of the woodlands, starting from the early settlement years 1,100 years ago, as well as the sheep overgrazing, has brought serious soil erosion problem to Iceland. The Icelandic Soil Conservation Service was founded in 1907, and has since succeeded in

halting, even reversing erosion in some of the most affected areas. 30-40% of the country and approximately 3,200 km<sup>2</sup> of vegetated land still remain under severe threat by erosion.

Iceland is the most sparsely populated country in Europe, with 2.6 inhabitants per km<sup>2</sup> and more than half of the nation living in the capital area. In addition, about four-fifths of the island is uninhabited, and urban settlement in fact covers only 0.07 % of the total land area. In comparison, farming, which in Iceland mainly means animal husbandry, covers 79% of the total land area. The amount of national parks, reserves and national areas has gone up from 533 km<sup>2</sup> in 1970 to approximately 2 000 000 ha in 2009 (European Environment Agency, 2011).

In terms of flora, there are 485 native and naturalized species in Iceland (European Environment Agency, 2011), as well as a number of species deliberately introduced for agricultural and soil conservation purposes. There are very few vascular species, but a significant amount of lichens and other bryophytes. The rocky coastlines host a luxuriant vegetation of algae. There are a few native trees, including birch (*Betula pubescens*), rowan (*Sorbus aucuparia*) and willow (*Salix phylicifolia*).

There is only one indigenous terrestrial mammal in Iceland, namely the arctic fox (*Alopex lagopus*), that presumably arrived to the island towards the end of the last Ice Age. Despite having been hunted throughout the human inhabitation, and having suffered significant fluctuations in the past 140 years, the arctic fox population is still fairly viable with around 3,000-6,000 individuals. Currently the most serious threat to the species is interbreeding with escapee blue foxes and silver foxes, that have been imported for farming.

In addition to the arctic fox, the island hosts the American mink (*Mustela vison*), which was imported in the early 1930s for fur farming. Escapees have since bred in the wild, establishing a population of some 10,000 individuals, and spreading throughout the country. The reindeer (*Rangifer tarandus*) was brought from Norway during the late 1700s. Out of three groups brought, one went extinct fairly soon, whereas three grew in size until they became regarded as a nuisance species and were then hunted into the brink of extinction. One of these herds went to extinction in the late 1920s, and the remaining two merged into

one herd, that began to grow in numbers again in 1940s. Today the population is kept around 2,000-2,500 individuals by annual hunting quotas.

Several species of rodents have also found their way to Iceland, with the wood mouse (*Apodemus sylvaticus*) believed to be the among the first wild mammals brought to the island. It lives independently of humans, unlike the house mouse (*Mus musculus*), brown rat (*Rattus norvegicus*) and roof rat (*Rattus rattus*), that live in commensal relationships, completely depending on humans for survival.

There are 75 bird species nesting regularly in Iceland (European Environment Agency, 2011), with around 20 additional species having nested on one or more occasions, and some of them currently establishing themselves in the country. Some of the most renowned species are the gyrfalcon (*Falco rusticolus*), the threatened white-tailed eagle (*Haliaeetus albicilla*), and the puffin (*Fratecula arctica*). Unsurprisingly, one of the most important elements of the island's bird fauna is the seabirds. Many of Iceland's seabird populations represent substantial parts of world populations of their species. Many of these populations inhabit Iceland's towering bird-cliffs. The three largest bird-cliffs, Látrabjarg, Hælavíkurbjarg, and Hornbjarg, are all in the Westfords - Hælavíkurbjarg and Hornbjarg both in Hornstrandir - and are among the largest seabird-cliffs in the North Atlantic.

There are five native fresh water fish in Iceland, namely the Atlantic salmon (*Salmo salar*), brown trout (*Salmo trutta*), the arctic char (*Salvelinus alpinus*), the three-spined stickleback (*Gasterosteus aculeatus*) and the European eel (*Anguilla anguilla*). In addition to these, the rainbow trout (*Oncorhynchus myskiss*) has escaped to the wild from hatcheries.

Iceland hosts approximately 1,290 species of insects (European Environment Agency, 2011), mainly of the Diptera group. The island is entirely lacking free-living ants, but has numerous species of Coleoptera, Hymenoptera, and Acari, but only a few Araneae and Lepidoptera (moths). Mollusca, Oligochaeta, Chilopoda and Diplopoda are poorly represented.

The ocean waters around Iceland have significant mixing of warm and cold water masses. This brings abundance of marine life, that has significant seasonal changes. The marine invertebrate fauna is rich and productive for the northern latitudes, with several significant subgroups from jellyfishes and sand worms to sea urchins and sponges. About 270 fish species have been found within Icelandic jurisdiction, and 150 are known to spawn. Cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), redfish (*Sebastes marinus* and *Sebastes mentella*) and plaice (*Pleuronectes platessa*) are among the most common. Several species whales and two species of seals (common and grey) are also known to habit the area. Some of the most renowned whale species include the sperm whale (*Physeter catodon*), killer whale (*Orcinus orca*) and blue whale (*Balaenoptera musculus*).

### **2.6.2 Nature conservation in Iceland**

The following section provides a summary of the comprehensive overview of the Icelandic nature conservation provided in Icelandic Ministry for the Environment and IINH (2001, p 21-32).

While the amount of land covered by protected areas and reserves has been growing in Iceland, the focus of protection has shifted from protection of areas to protection of species, habitats and ecosystems. Much emphasis is placed on conserving soil and vegetation from erosion and overgrazing. Unfortunately, this has also led to negative consequences, such as the introduction of Nootka lupin (*Lupinus nootkatensis*) to control erosion, and its consequential uncontrollable and invasive spread. Hunting and fishing are controlled with yearly quotas and area- and species-specific restrictions.

Natural wilderness areas have become especially important for the growing recreational tourism industry. Another growing field is biotechnology, and Icelandic fish and thermophilic bacteria are being studied for natural products production.

The responsible institution for nature conservation is the Ministry for the Environment. Under the auspices of the Ministry are The Environment Agency of Iceland, Icelandic Fire Authority, Icelandic Institute of Natural History, Lake Myvatn Research Station, Meteorological Office, National Land Survey of Iceland, Planning Agency, Stefanson

Arctic Institute, The Recycling Fund of Iceland, Soil Conservation Service of Iceland , and the Iceland Forest Service (Ministry for the Environment, 2012). The Ministry of Agriculture is responsible for land management in context of agricultural purposes, as well as combat against erosion and deforestation. The Ministry of Fisheries is responsible for fisheries and the commercial marine stocks. The Ministry of Industry is responsible for energy research and utilisation issues.

Terrestrial nature and biodiversity conservation is primarily dependent on the Act on Nature Conservation, last amended on the year 2011, including the establishment of protected areas. The latest amendment requires the Minister for the Environment to submit and update a Nature Conservation Strategy, emphasizing biodiversity preservation through, among other things, a better system of protected areas.

*Welfare for the Future: Iceland's National Strategy for Sustainable Development 2010-2013* lists the Icelandic Government's goals for sustainable development. As wilderness conservation strategies are listed, among others:

- “Large areas of wilderness should remain untouched in uninhabited areas of Iceland;
- Man-made structures should preferably be built outside of defined wilderness areas. When this is not deemed possible, care should be taken that the structures cause minimal damage and minimal visual effect;
- In reviewing the Nature Conservation Strategy, particular emphasis will be given to protection of landscape and the reinforcement of provisions pertaining to planning and development. Emphasis will be placed on protecting landscape and land areas, with particular focus on protection of culturally significant landscape.” (p. 23)

As strategies for “outdoor activities in harmony with nature” the publication lists, among others:

- “The public’s right to free access to common land should not be restricted, unless it is vitally necessary for the purposes of nature conservation;
- The growth in tourism in Iceland should be further encouraged, and accompanied by preventive measures to protect nature from damage caused by increased traffic;
- The grounds for imposing a tourism-related environmental levy will be investigated. Such a levy would be used to fund the measures necessary to reinforce land protection

and to improve walkways, signage, and other facilities at popular destinations of natural beauty and in sensitive areas;

- Research and further development of methodologies to determine the carrying capacity of tourist sites will be supported, and attempts will be made to assess systematically which sites are in greatest danger due to traffic and require special measures.” (p. 18)

To protect the Icelandic biota, the following strategies (among others) are listed:

- “Work will be done on the implementation of the Nature Conservation Strategy for 2009-2013, which focuses in particular on the protection of vegetated areas and habitats in the highlands and the protection of rare species of vascular plants, mosses, and lichens. Further work will also be done to protect areas not covered in the previous strategy and to aim at protecting important bird habitats;
- The Nature Conservation Act will be reviewed so as, among other things, to strengthen conservation provisions, ensure public rights, and promote nature conservation in coastal areas and the sea.” (p. 21)

### **2.6.3 Icelandic wilderness and nature-based tourism**

Ólafsdóttir and Runnström (2011) evaluate the pristine condition of Icelandic wilderness with respect to nature-based tourism. Noting that the definition of ‘wilderness’ has changed throughout the years, they lean mainly on the official definition of wilderness used in Iceland, from Article 3, Section 4 of the 1999 Nature Conservation Act (No. 44, 22 March, 1999). This definition describes wilderness as an area of land:

- where no trace of human activity is to be found and the natural landscape develops without any pressure related to human influences;
- that is situated at a distance of at least 5 km from human structures and other infrastructure, such as roads, houses, power lines, telecommunication masts, dams etc.;
- that is at least 25 km<sup>2</sup> in size, or such that one can enjoy solitude and the natural landscape without disturbance from human structures or traffic resulting from mechanized vehicles (Ólafsdóttir and Runnström 2011, p. 281-282).

They note that The Environment Agency of Iceland proposed a wilderness map, to some extent including areas that may or may not be actually designated under the Act, which is used when official representations of Icelandic wilderness are made. The proposition calculated the 5 km proximity zones around major roads, but completely ignored other anthropogenic structures. Additionally, the map shows protected areas as completely free of both roads and other anthropogenic structures, thus creating a false impression of pristine wilderness within these areas. (Ólafsdóttir and Runnström 2011, p. 282.) All in all, they claim that the Icelandic government is not keeping up with its own strategies.

The study notes that the tourism in Iceland is growing rapidly (from around 4,000 foreign visitors in 1950 to 502,000 in 2008), and that the absence of anthropogenic features is the main attraction of Iceland to foreign visitors. The Iceland Tourist Board's study in 2004 and 2005 found that over 90% of tourists name the natural landscape as their major motivating factor to visit Iceland. Yet as both the increasing tourism and the power plant constructions that have been expanding since 1970s make the interior highlands more accessible, they are also diminishing the extent of the pristine wilderness the tourism industry is so dependent on. The study states that Iceland is in urgent need for comprehensive assessment of the wilderness resources, to control the conflicts that are bound to rise between different stakeholders and different types of tourists.

Ólafsdóttir and Runnström did a GIS analysis of remoteness from access (categorizing the roads to major road, collector roads, country roads and highland roads), remoteness from settlements (categorizing the human facilities into urban nuclei, industrial and service facilities, and farms of single houses), and apparent naturalness, referring to the degree to which the landscape is free from "permanent anthropogenic structures of the modern era" (Ólafsdóttir and Runnström 2011, p. 287), as well as roads and permanent settlements. They also assessed the effect of topographical differences, such as elevation variations hiding the anthropogenic structures from view.

Ólafsdóttir and Runnström conclude with the notion that the Icelandic 'unspoiled wilderness' is decreasing rapidly, and the fact is already been noted by some visitors. They conclude that around 30% of the total land area of the country still counts as wilderness. At



the moment Iceland can still offer “the full variety of the whole recreational opportunity spectrum, from primitive and pristine to luxury urban” (Ólafsdóttir and Runnström 2011, p. 295), but rapid planning and management actions are needed to make sure that enough of the pristine wilderness is preserved.

The thesis of Taylor (2011) presents a further GIS study, comparing maps of Iceland from 1936 to 2010. She uses the definition of wilderness from the Nature Conservation Act of 1999, using the 5 km buffer zones. She concludes that areas free of roads and main power lines have decreased by 68% from 1936 to 2010, in other words the from 71% of the surface area of the country to 23%. The fastest rate of decrease occurs after the year 2001. She also notes that today 88% of the remaining wilderness are covered by glaciers. As the Icelandic glaciers are currently retreating at the speed of 0.3% per year, it remains to be seen what happens to the former glacial areas in the future.

Taylor notes also that as more and more areas are broken up by roads and power lines, large wilderness areas are turned into multiple smaller areas. Since 1936, there has been a 35% increase in areas the size of 26-100 km<sup>2</sup>, but 71% decrease in areas greater than 200 km<sup>2</sup>. According to Taylor’s study, the second largest remaining area after the central highlands is in the Westfjords, covering Hornstrandir and a continuous area to the south, as well as smaller areas on the Westfjords mountains. In this area, very little change has occurred after 1960, in comparison to the rest of the country.

Taylor concludes with the notion that if the decrease of wilderness areas continues at the current speed, it is possible that wilderness as defined in the Nature Conservation Act of 1999 will disappear from Iceland by 2032. She also notes that even if the areas are preserved for tourism, the pressure on the environment, as well as basic tourism infrastructure, can lead to degradation of the wilderness areas.

To conclude, the Icelandic environment is very unique, and somewhat delicate due to short growing season, harsh winters and erosion. The cliffs of the northwest Iceland are vital for several seabird species. The Icelandic conservation strategy is developing, at least on the theoretical level, yet it would seem that urgent practical measures are required to preserve the pristine wilderness of the island.

## 3 Hornstrandir

### 3.1 Settlement history



*Figure 1. Hornstrandir on map (Mappery 2011, Retrieved from <http://mappery.com/Hornstrandir-Topo-Map>)*

Hornstrandir Nature Reserve encompasses an area of roughly 58.000 ha in the northernmost part of the Westfjords peninsula (Óladóttir, n.d.). Bordering the Skorarheiði moor between Hrafnfjörður and Furufjörður, it covers the Hornstrandir region and parts of Jökulfirðir fjords and the district of Grunnvíkurhreppur (Umverfisstofnun, 2004). It was the last area in Iceland to be settled, with first inhabitants arriving in the 9th century. The area attracted settlers with large and easily accessible fish populations, and later also with easy access to driftwood and nesting seabird colonies (Óladóttir, n.d.; J. Björnsson, personal communication, October 20, 2011).

Through the centuries, the small farms - usually around 5-10 sheep and a cow - survived on subsistence farming and small boat fishing. Unimproved grassland and wetland were used for haymaking. Hornstrandir was never an easy place to farm, as the growing season is short. This also set limits to the amount of livestock, as the vegetation takes a long time

to regrow after grazing. Additionally, travel in the area is difficult especially during winter. The peninsula itself is only accessible by boat. Throughout the settlement era, the polar ice sometimes reached the fjords of Hornstrandir, making fishing impossible. The area was used by outlaws to board foreign ships and leave Iceland, and ice rafts sometimes brought polar bears from the arctic. (Óladóttir, n.d.; Umverfisstofnun, 2004; J. Björnsson, personal communication, October 18 and 20, 2011)

Due to social changes, the farms were finally abandoned during and after World War II, with the last permanent inhabitants moving away in the 1950's. Today, large part of the area is still under private ownership, used for summer residence. The landowners are still entitled to some of the traditional utilizations, including fishing and egg gathering. The summer houses include both old and renovated farmsteads, and new cottages. (Óladóttir, n.d.; Umverfisstofnun, 2004.)

## **3.2 Flora and Fauna**

Unlike most of the rest of Iceland, the region is now completely preserved against grazing. Around 260 species of flowering plants and ferns grow within the Nature Reserve, most of them common across the Westfjords area. The growing season is intense but short, continuous growth only reaches the altitude of 300-400 metres, and the land is partially covered by snow throughout the summer. The growing season is activated by light, not by temperature, which makes the vegetation less vulnerable against cold springs. This may, however, become a disadvantage if the global warming makes Hornstrandir a viable habitat for new species, that are activated by temperature. (Óladóttir, n.d.; Umverfisstofnun, 2004; J. Björnsson, personal communication, October 18 and 20, 2011).

Sea pea (*Lathyrus japonicus*) and sea lungwort (*Mertensia maritima*) populate the Reserve beaches. During the past five decades, the vegetation across the area has gone through significant changes, with grassland turning into flower meadows with large variety of plants, and Garden Angelica (*Angelica archangelica*) taking over large areas. (Óladóttir, n.d.; Umverfisstofnun, 2004; J. Björnsson, personal communication, October 18 and 20, 2011).

The arctic fox (*Vulpes lagopus*, formerly known as *Alopex lagopus*) is the iconic species of the Nature Reserve. The arctic fox is protected in law in the region since 1994, and the individuals living in the Reserve today are practically unafraid of humans. The Arctic Fox Centre (Melrakkasetur Islands) and its collaborators have done arctic fox research in the Reserve since the 1980's. (The Arctic Fox Centre, 2011.)

Another common mammal in the area is the field mouse (*Apodemus*). The famous bird-cliffs Hornbjarg, Hælavíkurbjarg and Riturinn host superabundance of birds, such as the iconic puffin (*Fratercula arctica*) and several subspecies of auk. (Umverfisstofnun, 2004.)

### **3.3 Hornstrandir and the Human Footprint**

Sanderson et al. (2002) have developed a human footprint dataset to calculate the sum total of ecological footprints of the human population. They combined four types of data, namely population density, land transformation, accessibility, and electrical power infrastructure. Each dataset was coded into standardized score on a scale of 0 to 10. The coding was based on existing scientific studies, as well as expert consultations.

Regarding population density, they note that the ecological consequences depend largely on the nature of the interaction, as well as the ecosystems and processes in question. They settle for a continuum approach in which “human influence scores for densities between 0 and 10 persons per km<sup>2</sup> increased linearly from 0 to 10 and the score above 10 persons per km<sup>2</sup> was held constant at 10” (Sanderson et al. 2002, p. 3). Human influence, as far as it is attributable solely to population density, is assumed to reach an asymptote at some level, here estimated to be 10 persons per km<sup>2</sup>.

Calculating the effect of land use, built environments get the score of 10, with a 2km buffer zones of score 8. Agricultural lands get the score of 6-8, depending on the level of input, and the score of 4 is given to mixed-use cover. The value of 0 is given to all other land cover types (forests, grasslands and Mediterranean ecosystems), despite the fact that these types of land cover are subject to various human uses. The study admits that some land uses, such as extensive grazing in arid areas, are likely underestimated in the analysis due

to their difficulty to map. Roads and railways are also included, with a score of 8 assigned to both, with a 2 km buffer. (Sanderson et al. 2002.)

Human access is connected not only to roads, but also to major rivers and coastlines. To measure the range of access effect, it was estimated how far a person could walk in one day in a difficult-to-traverse ecosystem. The study does admit that such approach oversimplifies the relationship between humans and roads, which is very much affected by ecosystem type and cultural context. Regardless, areas with 2 to 15 km of a road, major river or coast were assigned a score of 4. (Sanderson et al. 2002.)

Regarding power infrastructure, score was assigned in relation to night light visibility. Areas with light visible more than 89% of nights were assigned the score of 10, areas with light visible from 40% to 88% were given the score of 8, areas with lights visible less than 40% of nights were given the score of 4, and areas with no lights visible the score of 0. (Sanderson et al. 2002.)

To make the human influence scores between different ecosystem types and human histories comparable, the scores were normalized within large, regionally defined biomes, which were then differentiated within larger biogeographic realms, in accordance with the WWF-US Conservation Science Program's geographic definitions. A revised score of 0 was assigned to the grid cell with minimum human influence index value in each biome in each realm, and a score of 100 to the cell with maximum value. The intermediate values were stretched linearly between the two extremes. The resulting human footprint "expresses as a percentage the relative human influence in every biome on the land's surface". (Sanderson et al. 2002, p. 897.)

Sanderson et al. suggest that their geography of human influence is "roughly the inverse of the geography of natural processes and patterns in the region" (2002, p. 897). Yet they note that the consequences of human influence are always complex, and some aspects of nature always survive and thrive under strong human influence. However, they state that by mapping the human footprint it is possible to map the least influenced areas, i. e. the wildest areas of each biome. (Sanderson et al. 2002.)

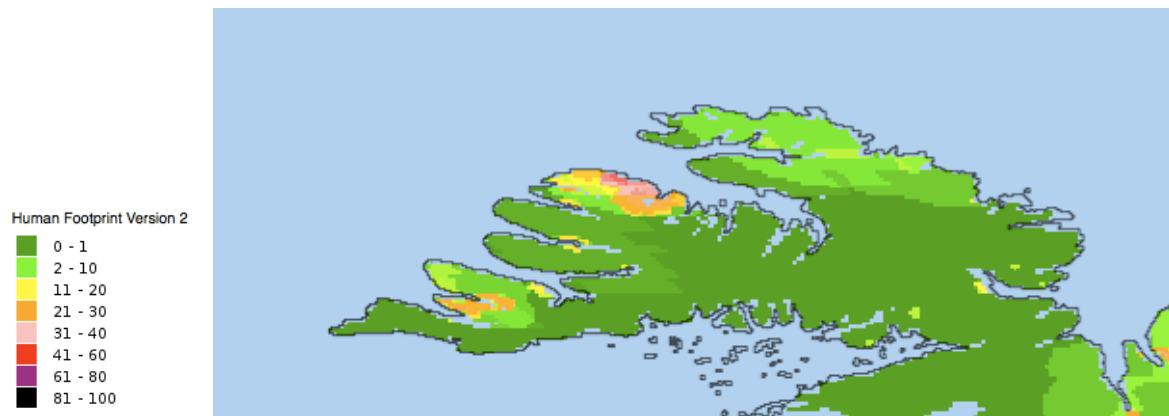


Figure 2. The human footprint in Westfjords, Iceland (SEDAC 2011, Retrieved from <http://sedac.ciesin.columbia.edu/maps/client?cntx=Conservation.xml>)

As can be seen from above, most of Hornstrandir scores 2-10, with the exceptions of Látrar and Sæbol, scoring 0-1, and the area between Veiðileisyfjörður and Lónafjörður, as well as the reserve's border at Skorarheiði, scoring 11-20.

Most of the Hornstrandir gains, in fact, higher scores than the surrounding Westfjords. However, it should be kept in mind that most of the 0-1 score area in the Westfjords is practically inaccessible highland. Additionally, most of the Nature Reserve area falls within the buffer zone of the coastline. The presence of the farmsteads also affects the score, regardless of how much the buildings are used.

### 3.4 Hornstrandir and the IUCN guidelines

It appears that the Hornstrandir Nature Reserve's current IUCN category is not clearly defined. While the Environmental Agency states that the area is currently not assigned a category, but it is treated as an Ib (J. Björnsson, personal communication, 2011), The World Database on Protected Areas (WDPA) has it listed as a category V (Protected Landscape/Seascape) area (Protected Planet, 2010). The Icelandic Ministry of Environment agrees with the WDPA assignment, which they state is in accordance with the regulation and criteria the reserve conservation was based upon in 1985. According to the Ministry, this criteria has not changed, nor has the Ministry formed a new policy regarding the issue. (B. N. Guðmundsdóttir, personal communication, February 9, 2012.)

IUCN emphasizes that the protected area management categories exist first and foremost to provide tools and vocabulary for international protection work and dialogue. The purpose of the categorization is not to provide excuses to downgrade protection, nor to expel people from their traditional lands. (IUCN, 2008.) It is also noted that: “all categories make a contribution to conservation but objectives must be chosen with respect to the particular situation; not all categories are equally useful in every situation” (IUCN 2008, p. 21).

The 58.000 ha Hornstrandir Nature Reserve is not especially large for a Wilderness area. However, the area is so difficult to travel in, and the terrain so mountainous, that it is easy to find a solitary area where no human influences are visible. In terms of ecosystems, Hornstrandir is uniquely preserved, as farming and grazing in the area have always been very small in scale. Today, as the area is relieved from farming and grazing, the ecosystem processes continue relatively unhindered by human activities. The number of tourists is monitored and limited, and during the most sensitive growing season, from the 15th of May to the 15th of June, tourists are completely banned from the reserve and all visits must be reported.

The definition of category Ib specifically mentions the protection and preservation of traditional lifestyle and customs of indigenous peoples. This, however, is not relevant in case of the Hornstrandir peninsula, for although the residents are direct descendants of the first inhabitants of the area, they lack the most essential aspect of what defines an indigenous population: the competition with and the oppression of a later colonizer culture (Kenrick and Lewis 2004). However, also included as an area Ib objective is that the area should protect the “relevant cultural and spiritual values and non-material benefits to [--] non-indigenous populations, such as solitude, respect for sacred sites, respect for ancestors, etc.” (IUCN 2008, p. 25). Although this objective can be considered slightly vague, it does imply that the traditional residents, regardless of their lack of indigenous status, do still have some rights with regard to preserving the cultural values area, even if it is declared a wilderness area. The cultural and ancestral bounds to the traditional family residences are strong and persistent among the Hornstrandir home owners (J. Verbockhaven, personal communication, 11 August 2011).

Another objective of an Ib area is to “allow for low-impact minimally invasive educational and scientific research activities, when such activities cannot be conducted outside the wilderness area” (IUCN 2008, p. 25). The Hornstrandir reserve is an important research area for several reasons listed above. The area is an important object of study for biologists, as it is the only area in Iceland where the arctic fox is protected, as well as due to the difficult growing conditions and the relative natural state of the vegetation. It is also an interesting object for anthropologists, due to the unique history and relationship with the former residents and their descendants.

In terms of distinguishing features of area Ib (see page 28), Hornstrandir fills most of the requirements rather precisely. Apart from the old farmsteads the area is free of modern infrastructure, and there is no motorized land access to the area. There is some recreational motorized use in the owners’ private lands, as well as few low-flying aircrafts visiting the area, but both of these are likely to be more strictly restricted in the future (J. Björnsson, personal communication, October 20, 2011). Biodiversity, ecological processes and ecosystem services are intact and close to original in most areas of the reserve, considering the size of the area. As the area is also protected by a buffer zone in the south against invasive species, it should provide a relatively good stronghold against the climate change impacts (J. Björnsson, personal communication, October 20, 2011). The area also provides refuge for the arctic fox and the nesting seabirds. The existing buildings (around 55, nine of which are emergency shelters) are distributed around the coastline (J. Björnsson, personal communication, December 13, 2011).

To summarize, there does not seem to be anything in the official IUCN definitions of Wilderness area that would automatically exclude Hornstrandir Nature Reserve as one. However, as is pointed out in the same definitions, each case should be considered individually.



## **4 Research methods**

### **4.1 Introduction**

The data for this research was gathered via surveys. It was considered the most effective way to reach and gather information from as many stakeholders as possible. Questionnaires also provided the interviewees with the opportunity to express their opinions anonymously. Three significant stakeholder groups were identified: tourists, workers and homeowners/other summertime residents. These groups were considered to be the most representative of the different stakeholders involved with the reserve. These groups also have rather different goals and expectations for the reserve, and it was assumed that their answers would reflect these differences. Each of the three interviewee groups was interviewed with mostly similar survey instruments, with minor group-specific differences.

### **4.2 Surveys**

Each survey instrument consisted of four sections. First section asked for details of the respondent's relationship with the nature reserve. Second section presented the respondent with seven human impact aspects: buildings, campsites, campers, summertime residents (in the survey sent to summertime residents, this was replaced by 'other people present in the reserve'), marked hiking trails, litter, and boats, and asked how the respondent found each aspect affected his or her personal wilderness experience in the reserve. The respondents were asked to evaluate the effect on the scale of one to five, with one meaning 'affects my wilderness experience hardly at all' and five meaning 'affects my wilderness experience very much'. This allowed the assignment of a "disturbance value" to each factor. Each question also provided space for voluntary additional comments. The respondents were also asked to write down other factors they found affecting their wilderness experience.

In the third section the respondent was introduced to the relevant IUCN concepts and asked to evaluate, again with the scale of one to five, their appropriateness to the Hornstrandir nature reserve. In addition, they were asked to evaluate how useful they

found such categories when discussing Hornstrandir with other people, or in the case of tourists, when selecting their holiday location. The workers and the summertime residents were also asked how they believed the official categorization of Hornstrandir as a wilderness area would affect them personally.

The fourth section asked for the respondents' age, gender, nationality and level of education, to help in profiling the respondents.

#### **4.2.1 Tourist surveys**

The tourists were asked to fill their survey during their stay in the reserve. Twenty surveys were sent out and distributed in the two main campsites. One of the campsites is in the village of Hesteyri, on the southern side of the reserve. The village was deserted in the mid-20th century and now some of the buildings are used as summer houses. The surveys were handed out by the local coffee shop owner. The other campsite is in the bay of Hornvík, on the northern side of the reserve, where there are only a couple of permanent buildings. The surveys in Hornvík were distributed by the park ranger. Five surveys were returned from Hesteyri and seven from Hornvík.

To determine the tourist profiles, the respondents were asked about the length of their stay in the reserve, how big a group they were traveling with, and how many times had they been to the reserve before. In addition, they were asked to explain in their own words what made them choose the Hornstrandir Nature Reserve as their holiday destination.

The tourists were also presented with the descriptions of both category 1b: Wilderness Area and category V: Protected Landscape, and asked to evaluate the applicability of both to the reserve. Additionally, they were asked how much do the official categories affect their choice of location when planning holidays.

#### **4.2.2 Worker surveys**

To interview professionals and workers in the reserve, an online survey was created based on the tourist survey, and distributed to relevant individuals and organizations. The online survey was created with the SurveyMonkey software ([www.surveymonkey.com](http://www.surveymonkey.com)). This

ensured the completely anonymity of the respondents, as SurveyMonkey allows data gathering without recording or tracking IP addresses or other identification data.

To determine the worker profiles, the respondents were asked about the length and type of their working relationship with the area. The given options were park management, tourism/recreation, scientific study, educational, and other, as well as full-time worker, part-time worker, volunteer, permanent worker, fixed-term worker, time to time worker and other.

As confusion arose regarding the current category assignment of the reserve, the description of category V and relevant question were removed from the worker survey. In addition to questions regarding applicability of the category 1b, the workers were asked how helpful do they find such categorization when discussing issues relating to Hornstrandir with other workers and professionals, summer residents, tourists, or other people interested in the reserve. Additionally, they were asked for any other thoughts they might have had about Hornstrandir being categorized as a Wilderness area, and how they thought it might affect their work.

#### **4.2.3 Resident surveys**

The resident survey was also conducted online with SurveyMonkey, and was largely similar to the worker survey. The residents were asked about what kind of house they had access to (old or new), whether it was their own or not, how much time they approximately spend in the reserve each summer, and where in the area is their destination located. In addition to the standard questions about the human impact aspects and the category 1b, the residents were asked how well do they feel that their opinions as house owners/residents are taken into account when making decisions regarding the nature reserve.

To ensure mutual understanding and a sufficient amount of responses, the resident survey was translated to Icelandic, using the official Icelandic translation of the IUCN category definitions. The responses were then translated back to English for analysis. The survey was sent to several individuals known to spend summers at the reserve, as well as a couple

of resident organizations. The respondents also forwarded the survey, and in the end 24 people responded.

#### **4.2.4 Survey limitations**

When conducting a survey of this type, there are several factors that are outside the researcher's control. With all three interest groups, the distribution of the surveys was either partially or fully in the hands of someone else. With the worker group and the resident group, the respondents themselves participated in spreading the survey, which potentially might have lead to forwarding the survey to people known to hold similar views.

The translation of the resident survey from English to Icelandic, and then the translation of the answers from Icelandic to English also adds to the uncertainty factor. There were three people involved in the translation process, and it was implied by one of them that there might be slight differences in the Icelandic and English versions of the IUCN category descriptions. This may affect how comparable the resident group results are with the other two groups.

There were also flaws in the questionnaire design, mostly due to time constraints. The confusion regarding the Reserve's current IUCN category posed some problems to the questionnaire layout. The category V was presented to the tourist group as the current category, before it turned out this may not actually be the case. Additionally, as the question associated with the human influence aspects in all the surveys was "how much does X affect your wilderness experience", it is possible that some respondents gave an aspect a high value if they thought that it had a *positive* effect. There were a couple of additional comments indicating that this might have happened. Additionally, reversing the scale in the IUCN concept questions (where the value one meant "not very appropriate" and five "very appropriate") might have confused some respondents.

The sample sizes were relatively small in comparison to the actual sizes of the stakeholder groups. This was especially the case with the tourists, as during the tourist season of 2011, when the data was gathered, 6500 visitors were registered in Hornstrandir. Ideally, the

tourist surveys would have been gathered across several years. Unfortunately this was not possible due to time constraints, and thus it needs to be taken into account that the tourist sample is potentially non-representative due to small size. With workers, it is possible that volunteers were overrepresented, as people who volunteer for work can be assumed to be also willing to volunteer for surveys. Volunteers working at protected areas also tend to be inclined toward a conservationist/preservationist perspective. In general, surveys of this kind tend to attract more environmentally inclined respondents. In the case of both workers and especially residents, it is possible that the use of online survey excluded older respondents and/or respondents who are less technologically oriented. All in all, the number of survey responses does not allow for a very detailed statistical analysis.

Additionally, gathering more baseline information would have been useful in analyzing the results. In this case, no information was gathered about the interviewees' previous wilderness experiences or their general wilderness perceptions, which makes comparisons problematic (cf. Higham 1998).

However, questionnaires also have their advantages. As the survey is filled in private, the interviewer's own opinions have no effect on the interviewees answers (as long as the questions are formulated in an objective fashion). In a study of this type, using questionnaires also allows the gathering of responses from more respondents than face-to-face interviews would have. Interviewing the tourists personally would have been especially difficult. Full anonymity may also encourage respondents to be more open about their opinions than what they might be in a face-to-face situation. Both weaknesses and strengths of this data gathering method need to be taken into account when analyzing the results.

# 5 Results

## 5.1 Tourist surveys

Twenty surveys were sent out to two campsites within the reserve: Ten to Hesteyri on the south side, where the campsite is in an old village, deserted in the mid-20th century, and ten to Hornvík on the north side, where there are only a couple of isolated houses visible near the campsite. In Hornvík the surveys were distributed by the park ranger, and in Hesteyri by the owner of the local coffee house. Five surveys were returned from Hesteyri, and seven from Hornvík. However, one survey from Hornvík was deemed invalid, as it was filled by a scientist visiting Hornstrandir to interview the residents, not by a tourist. The person was later contacted and asked to fill out the worker/professional survey. Also, two surveys in Hornvík were filled by two people. Of these surveys, personal information of both respondents (age, gender, nationality, level of education) is given below, but the survey responses are treated as one response.

The respondents were first asked details and reasons of their stay in Hornvík. Then they were asked to evaluate how several predetermined human impact aspects (buildings, campsites, other campers, marked hiking trails, summertime residents, litter, and boats) affected their personal wilderness experience. In the last section of the survey, they were introduced to two IUCN categories, category Ib: Wilderness Area, and category V: Protected Landscape, which places more emphasis on preserving traditional human settlements. The respondents were asked to evaluate how appropriate they found each category to Hornstrandir, and also how useful they find such categorizations themselves.

### 5.1.1 Visitor profiles

Majority of visitors on both sites were staying for several days. Three out of the five visitors in Hesteyri reported 4-5 days and two reported 6-7 days. In Hornvík two out of six surveys reported a stay of 4-5 days, two reported 6-7 days, and one reported a stay longer than a week. One respondent in Hornvík did not give a length of stay.

Gender	Hesteyri	Hornvík	Total
male	4	5	9
female	0	3	3
n/a	1	0	1

*Table 1. Tourist profiles: gender*

Age in years	Hesteyri	Hornvík	Total
21-30	1	0	1
31-40	2	2	4
41-50	2	2	4
51-60	0	3	3
61-70	0	1	1

*Table 2. Tourist profiles: age*

Highest grade	Hesteyri	Hornvík	Total
High school	0	1	1
Undergraduate	0	3	3
Master's degree	4	1	5
Doctorate	1	3	4
Other	0	0	0

*Table 3. Tourist profiles: education*

The respondents were primarily European. Hesteyri respondents were from Germany (3), France (1) and Great Britain (1), whereas the respondents from Hornvík came from Germany (1), Great Britain (2), Netherlands (2), Sweden (1), and Iceland (1). In Hesteyri, one respondent reported the age of 21-30 years, two 31-40 years and two 41-50 years. In Hornvík, one reported 31-40 years, (filled by two persons, both in this age gap) two 41-50 years, three 51-60 years, and one 61-70 years. In Hesteyri, four out of five surveys were filled by males, whereas one respondent did not give a gender. In Hornvík, one survey was

filled by a female, three by males, and two by both. Four out of the five Hesteyri visitors reported their level of education as Master’s degree and one as Doctorate. Of the Hornvík visitors, one reported High School as the highest grade level completed, three reported College/University undergraduate, one reported Master’s, and three reported Doctorate.

<b>Group size</b>	<b>Hesteyri</b>	<b>Hornvík</b>	<b>Total</b>
One person	2	0	2
Two persons	0	4	4
Group of 3-5	3	1	4
n/a	1	0	1

*Table 4. Tourist profiles: group size*

<b>Length of stay</b>	<b>Hesteyri</b>	<b>Hornvík</b>	<b>Total</b>
4-5 days	3	2	5
6-7 days	2	2	4
over 7 days	0	1	1
n/a	0	1	1

*Table 5. Tourist profiles: length of stay*

<b>Previous visits</b>	<b>Hesteyri</b>	<b>Hornvík</b>	<b>Total</b>
First visit	5	2	7
1-2 previous visits	0	3	3
n/a	0	1	1

*Table 6. Tourist profiles: previous visits*

Three respondents in Hesteyri were traveling in a group of 3-5 five people and the other two were traveling alone. Hornvík was more popular with smaller groups, with four surveys reporting people traveling with one friend and one with a group of 3-5 people. One person again did not answer the question.



All respondents in Hesteyri were first-time visitors to Hornstrandir, whereas in Hornvík only two survey responses reported first-time visitors and three to have one or two previous visits. Again, one person in Hornvík did not answer the question.

The respondents were also asked to explain, in their own words, what made them choose Hornstrandir as their destination. Recommendations from friends and relatives were mentioned in several responses, and almost all made some sort of reference to the wildness/wilderness, loneliness or remoteness of the area as a reason for coming. One person mentioned the possibility to observe the arctic foxes.

### 5.1.2 The effect of human impacts on wilderness experience

The respondents were asked to evaluate all the human impact aspects on a scale of one to five, with one meaning ‘affects my wilderness experience hardly at all’ and five meaning ‘affects my wilderness experience very much’. The values presented here are rounded to the nearest 0.01. The respondents were also provided additional space to comment on each aspect. The null hypothesis was that people in Hesteyri would be more tolerant towards visible human impacts, considering that they were camping in an area where more signs of human life were openly visible. However, it must be noted that most visitors in the reserve hike around the peninsula, and some hike from Hesteyri to Hornvík or vice versa.

Building disturbance value	Total Hesteyri	Total Hornvík	Total tourist (Hesteyri + Hornvík)
1	4	1	5
2	0	2	2
3	0	1	1
4	1	2	3
5	0	0	0

*Table 7. Tourist disturbance scores: buildings*

The visitors in Hesteyri seemed to be more tolerant towards the presence of buildings in Hornstrandir than those in Hornvík, therefore the null hypothesis was not rejected. The

respondents in Hesteyri gave the buildings a disturbance value average of 1.6 (standard deviation 1.34) whereas in Hornvík the average given was 2.67 (standard deviation 1.21). When asked to comment, several respondents mentioned that there were few enough houses for them not to be a disturbance. The traditional Icelandic style of the houses, their age and the way how they ‘blend’ or ‘belong’ into the environment were mentioned as reasons why the houses were not considered to be too distracting. One visitor in Hornvík and one in Hesteyri mentioned that any more houses, especially new ones, would have a much larger effect. One visitor in Hesteyri mentioned that the buildings give “an idea of life on Hornstrandir in the past”, and another that knowing “that somebody is here too” gave a sense of security.

<b>Campsite disturbance value</b>	<b>Total Hesteyri</b>	<b>Total Hornvík</b>	<b>Total tourist (Hesteyri + Hornvík)</b>
<b>1</b>	4	2	6
<b>2</b>	1	1	2
<b>3</b>	0	1	1
<b>4</b>	0	2	2
<b>5</b>	0	0	0

*Table 8. Tourist disturbance scores: campsites*

Campsites were also considered to be less distracting in Hesteyri than in Hornvík, with the average value of 1.20 (standard deviation 0.45) in Hesteyri, and 2.50 (standard deviation 1.38) in Hornvík. Several respondents noted that even though seeing a campsite affected the wilderness experience, campsites and toilets are necessary to control the visitor impacts. It was also mentioned in several responses that the campsites in Hornstrandir are small and basic enough to keep their effect to the minimum.

<b>Camper disturbance value</b>	<b>Total Hesteyri</b>	<b>Total Hornvík</b>	<b>Total tourist (Hesteyri + Hornvík)</b>
1	3	1	4
2	2	1	3
3	0	2	2
4	0	1	1
5	0	1	1

*Table 9. Tourist disturbance scores: campers*

Other campers were given a disturbance value of 1.40 (standard deviation 0.55) in Hesteyri and 3.00 (standard deviation 1.41) in Hornvík. Multiple respondents mentioned that as they were campers themselves, it would be hypocritical to be too judgmental towards fellow campers. Additionally, they noted that it was pleasant to interact with other people with similar mindsets.

Several respondents in both locations noted that they saw very few fellow campers, and that small numbers made the effect less distracting. It was noted that larger groups had or would have had worse impact, making the place feel too touristy. One respondent in Hesteyri noted that the total number of visitors “needs to be kept low.”

<b>Hiking trail disturbance value</b>	<b>Total Hesteyri</b>	<b>Total Hornvík</b>	<b>Total tourist (Hesteyri + Hornvík)</b>
1	4	3	7
2	1	2	3
3	0	1	1
4	0	0	0
5	0	0	0

*Table 10. Tourist disturbance scores: marked trails*

Marked hiking trails received among the lowest disturbance values of all aspects evaluated, with 1.20 (standard deviation 0.45) in Hesteyri and 1.67 (standard deviation 0.82) in

Hornvík. In fact, several respondents mentioned that they would have liked to see more clearly marked trails. It was also mentioned in multiple responses that marked trails help to restrict the ecological impact. However, most comments from Hornvík emphasized that the fewer trails the better, and that cairned trails with traditional appearance were preferred to groomed trails that draw attention.

<b>Resident disturbance value</b>	<b>Total Hesteyri</b>	<b>Total Hornvík</b>	<b>Total tourist (Hesteyri + Hornvík)</b>
<b>1</b>	2	3	5
<b>2</b>	1	1	2
<b>3</b>	1	2	3
<b>4</b>	0	0	0
<b>5</b>	0	0	0

*Table 11. Tourist disturbance scores: summertime residents*

The summertime residents received the disturbance value of 1.75 (standard deviation 0.96) in Hesteyri and 1.83 (standard deviation 0.98) in Hornvík. In the comments, they received an almost unanimous approval from respondents in both locations, due to their traditional connection to the reserve. They were praised of giving a friendly welcome to the tourists, and one respondent in Hornvík noted that they “offer safety and security because of the ability to help”. It was, however, noted in several responses that the residents need to respect the wilderness and/or their activities need to be regulated in order to prevent them from becoming a disturbance. Vehicles, motorbikes and horses, as well as building of new houses, were mentioned as potential distractive factors.

Litter disturbance value	Total Hesteyri	Total Hornvík	Total tourist (Hesteyri + Hornvík)
1	0	3	3
2	0	0	0
3	1	0	1
4	0	0	0
5	3	3	6

Table 12. Tourist disturbance scores: litter

Litter received the highest disturbance values in both locations, 4.50 (standard deviation 1) in Hesteyri, and a very divided 3.00 (standard deviation 2.19) in Hornvík. However, some respondents noted that the litter's effect is hypothetical; if there was litter, it would be highly distracting - more so than any other impact - but the respondents in question had not seen any or much. This might, at least partially, explain the high standard deviation. Multiple respondents also noted that most of the litter in Hornstrandir is drift litter from the ocean, and something that is found everywhere in the world. One respondent in Hornvík stated that all litter should be removed, whereas other noted that too much effort for cleaning would add to the negative impact. One respondent from Hesteyri noted that the campers themselves are also responsible for the amount of litter in the reserve.

Boat disturbance value	Total Hesteyri	Total Hornvík	Total tourist (Hesteyri + Hornvík)
1	2	4	6
2	2	2	4
3	1	0	1
4	0	0	0
5	0	0	0

Table 13. Tourist disturbance scores: boats

The presence of boats in nearby coastal waters received 1.80 (standard deviation 0.84) from the respondents in Hesteyri and 1.33 (standard deviation 0.52) from Hornvík. Five out of seven respondents who gave additional comments stated that they had seen so few boats - or none at all - that they were not a disturbance, whereas one stated that “not seeing one daily would be nice”. Another mentioned that the main disturbance caused by the day tour boats were the tourists they brought, as the respondent found that to their personal experience these tourists were “not always respectful to environment protection”. A couple of respondents claimed that they actually enjoyed seeing boats, whereas one mentioned a boat with buoys in “Adaðik bay” (likely meaning Aðalvík), apparently involved in fish farming, that the person had found more disturbing than other boats.

The visitors were also asked to add other factors they may have found affecting their wilderness experience. As positive factors, the respondents listed contact with animals unafraid of people, absence of easy communication (wifi and GSM), view over the bird cliffs, helpful ranger and residents, peace, solitude, huge open areas that are difficult to get to, view of the “open, wild sea” and the lack of cars and power. As negative effects, the respondents listed ocean pollution and potential large, noisy tourist groups. One respondent from Hornvík also expressed the desire for better information of the demands of the reserve pre-arrival, to help deciding “if Hornstrandir is ‘right for you’.”

### **5.1.3 The IUCN classifications**

The respondents were provided with the descriptions of IUCN categories V and Ib, and asked how fitting they found these descriptions to be to Hornstrandir, again on the scale of one to five. Category Ib received significantly more support, receiving the average appropriateness value of full 5.00 from Hesteyri and 3.83 (standard deviation 1.17) from Hornvík, while the category V received a modest 2.60 (standard deviation 0.55) from Hesteyri and 2.50 (standard deviation 1.64) from Hornvík. Several comments noted that the cultural impact is more a remnant of history than present. It was also mentioned that an official wilderness status would be helpful to protect the area from growing impacts of day tours, winter snowmobile and skiing trips, as well as potential infrastructure additions.

<b>Ib appropriateness value</b>	<b>Total Hesteyri</b>	<b>Total Hornvík</b>	<b>Total tourist (Hesteyri + Hornvík)</b>
1	0	0	0
2	0	1	1
3	0	1	1
4	0	2	2
5	5	2	7

*Table 14. Tourist scores: category Ib appropriateness*

<b>V appropriateness value</b>	<b>Total Hesteyri</b>	<b>Total Hornvík</b>	<b>Total tourist (Hesteyri + Hornvík)</b>
1	0	2	2
2	2	2	4
3	3	0	3
4	0	1	1
5	0	1	1

*Table 15. Tourist scores: category V appropriateness*

The respondents were also asked how useful they generally find official categories such as the one maintained by IUCN, when selecting a holiday location. The categories were given a helpfulness value of 2.60 (standard deviation 1.14) in Hesteyri and 1.33 (standard deviation 0.82) in Hornvík. The Hesteyri opinions were fairly divided. In Hornvík the respondents were more unanimous, with six respondents giving the value of one, and one respondent giving the value of three. While some respondents admitted that they were completely unaware of the existence of such categories, others noted that they are helpful for recognizing areas with protected status, and that in the case of Hornstrandir, the wilderness status would help to “keep the activities of holiday home owners in check”.

Category helpfulness value	Total Hesteyri	Total Hornvík	Total tourist (Hesteyri + Hornvík)
1	1	5	6
2	1	0	1
3	2	1	3
4	1	0	1
5	0	0	0

Table 16. Tourist scores: category helpfulness

## 5.2 Worker/professional surveys

An online survey was sent to 26 institutions and individuals who have worked with or in Hornstrandir Nature Reserve. 12 surveys were completed. The respondents were first asked details about their professional or working relationship with the reserve. Then they were asked to evaluate how several predetermined human impact aspects (buildings, campsites, other campers, marked hiking trails, summertime residents, litter, and boats) affected their personal wilderness experience. In the last section of the survey, they were introduced to the IUCN category Ib: Wilderness Area. The respondents were asked to evaluate how appropriate they found the category to Hornstrandir, and also how useful they find such categorizations for their work.

### 5.2.1 Worker profiles

Of the three groups interviewed, the workers were the most diverse and heterogenous. They were also the least inclined to answer to the survey, and it is difficult to say how well the results reflect the opinions of the workers and professionals in the area in general.

Six out of the eleven respondents were from Iceland, three from elsewhere in Europe, two from North America and one from Canada. Seven reported Master's degree as their highest level of education, four reported Undergraduate, and one reported High School. Seven were male and five were female. Five reported being between 21 and 30 years old, three



reported between 31 and 40, one reported between 41 and 50, two reported between 51 and 60, and one reported between 61 and 70.

Age in years	Total
21-30	5
31-40	3
41-50	1
51-60	2
n/a	0

*Table 17. Worker profiles: age*

Highest grade	Total
High school	1
Undergraduate	4
Master's degree	7
Doctorate	0
Other	0

*Table 18: Worker profiles: education*

Gender	Total
male	7
female	5
n/a	0

*Table 19. Worker profiles: gender*

<b>Working relationship</b>	<b>Total</b>
Tourism/recreation	7
Scientific study	3
Park management	1
Other	1

*Table 20. Worker profiles: working relationship*

<b>Length of working relationship</b>	<b>Total</b>
Less than 6 months	5
6 to 12 months	0
1-3 years	2
3-5 years	0
more than 5 years	5

*Table 21. Worker profiles: length of working relationship*

<b>Type of work</b>	<b>Total</b>
Casual/time to time worker	2
Part-time worker	1
Fixed-term worker	1
Full-time worker	1
Volunteer	4
Other	4

*Table 22. Worker profiles: Type of work*

Seven respondents reported working or having worked in the tourism/recreation field. Three reported having worked with scientific study, one in park management, and one reported 'other'. Regarding the type of employment, one respondent reported being full-

time worker, three reported part-time, one reported fixed-term, and two reported casual/ time to time. Four reported simply ‘other’. Four respondents also reported being volunteers. Regarding length of employment, five respondents reported having worked in the area less than six months, two reported one to three years, and four reported more than five years.

### 5.2.2 The effect of human impacts on wilderness experience

The respondents were asked to evaluate all the human impact aspects on a scale of one to five, with one meaning ‘affects my wilderness experience hardly at all’ and five meaning ‘affects my wilderness experience very much’. The values presented here are rounded to the nearest 0.01. The respondents were also provided additional space to comment on each aspect.

Building disturbance value	Worker total
1	1
2	3
3	3
4	3
5	2

*Table 23. Worker disturbance scores: buildings*

The workers’ opinions on the presence of buildings is somewhat divided. The average value given is 3.17, with standard deviation of 1.27. One respondent mentioned that the presence of houses and cabins is good for safety reasons. Another noted that original building structures are appropriate in the nature reserve, but mentioned that he would not want to see new buildings constructed. Third respondent found one or two buildings in the area “too big”.

Campsite disturbance value	Worker total
1	5
2	1
3	2
4	3
5	1

Table 24. Worker disturbance scores: campsites

The presence of campsites is largely well tolerated, receiving the average score of 2.50 (standard deviation 1.51). One respondent called designated campsites crucial for the area, noting that if people are allowed to camp “wherever”, the human-caused damage will be much worse.

Tourist disturbance value	Worker total
1	1
2	2
3	2
4	3
5	4

Table 25. Worker disturbance scores: tourists

The presence of tourists received the average value of 3.58 (standard deviation 1.38), with four workers reporting it affecting their wilderness experience ‘very much’ (5). One respondent admitted that his response reflects the fact that he “knew Hornstrandir before ‘tourists time’.” Another stated her wilderness experience being affected by organized groups, such as the day tours. Third respondent noted that when she was collecting data about the arctic foxes, the tourists made “all the difference”, but when working as a hiking guide, the tourists “are the job”.

<b>Resident disturbance value</b>	<b>Worker total</b>
1	3
2	2
3	4
4	2
5	1

*Table 26. Worker disturbance scores: residents*

The presence of summertime residents received the average value of 2.67 (standard deviation 1.30). Those who commented noted that the effect of the residents is largely dependent of their activities. One respondent mentioned four wheel bikes and sea jets as the reason for disturbance, whereas another noted that: “It [is] not wilderness to me if people walk out their back porch and have BBQ's every night of the summer.”. Third respondent noted that it is important to know who is staying in the house and when, but mentioned also that it is important to respect the fact that some of the families have owned the land for centuries.

<b>Hiking trail disturbance value</b>	<b>Worker total</b>
1	4
2	1
3	4
4	2
5	1

*Table 27. Worker disturbance scores: marked hiking trails*

The presence of hiking trails received the average of 2.58 (standard deviation 1.38). Two respondents noted that the hiking trails help to minimize the harmful human effect on the

environment, and third mentioned that they help to prevent getting lost, which would be “the worst thing for your safety”.

Litter disturbance value	Worker total
1	5
2	0
3	2
4	2
5	3

Table 28. Worker disturbance scores: litter

The presence of litter received the average value of 2.83 (standard deviation 1.75). It seems to be a very emotional issue to many respondents, sparking comments such as “makes me sad”. However, one worker from the tourist/recreational field noted that next year the community is planning to “take first steps towards a solution”.

Boat disturbance value	Worker total
1	4
2	4
3	4
4	0
5	0

Table 29. Worker disturbance scores: boats

The presence of boats in the nearby coastal waters received the lowest disturbance value, with the average of 2.00 (standard deviation 0.85). One respondent mentioned that the boat presence becomes disturbing when it happens too often, specifically mentioning the day tour boats. Another mentioned that the presence of boats as such is not specially affecting, but some boat owners “do not behave”.

When asked what other factors affected their wilderness experience, the respondents mentioned landing strips for airplanes, and the usage of machines with motors (likely referring to those powered with internal combustion engines, as the noise was specially mentioned as the source of disturbance). Notwithstanding the actual presence of private property in the Reserve, one respondent mentioned “people thinking that its their property because their grandparents used to live there” as potential source of disturbance. One respondent mentioned the fact that the tourists she is guiding “are busy using their phones when we are in places where that is possible”. This according to her happens for example on top of the highest peaks, creating “a total anticlimax experience”. One respondent also mentioned the difficulty and cost of the boat transportation, although she admitted that she understands the reasons for the high price.

### 5.2.3 The IUCN classification

The respondents were provided with the descriptions of IUCN category Ib, and asked how fitting they found the description to be to Hornstrandir, again on the scale of one to five. The workers’ opinions were somewhat more divided than those of the tourists, arriving at the average of 3.58 (standard deviation 1.51). Both of the two respondents who added comments to the question were in support of the idea, one of them stating that: “More moderating and management is needed to preserve Hornstrandir. Category Ib would highlight means of doing so.”

Ib appropriateness value	Worker total
1	2
2	1
3	1
4	4
5	4

Table 30. Worker scores: Ib appropriateness values

When asked how helpful the respondents found the categorizations when discussing issues relating to Hornstrandir, most people found it more or less helpful, arriving at the average of 3.58 (standard deviation 1.62).

Category helpfulness value	Worker total
1	3
2	0
3	0
4	5
5	4

Table 31. Worker scores: category helpfulness

The workers were also asked for any other thoughts about Hornstrandir being officially categorized as a Designated Wilderness area, and how they thought it might affect their work. Of the five who responded, four were firmly in support of the categorisation, suggesting that it would strengthen the park protection, increase the amount of ecological studies, help restricting the tourist activities, and prevent new buildings from being constructed. One respondent noted that: “With the obvious presence of summer buildings and residents Hornstrandir faces very unique challenges when being categorized, but these same challenges are part of what ultimately defines the area and makes it unique.” The fifth respondent took the side of the summertime residents, and was worried that the categorisation would weaken their position. She mentioned that in her study of the life and tales of those who were born in the area, she had learned that some of the old residents now have to share their old family homes with large families, and consequently are able to spend very little time on their native land. She suggested that young Icelandic architects should propose projects with new wooden houses that would be integrated into the landscape, allowing the old residents “to be back for a longer period, during the opening season of the nature reserve area, on their land.”



## 5.3 Summertime resident surveys

An online survey was sent out to individuals and organizations of Hornstrandir house owners and other summertime residents. 24 surveys were completed. The respondents were first asked what type of house they had access to, where it was located and how much time each summer they spend in the reserve. Then they were asked to evaluate how several predetermined human impact aspects (buildings, campsites, other campers, marked hiking trails, summertime residents, litter, and boats) affected their personal wilderness experience. In the last section of the survey, they were introduced to the IUCN category Ib: Wilderness Area. The respondents were asked to evaluate how appropriate they found the category to Hornstrandir, and also how useful they find such categorizations for their work. Finally, the respondents were asked how well did they feel that their opinions are taken into account when making decisions regarding the nature reserve.

### 5.3.1 Resident profiles

Eleven of the residents gave female as their gender, and eleven male. Two respondents did not give their gender. Six reported being 31-40 years old, six reported 41-50, and six 51-60. Two reported 61-70, and two 71-80. Two respondents did not give their age.

Twelve respondents gave University/College Undergraduate as their highest level of education. Two reported Master's degree, three High School, and one Elementary/Primary School. Two respondents did not report their level of education, and four reported 'other'. All respondents gave their nationality as Icelandic.

Gender	Total
male	11
female	11
n/a	2

*Table 32. Resident profiles: gender*

Age in years	Total
21-30	0
31-40	6
41-50	6
51-60	6
61-70	2
71-80	2

*Table 33. Resident profiles: age*

Highest grade	Total
Elementary/primary school	1
High school	3
Undergraduate	12
Master's degree	2
Doctorate	0
Other	4
n/a	2

*Table 34. Resident profiles: education*

Of the 24 respondents, eight reported themselves as owners of an old house and seven as owners of a new house. Five reported having other access to an old house, and four other access to new house. Five were located in Hesteyri, five in Hornvík, five in Fljótavík, five in Sæból, two in Látrar, one in Hælavík, and one somewhere else. It is notable that the location of the respondent's summer house most likely affects their opinions regarding some of the disturbance aspects, as for example tourists and boats are more frequent in some areas of the Reserve than others. This may in part cause the high standard deviations of some of the aspects.

Most common time spent in Hornstrandir each summer was 2-4 weeks, reported by eleven respondents. Up to two months was reported by four respondents and up to three months by two. Seven reported spending less than two weeks in Hornstrandir each summer.

Location of house	Total
Fljótavík	5
Hælavík	1
Hesteyri	5
Hornvík	5
Látrar	2
Sæból	5

*Table 35. Resident profiles: location*

Type of house	Total
Ownership of an old house	8
Ownership of a new house	7
Other access to an old house	5
Other access to a new house	4

*Table 36. Resident profiles: type of house*

Time spent in reserve	Total
less than two weeks	7
2-4 weeks	11
up to 2 months	4
up to 3 months	2

Table 37. Resident profiles: time spent in reserve each summer

### 5.3.2 The effect of human impacts on wilderness experience

The respondents were asked to evaluate all the human impact aspects on a scale of one to five, with one meaning ‘affects my wilderness experience hardly at all’ and five meaning ‘affects my wilderness experience very much’. The values presented here are rounded to the nearest 0.01. The respondents were also provided additional space to comment on each aspect.

Building disturbance value	Resident total
1	12
2	1
3	5
4	6
5	0

Table 38. Resident disturbance scores: buildings

Unsurprisingly, the residents were mostly fairly tolerant towards buildings, twelve out of twenty-four respondents giving them the disturbance value of one. The average score given was 2.21 (standard deviation 1.32). Of the eight respondents who wrote additional comments, four noted that the style of the houses makes all the difference; old houses, as

well as new buildings designed in harmony with them, were found fitting, but modern buildings with modern materials were found unsuitable and annoying. It was also noted that the buildings are a part of the heritage, and that it is enjoyable to see how people in the area used to live.

<b>Campsite disturbance value</b>	<b>Resident total</b>
<b>1</b>	11
<b>2</b>	4
<b>3</b>	6
<b>4</b>	3
<b>5</b>	0

*Table 39. Resident disturbance scores: campsites*

Campsites were also found relatively non-disturbing, with the average value of 2.04 (standard deviation 1.12). In the comments it was noted that again the design plays a large part in the level of effect. One respondent noted that having hygiene/waste facilities and running water is necessary, whereas another stated that while the location and appearance of the campsites should be acceptable for visitors and landowners alike, that is “not the case today”.

<b>Tourist disturbance value</b>	<b>Resident total</b>
<b>1</b>	8
<b>2</b>	5
<b>3</b>	5
<b>4</b>	6
<b>5</b>	0

*Table 40. Resident disturbance scores: tourists*

The presence of tourists received the average score of 2.38 (standard deviation 1.21), which is slightly higher than most other aspects, but the additional comments were mostly supportive. Two respondents mentioned that it is pleasant to meet the travelers and share opinions about the area. One noted that the tourists are not a disturbance as long as they treat the area well, and another that their existence is simply “part of the reserve”.

Other people disturbance value	Resident total
1	8
2	6
3	6
4	3
5	0

*Table 41. Resident disturbance scores: other people*

The presence of people other than tourists received an average of 2.17 (one respondent did not give a value) and a standard deviation of 1.07. One respondent commented that various leisure machines, such as jet skis and quad bikes, affect negatively both animals and humans. Another stated that the locals do not “hinder [her] enjoyment”, as all everyone respects the rules of the reserve. Third respondent admitted not understanding the question, as “[the] presence of other compatriots is generally good, but those visiting the area are nearly always tourists”.

Hiking trail disturbance value	Resident total
1	10
2	4
3	7
4	1
5	2

*Table 42. Resident disturbance scores: marked hiking trails*

Trails received the average score of 2.21 (standard deviation 1.28). As with buildings and campsites, it was mentioned that the way the paths are marked makes all the difference. Several respondents also mentioned the importance of carefully marking the dangerous places and impossible areas. One respondent commented that there is almost no markings, and that it would be important to “mark more to maintain paths”, while another stated that it “bears to be cautious” about opening new paths, and that walking the old routes should be part of the experience.

Litter disturbance value	Resident total
1	2
2	0
3	6
4	3
5	13

*Table 43. Resident disturbance scores: litter*

The presence of litter received by far the highest score, with the average of 4.04 (standard deviation 1.23). Of the five people who added comments, three noted the importance of people taking their litter with them as they leave the area. One respondent, however, noted

that the litter is only seen on the shores. At least the person herself had never seen litter out in the open.

<b>Boat disturbance value</b>	<b>Resident total</b>
<b>1</b>	11
<b>2</b>	5
<b>3</b>	3
<b>4</b>	4
<b>5</b>	1

*Table 44. Resident disturbance scores: boats*

The presence of boats on the nearby coastal waters received one of the lowest disturbance scores, with the average of 2.13 (standard deviation 1.30). Of the five people who wrote additional comments, two mentioned that loud speed boats and other vehicles with high levels of noise pollution are a big disturbance. Three respondents noted that most of the boats are used to get to and from the reserve, and thus have their place on the coasts. One respondent found fishing boats highly disturbing, while another noted that the fishing boats that come to the area are often seeking shelter from bad weather, and thus have a good reason for their presence.

When asked for additional factors affecting their wilderness experience, three people mentioned history, family ties and remembering forefathers as sources for emotional connection. Two mentioned nature, beauty, and peace and quiet. As negative effects, five respondents mentioned aircraft traffic. The presence of other motorized vehicles, as well as the presence of dogs, were mentioned as sources of potentially harmful disturbance for both people and nature. One respondent criticized people who “come to the area [thinking] that they can do whatever they like because legal enforcement is scant. Shoot things at will; don’t need to respect building regulations and other such things”. It should be noted, however, that guns are prohibited in the reserve (Umhverfisstofnun, 2002).



### 5.3.3 The IUCN classifications

The respondents were provided with the descriptions of IUCN category Ib, and asked how fitting they found the description to be to Hornstrandir, again on the scale of one to five. The residents were largely supportive to the idea, giving it the average score of 3.78 (standard deviation 1.13). The additional comments were largely supportive, with one respondent stating that the definition of Wilderness area is “very much in the spirit of the definition of 1972, agreed on by the landowners and the nature protection council”. One respondent, however, commented that as the area has been inhabited practically since the settlement of Iceland, the land is not necessarily as pristine as expected by the IUCN definition. The respondent also noted airplanes as a disturbance unfitting to a Wilderness area.

<b>Ib appropriateness value</b>	<b>Resident total</b>
<b>1</b>	1
<b>2</b>	2
<b>3</b>	5
<b>4</b>	8
<b>5</b>	7

*Table 45. Resident scores: Ib appropriateness*

The respondents were also asked about how useful they find such a categorization, when discussing Hornstrandir with park management, other residents, tourists, and other people. The categorization was given a helpfulness score of 3.39 and standard deviation of 1.20 (one respondent gave no score). Of the three respondents who wrote additional comments, two noted the importance and usefulness of an international reference. The third respondent also found using the classification important, noting that the landowners “need to have the final say on their land, but to respect the rules on treatment of the reserve and construction must be licensed”.

Category helpfulness value	Resident total
1	2
2	3
3	6
4	8
5	4

*Table 46. Resident scores: category helpfulness value*

The respondents were also asked how well they feel that their opinions as house owners/residents are taken into account when making decisions regarding the nature reserve. This received the average score of 2.61 (standard deviation 1.23). Those who commented generally felt that their opinions are not taken properly into account. One respondent stated that those opinions that do not “correspond with increasing emphasis on tourism” are not taken notice of. It was also mentioned that [the municipality of] Ísafjarðarbær took no notice of the comments from a majority of the landowners when the local plan for Fljótavík was determined. One respondent voiced the opposite opinion, stating that for four decades, “the opinions of a majority of landowners (the Landowners’ Association of Sléttu- and Grunnavíkurbætur) have been respected in decision-making in the area.”

House owner opinions	Resident total
1	6
2	4
3	7
4	5
5	1

*Table 47. Resident scores: “How well are house owners’ opinions taken into account?”*

Finally, the residents were asked for any other thoughts they might have about Hornstrandir being recategorized as a Wilderness Area, and how they think it might affect their life as a resident in the area. Of the eight people who responded, three emphasized the need of continuous protection of the landowners' rights, the right to build summerhouses on private lands, and the importance of consulting the landowners "on decisions and planning on the area". Comparatively, the landowners responsibilities were also emphasized by three respondents, including the enforcement of rules and supervision for new buildings. One respondent expressed the concern of "increased level of service for tourists, by building huts, increasing vehicular access for quad bikes, jeeps and so forth", noting that she would not like to see the area become "a summerhouse area like [the more developed, popular cottage area of] Skorradalur or similar places". Another respondent, however, stated that there is a need in the area for more money to create hygiene facilities for tourists. Two people mentioned the ongoing debate over the full protection of the arctic fox and its effect on the local birdlife, calling for more research in the area to solve the issue.

## 5.4 Comparison and general observations

### 5.4.1 The human impact aspects

Human impact aspect	Tourist disturbance average	Worker disturbance average	Resident disturbance average
Buildings	2.18	3.17	2.21
Campsites	1.90	2.50	2.04
Tourists	2.27	3.58	2.38
Residents/others	1.80	2.67	2.17
Trails	1.45	2.58	2.21
Litter	3.60	2.83	4.04
Boats	1.54	2.00	2.13

*Table 48. Disturbance value averages of each group given to each human impact aspect. Rounded to the nearest 0.01.*

The table above shows the disturbance averages given by each interviewed group to each human impact aspect. It is notable that each aspect apart from litter and boats has received the highest disturbance score from the worker group and lowest score from the tourist group. This may reflect the differences in mindset, as the tourists presumably arrive to the area with more positive approach. Additionally, they spend less time in the area than the other two groups, and thus see less of the disturbing factors.

Litter receives the highest disturbance score from both the tourist group and the resident group. In both groups, the score is significantly higher than that of any other aspect. From the worker group litter receives only the third highest score, after tourists and buildings.

There is more dispersion in selecting the least disturbing aspect. The tourist group gives the lowest score to marked hiking trails, while the worker group gives lowest score to boats and the resident group to campsites.

The average score of all human impact aspects given by tourists is 2.11, by residents 2.45, and by workers 2.76. This, again, may reflect the fact that tourists arrive to the area with the most positive approach and spend the smallest amount of time, whereas the workers presumably have a more neutral approach, and spend more time in the reserve than the tourists.

Looking at the additional comments given by respondents in each group, it is notable that most respondents find roughly the same features most disturbing and most precious. When commenting the buildings, the almost unanimous opinion of the respondents was that the existing old, traditional architecture that blends into the environment does not affect their wilderness experience, but new, modern and large buildings would have a significant negative effect.

Regarding campsites, the predominant opinion supported campsites that are discrete and simple. Respondents from each group also emphasized the role the campsites and their facilities play in protecting the environment from excessive human impacts. Similarly, trails were supported as they help in controlling and minimizing the effect the hikers have on the vegetation. Additionally, the preference for markings that blend well with the environment was expressed by respondents from all groups.

The presence of other people also received mostly supportive comments, albeit with slight reservations. Both the residents and the tourists expressed their appreciation for the chance to meet like-minded people, and it was found by tourists that the presence of summertime residents adds to the feeling of safety and security. However, all three groups emphasized the need to regulate and control human actions, especially in terms of motorized vehicles. The presence of low-flying aircrafts received almost unanimous condemnation. The day tour groups and the associated boat traffic were also found disturbing by individual respondents.

The presence of boats on the coasts divided opinions somewhat. The residents were mostly supportive, noting that the boats are essential in getting in and out of the reserve. The other two groups were slightly more reserved, admitting that as long as the amount of boats is

kept low they are not very disturbing, but daily visits from day tour boats, as well as louder private boats, somewhat affected the wilderness experience.

Litter was also unanimously condemned, but it was admitted that there is relatively little litter in the reserve, and that a major amount of litter on the shores comes from outside the reserve. Each individual's responsibility of removing their own litter was emphasized in multiple responses.

The most common "other factors" affecting each respondents' own wilderness experience were peace, solitude and different aspects of the nature itself, among which the contact with animals unafraid of humans. Most commonly mentioned negative aspects were different sources of noise pollution, particularly motorized vehicles. Homeowners who act disrespectfully towards the reserve's rules were also mentioned by respondents in all groups.

#### **5.4.2 Opinions on Hornstrandir as a Wilderness area**

The tourists were the most supportive towards the reserve becoming officially a Wilderness area, giving it the average score of 4.36, against 3.58 from workers and 3.78 from residents. In the comments from all groups it was suggested that the category applies well and would be helpful in regulating and preserving the area. The usefulness of such categorization received the average score of 1.90 from tourists, 3.58 from workers and 3.39 from residents. Residents appreciated the usefulness of international reference, while several tourists noted that they were largely unaware of such categorizations and/or their management implications.

In additional comments some of the residents and one worker expressed their concern of the resident's rights, while most respondents noted that the classification would be helpful in regulating human activities, including both residents and tourists. Both workers and residents expressed the wish that the categorization would increase the amount of ecological studies in the area, which would in turn help in the preservation of the environment and ecosystem.

## 6. Discussion

### 6.1 Hornstrandir as a Wilderness Area

It appears that the majority of stakeholders find Hornstrandir a place where wilderness can be experienced relatively undisturbed. If we consider the human impact aspect disturbance value  $\leq 3$  as acceptable for wilderness, to filter the negative answers, it is notable that only two aspects exceed that, namely litter (according to tourists and residents) and tourists (according to workers). As discussed above, this litter was stated by the respondents to be found only on the beaches, and most likely to be something brought in by the sea from outside the Reserve.

The majority of the interviewed stakeholders were also in support of the IUCN category Ib. All interviewed groups gave the category a  $\geq 3$  value (in fact, all groups gave a value of  $>3.5$ ). All groups seem to be in agreement that more regulation and scientific study is called for in the area, and that official category assignment for the reserve would be a feasible tool to try to achieve that.

Respondents from all interest groups also expressed the thought that the presence of an official categorization would help in controlling the unfavourable actions. Only the resident group expressed the fear that the categorization would have a negative effect on their own situation. Considering that both the tourists and the workers hinted that the resident activities need tighter control, their concerns might not be entirely without a cause.

A critical issue for the reserve, both from the viewpoint of the stakeholders and with regard to the IUCN Ib definition, seems to be the use of motorized vehicles, particularly aircraft. It is both outside the wilderness park definitions, and considered very disturbing for the wilderness experience. It is also notable that the assignment of Ib category does not, by itself, convey any real changes to the Nature Reserve protection. The preservation of Hornstrandir Nature Reserve cannot rely on the IUCN category assignment alone. Actually achieving “more regulation and scientific study”, as called for by the survey respondents, requires concrete actions from the park management and the Icelandic state.

It appears that majority of the Hornstrandir Nature Reserve fills the basic IUCN requirements for the Ib category. However, some areas, such as the village of Hesteyri, are too built-up to truly classify. As is stated by the IUCN:

*The key objectives [of a category Ib area] are biological intactness and the absence of permanent infrastructure [--] motorized use, and other indicators of modern or lasting technology. (IUCN 2008, p. 15.)*

Consequently, while large parts of the Hornstrandir Nature Reserve could be assigned the Ib category, some zoning is required for the most built-up areas. The current Icelandic legislation, as defined in the Nature Conservation Act, requires 5km buffer zones from human structures and other infrastructure (No. 44, 22 March, 1999). Using this existing legislation, it should be possible to identify the wilderness zones within the Reserve. Zoning out the areas that are not wilderness, and using them for visitor infrastructure, as both campgrounds and ingress points with information for wilderness-appropriate traveling, could be helpful in controlling the visitor impact on the wilderness zones. This would also be consistent with the *Iceland's National Strategy for Sustainable Development*, which requires man-made structures to be built outside of defined wilderness areas whenever possible (p. 22). Zoning can also be used to provide access for necessary motorized land use for the residents.

## **6.2 The stakeholder groups**

While it appears that all three stakeholder groups are in support of the preservation of the Hornstrandir area, understandably they have slightly different personal hopes and goals. While it is considered important that the area remains enjoyable for the future generations, human individuals tend to be somewhat reluctant to give up their own existing rights. It does appear, however, that the resident group will eventually have to face some changes, and that the amount of tourists will potentially reach its sustainable limit at some point.

Regarding the workers, it is interesting to note how their line of work affects their stance. A person doing a research on the residents seems to be more likely to offer preferences that align most consistently with the residents, while a person working in the tourism industry has a different perspective. Thus, as a group, the workers' motives are the most ambiguous.



There seems to be some divergence of opinions also within the resident group. Some respondents were in favour of more restriction, whereas others supported preserving the *status quo*. The residents seem to be most concerned about their rights to build on their own land, which is something that needs to be tightly controlled in a Wilderness area, according to the IUCN definitions. Additionally, a significant proportion of the residents seems to feel that their opinions are not taken properly into account in the reserve management.

All in all, it seems that there is enough common ground within and across the three groups to base fruitful discussion on. All stakeholder groups have expressed their willingness to advance the preservation of the reserve, and with appropriate management actions it should be possible to find a compromise acceptable to all parties.

### **6.3 The Icelandic wilderness**

While tourism, especially wilderness tourism, is one of the most thriving and fastest growing economy in Iceland, the country is facing an increasing loss of wilderness similar to most of the Western world (Ólafsdóttir and Runnström, 2011). Significant areas of Icelandic wilderness have been lost to industry during the past years, and tourism itself is reaching numbers that will in the long run have the potential to become unsustainable (Ólafsdóttir and Runnström, 2011). Additionally, according to previous studies, there seems to be a conflict between what is perceived as wilderness in Iceland, and what actually fits the country's own legal definition of wilderness. This may contribute to the rapid disappearing of the wilderness areas in Iceland.

The Hornstrandir Nature reserve offers one good option for a wilderness reservation site, as it is an area already dedicated to tourism and leisure use. As the area is relatively small, difficult to get to, and without significant natural resources, it is unlikely that the area will be wanted for industrial use. In addition, the area is exceptional for both ecological and historical reasons, and thus worth proper protection. Assigning the 1b category to the Reserve would be consistent with the Icelandic government's sustainable development strategy. However, the Icelandic nature conservation, in the Hornstrandir Nature Reserve

and elsewhere, needs to lean primarily on the national legislation as the purpose of the IUCN categories is to serve as a tool in international dialogue, not to replace existing national legislation.

## **6.4 Concluding remarks**

The categorization process in Hornstrandir is ongoing, and it remains to be seen what changes will take place and how they will affect the area and the stakeholders. The area warrants further study on various aspects, both ecological and sociological. Further research on stakeholder opinions, especially after the categorization becomes official, should provide useful for the park management.

Hornstrandir also provides an interesting example of previously inhabited land to be reclaimed for wilderness, even if the area is still seasonally habited. Both the ecological and sociological changes due to happen in Hornstrandir in the future should, if carefully studied and documented, also provide helpful for other similar projects elsewhere in Iceland and other areas. Additionally, conducting a more robust, preferably a more long-term study of the stakeholder views before the Ib assignment would be beneficial.

The Hornstrandir Nature Reserve is worth preserving partially for the very reason of its unusual combination of wilderness and historical human infrastructure. The Wilderness area category would ensure the preservation of the exceptional wildlife of northern Iceland, the conservation of the existing farmsteads could be provided by appropriate zoning.

While the IUCN category may provide to be a helpful tool in conserving the Nature Reserve, it should be kept in mind that the assignment does not, in itself, convey any additional protection. Some of the stakeholders have expressed their wish for more regulation and research for the reserve, but the category assignment alone will not provide either. If the management wishes to fulfill these wishes, it needs to look elsewhere.

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# **Appendix: Surveys**

## **Appendix A: Tourist Survey**

Dear Respondent,

Thank you for taking the time to respond to this survey. The survey is being conducted to provide information for research being conducted as part of a master's thesis for the University Centre of the Westfjords. The purpose of this survey is to gather the Hornstrandir visitors' opinions about the concept of wilderness, and how well they think the term 'wilderness' describes the Hornstrandir nature reserve.

Your participation in this research study is voluntary. The procedure involves filling the survey of eight pages, that will take approximately 20 minutes to complete. Your responses are confidential. No identifying information such as your name or address will be collected, and the information provided will remain confidential. The results of this study will be used for scholarly purposes only.

If you have any questions regarding the survey, please contact Vilma Kuuliala at [vilma-inkeri10@uwestfjords.is](mailto:vilma-inkeri10@uwestfjords.is)

**Information regarding your stay in the Hornstrandir nature reserve**

How long are you staying in the Hornstrandir nature reserve?

- One day (not staying overnight)
- 2-3 days
- 4-5 days
- 6-7 days
- Longer than 7 days

With how many people are you traveling?

- By myself
- With one friend
- In a group of 3-5 people
- In a group of 5-8 people
- In a group larger than 8 people

How many times have you visited Hornstrandir nature reserve before?

- This is my first visit
- 1-2 previous visits
- 3-5 previous visits
- More than 5 previous visits

In your own words, briefly explain what made you choose the Hornstrandir nature reserve as your destination.

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**Your perceptions of the wilderness of Hornstrandir**

In this section, you will be asked questions about your own opinion of how appropriate the term *wilderness* is to describe the Hornstrandir nature reserve. In each question, you are asked to select one number on the scale of 1 to 5. After each question, there is space reserved for any additional comments or thoughts you might have. Feel free to continue to the other side of the paper.

1. On a scale of 1 to 5 (1 meaning hardly at all, 5 meaning very much) how much does the presence of buildings affect your own experience of wilderness in Hornstrandir?

1 - 2 - 3 - 4 - 5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. On a scale of 1 to 5 (1 meaning hardly at all, 5 meaning very much) how much does the presence of campsites affect your own experience of wilderness in Hornstrandir?

1 - 2 - 3 - 4 - 5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**3.** On a scale of 1 to 5 (1 meaning hardly at all, 5 meaning very much) how much does the presence of other campers affect your own experience of wilderness in Hornstrandir?

1   -   2   -   3   -   4   -   5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**4.** On a scale of 1 to 5 (1 meaning hardly at all, 5 meaning very much) how much does the presence of marked hiking trails affect your own experience of wilderness in Hornstrandir?

1   -   2   -   3   -   4   -   5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**5.** On a scale of 1 to 5 (1 meaning hardly at all, 5 meaning very much) how much does the presence of local summertime residents affect your own experience of wilderness in Hornstrandir?

1   -   2   -   3   -   4   -   5

Comments: \_\_\_\_\_  
\_\_\_\_\_

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**6.** On a scale of 1 to 5 (1 meaning hardly at all, 5 meaning very much) how much does the presence of litter affect your own experience of wilderness in Hornstrandir?

1   -   2   -   3   -   4   -   5

Comments: \_\_\_\_\_

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**7.** On a scale of 1 to 5 (1 meaning hardly at all, 5 meaning very much) how much does the presence of boats on the nearby coastal waters affect your own experience of wilderness in Hornstrandir?

1   -   2   -   3   -   4   -   5

Comments: \_\_\_\_\_

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**8. What other factors affect your experience of wilderness in Hornstrandir?**

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## **Hornstrandir and the IUCN categorization**

The International Union for Conservation of Nature (IUCN), founded in 1948, maintains an international categorization (six separate categories) for protected areas. Up until now, the Hornstrandir nature reserve has been in the category V, *Protected Landscape*. However, the reserve is currently undergoing the transition to category Ib, *Designated Wilderness*.

Below, you will find short descriptions of both category Ib and category V, as well as their highlighted differences. Please take a moment to familiarize yourself with the descriptions.

### **Category V: Protected Landscape**

*A protected area where the interaction of people and nature over time has produced an area of distinct character with significant ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.*

### **Category Ib: Designated Wilderness**

*Protected areas are usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.*

**The main differences between category V and category Ib:**

<b>Category V: Protected Landscape</b>	<b>Category Ib: Designated Wilderness</b>
Category V protected areas comprise cultural landscapes and seascapes, shaped by (usually long-term) human intervention and usually containing sizable settled human communities.	Category Ib should be in as natural a state as possible and would only contain cultural landscapes if the intention were to restore these back to near-natural conditions.
Category V protected areas are not “wilderness” as defined by IUCN. Many will be subject to management intervention adverse to the concept of category Ib.	
Should have landscape and/or coastal and island seascape of high and/or distinct scenic quality and with significant associated habitats, flora and fauna and associated cultural features.	Should be free of modern infrastructure, development and industrial extractive activity, including but not limited to roads, pipelines, power lines, cellphone towers, agriculture including intensive livestock grazing, commercial fishing, low-flying aircraft etc., preferably with highly restricted or no motorized access.
Should have balanced interaction between people and nature that has endured over time and still has integrity, or where there is reasonable hope of restoring that integrity.	Should be characterized by a high degree of intactness: containing a large percentage of the original extent of the ecosystem, complete or near-complete native faunal and floral assemblages, retaining intact predator-prey systems, and including large mammals.
Should have unique or traditional land-use patterns, e.g., as evidenced in sustainable agricultural and forestry systems and human settlements that have evolved in balance with their landscape.	Should be of sufficient size to protect biodiversity; to maintain ecological processes and ecosystem services; to maintain ecological refugia; to buffer against the impacts of climate change; and to maintain evolutionary processes.
Would preferably have opportunities for recreation and tourism consistent with life style and economic activities.	Should offer outstanding opportunities for solitude, enjoyed once the area has been reached, by simple, quiet and non-intrusive means of travel (i.e., non-motorized or highly regulated motorized access where strictly necessary and consistent with the biological objectives listed above).

<b>Category V: Protected Landscape</b>	<b>Category Ib: Designated Wilderness</b>
<p>Would preferably have unique or traditional social organizations, as evidenced in local customs, livelihoods and beliefs.</p>	<p>Should be free of inappropriate or excessive human use or presence, which will decrease wilderness values and ultimately prevent an area from meeting the biological and cultural criteria listed above. However, human presence should not be the determining factor in deciding whether to establish a category Ib area. The key objectives are biological intactness and the absence of permanent infrastructure, extractive industries, agriculture, motorized use, and other indicators of modern or lasting technology.</p>
<p>Would preferably have recognition by artists of all kinds and in cultural traditions (now and in the past), and potential for ecological and/or landscape restoration.</p>	<p>May include somewhat disturbed areas that are capable of restoration to a wilderness state, and smaller areas that might be expanded or could play an important role in a larger wilderness protection strategy as part of a system of protected areas that includes wilderness, if the management objectives for those somewhat disturbed or smaller areas are otherwise consistent with the objectives set out above.</p>

### Hornstrandir and the IUCN categories

1. On a scale of 1 to 5 (1: hardly at all, 5: very much), how well do you think the concept of *Protected Landscape* (category V) applies to the Hornstrandir nature reserve?

1   -   2   -   3   -   4   -   5

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. On a scale of 1 to 5 (1: hardly at all, 5: very much), how well do you think the concept of *Designated Wilderness* (category Ib) applies to the Hornstrandir nature reserve?

1   -   2   -   3   -   4   -   5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. On a scale of 1 to 5 (1: hardly at all, 5: very much), how much do the official categories, such as the one maintained by IUCN, affect your choice of location when planning your holidays?

1   -   2   -   3   -   4   -   5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Personal information

In this section, you will be asked for information to assist in evaluating the survey results. As a reminder, all information submitted is anonymous.

Age:

- 0-10 years
- 11-20
- 21-30
- 31-40
- 41-50
- 51-60
- 61-70
- 71-80
- 81+

Gender:

- male
- female

Nationality: \_\_\_\_\_

Level of education (highest grade level completed):

- Elementary/Primary School
- High School
- College/University Undergraduate
- Masters' Degree
- PhD
- Other



Thank you very much for taking the time to complete the survey! As a reminded, any questions or comments can be directed to Vilma Kuuliala at [vilma-inkeri10@uwestfjords.is](mailto:vilma-inkeri10@uwestfjords.is)

## Appendix B: Worker Survey

Dear Respondent,

Thank you for taking the time to respond to this survey. The survey is being conducted to provide information for research being conducted as part of a master's thesis for the University Centre of the Westfjords. The purpose of this survey is to gather opinions from people who work in/with the Hornstrandir Nature Reserve, of the concept of wilderness, its appropriateness regarding Hornstrandir, as well as applying the IUCN category *Designated Wilderness* to Hornstrandir.

Your participation in this research study is voluntary. The procedure involves filling the survey of 10 pages, that will take approximately 20 minutes to complete. Your responses are confidential. No identifying information such as your name or address will be collected, and the information provided will remain confidential. The results of this study will be used for scholarly purposes only.

If you have any questions regarding the survey, please contact Vilma Kuuliala at [vilma-inkeri10@uwestfjords.is](mailto:vilma-inkeri10@uwestfjords.is)

**Information regarding your professional relationship with Hornstrandir nature reserve**

Which of the following options best describes your working relationship with the Hornstrandir nature reserve?

- Park Management
- Tourism/recreation
- Scientific study
- Educational
- Other

Please check all that apply.

- Full-time worker
- Part-time worker
- Volunteer
- Permanent worker
- Fixed-term worker
- Casual (time to time) worker
- Other

### **Your perceptions of the wilderness of Hornstrandir**

In this section, you will be asked questions about your own opinion of how appropriate the term *wilderness* is to describe the Hornstrandir nature reserve. In each question, you are asked to select one number on the scale of 1 to 5. After each question, there is space reserved for any additional comments or thoughts you might have.

**1.** On a scale of 1 to 5 (1 meaning hardly at all, 5 meaning very much) how much does the presence of buildings affect your own experience of wilderness in Hornstrandir?

1       -       2       -       3       -       4       -       5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**2.** On a scale of 1 to 5 (1 meaning hardly at all, 5 meaning very much) how much does the presence of campsites affect your own experience of wilderness in Hornstrandir?

1       -       2       -       3       -       4       -       5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**3.** On a scale of 1 to 5 (1 meaning hardly at all, 5 meaning very much) how much does the presence of tourists affect your own experience of wilderness in Hornstrandir?

1     -     2     -     3     -     4     -     5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**4.** On a scale of 1 to 5 (1 meaning hardly at all, 5 meaning very much) how much does the presence of marked hiking trails affect your own experience of wilderness in Hornstrandir?

1     -     2     -     3     -     4     -     5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**5.** On a scale of 1 to 5 (1 meaning hardly at all, 5 meaning very much) how much does the presence of local summertime residents affect your own experience of wilderness in Hornstrandir?

1     -     2     -     3     -     4     -     5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**6.** On a scale of 1 to 5 (1 meaning hardly at all, 5 meaning very much) how much does the presence of litter affect your own experience of wilderness in Hornstrandir?

1       -       2       -       3       -       4       -       5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**7.** On a scale of 1 to 5 (1 meaning hardly at all, 5 meaning very much) how much does the presence of boats on the nearby coastal waters affect your own experience of wilderness in Hornstrandir?

1       -       2       -       3       -       4       -       5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**8.** What other factors affect your experience of wilderness in Hornstrandir?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## **Hornstrandir and the IUCN categorization**

The International Union for Conservation of Nature (IUCN), founded in 1948, maintains an international categorization (six separate categories) for protected areas. Hornstrandir Nature Reserve is currently undergoing the process of being officially assigned to category Ib.

Below, you will find short description of category Ib. If you are not already familiar with the category, please take a moment to familiarize yourself with the description.

### Category Ib: Designated Wilderness

*Protected areas are usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.*

### **Category Ib in bullets:**

- Should be free of modern infrastructure, development and industrial extractive activity, including but not limited to roads, pipelines, power lines, cellphone towers, agriculture including intensive livestock grazing, commercial fishing, low-flying aircraft etc., preferably with highly restricted or no motorized access.
- Should be characterized by a high degree of intactness: containing a large percentage of the original extent of the ecosystem, complete or near-complete native faunal and floral assemblages, retaining intact predator-prey systems, and including large mammals.
- Should be of sufficient size to protect biodiversity; to maintain ecological processes and ecosystem services; to maintain ecological refugia; to buffer against the impacts of climate change; and to maintain evolutionary processes.
- Should offer outstanding opportunities for solitude, enjoyed once the area has been reached, by simple, quiet and non-intrusive means of travel (i.e., non-motorized or highly

regulated motorized access where strictly necessary and consistent with the biological objectives listed above).

- Should be free of inappropriate or excessive human use or presence, which will decrease wilderness values and ultimately prevent an area from meeting the biological and cultural criteria listed above. However, human presence should not be the determining factor in deciding whether to establish a category Ib area. The key objectives are biological intactness and the absence of permanent infrastructure, extractive industries, agriculture, motorized use, and other indicators of modern or lasting technology.

- May include somewhat disturbed areas that are capable of restoration to a wilderness state, and smaller areas that might be expanded or could play an important role in a larger wilderness protection strategy as part of a system of protected areas that includes wilderness, if the management objectives for those somewhat disturbed or smaller areas are otherwise consistent with the objectives set out above.

### **Hornstrandir and the IUCN categories**

1. On a scale of 1 to 5 (1: hardly at all, 5: very much), how well do you think the concept of *Designated Wilderness* (category Ib) applies to the Hornstrandir nature reserve?

1       -       2       -       3       -       4       -       5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**2.** On a scale of 1 to 5 (1: hardly at all, 5: very much) how helpful do you find this kind of categorization when discussing issues relating to Hornstrandir with other workers and professionals, summer residents, tourists, or other people interested in the reserve?

1     -     2     -     3     -     4     -     5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**3.** Any other thoughts you might have about Hornstrandir being recategorized as a *Designated Wilderness* area, and how you think it might affect your work.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### **Personal information**

In this section, you will be asked for information to assist in evaluating the survey results.

As a reminder, all information submitted is anonymous.

Age:

- 0-10 years
- 11-20
- 21-30
- 31-40
- 41-50
- 51-60
- 61-70
- 71-80
- 81+

Gender:

- male
- female

Nationality: \_\_\_\_\_

Level of education (highest grade level completed):

- Elementary/Primary School
- High School
- College/University Undergraduate
- Masters' Degree
- Doctorate
- Other

Thank you very much for taking the time to complete the survey! As a reminded, any questions or comments can be directed to Vilma Kuuliala at [vilma-inkeri10@uwestfjords.is](mailto:vilma-inkeri10@uwestfjords.is)

## Appendix C: Resident Survey

Ágæti þátttakandi,

Kærar þakkir fyrir að taka þér tíma til að svara þessari könnun.

Könnunin er framkvæmd í tengslum við rannsókn sem verið er að vinna sem hluta af meistaraverkefni við Háskólasetur Vestfjarða. Hornstrandafriðlandið, líkt og önnur friðlýst svæði á Íslandi hefur verið flokkað samkvæmt alþjóðaskilgreiningum um flokkun slíkra svæða. Hornstrandir flokkast í dag sem víðerni eða óbyggðarsvæði (wilderness/víðerni). Nánari skilgreining á flokkuninni er á næstu blaðsíðu.

Tilgangur þessarar könnunar er að safna upplýsingum um viðhorf þeirra sem dvelja í Hornstrandafriðlandinu á sumrin til hugtaksins „víðerni (óbyggðir)“.

Þér er í sjálfsvald sett hvort þú takir þátt í könnuninni. Könnunin fer þannig fram að fylltur er út 10 blaðsíðna spurningalisti á netinu, sem tekur um það bil 20 mínútur að klára. Svör þín verða meðhöndluð sem trúnaðarmál og upplýsingum svo sem nafn eða heimilisfang, er ekki safnað. Niðurstöður þessarar rannsóknar verða eingöngu notaðar í rannsóknarskygni.

Ef þú hefur einhverjar spurningar í tengslum við könnunina, vinsamlegast hafðu samband við Vilmu Kuuliala í tölvupósti [vilma-inkeri10@uwestfjords.is](mailto:vilma-inkeri10@uwestfjords.is)

## Upplýsingar tengsl þín við Hornstrandafriðlandið

1. Hvert af eftirtöldu lýsir þinni stöðu best?

- Eigandi gamals húss
- Eigandi nýs húss
- Annarskonar aðgengi að gömlu húsi
- Annarskonar aðgengi að nýju húsi

2. Hversu miklum tíma, að meðaltali, dvelur þú í Hornstrandafriðlandinu á hverju sumri?

- Minna en tvær vikur
- Tvær til fjórar vikur
- Allt að tveimur mánuðum
- Allt að þremur mánuðum
- Meira en þremur mánuðum

3. Hver er helsti áfangastaður þinn innan friðlandsins?

- Hesteyri
- Sæból
- Látrar
- Fljótavík
- Furufjörður
- veiðileysufjörður
- Hornvík
- Hælavík
- Annað

## Viðhorf þín til óbyggða Hornstrandafriðlandsins

Í þessum hluta verður spurt um viðhorf þín gagnvart því hversu viðeigandi er að nota hugtakið "Friðlýst víðerni" til að lýsa Hornstrandafriðlandinu. Í hverri spurningu ertu beðin/nn um að velja eitt númer á skalanum 1 til 5, 1 merkir mjög lítil – 5 merkir mjög mikil. Eftir hverja spurningu má bæta við athugasemdum ef einhverjar eru.

4. Á skalanum 1 til 5 hversu mikil áhrif hafa byggingar á svæðinu á upplifun þína af víðerni (friðlýst víðerni) Hornstrandafriðlandsins?

1       -       2       -       3       -       4       -       5

Athugasemdir: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. Á skalanum 1 til 5, hversu mikil áhrif hafa tjaldstæði á upplifun þína af víðerni Hornstrandafriðlandsins?

1       -       2       -       3       -       4       -       5

Athugasemdir: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. Á skalanum 1 til 5, hversu mikil áhrif hefur nærvera ferðamanna (dagferðamenn, göngufólk) á upplifun þína af víðerni Hornstrandafriðlandsins?

1       -       2       -       3       -       4       -       5

Athugasemdir: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**7.** Á skalanum 1 til 5, hversu mikil áhrif hefur nærvera annarra en ferðamanna á upplifun þína af víðerni Hornstranda

1     -     2     -     3     -     4     -     5

Athugasemdir: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**8.** Á skalanum 1 til 5, hversu mikil áhrif hafa merktar gönguleiðir á upplifun þína af víðerni Hornstrandafriðlandsins?

1     -     2     -     3     -     4     -     5

Athugasemdir: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**9.** Á skalanum 1 til 5 hversu mikil áhrif hefur rusl á víðavangi áhrif á upplifun þína af víðerni Hornstrandafriðlandsins?

1     -     2     -     3     -     4     -     5

Athugasemdir: \_\_\_\_\_

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**10.** Á skalanum 1 til 5 hversu mikil áhrif hefur nærvera báta á fjörðum og víkum á upplifun þína af viðerni Hornstrandafriðlandsins?

1      -      2      -      3      -      4      -      5

Athugasemdir: \_\_\_\_\_

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**11.** Hvaða aðrir þættir hafa áhrif á upplifun þína af viðerni Hornstrandafriðlandsins?

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## Hornstrandir og IUCN flokkunin

Alþjóðlegu náttúruverndarsamtökin (enska: The International Union for Conservation of Nature (IUCN)), voru stofnuð árið 1948. Þau hafa búið til og viðhaldið alþjóðlegri flokkun (sex aðskildra flokka) fyrir vernduð svæði. Hornstrandafriðlandið er skilgreint í flokki sem kallast Ib (wilderness) og útleggst sem víðerni hérlendis (óbyggðir).

Fyrir neðan geturðu séð stutta lýsingu á flokki Ib.

Flokkur Ib:

Óbyggðir (wilderness area), Friðlýst víðerni

Vernduð svæði, yfirleitt stór land- eða hafsvæði sem eru lítt mótuð af mannum og hafa haldið í náttúruleg einkenni sín og áhrif. Þar er ekki varanleg eða umtalsverð búseta. Vernd og stjórnun svæðanna miðar að því að varðveita náttúrulegt ástand þeirra.

Flokkur Ib:

- Vera laus við nútíma uppbyggingu (innviða) og tækni eða iðnaðar, s.s. vegir, rafmagnslínur, fjarskiptamöstur (GSM), olíu- eða gasvinnslusvæði, flugstöðvar, varanlegar byggingar (þ.e. óafturkræfar, t.d. stíflumannvirki), landbúnaðarsvæði, s.s. akrar, beitarhólf o.fl., atvinnuveiðar, lágflugssvæði flugvéla og aðgangur vélknúinna farartækja er afmarkaður (háður leyfum).

- Stór hluti svæðisins lítt eða ósnertur, þ.e. vistkerfi þróast sjálfstætt, jafnt dýralíf sem gróður. Stærð tryggir að náttúrulegar heildir varðveitist.

- Hafa nægilegt rými (pláss) til þess að vistkerfi og vistkerfapjónusta nái að þróast og geti tekist á við utanaðkomandi áhrif (hafi svigrúm, buffer, til þess), þ.e. geti tekist á við náttúrulegar breytingar s.s. hnattræna hlýnun eða aðra utanaðkomandi þætti.

- Geti boðið uppá kyrrð og ró án truflandi utanaðkomandi hluta s.s. vegna umferðar, iðnaðar, innviða o.s.frv. Náttúran og hljóð hennar ráðandi á svæðinu. Jafnframt geti gestir upplifað einveru og náð að máta sig við umhverfið.

- Vera laus við umfangsmikil not, umferð eða fólksfjölda sem hafa truflandi áhrif á og draga úr náttúrulegum gildum svæða og rýra vistkerfi, dýra- og plöntulíf. Hinsvegar má aðkoma almennings ekki draga úr flokkun í 1b. Lykilllutverkið er varðveisla náttúrunnar og lífkerfa (vistkerfa) með því að draga úr áhrifum mannlegrar tækni og athafna.

- Röskuð svæði sem endurheimta má til fyrra horfs og lítil svæði sem reikna má með að stækki eða lítil svæði sem leika mikilvægt hlutverk í heildarkerfi margra friðlýstra svæða geta fengið skilgreiningu 1b að uppfylltum ofangreindum skilyrðum og stjórnunarstefnu sem tilheyrir 1b svæðum.

**12.** Á skalanum 1 til 5, hversu vel telur þú að skilgreining á hugtakinu Friðlýst víðerni (Flokkur 1b) eigi við um Hornstrandafriðlandið?

Athugasemdir: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**13.** Á skalanum 1 til 5, hversu gagnleg heldur þú að slík flokkun sé þegar rætt er um Hornstrandafriðlandið við landverði, landeigendur, ferðamenn, eða aðra áhugasama um friðlandið?

1      -      2      -      3      -      4      -      5

Athugasemdir: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**14.** Á skalanum 1 til 5, hversu mikið tillit telur þú að tekið sé til þinna skoðana sem landeigandi/notandi þegar verið er að taka ákvarðanir um friðlandið?

1      -      2      -      3      -      4      -      5

Athugasemdir: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**15.** Eitthvað annað sem þú myndir vilja koma á framfæri varðandi að flokka Hornstrandafriðlandið sem Friðlýst víðerni, og hvernig þú heldur að það hefði áhrif á þig sem landeiganda/notanda.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Persónulegar upplýsingar

Í þessum flokki, verður þú beðin/nn um að gefa upplýsingar sem aðstoða við að vinna bakgrunnsbreytur fyrir rannsóknina. Ítrekað er að allar upplýsingar eru meðhöndlaðar sem trúnaðarmál.

### 16. Aldur

- 0-10 ára
- 11-20
- 21-30
- 31-40
- 41-50
- 51-60
- 61-70
- 71-80
- 81+

### 17. Kyn

- Karlmaður
- Kvenmaður

18. Þjóðerni: \_\_\_\_\_

### 19. Menntun (hæsta gráða sem hefur verið lokið)

- Grunnskóli
- Menntaskóli
- Grunnháskólagráða (BA/BSc/BEd)
- Meistaragráða (MA/MSc)
- Doktorsgráða
- Annað

Takk kærlega fyrir að taka þér tíma til að ljúka könnuninni! Munið að ef einhverjar spurningar vakna er velkomið að hafa samband við Vilmu Kuuliala í tölvupósti [vilma-inkeri10@uwestfjords.is](mailto:vilma-inkeri10@uwestfjords.is)