UNIVERSITY OF GOTHENBURG

DEPARTMENT OF MARINE SCIENCES

NON-MARKET GOODS DERIVED FROM RESTORING FLADS, ARE THEY WORTH THE TROUBLE?

Combining ecological and economic knowledge.

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Abstract

The quark archipelago is home to a unique environment called flad. These shallow lagoons are, trough an uplift up to 1cm year^{-1}, changing appearance rather quickly and therefore create a niche environment. In Västerbotten, three flads were restored at their threshold with the ambition of increasing some of the *ecosystem services* and *ecosystem goods* received from a flad. These are located at Halsskärgraven, Inre Bastufjärden and Ytteravan. By using the *stated preference method*, or more precise the *contingent valuation method*, this study identifies the non-market values received from an increase in six ecosystem goods received by the nearby property owners, for these three flads. An *interval open-ended* method was used to identify respondents' true *willingness to pay*. The study identifies if there is a difference between *users* and *non-users* in which ecosystem goods that are important while also identifying their willingness to pay. It further looks into the differences between locations in terms of total willingness to pay. The three major findings are (a) users and non-users seem to value different ecosystem goods as important, however the total willingness to pay was not significantly different between users and non-users, (b) the total willingness to pay was significantly different for Inre Bastufjärden compared to the other two locations and (c) the total willingness to pay varied between 28 077-74 774 SEK in Halsskärgraven, 9 338-17 388 SEK in Inre Bastufjärden and 33 775-54 915 SEK in Ytteravan. The study further concludes that about 11-30% (Halsskärgraven), 19-35% (Inre Bastufjärden) and 31-50% (Ytteravan) of the costs could be argued for by economic benefits received from the non-market ecosystem goods, by the nearby property owners. This gives an indication of the importance in the usage of the stated preference method.

Popular scientific summary

What is a flad?

Along the *Quark* (*Kvarken*) archipelago, you can find shallow lagoons. These lagoons, or so called flads, are in constants change since there is a strong uplift, up to 1cm^{year-1}. This causes the flad to transform from a coastal shallow lagoon, to more of a lake. Since these lagoons provide good shelter from storms, many have been dredged to be able to safely store a boat in the flad. However, this has a negative impact on several species which in turn can have a negative impact on us humans. During 2016-2020 the County Administrative Board of Västerbotten restored the threshold for three flads in Västerbotten. These were located at Halsskärgraven, Inre Bastufjärden and Ytteravan.

Ecosystem good

Ecosystem goods is a word used to describe goods that humans receive from the nature. Some of the ecosystem goods that can be received from a flad is: Recreational fishing, water clarity, algae bloom prevention, a high biodiversity, climate change prevention and an aesthetic value. An ecosystem good can therefore both be something you physically get, but it can also be an experience, which is further explained in 'Economic definitions'.

Economic definitions

Ecosystem good can be divided into two groups: those who have a market price, and thereby can easily be valued, and those who do not have a market price. The non-market values can in turn be divided in to two groups: those who use a good, and those who do not. But how can you evaluate something that does not have a market price? The only known way to include both those who use a good and those who do not, is by using a survey.

In this study

In this study, people who owned a property close to the three flads Halsskärgraven, Inre Bastufjärden and Ytteravan, were surveyed in order to find how they valued some of the ecosystem goods that were expected to increase after the flads were restored. The most interesting findings were that (a) it seems that the ones using the flad value ecosystem goods differently compared to the ones not using the flad, however there was no difference in the total amount they were willing to pay when comparing the three locations, (b) the valuation in Inre Bastufjärden was significantly smaller than in the other two locations and (c) the total value of the six non-market ecosystems goods was valued to between 28 077-74 774 SEK in Halsskärgraven, 9 338-17 388 SEK in Inre Bastufjärden and 33 775-54 915 SEK in Ytteravan.

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1. Introduction

1.1 Values from ecosystems

Ecosystems are complex and contain biological and geological structures which, depending on their texture, create an array of environments. In these environments, a variety of different systems exists, where some can be of benefit to humans. These systems are called ecosystem services and are, as mentioned, services provided by nature which can be beneficial to humans. Ecosystem services (ESs) can further be divided into three sub-categories: *provisional*, *regulating*, and *cultural*. Provisional services contribute to ecosystem goods (EGs) such as food and medical resources, and could further be described as goods that have the potential to become a market product. Regulating services on the other hand, are services the e.g. helps mitigate atmospheric CO^2 and gives resilience against pollution and invasive species. Lastly, cultural services explain the value in an environment's aesthetics and recreational value.

Describing both ESs and EGs can sometimes lead to confusion among which is which. While an ES explain a service, the EG is the extraction from human activity. For example, a recreational fisherman catches two fishes - here, the ecosystem service would be the production of fish in the lake, while the ecosystem good is the two fishes caught by the fisherman.

ESs and EGs have often been used to try and evaluate the economic value that can be linked to an ecosystem. In doing so, questions regarding their relevance have been tested (Hausman, 2012). Economists, ecologists, and policy analysts have different opinions regarding this matter, where some point to their importance (Heal et al. 2005), while others argue that they are misleading (Chee, 2004; Sagoff, 2008). However, valuating EGs can help policy makers address important ecological issues. They can therefore be an important tool in conserving and restoring ecosystems, but should be addressed with caution.

1.2 Transforming non-marketed ecosystem goods to an economic value

Economists divide values received from ES' into five groups: *Direct* and *indirect values* (categorised as *use-values*), *existence* and *bequest values* (categorised as *non-use values*) and *option values* (Hernández et al, 2014). A use-value is a value that one gets from using the environment e.g., by fishing (direct) or drinking water purified by a mire (indirect). A non-use value on the other hand, is the value one can have without using the environment e.g., the value of knowing of its existence (existence) or the value in knowing it will be preserved for future generations (bequest). The option value describes the value in being able, to in the future, choose if you want to use the environment. In all five categories there are values called non-market values. These values are described as products that do not have a value on a market, e.g., the possibility to walk in a forest. One of the most used tools to evaluate non-market values are by using the *revealed preference* method (Bockstael and McConnell, 2010). The revealed preference method identifies what the public is willing to pay for being able to use a region by estimating a cost that was necessary to pay for using the region. This cost could be the cost for traveling to the region or the difference of market priced housing in the region compared to

another region of similar trait (Mayer and Woltering, 2018; Spanou et al, 2020). However, the revealed preference method can only capture the non-marked value from use-values and fails to capture the non-use values. To be able to capture the economic value of all non-marked values, another tool is needed, called the stated preference method (Johnston et al, 2017).

The *stated preference* (SP) method is an approach to estimate an economic value of a public good by asking participants what they would be willing to pay for a change (Johnston et al, 2017). Using SP as a method is, as earlier mentioned, the only known way to capture the economic value from all non-market values and is thus an important tool when estimating the economic value from e.g., ES' (Carson et al, 2001). Multiple variants of the stated preference method exist, but the two most common are the *contingent valuation* (CV) method, and the newer *choice experiment* (CE) method (Johnston et al, 2017). A CV study is constructed to ask the participant what they would be willing to pay for a proposed change (Carson et al, 2003). CE studies on the other hand, asks the participants to choose between multiple alternatives of change (Johnston et al, 2017).

The SP method became popular during the Exxon Valdez case in 1989, after a ship ran aground at Prince William Sound, in Alaska. The ship released more than 40 million litters of crude oil which spread over 1300 miles of shoreline (Carson et al, 2003; Kling et al, 2012). Estimates showed that about 250.000 birds, 2800 otters and more than 250 seals were lost by the oil spill (Kling et al, 2012). The oil spill led to the state of Alaska and the U.S government using a SP method, or more precise - the CV method, to investigate the lost economic value of non-market public goods (Carson et al, 2003). Exxon responded with their own study where they argued that CV studies were not able to capture non-market values in a reliable way (Hausman, 1993). Since both sides investigated the reliability of CV studies, the Exxon Valdez case led to an increase in method development regarding CV method and their credibility (Kling et al, 2012). Carson et al. (2003) estimated that the damage from Exxon Valdez oil spill were 4.9 billion dollars, in comparison with Hausman et al. (1995) who estimated the damages to 3.8 billion dollars. The difference of 1.1 billion dollar were believed to derive from Carson et al.'s (2003) capability to also capture the non-market values lost in the accident.

There are two ways to identify the economic value from a SP study when asking participants what they think the chosen good is worth. The first, and most used one, is to ask the participants what their *willingness to pay* (WTP) would be (Younjun et al, 2015). Another way is to instead ask the participants what they would be *willing to accept* (WTA) as compensation for losing a good (Younjun et al, 2015). It is important when creating a SP study to carefully consider which of the two methods to use, since studies has shown that the two different methods can result in a difference in economic value (Kim et al, 2015). Moreover, the study should also thoroughly explain the scenario that the participants are expected to value, include a no-answer option, be pretested, and have clearness regarding how payment will be input (Johnston et al, 2017). Johnston et al. (2017) further describes recommendations (in total 23) when constructing a SP study.

SP methods has been a controversial subject for a long time. Questions regarding if the hypothetical nature of the SP method can reflect anything else than a hypothetical scenario, and thereby does not mirror the true economic value of the good, has been challenged by economists (Scott, 1965; Hausman, 2012). Some argue that SP studies at their best can be incomplete and at their worst be misleading (Carson et al, 2001). However, as Carson et al., (2000) wrote:

> 'Without stated preference survey methods, though, economists have to admit that they are not measuring the passive use aspects of environmental and other non-market goods, and that these are the aspects about which people may care about most.'

1.3 Shallow lagoons, called flads

There is a unique form of environment in the northern Baltic archipelago. Around the Quark (Kvarken), there is an uplift up to 1 cm year $^{-1}$ (Vestøl et al, 2019). This creates an environment that is in constant change, parts of the eastern Quark archipelago have therefore been placed on the UNESCO World Heritage Natural World Heritage Site. Along the coastline of the Quark, there are shallow lagoons called *flads* that are a unique environment for the Baltic Sea. Because of the flad's ability to, in a geological perspective, change in appearance rather quickly, they have been subcategorised into four groups: *juvenile flads, flads, gloeflads* and *gloes* (Figure 1). A juvenile flad has started to form an underwater threshold, but the effect on water change has however not changed (Figure 1.1). A flad on the other hand, has an increased threshold which limits some of the water exchange from the sea to the flad (Figure 1.2). Next is a gloeflad, where the threshold is almost at the hight of the standard water level, which limits the water exchange from the sea even further (Figure 1.3). The fourth stage is called a gloe, the threshold has now raised above the standard water level, and water exchange from the sea only occurs during storms or high water (Figure 1.4).

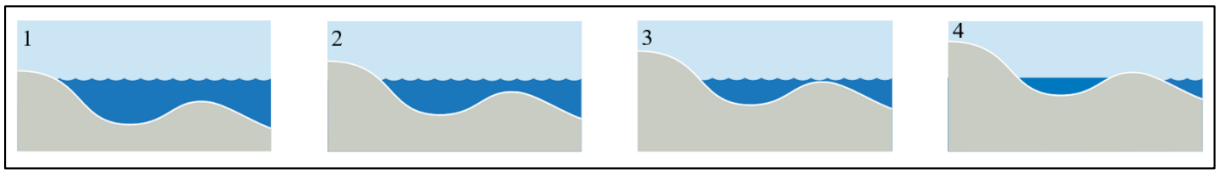


Figure 1. A representation of a flad's four stages: (1) Juvenile flad, (2) flad, (3) gloeflad and (4) gloe (Saarinen, 2019a).

The further the flad goes from a juvenile flad, to a gloe, the more isolated it becomes - and the warmer it gets during spring (Saarinen, 2019a). This creates spawning grounds for species such as pike (*Esox lucius*) and perch (*Perca fluviatilis*), who needs warmer temperatures for their reproduction (Ilvessalo-Lax and Mikkola, 2019). It also increases biodiversity by attracting birds, bats, insects, and a variety of vegetation (Ilvessalo-Lax and Mikkola, 2019). A general increased abundance of aquatic vegetation is not only a basis for an increase in abundance of fish (Massicotte et al, 2015), but also mitigates atmospheric CO^2 (Tokoro et al, 2014), reduces turbidity and improves water clarity (Madsen et al, 2001). It further creates competition with e.g., the algae *Scenedesmus obliquus* for nutrients, which reduces algae blooms (Lürling et al, 2006). A further detailed visualization of all functions, services and goods that flads give, and

how they affect each other has been summarized in figure 2. Some of the services and goods for figure 2 were collected from Ilvessalo-Lax and Mikkola (2019).

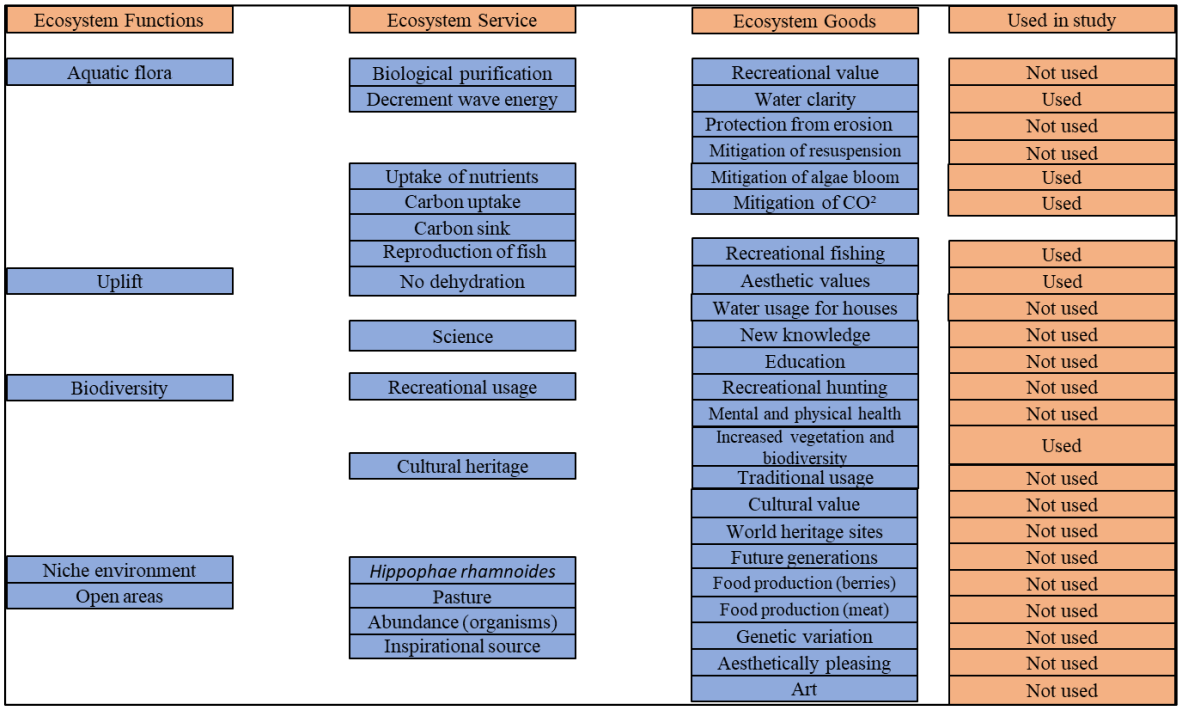


Figure 2. Ecosystem functions, services and goods received from flads, as well as specification of which goods that were used in the survey.

About 55% of the flads in Västerbotten are affected by human activity, often by dwelling or dredging (Saarinen, 2019a). The reason to dredge the threshold lays in the interest of storing boats in a calm lagoon and being able to easily exit the flad when needed (Saarinen, 2019a). However, this increases the water exchange with the sea which decreases the water temperature in the flad - especially during spring. The increased exchange of water can also lead to an increased salinity level in the flad, and cause drought (Saarinen, 2019a). Moreover, boating in coastal zones can lead to upstirrring of sediment, the release of toxins and create noise pollution which all can have a negative effect on the aquatic environment (Moksnes et al, 2019).

During 2016-2020, the County Administrative Board of Västerbotten collaborated with national and regional authorities in Ostrobothnia to restore coastal environments of importance in the Quark archipelago. The project was named *Kvarken flada* and the objectives were to study the status and ecological importance of flads while also test restoration methods. Three flads on the Swedish side of the Quark were restored at the threshold, these flads were located at Inre Bastufjärden, Halsskärgraven and Ytteravan (figure 3). Both Inre Bastufjärden and Halsskärgraven are in the municipality of Robertsfors, north of Umeå. Ytteravan, on the other hand, is in the municipality of Nordmaling, south of Umeå. This flad is positioned in a nature reserve. The flads have a size of 0.17km^2, 0.20km^2 and 1,83km^2, where Inre Bastufjärden is the smallest and Ytteravan the largest. Halsskärgraven was restored in 2018, Ytteravan in 2019, and Inre Bastufjärden in 2020. After the restoration of Ytteravan in 2019, the restoration needed to be supplemented and continued in 2020 (Saarinen, 2019b). All restoration efforts focused on

refilling the thresholds that were once dredged. Further, in Halsskärgraven the restoration led to the relocation of a small jetty that earlier was located inside the flad, to be combined with another jetty outside of the flad (Saarinen, 2019a). The cost of restoration in Inre Bastufjärden was 50 000 SEK, in Halsskärgraven 250.000 SEK, and in Ytteravan 109.000 SEK (Saarinen, 2019a). The extra measures that were assigned for Halsskärgraven likely increased the costs of the restoration.

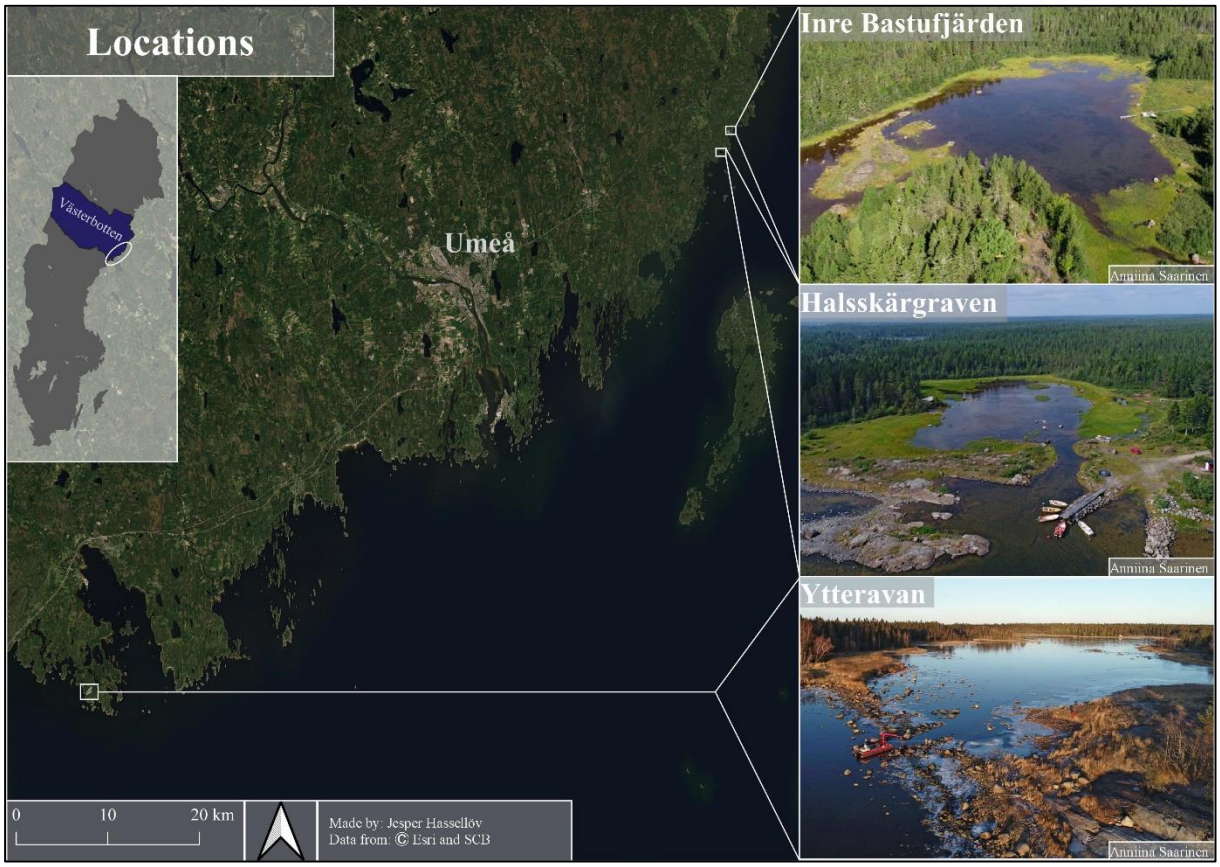


Figure 3. The three chosen locations for this study: Inre Bastufjärden, Halsskärgraven and Ytteravan.

1.4 Aims

This thesis aims to provide knowledge on how nearby property owners around three flads in the county of Västerbotten value non-market EGs received from their specific flad - in order to pinpoint the non-market values and thereby guide authorities and stakeholders in the importance of non-market values. Nearby property owners likely have a relation to their flad which in turn creates non-market values and this is therefore an interesting population to study. The thesis will further examine if the total WTP differs between the three locations, to help authorities identify if the result can be generalized, or if local studies are needed. Moreover, since the revealed preference method often is considered to be more confident than the stated preference method, this study will identify if there is a difference in WTP between use and non-use values for the three locations - in order to reveal the relevance of using a stated preference method instead of the revealed preference method when valuing flads. The study further investigates if there is consistency in the way respondents tend to value the three factors: stated

importance, percentage willing to pay and the WTP. Lastly, the total WTP calculated for a specific location will be compared with the cost of restoring the flad. The study thereby asks the following questions:

- Is there a difference between users and non-users WTP?
- What are respondents willing to pay for an improvement of the EGs given by the flads?
- Does the total WTP differ between respondents from different locations?
- Is there a relation between respondents' choice in regards to stated important, the percentage willing to pay and WTP?
- How does the economic value from the hypothetical scenario, stand in relation to the restoration costs?

2. Method

2.1 Definitions of exclusion

2.1.1 Protest votes

In some cases, respondents do not state their true WTP and instead give an answer of not wanting to pay. Depending on the reason for not wanting to pay, a respondent can be classified as a protest vote (Meyerhoff and Liebe, 2007). A follow-up question is often added to the survey, to be able identify respondents who answered with a protest vote. One reason to why respondents protest has been formulated by Mitchell and Carson (1989) as respondents 'refusing to play the game'. This becomes an issue when trying to value a populations true WTP, where protesters risk minimizing the true WTP of a population and are therefore considered to be excluded when calculating WTP (Frey and Pirscher, 2019).

In this study, if the respondent answered that the reason for not wanting to pay for an increase in EG/s was because they had an objection against the survey or the payment vehicle, they were considered a protest vote. Furthermore, if the respondent did not want to pay because they did not believe it was right that they needed to pay for the restoration and that it instead should be paid by a governmental organisation, or if they thought more information was needed before answering, then they were also considered a protest vote (Frey and Pirscher, 2019). If a respondent answered that they were not (or was not sure if) willing to pay for a change (and by the definitions described above, was considered a protest vote), then the respondent was discarded from the analysis on WTP. However, they were still included when calculating the response rate for the socioeconomic factors, importance of EGs and percentage of respondents willing to pay.

2.2 Survey

Inspiration when designing the survey were not only taken from the 23 steps described by Johnston et al., (2017), but also from Östberg et al., (2010). The decision to make a WTP based study (instead of WTA) was judged to be the most realistic choice since the three flads already was depredated and had been restored.

Data regarding ES' was obtained from Ilvessalo-Lax H. & Mikkola R. (2019) and EGs were developed from these ES'. The EGs that were relevant for the three restored locations, and which were feasible to implement in the survey, were included in the survey and are visualized in figure 2. People who were chosen for the study will hereon be called participants before receiving their answers and respondents afterwards. This study defines 'nearby property owners' as the 50 closest to the specific flad. The number of participants was defined with two goals in mind. First, the objective was to study property owners who owned property near one of the three flads, increasing the number of participants would therefore also increase the distance from the flad and risk diminishing the thesis' interest. Secondly, there was an economic limitation which constrained the number of participants that could be included, since most surveys likely would be sent by letter.

The GIS-software QGIS was used to identify which property owners who were the fifty closest to the specific flad. Data regarding property subdivision in the region of the flads were collected and downloaded from the Swedish University of Agricultural Sciences (SLU) data bank for geodata. Polygon layers were created for the three flads, this was used to measure the distance between property owners with the flads. Next, a layer for each flad was created containing the 50 closest property owners. Lantmäteriet's search engine 'Vem äger fastigheten?' (who owns the property) was first used to identify the owners of properties. However, since the search engine only allowed five searches a day, an order on remaining property owners (adding up to fifty per location) was sent to Lantmäteriet. The order was delivered by letter and needed to manually be organized in the Excel sheet. The order contained up to two owners with their respective addresses. Obtaining the addresses of where the participants lived was very important since most of the houses around the flads were holiday homes.

Next step was to look up the phone numbers of all the chosen participants. If there were two owners for the same property, the first one on the list given by Lantmäteriet was chosen. All the participants who had a visible phone number on the web, were called once. If they answered, the call would contain a presentation of what a flad was and why they were chosen for the survey, following with a question if it would be alright to send them a survey. Participants who weren't interested in answering the survey were excluded. Participants who were interested in answering the survey were given the option to either get the survey by letter or email. They were presented with this option to try and increase the number of participants answering the survey and at the same time, lower the cost for the study. Earlier studies show that no difference can be seen when answering a survey online compared to answering by letter (Olsen, 2009), which was also assumed for this study. A voicemail was recorded for participants who did not answer when called, but who had the function of a voicemail. The voicemail contained the same information as mentioned for those who answered. A text containing the same information as above was sent to participants who had a mobile number and did not answer when called and who did not have a voicemail. A letter-based survey was also sent to participants who did not respond and to those who could not be reached.

The survey was divided into five parts, where the first section contained information regarding why the participants received the survey, what a flad is, the restoration efforts done, the length of the survey and that the respondents were completely anonymous (appendix 1). The second section (question one to three) focused on participants knowledge regarding the restoration measures executed by the County Administrative Board of Västerbotten and participants usage of the flad. The third section (question four to twenty-four) contained questions regarding a hypothetical increase of five EGs after ten years, plus one EG that changed directly after the restoration. The participants were asked to value these EGs, both by their stated importance, and by their WTP for the increase of the EGs. They were also asked to answer in what way they had a connection to the flad, to capture which of the five usages (direct, indirect, bequest, existing or option) that their WTP depended on, and to answer questions regarding if they were or were not willing to pay for the increase of EGs. This measure was taken to try and capture protest votes. The fourth section (question twenty-five to thirty) contained question regarding

their socioeconomic situation, such as their age, income, and highest educational level. Participants were lastly thanked for their participation, given direction to where more information regarding the project Kvarken flada could be found and how to get a free copy of this study. Information regarding when and how to send the survey back and space to write their thoughts regarding the survey was also included.

Vossler and McKee (2006) identified that respondents sometimes found it difficult to state their WTP when they were asked to state an exact amount. Hence, the survey used an interval open-ended method, described by e.g., Håkansson (2008). This method gives the participants the room to express their WTP through an interval. The true value that participants were willing to pay is believed to lie in between this interval (Östberg et al. 2010).

The survey was tested by a small group containing three volunteers, before posting and mailing the survey. Some key questions were put forward during the test. For example, the volunteers first did not understand that there was more than one question regarding their WTP, which affected how they responded on the different EGs. A disclaimer was thereafter placed in the beginning of the third part of the survey to recommend the participants to read through all the EGs before answering. Insecurity in how often they were supposed to pay the fee was also put forward and adjustments to ensure that this would not be an issue in the actual survey were put in place. The survey took between ten and twelve minutes to answer for the volunteers, so an approximated time to answer the survey was put to ten minutes. The survey was thereafter sent to the supervisors to identify parts that could be improved. The response received was very valuable.

Both the web-based and the letter-based survey were sent on 27/03. Participant then had three weeks to answer the survey and send it back. The data was gradually organized as surveys were sent back, and the last day of organizing data was on the 19/04. All surveys received after this date was excluded from the study.

In some cases, the respondent missed writing a span for their WTP and instead only wrote one value for their WTP. The assumption became that the written value for WTP were the highest and that the respondents WTP were between zero and the written value. This measure was taken to not risk exaggerate their WTP. The same measurement was taken when a respondent only filled one value for the number of days per year that they visited the flad. Further, one respondent described their number of days visiting the flad by writing that they visited the flad multiple times a week. The assumption became that they visited the flad 3-4 days a week. Another respondent wrote that they saw the flad from their garden, instead of writing an interval of days. The assumption here was that the respondent visited the flad between 1 to 365 days a year.

Question 22 was developed to identify what type of group that respondents belonged to (direct, indirect, existence, bequest or option values). However, after looking through the data it became clear that this question had failed its' purpose, since some respondents answered in a way that was assumed to be contradictory. For example, some respondents agreed that they valued the

EGs since they used the area for recreational activity (which was assumed to indicate a use value), but also agreed that they did not use the area but could see the value in the EGs that the flad was giving (indicating a non-use value). To still be able to identify which group respondents belonged to, to some extent, the idea instead became to analyse the number of days the respondents visited the flad. Respondents were counted as non-users (categorised as non-use values) if they visited the flad less than one day per year, and as users (categorised as use-values) if they used the flad one day or more per year.

All six scenarios containing an improved EGs described in the survey, were expected to improve after the restoration. Five of the EGs were given a scenario where the EGs in ten years either had doubled or decreased to the half, depending on what was beneficial. For example, recreational fishing and water clarity increased while the uptake of atmospheric CO^2 in the flad and events of algae blooms in the flad decreased. The sixth EG had a scenario where the flad directly after the restoration became more tolerant against a low water level, which made the flad resistant to drought (Mikkola et al. 2020). The reason for setting the increase to the double after ten years, was for the spawning of pike and perch in the flad (which than increased the value of recreational fishing), based on the difference seen in Saarinen et al., (2021) regarding the increase between the two stages flad and a gloeflad. To choose these two specific subcategories of a flad was derived from that all the three flads behaved more like a flad (the under category) when they were dredged, and became more of a gloeflad after the restoration. The other four EG were set to either double or decrease to the half since no information regarding what an expected improvement could result in, could be was found.

2.3 Statistics

To test if the WTP varies significantly between the three locations, a Kruskal-Wallis test was performed. The test was followed with a post hoc test to identify where (if any) the null hypothesis could be rejected. Further, the Mann-Whitney u-test was used to identify if there was a difference between the WTP of users and non-users, for the three locations separately. Significance was set to $\alpha=0.05$. Above mentioned statistical tests were performed in SPSS while all the descriptive statistics (means and standard deviations) were performed in Microsoft Excel.

Data regarding an EGs stated importance, the percentage willing to pay and WTP, all had different measurements. Since the interest was to identify if an EG had the same value in relation to the other EGs among the two groups in a location, the EGs for the three different categories were therefore ranked from one to six, six being the highest and one the lowest. If two or more EGs had the same value for a specific factor, then all concerned EGs were set to a mean value (e.g., two, three and four all got three). The standard deviation was calculated to better see how the variation was between factors, where zero would indicate a perfect line between all three factors.

The true value for a respondents' WTP was, in this study, believed to be the midpoint of the interval open-ended question (WTP_{MP}). A lower (WTP_L) and upper (WTP_U) mean estimate of

the WTP was estimated in order to create a form of confidence interval (Håkansson, 2008; Östberg et al, 2010). Respondents who did not want, or did not know if they wanted to pay for an EG and who was not a protest vote (described in the chapter 'Definitions of exclusion'), were set to have a WTP of zero.

WTP_{MP} (together with WTP_L and WTP_U) was used to identify which EG that respondents were most willing to pay for, and to verify if this varied between users and non-users for the three locations. The differences in WTP were also compared to how respondents valued the different EGs. Further, two scenarios were created in order to identify an interval regarding the true total WTP for the three locations, which was inspired by Loomis et al., (1996). The first scenario used respondents from the three locations to identify their respective total WTP. The second scenario included all participants that were incorporated in the survey, plus participants that, when called, did not want to participate in the survey. Although, still excluding protest votes. Here, the assumption was that participants who did not respond and who did not want to participate in the survey, did so because they did not see a value in their specific flad. Their WTP were thereby set to zero. Both scenarios combined the users and non-users. The two scenarios thereby give authorities and stakeholders an interval between two true values of WTP.

3. Result

3.1 Response rate

130 participants were left after excluding duplicates, state owned properties and other non-relevant participants: 49 from Halsskärgraven, 46 from Inre Bastufjärden and 35 from Ytteravan (figure 4). The high exclusion of participants from Ytteravan was due to a high number of properties owned by the Swedish Environmental Protection Agency (8), and participants owning more than one property in the region (7) creating duplicates. When called, 22, 23 and 17 participants from Halsskärgraven, Inre Bastufjärden and Ytteravan, respectively, answered that it would be okey to send a survey (figure 4). Only one of the respondents in Halsskärgraven answered that they would not like to participate in a survey compared to Inre Bastufjärden where five participants declined to participate, and Ytteravan where there were none (figure 4). Participants who were unreachable when called, texted, or by having a hidden (or not having a) number were 26 for Halsskärgraven, and 18 for both Inre Bastufjärden and Ytteravan.

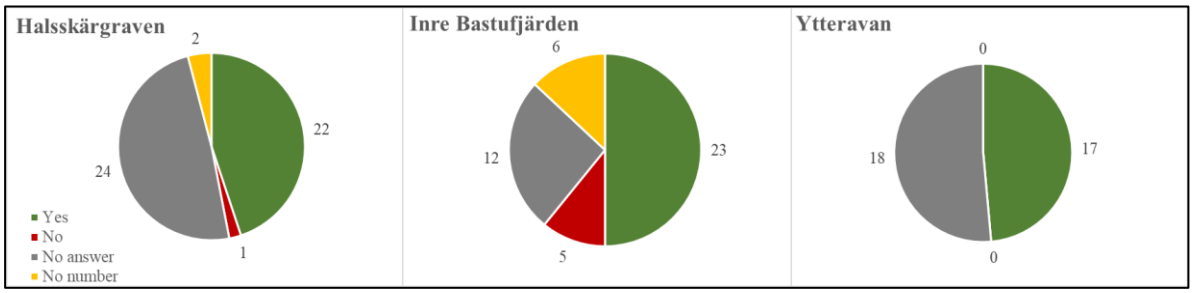


Figure 4. Answers from the participants when ask to participate it the survey.

The number of participants who wanted to take part in the online version of the survey were 12 for Halsskärgraven, 13 for Inre Bastufjärden and 8 for Ytteravan (Figure 5). The remaining 10 participants from Halsskärgraven and Inre Bastufjärden respectively, and 9 from Ytteravan who had agreed on answering the survey, rather wanted to be sent a letter version. The letter version was also sent to the participants who were unreachable.

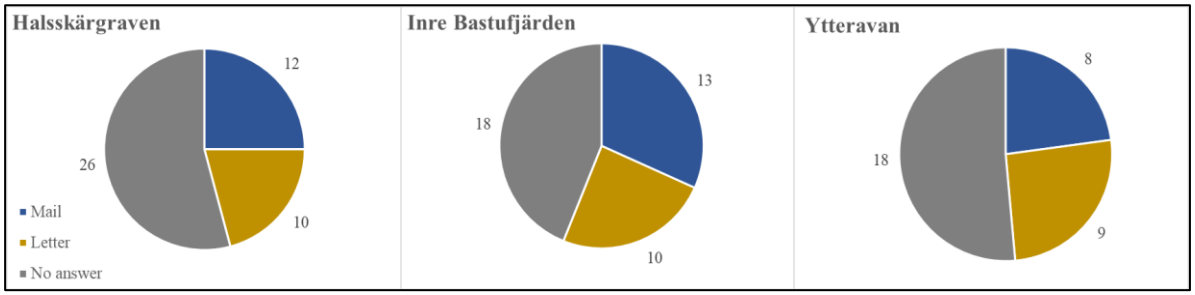


Figure 5. Participants that were sent a survey.

The response rate was for Halsskärgraven 44% (21 respondents), Inre Bastufjärden 68% (28 respondents), and Ytteravan 66% (23 respondents) (figure 6). Of the responses, 40% (8 respondents) from Halsskärgraven, 41% (11 respondents) from Inre Bastufjärden, and 35% (8 respondents) from Ytteravan were gathered from the web-based version of the survey. It is

worth noting that all respondents that took the web-based survey from Ytteravan answered the survey. Also, the response rate of the letter-based version was higher than the number of participants who answered they wanted a letter-based version of the survey, in all three locations.

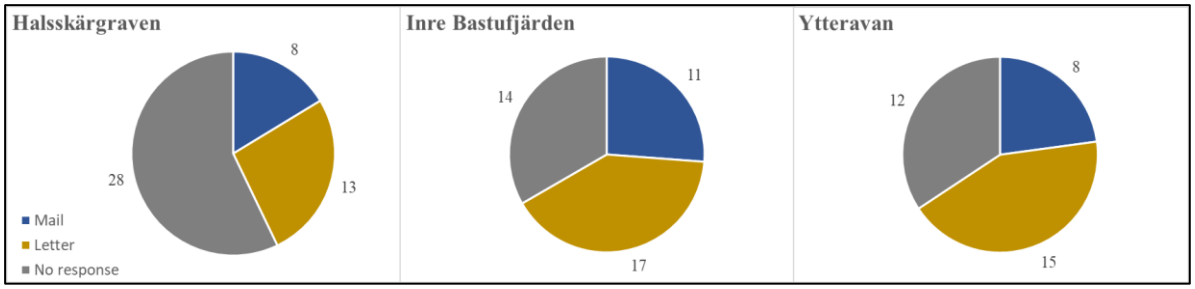


Figure 6. Response rate.

90% (19) of the total amount respondents in Halsskärgraven were using (users) the flad, the users in Inre Bastufjärden and Ytteravan was 57% (16) and 70% (16) respectively of the total amount of respondents. Non-users in Halsskärgraven were 10% (2) of the total amount of respondents while the remaining 43% (12) from Inre Bastufjärden and 30% (7) from Ytteravan were non-users. Note that the sample size of non-users from Halsskärgraven is small in comparison to the other sample sizes.

3.2 Socioeconomic statistics

Most of the respondents who visited their flad (users) from Halsskärgraven and Inre Bastufjärden were familiar with the restoration effort from the project Kvarken flada, while fewer respondents from Ytteravan were aware of the restoration efforts (table 1). Respondents who did not use the flad (non-users) had less knowledge about the restoration effort in all three locations. The mean number of days that respondents visited the flad were for Halsskärgraven and Inre Bastufjärden similar in comparison with Ytteravan (≈ 37, 37 and 5 days respectively). However, the difference in days visited for each location varied by 94% for Ytteravan, 147% for Halsskärgraven and 239 % for Inre Bastufjärden – when comparing the standard deviation with the average. This shows that there is a great difference between respondents from the same location regarding how often they visited the flad. The mean age for all three locations, were ranging between 64-75 years, where both the youngest (users) and the oldest (non-users) were found in Halsskärgraven. Respondents who used the flad (users) in Halsskärgraven and Ytteravan had a similar distribution between female (=1) and male (=0) respondents, where Halsskärgraven had more females (0.56) and Ytteravan had more males (0.44). Inre Bastufjärdens respondents (who use the flad) were mostly male (0.25), the non-users on the other hand had more female respondents (0.64). Non-users from Halsskärgraven were only male (0.00), and from Ytteravan only female (1.00). It is however worth reminding that the number of non-users who responded from Halsskärgraven were only two. The income per month ranged on average between 31 TSEK (Non-users in Ytteravan) to 43 TSEK (Users in Ytteravan), with a standard deviation up to 21 TSEK (Non-users in Inre Bastufjärden). The most common settlement, among all three locations, was that the household contained two

adults. In few of the cases there was also one or more children. Lastly, only a few of the respondents wrote that they were part of a green non-governmental organisations (NGOs).

Table. 1. The mean response to socioeconomic questions. Standard deviation in brackets.

	Halsskärgraven		Inre Bastufjärden		Ytteravan	
	User	Non-user	User	Non-user	User	Non-user
Knowledge about the project Kvarken flada (1=yes)	0.89 (0.31)	0.50 (0.50)	0.80 (0.40)	0.25 (0.43)	0.38 (0.48)	0.00 (0.00)
Number of visists per year	37.32 (54.84)	0.00 (0.00)	36.86 (88.22)	0.01 (0.04)	5.28 (4.95)	0.04 (0.09)
Age	63.84 (11.20)	75.00 (0.00)	65.00 (9.56)	64.55 (10.46)	64.31 (8.12)	70.14 (10.13)
Income (tkr)	42.22 (18.80)	35.00 (10.00)	37.50 (16.01)	43.18 (21.24)	43.75 (19.00)	31.67 (13.74)
Number of adults in household	1.89 (0.45)	2.00 (0.00)	1.81 (0.53)	1.92 (0.49)	1.88 (0.33)	1.57 (0.49)
Gender (1=female)	0.56 (0.50)	0.00 (0.00)	0.25 (0.43)	0.64 (0.48)	0.44 (0.50)	1.00 (0.00)
Children in household (yes=1)	0.16 (0.36)	0.00 (0.00)	0.06 (0.24)	0.08 (0.28)	0.06 (0.24)	0.00 (0.00)
University degree (yes=1)	0.56 (0.50)	0.00 (0.00)	0.38 (0.43)	0.58 (0.49)	0.56 (0.50)	0.57 (0.49)
NGO member (yes=1)	0.16 (0.36)	0.00 (0.00)	0.19 (0.39)	0.08 (0.28)	0.25 (0.43)	0.00 (0.00)

The most common activities around Halsskärgraven apart from ‘other’, were walking around in the area and fishing in the flad (table 2). Fishing was also a common activity in Inre Bastufjärden together with kayaking. In Ytteravan, the most common activity was to take a walk around the flad, followed by both having a fika and birdwatching. Birdwatching was the only activity that was mentioned in all three locations. However, the number of respondents who expressed an interest in birdwatching were few. Note that a participant could state more than one activity.

Table 2. Activities performed in the flads, displayed as percentages. Observed number in brackets.

	Halsskärgraven	Inre Bastufjärden	Ytteravan
Sauna	4.8 (1)		
Swimming	4.8 (1)		4.3 (1)
Fishing	19.0 (4)	14.3 (4)	
Walking	43.0 (9)		52.2 (12)
Boating	9.5 (2)		
BBQ	4.8 (1)		8.7 (2)
Watching birds	4.8 (1)	3.6 (1)	13.0 (3)
Watching plants		3.6 (1)	4.3 (1)
Working		3.6 (1)	4.3 (1)
Measuring water level		3.6 (1)	
Kayaking		10.7 (3)	4.3 (1)
Fika			13.0 (3)
Hunting	4.8 (1)		4.3 (1)
Picking mushrooms			8.7 (2)
Picking berries			4.3 (1)
Watching sunset		3.6 (1)	4.3 (1)
Skiing	9.5 (2)		
Other	33.3 (7)	35.7 (10)	
Total number of responders	21	28	23

3.3 Importance of, and willingness to pay for, Ecosystem Goods

3.3.1 Halsskärgraven

When asking respondents how important an increase of a specific EG would be for them, users from Halsskärgraven replied with *mitigation of algae blooms* as the most important EG, while non-user wrote that the *aesthetic values* was the most important EG (table 3). Non-users valued the *Increased vegetation and biodiversity* the least and had an interval between 3.00–4.50, where 1 was the lowest and 6 was the highest. Users on the other hand, thought the least important EG was an increase in *recreational fishing*. Their range were between 4.05–5.11. For all six EGs. In all of the six EGs, users had a higher mean than non-users.

Users had a higher percentage of respondents willing to pay for an EG in four out of six cases when asked if the respondent would be willing to pay for an increase of an EG (table 4). The EG that had the highest percentage of users that were willing to pay for an EG was *recreational fishing* (47%), while the lowest were *mitigation of* CO^2 (21%). Non-users had their highest percentage of respondents willing to pay for an EG for *recreational fishing* (50%) and *aesthetic values* (50%), while the remaining four EGs had a percentage of zero among non-users.

Table 3. The mean value from respondents when asked how important an increase of the EGs was for them. The interval was between 1-6 where 1 was the lowest. Standard deviation in brackets.

	Halsskärgraven		Inre Bastufjärden		Ytteravan	
	User	Non-user	User	Non-user	User	Non-user
Recreational fishing	4.05 (1.28)	3.50 (0.50)	3.93 (0.96)	2.82 (1.11)	4.13 (1.49)	3.33 (1.37)
Water clarity	4.44 (1.30)	3.50 (0.50)	3.36 (1.11)	2.56 (1.17)	3.31 (1.49)	3.50 (1.61)
Mitigation of algae blooms	5.11 (1.02)	4.00 (0.00)	4.13 (1.49)	4.36 (0.77)	4.50 (1.73)	3.29 (1.67)
Increased vegetation and biodiversity	4.47 (1.23)	3.00 (1.00)	4.07 (1.34)	2.89 (1.29)	4.50 (1.66)	3.50 (1.38)
Mitigation of CO^2	4.89 (1.15)	4.00 (1.00)	4.20 (1.51)	4.55 (0.66)	5.13 (1.22)	4.43 (1.68)
Aesthetic values	4.74 (1.41)	4.50 (1.50)	4.63 (1.11)	3.92 (1.32)	4.50 (1.58)	3.67 (1.25)

3.3.2 Inre Bastufjärden

The highest rated EG in Inre Bastufjärden was *aesthetic values*, which is rated the highest by the ones who used the flad (figure 3). The EG with the highest importance among non-users were *mitigation of* CO^2. The least important EG for users were *water clarity* and the mean importance among the EGs for users were between 3.36–4.63. *Recreational fishing* was the least important EG among non-users, this was also the lowest rated EG among all three locations. Furthermore, non-users had an interval between 2.82–4.55 when evaluating the importance of the six EGs. Users had in all except one case, a higher mean value for the importance of EGs than non-users, the exception being the *mitigation of algae blooms*.

Non-users had the highest percentage of respondents willing to pay for an increase in EGs, with the highest of the six being the *mitigation of algae blooms* (25%) (table 4). The highest percentage of respondents willing to pay for an increase of an EG was for users the *aesthetic*

values (19%). Continuing, the remaining five EGs all had a percentual willingness to pay at 13% for users, while it varied between 0-16% for non-users.

3.3.3 Ytteravan

In Ytteravan, the highest rated EG was *mitigation of CO^2* by both users and non-users, although, rated higher by users (figure 3). On the other hand, the least rated EG was *water clarity* by users of the flad, this was the only EG in Ytteravan where non-users had a higher rate than users. Non-users had the lowest rate of respondents willing to pay for *recreational fishing* and had an interval between 3.33–4.43. Further, users rated the EGs between 3.31–5.13.

The most frequent EG that users were willing to pay for was *mitigation of CO^2* (44%), following the highest rated EG by importance (figure 4). Non-users did not follow this trend and had instead the highest percentage of respondents willing to pay for *water clarity* (29%). Interestingly enough, *water clarity* was also the least frequent EG that users were willing to pay for (19%). Non-users were least willing to pay for the *aesthetic values*, in fact, the percentage here was zero.

Table 4. Respondents' answers to if they were or were not willing to pay for the different EGs. Observed number in brackets.

Recreational fishing						Water clarity					
	Group	Yes %	No %	Don't know %	Total %		Group	Yes %	No %	Don't know %	Total %
Halsskärgraven	User	47.4 (9)	36.8 (7)	15.8 (3)	100 (19)	Halsskärgraven	User	26.3 (5)	52.6 (10)	21.1 (4)	100 (19)
	Non-user	50 (1)	50 (1)	0 (0)	100 (2)		Non-user	0.0 (0)	100 (2)	0.0 (0)	100 (2)
Inre Bastufjärden	User	12.5 (2)	56.3 (9)	31.3 (5)	100 (16)	Inre Bastufjärden	User	0.0 (0)	50.0 (8)	50.0 (8)	100 (16)
	Non-user	8.3 (1)	58.3 (7)	33.3 (4)	100 (12)		Non-user	0.0 (0)	58.3 (7)	41.7 (5)	100 (12)
Ytteravan	User	37.5 (6)	43.8 (7)	18.8 (3)	100 (16)	Ytteravan	User	18.8 (3)	50.0 (8)	31.3 (5)	100 (16)
	Non-user	14.3 (1)	57.1 (4)	28.6 (2)	100 (7)		Non-user	28.6 (2)	57.1 (4)	14.3 (1)	100 (7)
Mitigation of algae bloom						Increased vegetation and biodiversity					
	Group	Yes %	No %	Don't know %	Total %		Group	Yes %	No %	Don't know %	Total %
Halsskärgraven	User	36.8 (7)	42.1 (8)	21.1 (4)	100 (19)	Halsskärgraven	User	31.6 (6)	52.6 (10)	15.8 (3)	100 (19)
	Non-user	0.0 (0)	50.0 (1)	50.0 (1)	100 (2)		Non-user	0.0 (0)	50.0 (1)	50.0 (1)	100 (2)
Inre Bastufjärden	User	12.5 (2)	43.8 (7)	43.8 (7)	100 (16)	Inre Bastufjärden	User	12.5 (2)	50.0 (8)	37.5 (6)	100 (16)
	Non-user	25.0 (3)	41.7 (5)	33.3 (4)	100 (12)		Non-user	8.3 (1)	58.3 (7)	33.3 (4)	100 (12)
Ytteravan	User	37.5 (6)	37.5 (6)	25.0 (4)	100 (16)	Ytteravan	User	31.3 (5)	50.0 (8)	18.8 (3)	100 (16)
	Non-user	14.3 (1)	42.9 (3)	42.9 (3)	100 (7)		Non-user	14.3 (1)	57.1 (4)	28.6 (2)	100 (7)
Mitigation of CO^2						Aesthetic values					
	Group	Yes %	No %	Don't know %	Total %		Group	Yes %	No %	Don't know %	Total %
Halsskärgraven	User	21.1 (4)	42.1 (8)	36.8 (7)	100 (19)	Halsskärgraven	User	36.8 (7)	36.8 (7)	26.3 (5)	100 (19)
	Non-user	0.0 (0)	50.0 (1)	50.0 (1)	100 (2)		Non-user	50.0 (1)	50.0 (1)	0.0 (0)	100 (2)
Inre Bastufjärden	User	12.5 (2)	37.5 (6)	50.0 (8)	100 (16)	Inre Bastufjärden	User	18.8 (3)	43.8 (7)	37.5 (6)	100 (16)
	Non-user	8.3 (1)	58.3 (7)	33.3 (4)	100 (12)		Non-user	16.7 (2)	58.3 (7)	25.0 (3)	100 (12)
Ytteravan	User	43.8 (7)	31.3 (5)	25.0 (4)	100 (16)	Ytteravan	User	31.3 (5)	50.0 (8)	18.8 (3)	100 (16)
	Non-user	14.3 (1)	42.9 (3)	42.9 (3)	100 (7)		Non-user	0.0 (0)	42.9 (3)	57.1 (4)	100 (7)

3.4 Protest votes

The number of protest votes were for both Halsskärgraven and Ytteravan always higher for users than for non-users (table 5). The opposite is seen in Inre Bastufjärden where non-users had a larger or equal number of protest votes compared to users. The largest proportion of protest votes derived from a group, were from the users in Halsskärgraven. However, when combining users and non-users, and only comparing the three locations, the largest number of protests votes then arrived from Inre Bastufjärden. The amount of protest votes from users in Halsskärgraven did not vary more than one participant (±1) through the different EGs. This is also true for users from Inre Bastufjärden and Ytteravan. Non-users on the other hand, always showed the same number of protests votes in-between EGs for all three locations. The low

frequency of change in-between EGs can be explained with that it was always the same respondents who protested, and that they in some cases (for users) were willing to pay for specific EG/s. The two most common reasons for respondents to give a protest vote was first because they did not believe that it was their responsibility, and that the fee should be paid by a governmental organisation. While the second reason to protest vote was that respondents felt that there was a lack of information. After excluding protest votes, 16-17 (14-15 users and 2 non-users) respondents remained from Halsskärsgraven, 20-21 (12-13 users and 8 non-users) in Inre Bastufjärden and 19-20 (13-14 users and 6 non-users) in Ytteravan.

Table 5. The number of protest votes from the different scenarios and locations, in percentage. Observed number in brackets.

	Group	Recreational fishing	Water clarity	Mitigation of algae bloom	Increased vegetation and biodiversity	Mitigation of CO^2	Aesthetic values
Halsskärgraven	User	21.1 (4)	26.3 (5)	21.1 (4)	21.1 (4)	26.3 (5)	21.1 (4)
	Non-user	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
Inre Bastufjärden	User	18.8 (3)	25.0 (4)	18.8 (3)	25.0 (4)	25.0 (4)	18.8 (3)
	Non-user	33.3 (4)	33.3 (4)	33.3 (4)	33.3 (4)	33.3 (4)	33.3 (4)
Ytteravan	User	12.5 (2)	18.8 (3)	18.8 (3)	18.8 (3)	18.8 (3)	18.8 (3)
	Non-user	14.3 (1)	14.3(1)	14.3 (1)	14.3 (1)	14.3 (1)	14.3 (1)

3.5 Willingness to pay, difference between users and non-users

3.5.1 Halsskärgraven

When combining all six EGs, users had a total WTP_{MP} of 1533 SEK per household (Figure 7). Non-users had a similar amount, of 1500 SEK per household. The highest valued EG in Halsskärgraven was *recreational fishing* (750 SEK) and the *aesthetic values* (750 SEK), by non-users (table 7). *Recreational fishing* was also the highest valued EG among users (367 SEK), together with *mitigation of algae blooms* (340 SEK) second. Although non-users had the highest WTP_{MP} for two of the EGs, their WTP_{MP} for the reaming four EGs had a value of zero. Users on the other hand, ranged between 182-220 SEK for the remaining four EGs. Note that the two high values for non-users were derived from one respondent who had a WTP_{MP} of 1500 SEK for mentioned EGs. It can further explain the high interval between WTP_L and WTP_U, together with their standard deviations. No significant difference could however be seen when comparing users against non-users (table 6).

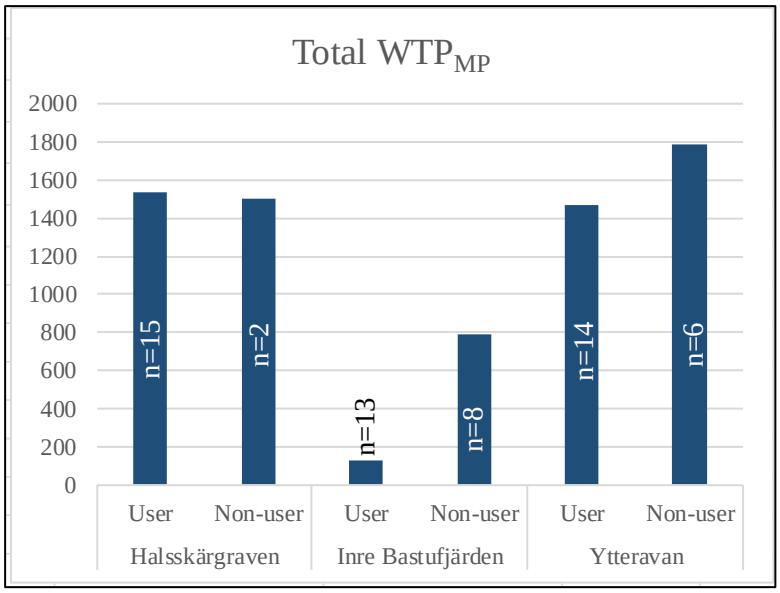


Figure 7. The total WTP_{MP} among the locals and groups.

3.5.2 Inre Bastufjärden

In Inre Bastufjärden, users had a total WTP_{MP} of 127 SEK per household, while non-users had a total WTP_{MP} of 787 SEK per household (figure 7). Non-users were most willing to pay for the *mitigation of algae blooms* (381 SEK) and *recreational fishing* (367 SEK) (table 7). Moreover, the WTP for non-users dropped with more than four times (81 SEK) for the third EG and continued downwards (6 SEK, 6 SEK and 0 SEK). The highest WTP_{MP} for users was *mitigation of* CO^2 (33 SEK) which had a WTP_{MP} more than ten times smaller than the highest WTP_{MP} from non-users. Following, the second highest WTP_{MP} from users was *recreational fishing* and the aesthetic values (27 SEK). Users and non-users also agreed on not paying anything for *water clarity* in Inre Bastufjärden. This is the only EG where both users and non-users had the same value for an EG (0 SEK), considering all three locations. Regardless of the difference between users and non-users WTP, no significant difference could be seen between the two groups (table 6).

Table 6. Tests of significance between users and non-users, significance if $p<0.05$. Grey=no significance.

Locations	p-value
Halsskärgraven	0.15
Inre Bastufjärden	0.77
Ytteravan	0.07

3.5.3 Ytteravan

In Ytteravan, users had a total WTP_{MP} of 1467 SEK per household, non-users had a somewhat similar 1792 SEK per household (figure 7). Non-users had the highest WTP_{MP} in Ytteravan and were most willing to pay for *water clarity* (458 SEK) (table 7). Four of the remaining EGs had a WTP_{MP} of 333 SEK by non-users, while the last EG, the *aesthetic values* had a WTP_{MP} of 0 SEK. Users in Ytteravan had the highest WTP_{MP} for the *mitigation of* CO^2 (300 SEK), followed by *recreational fishing* (275 SEK). The remaining four EGs had a WTP_{MP} between 244-196 SEK for users. Further, users in Ytteravan only had a larger WTP_{MP} than non-users for the

aesthetic values. No significant difference between users and non-users could be seen in Ytteravan (table 6).

Table 7. Willingness to pay for users and non-users. Standard deviation in brackets.

Recreational fishing				
	Group	WTP_L	WTP_{MP}	WTP_U
Halsskärgraven	User	153.33 (272.32)	366.67 (614.12)	580.00 (986.71)
	Non-user	0.00 (0.00)	750.00 (750.00)	1500.00 (1500.00)
Inre Bastufjärden	User	15.38 (36.08)	26.92 (63.90)	38.46 (92.31)
	Non-user	0.00 (0.00)	312.50 (826.80)	625.00 (1653.59)
Ytteravan	User	157.14 (289.62)	275.00 (427.51)	392.86 (572.54)
	Non-user	166.67 (372.68)	333.33 (745.36)	500.00 (1118.03)

Water clarity				
	Group	WTP_L	WTP_{MP}	WTP_U
Halsskärgraven	User	78.57 (161.15)	217.86 (456.93)	357.14 (783.50)
	Non-user	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Inre Bastufjärden	User	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	Non-user	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Ytteravan	User	123.08 (285.96)	196.15 (429.88)	269.23 (575.64)
	Non-user	250.00 (381.88)	458.33 (741.85)	666.67 (1105.54)

Mitigation of algae bloom				
	Group	WTP_L	WTP_{MP}	WTP_U
Halsskärgraven	User	133.33 (277.29)	340.00 (623.75)	546.67 (997.91)
	Non-user	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Inre Bastufjärden	User	11.54 (28.78)	21.15 (55.34)	30.77 (82.13)
	Non-user	125.00 (330.72)	381.25 (692.79)	637.50 (1104.47)
Ytteravan	User	157.69 (282.74)	244.23 (422.01)	330.77 (563.48)
	Non-user	166.67 (372.68)	333.33 (745.36)	500.00 (1118.03)

Increased vegetation and biodiversity				
	Group	WTP_L	WTP_{MP}	WTP_U
Halsskärgraven	User	66.67 (153.48)	206.67 (441.92)	346.67 (757.95)
	Non-user	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Inre Bastufjärden	User	12.50 (29.76)	18.75 (44.63)	25.00 (59.51)
	Non-user	0.00 (0.00)	6.25 (16.54)	59.51 (33.07)
Ytteravan	User	138.46 (281.58)	219.23 (422.69)	300.00 (565.69)
	Non-user	166.67 (372.68)	333.33 (745.36)	500.00 (1118.03)

Mitigation of CO^2				
	Group	WTP_L	WTP_{MP}	WTP_U
Halsskärgraven	User	64.29 (158.60)	182.14 (453.01)	300.00 (769.04)
	Non-user	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Inre Bastufjärden	User	8.33 (27.64)	33.33 (77.28)	58.33 (144.10)
	Non-user	0.00 (0.00)	6.25 (16.54)	12.50 (33.07)
Ytteravan	User	184.62 (290.48)	300.00 (432.35)	415.38 (577.59)
	Non-user	166.67 (372.68)	333.33 (745.36)	500.00 (1118.03)

Aesthetic values				
	Group	WTP_L	WTP_{MP}	WTP_U
Halsskärgraven	User	80.00 (155.78)	220.00 (439.62)	360.00 (754.37)
	Non-user	0.00 (0.00)	750.00 (750.00)	1500.00 (1500.00)
Inre Bastufjärden	User	15.38 (30.28)	26.92 (56.72)	38.46 (83.56)
	Non-user	25.00 (66.14)	81.25 (196.75)	137.50 (327.63)
Ytteravan	User	150.00 (285.55)	232.69 (426.46)	315.38 (569.54)
	Non-user	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)

3.6 Identifying the total willingness to pay among locations

The following two subchapters describes the WTP from the different locations and identifies a locations total WTP_{MP}. Unlike chapter 3.5, this chapter combines users and non-users. In scenario 1, only the respondents are included. While in scenario 2, participants and the ones not wanting to take part in the survey were included. Here, non-respondents were set to have a WTP of zero. In both scenario 1 and 2, protest votes were excluded.

3.6.1 Scenario 1 – Willingness to pay among respondents

The three EGs that respondents were most willing to pay for in Halsskärgraven were *recreational fishing, mitigation of algae blooms* and the *aesthetic values* (table 9). Inre Bastufjärden had a similar trend where *mitigation of algae blooms* was the EG that respondents were most willing to pay for, followed by *recreational fishing* and the *aesthetic values*. Respondents in Ytteravan were most willing to pay for *mitigation of* CO^2, *recreational fishing* and *water clarity*. Overall, the three highest valued EGs were *recreational fishing* from Halsskärgraven (412 SEK), followed by the *mitigation of* CO^2 in Ytteravan (311 SEK) and lastly the *mitigation of algae blooms* in Halsskärgraven (300 SEK). The true WTP_{MP} for the six EGs respectively, had a fairly similar range along all the three locations, ranging between 0-158 SEK (Inre Bastufjärden), 159-311 SEK (Ytteravan) and 182-412 SEK (Halsskärgraven) per household.

Halsskärgravens true WTP_{MP} when combining all EGs were 1 526 SEK per household (figure 8), which gives a total WTP_{MP} in the region to 74 774 SEK. Ytteravan had a similar true WTP_{MP}, 1 569 SEK per household, and gives a total WTP_{MP} of 54 915 SEK. Respondents in Inre Bastufjärden had a true WTP_{MP} of 378 SEK per household, when combining all EGs. Here, the total WTP_{MP} is 17 388 SEK. The WTP_{MP} in Inre Bastufjärden was significantly lower than the WTP_{MP} revealed from respondents in both Halsskärgraven and Ytteravan respectively. No significant difference could be seen between Halsskärgraven and Ytteravan (table 8).

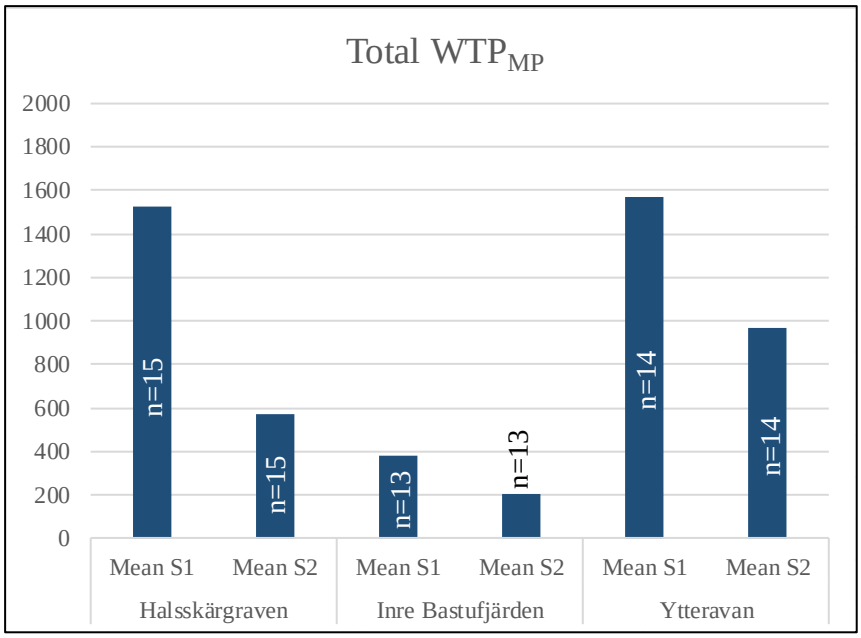


Figure 8. The total WTP_{MP} for the three locations, displaying both S1 (scenario 1) and S2 (scenario 2).

The reason to why the total WTP differs with about 20 000 SEK between Halsskärgraven and Ytteravan was because of the smaller size of participants in Ytteravan (49 compared to 35). Differences in size of participants also affect Inre Bastufjärden and makes it impractical to compare the total WTP between the locations. Therefore, when comparing the three locations total WTP, a correction to Halsskärgraven and Inre Bastufjärden needs to be implemented to match the respondent's size of Ytteravan. The total WTP of Halsskärgraven then was 53 090 SEK, while Inre Bastufjärden then had a total WTP of 13 215 SEK. The total WTP from Halsskärgraven and Ytteravan became very similar while in Inre Bastufjärden, the total WTP was about four times smaller.

Table 8. Tests of significance between locations, where p<0.05. Green=significance grey=no significance.

Locations	p-value*
Inre Bastufjärden-Ytteravan	0.001
Inre Bastufjärden-Halsskärgraven	<0.001
Halsskärgraven-Ytteravan	1.000
**p-values are adjusted by Bonferroni correction for multiple pairwise comparisons*	

3.6.1 Scenario 2 – Willingness to pay among participants

When including all participants (participants who were sent a survey and participants who did not want to participate), the true value of WTP_{MP} when combining all EGs were 573 SEK per household in Halsskärgraven (figure 8). This gives a total WTP_{MP} of 28 077 SEK. For Ytteravan, the true WTP_{MP} when combining all EGs were 965 SEK per household which gave a total WTP_{MP} of 33 775 SEK. Inre Bastufjärden had a true WTP_{MP} of combined EGs of 203 SEK per household and a total WTP_{MP} of 9 338 SEK.

Table 9. WTP for scenario 1 (S1) and scenario 2 (S2). Standard deviation in brackets.

Recreational fishing				
	Group	WTP_L	WTP_{MP}	WTP_U
Halsskärgraven	Mean S1	135.29 (260.52)	411.76 (643.58)	688.24 (1100.74)
	Mean S2	51.11 (173.04)	155.56 (443.09)	260.00 (754.37)
Inre Bastufjärden	Mean S1	9.52 (29.35)	135.71 (531.20)	261.90 (1062.11)
	Mean S2	5.13 (22.06)	73.08 (395.62)	141.03 (790.23)
Ytteravan	Mean S1	160.00 (316.86)	292.50 (543.43)	425.00 (779.02)
	Mean S2	100.00 (262.20)	182.81 (452.36)	265.63 (649.33)

Water clarity				
	Group	WTP_L	WTP_{MP}	WTP_U
Halsskärgraven	Mean S1	68.75 (152.97)	190.63 (433.45)	312.50 (742.36)
	Mean S2	25.00 (97.99)	69.32 (277.00)	113.64 (472.22)
Inre Bastufjärden	Mean S1	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	Mean S2	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Ytteravan	Mean S1	163.16 (324.78)	278.95 (561.32)	394.74 (804.25)
	Mean S2	100.00 (266.40)	170.97 (459.97)	241.94 (658.33)

Mitigation of algae blooms				
	Group	WTP_L	WTP_{MP}	WTP_U
Halsskärgraven	Mean S1	117.65 (263.99)	300.00 (596.07)	482.35 (953.78)
	Mean S2	44.44 (171.99)	113.33 (394.18)	182.22 (631.15)
Inre Bastufjärden	Mean S1	54.76 (212.64)	158.33 (464.02)	261.90 (745.45)
	Mean S2	29.49 (158.40)	85.26 (349.53)	141.03 (562.37)
Ytteravan	Mean S1	160.53 (313.96)	272.37 (546.81)	383.21 (786.24)
	Mean S2	98.39 (257.93)	166.94 (448.18)	235.48 (643.35)

Increased vegetation and biodiversity				
	Group	WTP_L	WTP_{MP}	WTP_U
Halsskärgraven	Mean S1	58.82 (145.76)	182.35 (420.41)	305.88 (720.68)
	Mean S2	22.22 (94.02)	68.89 (273.11)	115.56 (467.12)
Inre Bastufjärden	Mean S1	7.50 (23.85)	13.75 (36.64)	20.00 (50.99)
	Mean S2	3.95 (17.70)	7.24 (27.45)	10.53 (38.32)
Ytteravan	Mean S1	147.37 (313.50)	255.26 (548.18)	363.16 (788.88)
	Mean S2	90.32 (255.72)	156.45 (446.81)	222.58 (642.43)

Mitigation of CO^2				
	Group	WTP_L	WTP_{MP}	WTP_U
Halsskärgraven	Mean S1	56.25 (149.87)	159.38 (428.01)	262.50 (726.18)
	Mean S2	20.45 (94.34)	57.95 (269.25)	95.45 (455.75)
Inre Bastufjärden	Mean S1	5.00 (21.79)	22.50 (62.20)	40.00 (115.76)
	Mean S2	2.63 (46.50)	11.84 (46.50)	21.05 (86.32)
Ytteravan	Mean S1	178.95 (318.84)	310.53 (550.97)	442.11 (790.28)
	Mean S2	109.68 (264.40)	190.32 (457.10)	270.97 (655.10)

Aesthetic values				
	Group	WTP_L	WTP_{MP}	WTP_U
Halsskärgraven	Mean S1	70.59 (148.58)	282.35 (515.62)	494.12 (949.59)
	Mean S2	26.67 (97.52)	106.67 (345.22)	186.67 (630.91)
Inre Bastufjärden	Mean S1	19.05 (47.50)	47.62 (132.04)	76.19 (218.01)
	Mean S2	10.26 (36.13)	25.64 (99.76)	41.03 (164.42)
Ytteravan	Mean S1	102.63 (246.27)	159.21 (368.96)	215.79 (493.39)
	Mean S2	62.90 (199.18)	97.58 (299.08)	132.26 (400.31)

3.7 The relationship between stated importance, percentage willing to pay and willingness to pay

In the following, respondents stated preference was compared to the percentage willing to pay and their WTP_{MP} – in order to identify if the three factors are in line. All three factors are of curse a way of identifying the importance of an EG and stated importance is defined as the value respondents chose when asked how important the EG was.

In four cases, users in Halsskärgraven had a standard deviation varying between 0.24-0.62, while the other two cases had a higher standard deviation (figure 7). First, the lowest mean for the stated importance of an EG was for *recreational fishing*. While this, for the same group, was the EG that had the highest percentage of respondents willing to pay for an EG (standard deviation=2.36). Secondly, *mitigation of* CO^2 had, for the same group, the lowest percentage when asked if they would be willing to pay, but is the second most important EG (standard deviation=1.89). However, these two EGs only had a difference in stated importance, while the percentage willing to pay and their WTP_{MP} was ranked the same.

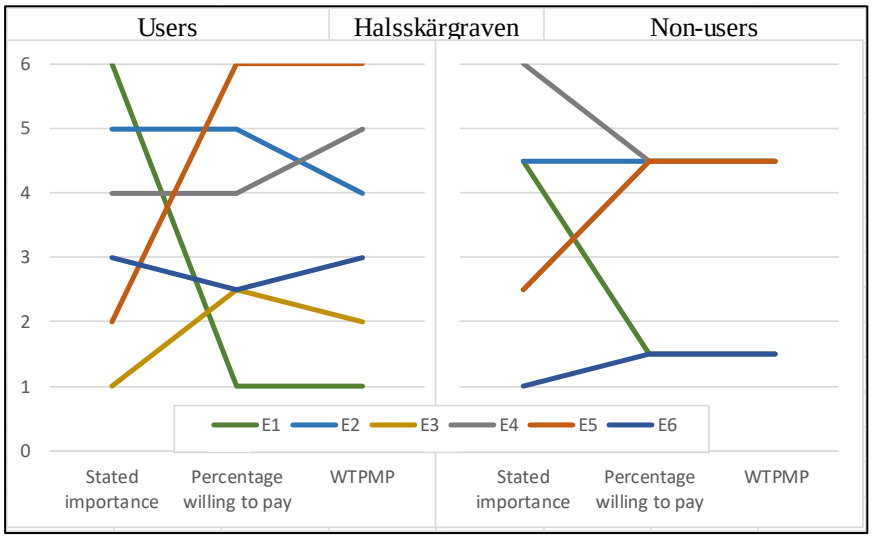
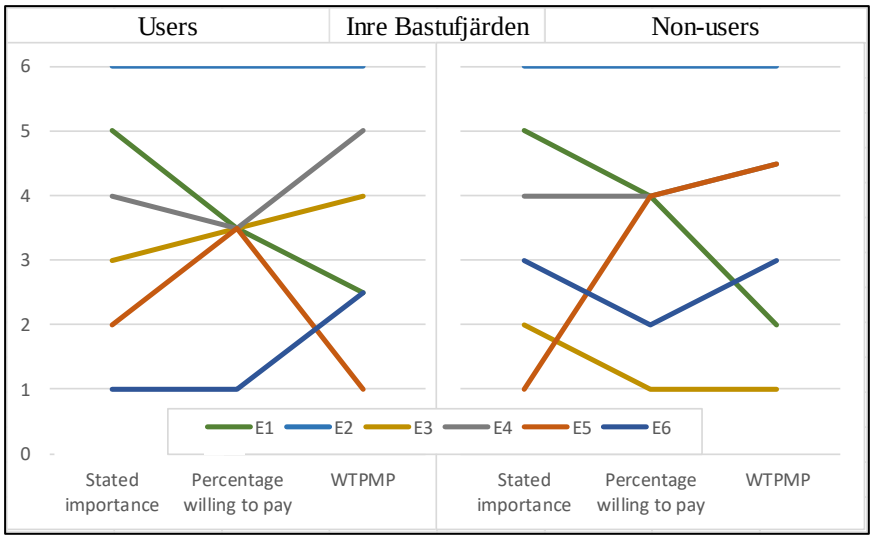


Figure 7. Visualization of how an EG relates to the three factors: stated importance, percentage willing to pay (%) and WTP (WTP_{MP}), for all six EGs (for users and non-users). E1=*Recreation fishing*, E2=*Water clarity*, E3=*Mitigation of algae blooms*, E4=*Increased vegetation and biodiversity*, E5=*Mitigation of* CO^2 and E6=*Aesthetic values*

Both users and non-users in Inre Bastufjärden always rated *water clarity* the highest among the EGs (figure 8). These were the only times where all three factors were perfectly in a line in Inre Bastufjärden. Further, users had, for the other five EGs, a standard deviation between 0.41–1.03. Non-users had in three cases a standard deviation between 0.24-0.47, while the remaining two were slightly higher, ranging between 1.25–1.55.



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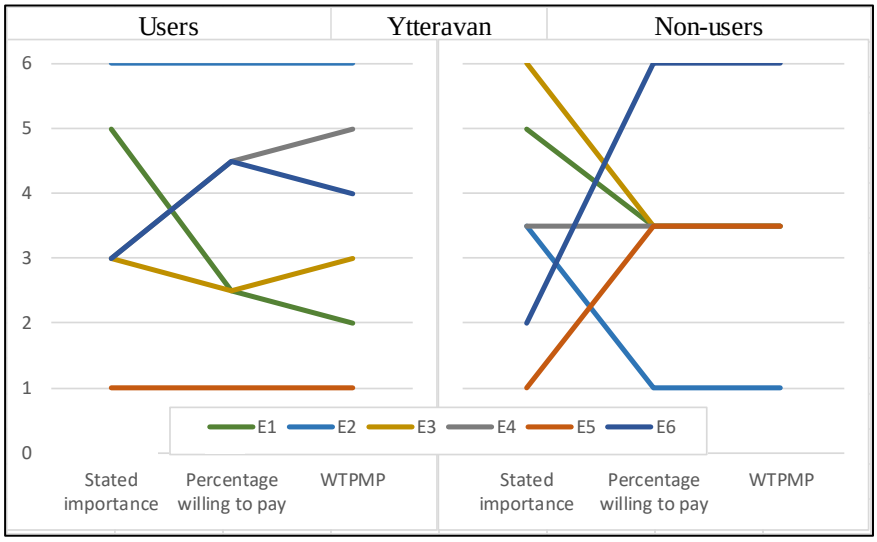
Users in Ytteravan had two EGs that were perfectly in line regarding all three factors, *water clarity* (highest) and *mitigation of* CO^2 (lowest) (figure 9). The other four had a standard deviation between 0.24 – 1.31. Non-users did have one EG with a perfect line which was for *Increased vegetation and biodiversity*. Here, the standard deviation for the other five EGs were between 0.71- 1.89. However, for all six EGs, the percentage willing to pay and the WTP were both in line while the factor of stated importance was not.



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4. Discussion

This study is the first of its kind to identify economic non-market values received from flads and provides knowledge to authorities and stakeholders about how important they are among nearby property owners. It further displays that there was no significant difference between users and non-users among the three flads which thereby indicates that the importance of non-use values is as valuable as that of use values. This study further reveals the estimated economic value received from six EGs in the three flads to be worth between 28 077-74 774 SEK, 9 338-17 388 SEK and 33 775-54 915 SEK for Halsskärgraven, Inre Bastufjärden and Ytteravan respectively. Respondents total WTP_{MP} per household signifies that the estimated value from Inre Bastufjärden is significantly different from the other two locations and hence hints on an issue in generalising the results.

The reason to why the cost for restoring a threshold can vary up to five times is interesting, and as mentioned before, obviously effects the percentage that could be argued for by non-market values. However, the reason to why the cost differ is not part of this studies real interest and will hence not be further discussed.

4.1 Difference between users and non-users

The highest WTP_{MP} among the EGs in a location, is for all three locations, always set by non-users, indicating that non-use values have importance in all three locations. The same result is seen when adding the WTP_{MP} from all six EGs. However, there was no significant difference between the two groups, so although non-users often have a higher WTP_{MP} than users – the null hypothesis cannot be rejected. Moreover, the difference is the smallest in Halsskärgraven where the total WTP_{MP} differs with 33 SEK, and the highest in Inre Bastufjärden where the difference in total WTP_{MP} differs with 660 SEK. The specific EG that non-users were willing to pay the most for varied between the three locations. As mentioned above, there was no significant difference between users and non-users in any of the three locations. Because of the difference seen in WTP between users and non-users in Inre Bastufjärden, one could expect a difference of significance here. However, the reason could be because a non-parametric significance test that was used, significance may have occurred if the data would have been normally distributed and a t-test could have been applied. Lastly, in some cases, non-users valued an EG high while users valued the same EG low (e.g., the percentual difference of *water clarity* in Ytteravan). A reason for this difference could be that users already believed that the EG was in a good condition and was not in need of improvement.

4.2 The true willingness to pay

This study shows that the non-market value, for nearby property owners including all six EGs, range between 28 077-74 774 SEK in Halsskärgraven. The cost of restoring Halsskärgraven was 250 000 SEK. The value received from non-market goods is thereby about 11-30% of the cost. Further, in Ytteravan the non-market value received range between 33 775-54 915 SEK. The cost of restoring Ytteravan was 109.000 SEK, which is less than half of what the cost was

in Halsskärgraven. Here, the non-market value can therefore be considered to make up for between 31-50% of the costs needed to restore the flad. Lastly, Inre Bastufjärdens has a significantly lower WTP_{MP} than the other two locations, where the nearby property owners valued an increase of the six EGs, between 9 338-17 388 SEK. The cost of restoring Inre Bastufjärden was however the cheapest of the three and had a cost of 50 000 SEK. The percentage of the cost that could be argued for by non-marked values is therefore between 19-35%, which is slightly higher than the percentage calculated for Halsskärgraven.

As earlier mentioned, the difference in economic value between locations does not solely derive from difference in respondents WTP, but also from the number of participants included in the survey. The total economic benefits (total WTP_{MP}) received from non-market values should therefore not be compared between locations from these values.

4.3 Relation between respondents' valuation of EGs stated importance, willingness to pay and WTP_{MP}

A thought when construing the survey was that respondents would, as a population, agree upon which EGs that were most important, and that this would be consistent for the three factors: stated importance, percentage willing to pay and WTP_{MP}. However, this was not true, at least not to the extent that was believed.

The relationship between the stated importance, percentage willing to pay and the WTP_{MP}, among respondents, were perfectly in line in 4 out of 36 cases. In three cases, this was *water clarity* for both users and non-users in Inre Bastufjärden and users in Ytteravan, who all valued this as the highest. The fourth EG that had a perfect line through all three measures was also by users in Ytteravan and was the *mitigation of* CO^2 - which was the lowest rated EG here. Apart from these four cases, no true consistency could be seen. However, in 15 cases, the variation differed at most one and a half level from a perfect line (0.5-1.5). Also, in around 20 cases there was a perfect line for two factors, while the third varied, often being stated importance. So, even though most of the lines were not perfectly straight through all three factors, some relation exists, most often between percentage willing to pay and WTP_{MP}.

However, what is further interesting is that for all three measures: stated importance of EG, percentage of respondents willing to pay and respondents WTP_{MP}, Inre Bastufjärden expressed a low value, compared to the other two locations. This, and reasons for why this could be, will further be discussed in chapter 4.5 below.

4.4 Looking through socioeconomic factors to find the answers for difference

While Halsskärgraven and Ytteravan have a rather similar total WTP_{MP}, Inre Bastufjärden has, as mentioned above, a significantly lower WTP_{MP} (about two to four times smaller). One way to try and understand why Inre Bastufjärden has such a difference in WTP_{MP} is by looking at the socioeconomic factors. A socioeconomic factor could explain the difference seen if Inre Bastufjärden was distinguished from the other two location. However, for both the mean knowledge regarding the restoration project Kvarken flada and the mean number of days

respondents visits the flad, Inre Bastufjärden has a similar result as Halsskärgraven while Ytteravan has a value less than half. Further, salaries, ages, number of adults and presence of children in the household, are somewhat similar for all three locations and is likely not the answer to Inre Bastufjärdens smaller WTP_{MP}. However, when only comparing users in Inre Bastufjärden, then there is a slightly smaller proportion of respondents who have a university degree and a slightly higher proportion of male respondents than the other two locations. However, Östberg et al., (2010) had a significantly higher number of males who were willing to pay than females, which is the opposite of what the argument would be in this study, if gender would make a difference in WTP in Inre Bastufjärdens. Moreover, a low response rate could be an indication for a low interest of either the flad, or the survey - which further could indicate a low WTP and thereby gives some explanation to Inre Bastufjärdens low WTP. However, the result show that Inre Bastufjärden has a rather similar percentage of responders as Ytteravan (66% and 68% respectively) while Halsskärgraven has the lowest response rate (44%). So, if any of the identified socioeconomic factors can explain the significantly smaller WTP_{MP} in Inre Bastufjärden, or at least partly explain it, then the likely reason would be the difference in education or gender.

Another reason for the difference seen could of course be the fact that the flads do not look identical, and that differences in aesthetics and/or EGs result in valuations differing from each other. This would however also be more reasonable if it was Ytteravan that had a significant different value, since both the size and the area around the flads are more similar between Halsskärgraven and Inre Bastufjärden than compared with Ytteravan.

4.5 Socioeconomics

The standard deviation of the number of days that respondents spent at the flad was about one and a half to two times higher than the mean value, for the groups Halsskärgraven and Inre Bastufjärden. A reason for the high standard deviation could indicate the difference between respondents who lived in the area and thereby used the flad more regularly, against respondents who had a holiday home in the area and perhaps only used the flad occasionally. A future study also including the separation of these groups could raise an interesting question regarding if locals would estimate a flads EGs higher than non-locals, something that Östberg et al., (2010) concluded in their study along the east coast and west coast of southern Sweden.

Results from the socioeconomic statistics can further be used when investigate coastal areas in the quark archipelago and compare with the results from this study. Further, no investigation regarding the region's actual population in terms of socioeconomic factors has been made, since respondents were considered to write truthfully about their socioeconomic status.

4.6 Credibility of this study

A flaw that could have led to bias it this study is by not having given the respondents enough details regarding the EGs that they are supposed to evaluate, which thereby could have skewed the result from the survey. To give respondents a realistic and believable scenario for their WTP

is often pointed as a crucial step in order to find their true WTP for an EG, when creating a SP study (Johnston et al. 2017).

Moreover, when designing a SP study, a hypothetical scenario is used to try and capture respondents WTP. However, it could be argued that this study does not provide a hypothetical scenario, but more of a semi-hypothetical scenario. The reason for this is since the restoration already have been executed in the three locations and that respondents were asked to imagine that it was not yet restored. However, the cases of which they were asked to care about i.e., the increase of EGs were hypothetical, making the scenarios semi-hypothetical. If this has given the study a biased increase or a biased decrease is difficult to answer and can therefore not be excluded as a possible reason for a skewed result. A future study where the SP survey is given to nearby property owners around flads which has not yet been restored would therefore be an interesting study to compare results with.

To argue for the study's credibility in not capturing the fifty closest property owners' WTP would also be valid, since some participants were excluded from the entire study - thereby lowering the number of participants for all three locations. Thereby, the study more correctly identifies the WTP for the 49 closest in Halsskärgraven, 46 closest in Inre Bastufjärden and 35 closest in Ytteravan. A better approach would have been to identify participants who needed to be excluded (e.g., state owned property and duplicates) and replacing them with new participants, adding up to 50 participants for each location.

Protest votes is a regularly occurring phenomenon in SP studies. How to treat protest votes and which votes to categorize as protest votes differ from study to study, and as far as this study has been able to identify, no model has been accepted as the 'one way' to identify and reject protest votes. In this study the proportion of protest votes was between 12-33% depending on group and location. The number of protest votes is believed to mainly derive from two aspects.

First, Johnston et al., (2017) emphasized the importance of giving participants a good and detailed description of how scenarios would affect the chosen environment. In this study, some participants expressed that they were not willing to pay since they knew too little about the area. Perhaps the number of protest votes with this reason could have been decreased with a more thorough description. Although, one of the biggest reasons for constricting the length of the survey was due to financial limitation. The survey was also recommended to be as short as possible, to not risk losing participants engagement for the survey.

Second, the largest group of protest votes had an issue with that they were the ones who were expected to pay for the execution of the hypothetical restoration. Perhaps a more realistic payment vehicle would have decreased the number of protest votes from this group. However, this has not been further investigated and is only speculation.

4.7 Calling participants before sending survey

As mentioned in the result, the number of letter-based surveys that respondents sent back were higher than the number of participants stating they would send it back. This can of course not

conclude that all participants stating they would send it back, actually sent it back. Nor is it proof that the call-around increased the number of respondents. However, when calling, most of the participants had a positive attitude to my call. Some participants even replied that they would answer the survey solely because I first called. With this in mind, together with the response rate ranging between 44-68% (depending on location), the call-around was considered to be successful in its goal to increase the number of participants. The second goal of the call-around, to decrease the cost of the survey, was also considered successful since some participants were led to an online version while a few participants answered that they would not want to participate and thereby, minimizing the number of stamps, letter and printouts that were needed.

4.8 Conclusion

The study identifies that about 11-30%, 19-35% and 31-50% of the costs for restoring the flads in Halsskärgraven, Inre Bastufjärden and Ytteravan respectively can be argued for by the increase of non-market values received from nearby property owners. It further identifies that users and non-users value differently regarding which EGs that are most important. Non-users further seem to have a higher WTP_{MP} than users, although no significance could be seen. The importance of including non-use values when evaluating economic benefits received from a flad can thereby, to some degree, be argued for. Moreover, this study demonstrates that values from non-market goods can vary between locations which motivates the importance of producing a SP study when investigating the potential economic benefits received from non-market goods in a planned or newly established restored flad. When combining the knowledge received above, this highlights the importance of including non-market values when identifying a flads' economic benefits. It further shows that not only are non-use values as important as use values, but they could also be the highest rated values among non-market values, although no significance could be seen. This shows that the SP method is a needed tool when analysing the economic value received from a flad.

However, as earlier mentioned, the usage of the SP method has been criticised. Hence, the results should be interpreted with caution and comprehension that this thesis, at its best, could give an insight in the economic value of some of the non-market goods for the three flads, valued by the property owners nearby. Regardless, the importance of including non-marked goods in decision making is of relevance, and for now, the only practice which is able to capture both use and non-use values is by using a SP study.

5. Acknowledgement

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Appendix 1.

This is an English version of the survey sent to the participants. The survey was specified for the specific locations.

Survey in Halsskärgraven

Hello!

I am currently on my last semester in my master's degree from the program 'Sea and society' from the **University of Gothenburg**, and is currently working on my thesis. The objective of the thesis is to investigate an **environmental improvement** after a restoration executed by the **County Administrative Board of Västerbotten.**

A flad is a shallow bay which has been cut of from the sea, which is in a constant change because of the rising landmass. The landmass is rising in Västerbotten approximately 10mm/year and in this survey, all four stages (shown in the figure) are considered as a flad.

1. **Förflada**, där vatten-utbytet med havet är knappt begränsad

2. **Flada**, där en under-vattenströskel begränsar vattenutbytet

3. **Gloflada**, där vattenutbytet är mycket begränsad och tröskeln ligger ungefär vid normalvattennivå

4. **Glo**, där havsvatten kommer in endast vid högvatten och stormar

The flad restorations were executed in the project Kvarken flada. In Halsskärgravens flad, the restoration contained **putting back stone and gravel** at the threshold, where it earlier had been dug out. The restoration of the threshold is expected to among other things **increase the amount of vegetation and diversity, reproduction of fish, increase the uptake of CO and increase the uptake of nutrients in the flad**. See separate sheet for a map over the flad.

I am with the survey interested in how nearby house- and landowners value the **increased ecosystem services. You** have been chosen for the survey since you own a property in close proximity to the restored flad in Halsskärgraven. **Your answer is valuable even if you rarely or never visit the flad.**

It takes about **10 minutes** to complete the survey and you are completely **anonymous**. The survey will have a central part in my thesis which makes my extra thankful that you took the time to answer my questions. The result will also be useful for authorities around the Bothnian sea when evaluating the interest from nearby house- and landowners in future restorations. **Observe that the survey has two sides.**

Would you rather like to answer the survey online? Follow the link https://forms.gle/D9rx1YgstpKrZpVB8 or scan the QR-code.

Kind regards
Jesper Hassellöv

1. Did you know about the project Kvarken flada and/or the restoration executed on the flad?

Yes ☐ No ☐ Don't know ☐

2. How often do you visit the flad? ***Answer within a range.***

I visit the flad approximately _____ to _____ days a year.

3. What do you do when you visit the flad?

I…

Following are questions regarding your willingness to pay for an increase in ecosystem services received from the flad.

Suppose that the restoration not yet has been executed. To be able to proceed with the restoration, the payment needs to be paid by the property owners around the flad. The payment is collected in a state-owned fond and you are only expected to pay once. The payment will be marked for the restoration and the restoration risks not being executed if the payments do not exceed the costs.

It can be good to read trough all ecosystem services described above question 4, 7, 10, 13, 16 and 19, before answering questions 4. The valuation will in the study both be counted separately and combined for your total willingness to pay.

The restoration has after 10 years increased the number of fry from pike and perch to the double. This increase is also expected to favour the local recreational fishing.

4. How important is the increase to you? ***Chose the box that best describes your opinion. 1=not at all important, 6= Verry important.***

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ Don't know ☐

5. Would you be willing to pay a fee for the increase of recreational fishing? ***Pick the box that best describes your opinion.***

Yes ☐ No ☐ Don't know ☐

6. If you answered 'yes' on question 5, how much would you be willing to pay for an increase in recreational fishing? If you answered 'no' or 'don't know', skip this question. ***Answered with an interval. The fee is only paid once.***

I would be willing to pay _____ to _____SEK for the increased service.

The restoration has after 10 years in average doubled the secchi depth in the flad.

7. How important is the increase to you? ***Chose the box that best describes your opinion. 1=not at all important, 6= Verry important.***

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ Don't Know ☐

8. Would you be willing to pay a fee for the increase of the secchi depth? ***Pick the box that best describes your opinion.***

Yes ☐ No ☐ Don't know ☐

9. If you answered 'yes' on question 8, how much would you be willing to pay for an increase in secchi depth? If you answered 'no' or 'don't know', skip this question. ***Answered with an interval. The fee is only paid once.***

I would be willing to pay _____ to _____SEK for the increased service.

The restoration has after 10 years decreased the mean number of algae blooms to half.

10. How important is the increase to you? ***Chose the box that best describes your opinion. 1=not at all important, 6= Verry important.***

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ Don't know ☐

11. Would you be willing to pay a fee for a decrease in algae blooms? ***Pick the box that best describes your opinion.***

Yes ☐ No ☐ Don't know ☐

12. If you answered 'yes' on question 11, how much would you be willing to pay for an decrease of algae blooms? If you answered 'no' or 'don't know', skip this question. ***Answered with an interval. The fee is only paid once.***

I would be willing to pay _____ to _____SEK for the increased service.

The restoration has after 10 years increased its vegetation to the double, which also increases the protection and food availability for other species and increases the biodiversity in and around the flad.

13. How important is the increase to you? ***Chose the box that best describes your opinion. 1=not at all important, 6= Verry important.***

1	2	3	4	5	6	Don't know
☐	☐	☐	☐	☐	☐	☐

14. Would you be willing to pay a fee for an increase of biodiversity which gives an increased opportunity to spot more species? ***Pick the box that best describes your opinion.***

Yes	No	Don't know
☐	☐	☐

15. If you answered 'yes' on question 14, how much would you be willing to pay for an increase in biodiversity and the possibility to spot more species? If you answered 'no' or 'don't know', skip this question. ***Answered with an interval. The fee is only paid once.***

I would be willing to pay _____ to _____SEK for the increased service.

The restoration has after 10 years increased the uptake of CO^2 to the double, which is expected to mitigate climate change.

16. How important is the increase to you? ***Chose the box that best describes your opinion. 1=not at all important, 6= Verry important.***

1	2	3	4	5	6	Don't know
☐	☐	☐	☐	☐	☐	☐

17. Would you be willing to pay a fee for an increased uptake of CO^2 which can help mitigate climate change? ***Pick the box that best describes your opinion***

Yes	No	Don't know
☐	☐	☐

18. If you answered 'yes' on question 17, how much would you be willing to pay for an increased uptake of CO^2 which can help mitigate climate change? If you answered 'no' or 'don't know', skip this question. ***Answered with an interval. The fee is only paid once.***

I would be willing to pay _____ to _____SEK for the increased service.

The restoration has directly after increased the flads resistance to drought and has can now constantly have a 'mirror'.

19. How important is the increase to you? ***Chose the box that best describes your opinion. 1=not at all important, 6= Verry important.***

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ Don't know ☐

20. Would you be willing to pay a fee for the flads ability to constantly keep having a 'mirror'? ***Pick the box that best describes your opinion***

Yes ☐ No ☐ Don't know ☐

21. If you answered 'yes' on question 20, how much would you be willing to pay for the flads ability to keeping a 'mirror'? If you answered 'no' or 'don't know', skip this question. ***Answered with an interval. The fee is only paid once.***

I would be willing to pay _____ to _____SEK for the increased service.

22. An increase of above-mentioned ecosystem services gives me…

	Pick **one** box that best describe your opinion.			
	Do not agree	Agree to some degree	Agree	Don't know
Comfort since I use the flad for fishing, birdwatching, walking **or** another form of recreation.	☐	☐	☐	☐
Comfort in that the **increased** ecosystem **exists** even though I do not use the area myself.	☐	☐	☐	☐
Comfort since I might want to use the increased values in the **future**.	☐	☐	☐	☐
Comfort since I know the increased values can be used by **future generations**.	☐	☐	☐	☐

23. If you were <u>not</u> willing to pay for one or more services, why did you not want to pay? You can skip this question if you were willing to pay for all services. *Pick one or more boxes that best describes your opinion.*

I do not see a value in the area. ☐

I cannot afford it. ☐

Another reason _____

24. If you <u>were</u> willing to pay for one or more services, why did you want to pay? You can skip this question if you were not willing to pay for any services. *Pick one or more boxes that best describes your opinion.*

I consider the increase of mentioned services being worth it. ☐

I have a responsibility to help these services. ☐

I consider the restoration being worth it. ☐

Another reason _____

Lasty some question about your socioeconomic status. The questions will only be used to identify trends in the population for this study and the answers cannot be used to track back a specific respondent. *Pick the answer that best describes you.*

25. How old are you? _____years

26. What is your household's income (after taxes) a month? *Do not forget to count all sorts of income, even contribution. Write your answer in the empty space or chose on of the alternatives provided.*

_____SEK

Less than 10 000 SEK	50 000 – 59 999 SEK
10 000 – 19 999 SEK	60 000 – 69 000 SEK
20 000 – 29 999 SEK	70 000 – 79 999 SEK
30 000 – 39 999 SEK	80 000 – 89 999 SEK
40 000 – 49 999 SEK	90 000 SEK or more

27. What sex do you associate with? *Chose the one that best fits you.*

Male Female Non-Binary Do not want to answer

28.How many adults are part of the household? *Do not forget to count yourself.*

_____ Adult (18years or older) and _____ children (less than 18years).

29. What is your highest form of education? *Chose the one that best fits you.*

Elementary school High-school Polytechnic University Other

30. Are you part of a green non-governmental organisation? *Pick the one that best fits you.*

Yes No Don't know

Are you curious and wants to learn more about the project Kvarken flada? Visit www.kvarkenflada.org or scan the QR-code below.

Are you curious about my thesis? visit https://forms.gle/ShpCGcnJRNiTUuYr6 or scan the QR-code below to registrate your interest. I will then send you a copy of my thesis when it is finished (likely in June). I can unfortunately not send it by paper. Feel free to send me an email to Hassellov96@hotmail.com if you have any questions.

I would lastly like to again thank you for taking the time to answer this survey. Please send you answers back to me as fast as possible so that there is time to analyse the results. Post your answers by placing the survey in the prefilled enveloped that were included.

If you have any other comments regarding the survey, please let me know by either writing in the box bellow, or by sending an email (Hassellov96@hotmail.com). This is however not mandatory.