



Preventing the extinction of the Dinaric-SE  
Alpine lynx population through reinforcement  
and long-term conservation



# Assessment of public attitudes toward lynx and lynx conservation in Slovenia, Croatia and Italy

## *Intermediate report of the Action D.4*

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## Contents

Methods	3
Study area	3
Questionnaire	3
Target groups and sampling	4
Data management and analysis	5
Results	5
About the sample	5
Attitudes toward lynx	6
General public by country	6
Results by stakeholder group	7
Fear of lynx	8
General public by country	8
Results by stakeholder group	9
Acceptance of lynx in local environment	10
General public by country	10
Results by stakeholder group	11
Lynx population management – size and status of the population	13
General public by country	13
Results by stakeholder group	16
Lynx population management – Population reinforcement	20
General public by country	20
Results by stakeholder group	21
Damages and damage prevention	21
General public by country	21
Results by stakeholder group	24
Hunting and beliefs regarding lynx impacts on game species	26
General public by country	26
Results by stakeholder group	27
Value of lynx	27
General public by country	27
Results by stakeholder group	30
Conclusions	33
References	35

## Methods

### Study area

Study area of the attitude survey has included the entire Alpine-Dinaric LIFE Lynx project area of Italy, Slovenia, and Croatia. The Slovenian study area has been additionally divided into the Alpine and the Dinaric part.

### Questionnaire

For this intermediate report a modified version of the questionnaire already developed in A.7 action was used. A great deal of attention was dedicated to the development of that A.7 questionnaire, the main tool for data collection. The process included identification of the relevant issues to be explored where the entire project team has participated in the subsequent design and testing of the wording of the questions. The original questionnaire was designed in the English language which participating national teams have translated into their languages. The modified questionnaire that we have used for this intermediate report contained 48 questions. Mostly the same questions were used as for the questionnaire survey done in 2019 (A.7 action), with three minor differences. The first difference is that in this questionnaire we did not use three questions about which European lynx population is the most suitable for translocations to Slovenia, as most of the lynx translocations to Slovenia have already taken place and these questions are no longer so relevant. Another difference is that this time the question "From which sources of information do you get the most information about the lynx?" was closed-ended, so possible answers were offered to the respondents in advance. The third difference is that we added a question asking the respondents if they had already answered a similar questionnaire in 2019.

The questionnaire included questions covering the following topics:

- General sentiment towards lynx
- Perceptions about lynx
- Knowledge and believes about lynx
- Opinions about different management measures and approaches
- Evaluation of information sources about lynx
- Demographic characteristics of the respondents
- Project visibility

In designing the questionnaire we've also partially used the questionnaire used in a public attitude survey in Slovenia and Croatia in 2007 (Interreg IIIA DinaRis).



## Target groups and sampling

With the public attitude survey we've targeted the main stakeholder groups which are either crucial for lynx conservation or which livelihoods lynx presence can impact – general public in the project area, hunters in the project area and livestock breeders in the project area.

In Slovenia, a sample of potential general public respondents was obtained from the register of inhabitants – a random stratified (Alps and Dinarics) sample of adult (18 years and older) inhabitants was obtained from the national Statistical Office. The sample included first name, last name, and address of the selected potential respondent. In Italy a commercial panel sample was used and in Croatia a CATI sample. In Slovenia questionnaires were sent to the potential respondents and an envelope with prepaid return postage was included. Seven days later a reminder/thank you card was sent to increase response rate. In Croatia, the study was conducted using a CATI telephone method. In Italy questionnaires were filled online or through telephone interviews.

Sample of farmers was obtained in Slovenia from the register of farmers at the Ministry of Agriculture, Forestry, and Food. Names, last names, and addresses were obtained, and questionnaires were sent by mail with an envelope with prepaid return postage. Seven days later a reminder/thank you card was sent in order to increase response rate. In Croatia a CATI telephone method was carried out and additionally an online survey was shared on various social networks and portals thematically related to the areas of Lika and Gorski Kotar. In Italy no additional effort was made to obtain a sample of breeders. They were identified within the panel sample by answering the question whether they own livestock.

Sample of hunters was obtained in Slovenia by sending 3-5 questionnaires to each of the local hunting organizations in the project area and asking the leaders of the hunting organizations to distribute the questionnaires among the hunters. In Croatia a CATI telephone method was carried out and additionally an online survey was shared on various social networks and portals thematically related to the areas of Lika and Gorski Kotar. In Italy a panel survey was carried out and additionally the questionnaire was also distributed by hunters themselves to increase the sample size.



Evrazijski ris (*Lynx lynx*)

Na sliki je ris Doru, prvi ris, ki je bil preseljen in izpuščen na Hrvaškem v sklopu projekta LIFE Lynx. Po izpustu je v iskanju svojega teritorija odpotoval v Slovenijo.

Spoštovani!

Prejšnji teden smo vam poslali vprašalnik o risu. V primeru, da ste vprašalnik že izpolnili in nam ga poslali se vam iskreno zahvaljujemo in vas vabimo, da si ogledate našo spletno stran [www.lifelynx.eu](http://www.lifelynx.eu), kjer bomo objavili rezultate anketne raziskave, v kateri ste sodelovali.

V nasprotnem primeru pa vas lepo prosimo, da vprašalnik izpolnite in nam ga pošljete v priloženi kuverti s plačano poštnino. Vaši odgovori bodo pomembno pripomogli k učinkovitemu upravljanju z risom ter sobivanju ljudi in risov.

Zahvaljujemo se vam za sodelovanje in pomoč!

Raziskovalci Oddelka za biologijo na Biotehniški fakulteti Univerze v Ljubljani

Poštnina  
plačana  
pri pošti  
!!!!

S podporo finančnega mehanizma Evropske unije LIFE.

Figure 1: Reminder/Thank you card that was used in Slovenia to increase response rates for general public and farmers.

## Data management and analysis

All the data was entered into an agreed excel form. A random sample of 3% of questionnaires entered by hand was re-checked for the typing mistakes at the end. We did not find any mistakes.

## Results

### About the sample

The obtained sample sizes were 1059, 582 and 681 for Slovenia, Italy and Croatia, respectively. Response rate for questionnaires sent by mail in Slovenia was 33%. Thirteen questionnaires were completed by minors, so they were excluded from the analysis. We also excluded 26 questionnaires from the analysis because they contained a very low number of question responses.

Within the general public sample the share of females vs. males was not so well distributed. Females made up 55%, 47% and 70% in Slovenia, Italy and Croatia, respectively. The oldest were general public respondents in Croatia (61 years on average), followed by Slovenia (50 years average) and Italy (49 years average).

In the following section we show first the results of the general public in the three countries. The answers of all the stakeholder groups are presented in the following sections “Results by stakeholder group”. It is important to note that respondents from each country were answering questions about their own country.

## Attitudes toward lynx

### General public by country

In all three countries the majority of respondents described themselves as being in favour of lynx. In Italy, where the lynx are scarcest, the share of those describing themselves as being neither in favour nor against was relatively high with 36% (Figure 2) and very similar as in the 2019 survey (35%).

Similar distribution of opinions was found when respondents in all three countries assessed their agreement/disagreement to supporting maintaining lynx in their respective countries for future generations (Figure 3, Figure 4). When we compare the results of the survey done in 2019 with this survey (2021) we can see that in Croatia the share of respondents who disagree with the statement, that it is not important to maintain lynx in their respective country because there are lynx present in other parts of Europe, decreased (in 2019 90%, in 2021 74%).

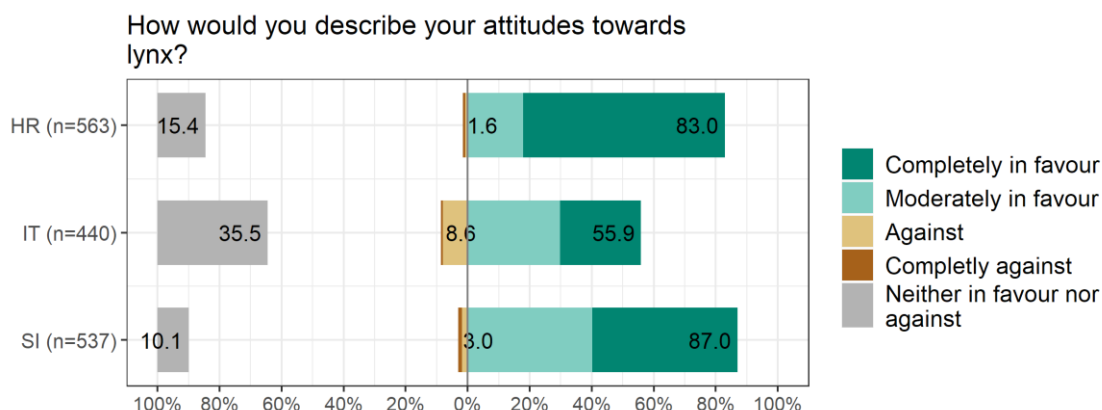


Figure 2

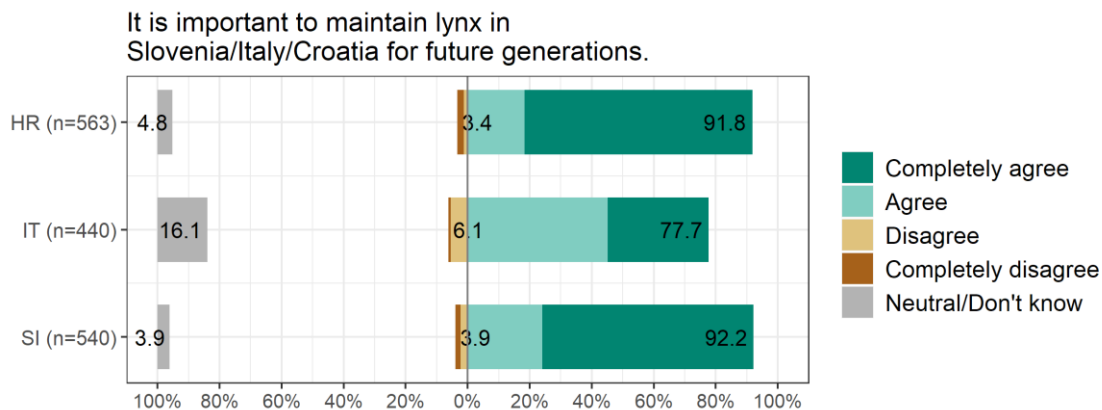


Figure 3

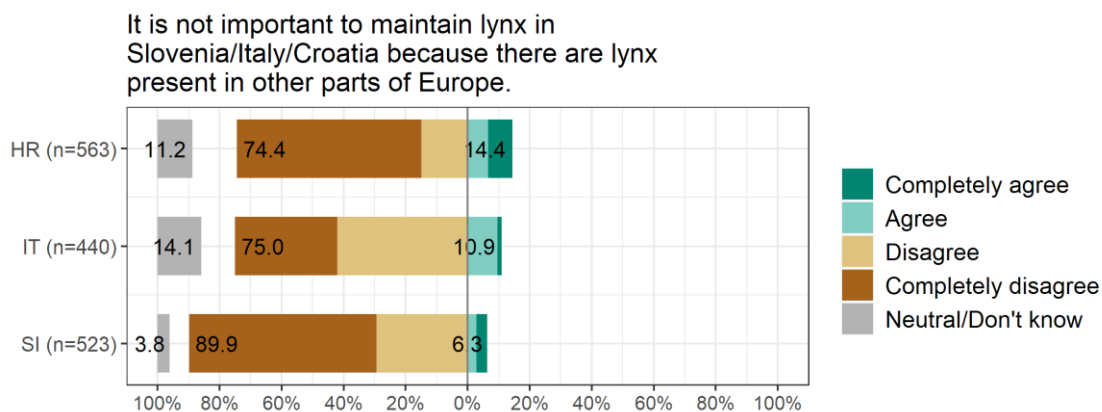


Figure 4

### Results by stakeholder group

If we look at the results based on the respondents' belonging to a stakeholder group, we see that the only group not so overwhelmingly in favour of lynx are livestock breeders since approximately quarter of them still describe their own attitudes as being against lynx (Figure 5). With 66% agreement to the question it is important to conserve lynx for future generations (

Figure 6), this is the stakeholder group with the lowest acceptance level. At the graph "How would you describe your attitudes towards lynx?" the most notable difference to the graph of 2019 is that a lower percentage of hunters answered with in favour (83% in 2019 and 75% in 2021). Similar also happened at the statement "It is not important to maintain lynx in Slovenia/Italy/Croatia because there are lynx present in other parts of Europe."

(respondents were answering about their respective countries). Regarding these results, it is important to point out that almost five times as many hunters participated in this 2021 survey as in the previous survey, so we can assume that this result is much more representative for the group of hunters than the result from 2019.

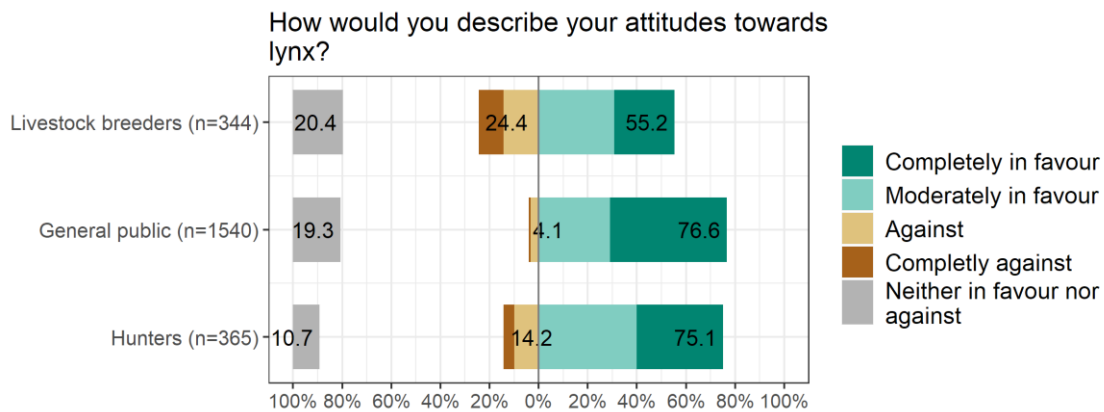


Figure 5

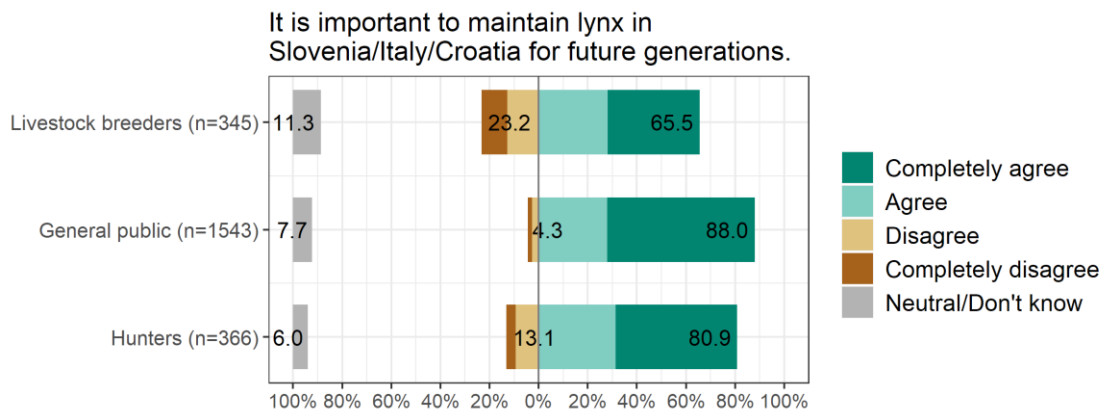


Figure 6

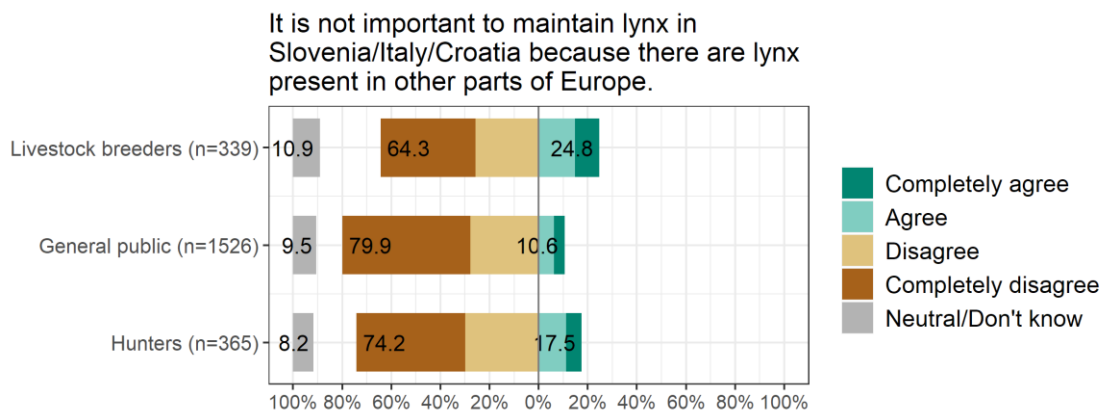


Figure 7

## Fear of lynx

### General public by country

Large carnivores can evoke strong and emotional responses in humans (Jacobs et al. 2019). They often feel fear, hatred or admiration, excitement towards them (Røskaft et al. 2007,



Johansson et al. 2012, Sjölander-Lindqvist et al. 2015). Lynx avoid people and are not considered to be dangerous to them, which respondents from Slovenia and Croatia seem to be well aware of (Figure 9). Majority of respondents from Italy, on the other hand, chose “Not sure” answer to the statement that lynx often attack humans, and more than 40% of them expressed they would be afraid to go to the forest where lynx are present (Figure 8). The biggest change in attitudes towards the statement “I would be afraid to go to the forest where lynx are present.” can be noticed in Croatian data, where in 2019 there was only 13% of respondents who agreed with that statement and in 2021 we can see that almost 30% agree with the statement. One reason for this result might be that the number of people surveyed in Croatia in 2021 is 3 times as large as in 2019, so because of the larger number of respondents this 2021 results are probably more representative of the general public.

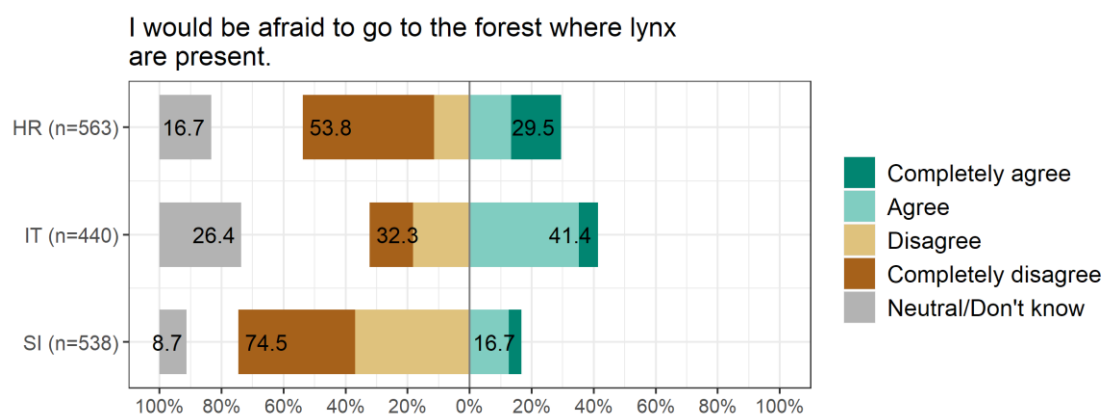


Figure 8

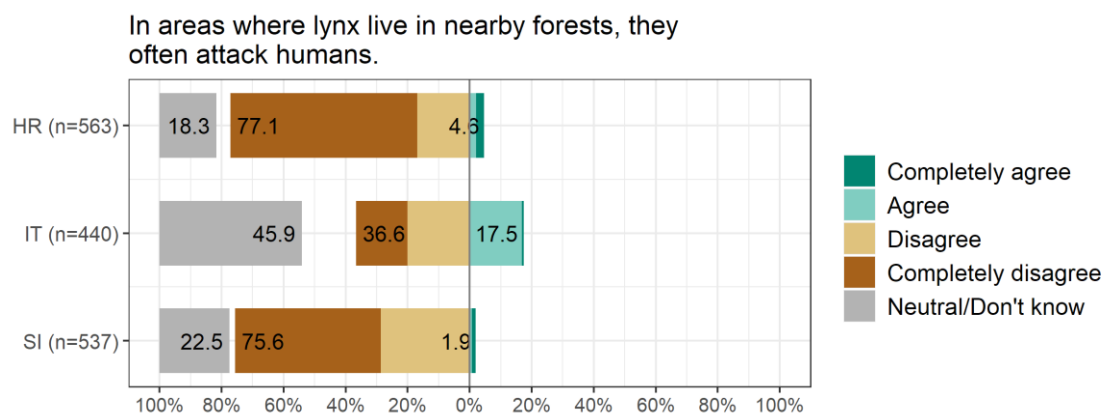


Figure 9

### Results by stakeholder group

Fear of lynx seems to be to some degree an issue with the general public and livestock breeders (Figure 10). The results look very similar as in the previous survey (2019). It seems that the

majority of stakeholders did not agree that in areas where lynx live in nearby forests, they often attack humans (Figure 11), however a lot of livestock breeders and general public respondents selected “Neutral/Don’t know” option at that statement.

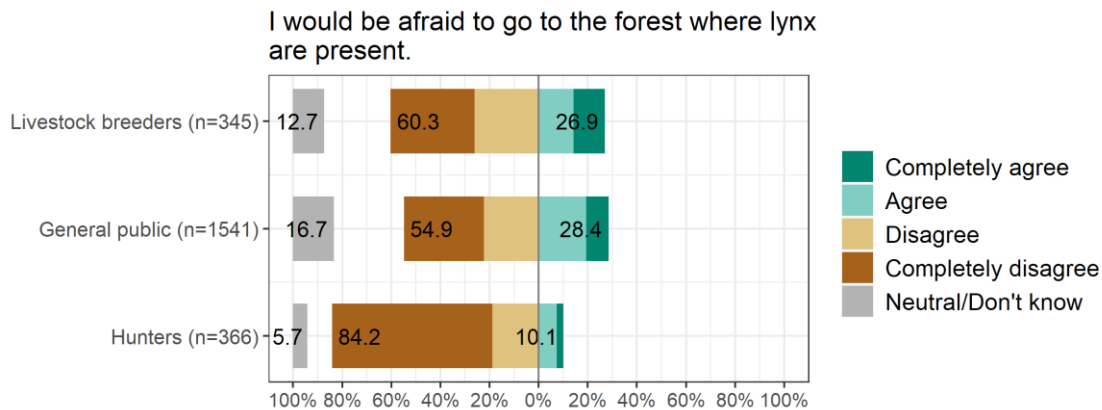


Figure 10

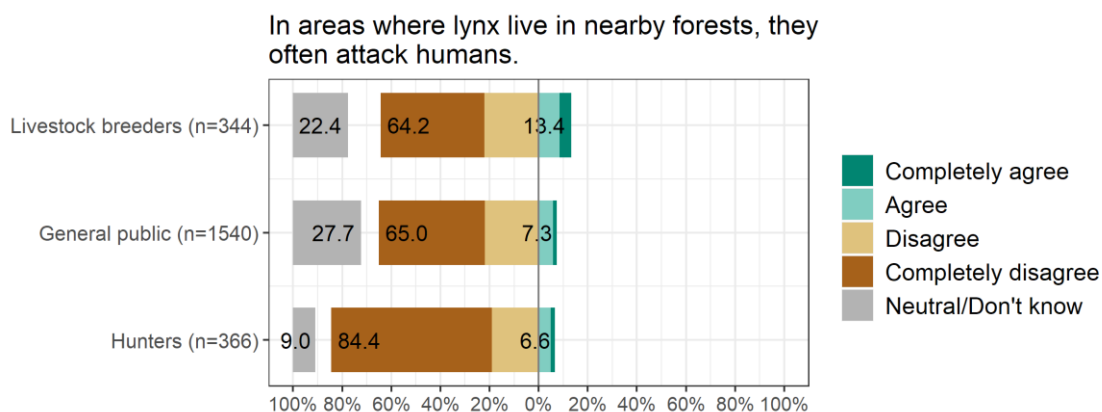


Figure 11

## Acceptance of lynx in local environment

### General public by country

One of the important factors determining lynx population chances for long-term survival is whether the local inhabitants are willing to tolerate lynx in their vicinity. Large majority of all respondents disagree with extermination of the species (Figure 12).

Economic impacts of coexisting with large carnivores are often one of the factors influencing acceptance levels. Respondents in our survey are generally not concerned with the potential financial damage caused by lynx (Figure 13). This was also noted in the 2019 survey.

If strong negative attitudes toward wildlife develop, wildlife poaching can become an issue (Červený et al 2019). Respondents from all three countries participating in the LIFE Lynx project believe that illegal killings of lynx are not justifiable (Figure 14).

Lynx do not belong to our country and should be exterminated.

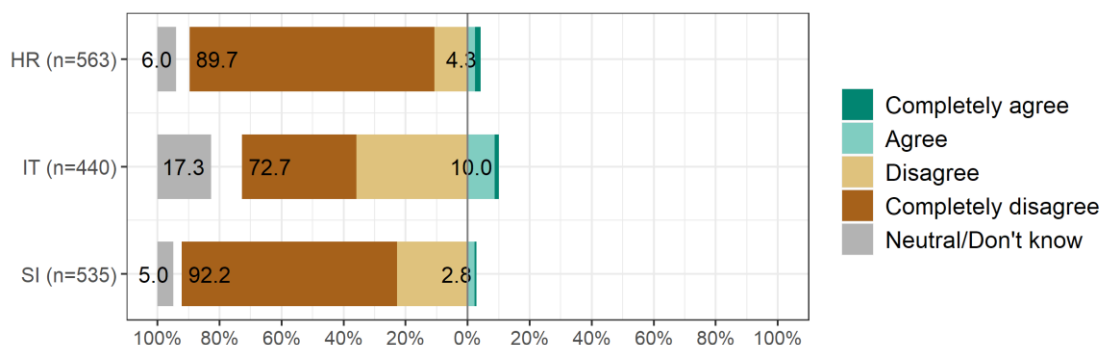


Figure 12

I am afraid that increased lynx presence would cause me financial damage.

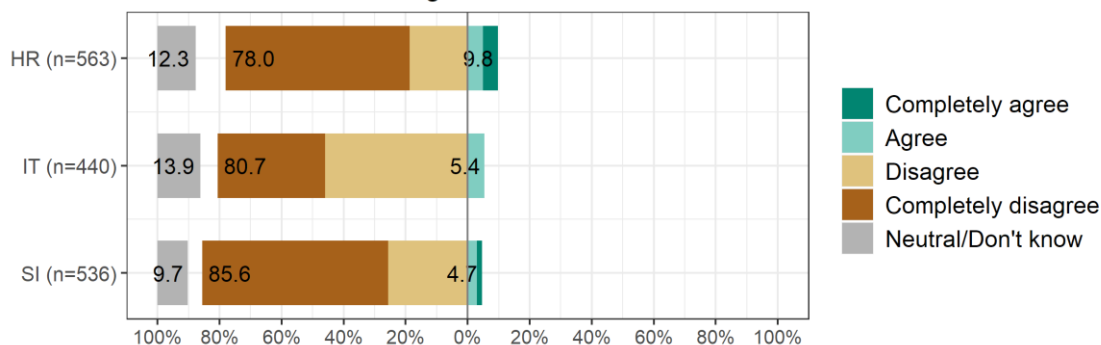


Figure 13

Illegal killings of lynx are justifiable.

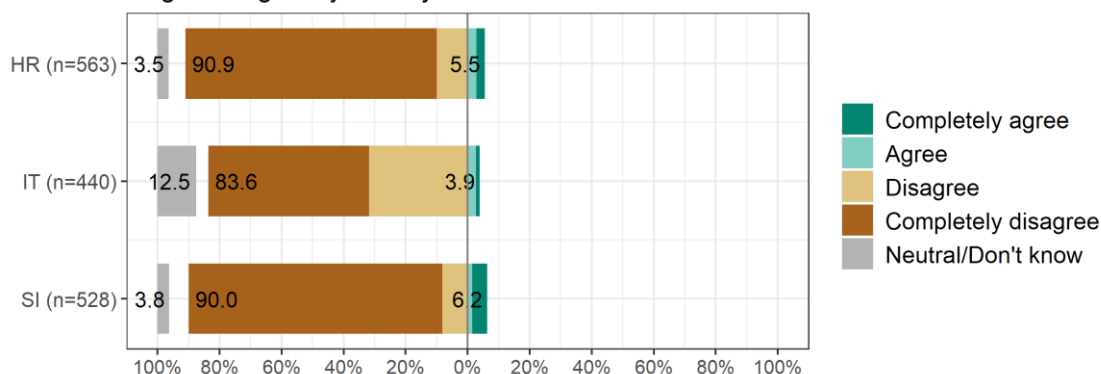


Figure 14

### Results by stakeholder group

Among stakeholder groups, livestock owners are still the most concerned about the potential of economic damage caused by lynx. The share of hunters afraid of lynx causing

them financial damage has increased from 10% (2019) to 18% (2021). Regarding the opinion of hunters surveyed, it is important to emphasise that almost five times as many hunters participated in this survey (2021) as did in the previous survey, so we can assume that these results are more representative of the group of hunters than in 2019.

Nevertheless, all the stakeholders overwhelmingly disagree with the extermination or illegal killings of lynx. This was also noted in the survey done in 2019.

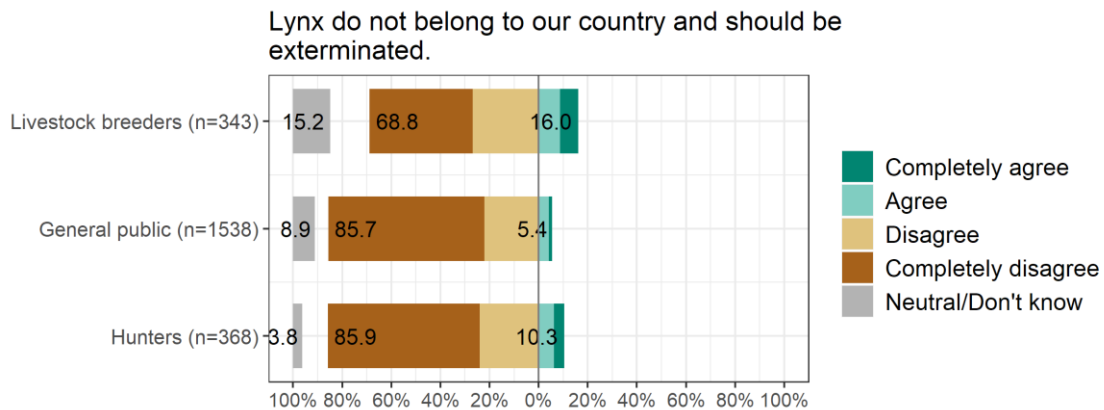


Figure 15

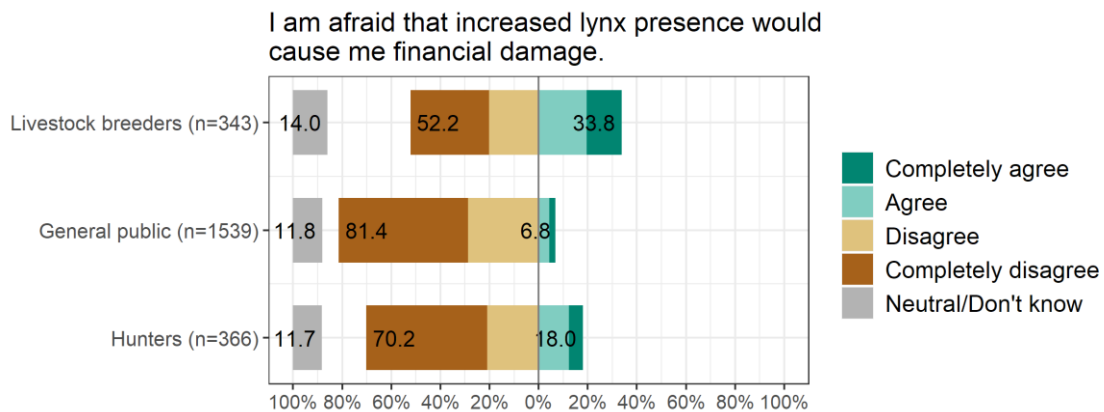


Figure 16

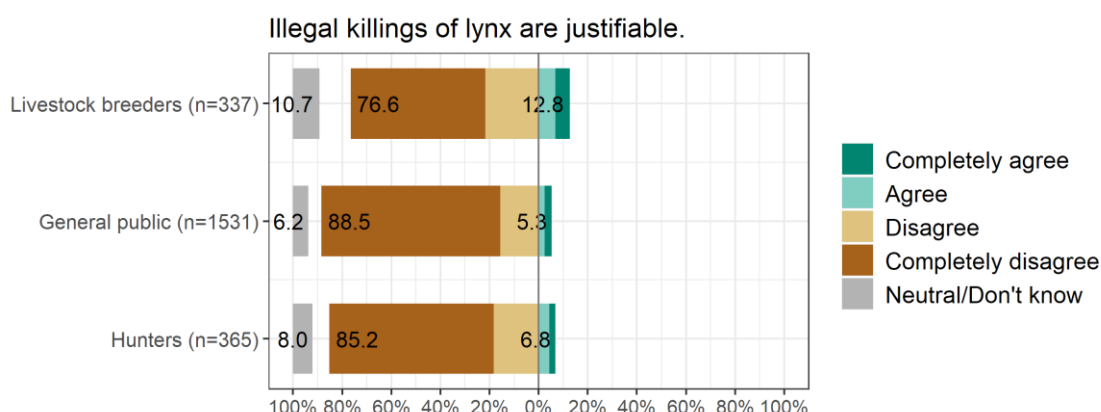


Figure 17

## Lynx population management – size and status of the population

### General public by country

Public perceptions about the species' abundance play an important role in shaping public support or opposition to different management measures. We have used a series of statements to assess these perceptions. Most of our respondents did not believe the lynx population is in good condition. In Italy, 43% and in Croatia, 37% of the respondents chose a neutral answer (Figure 18). In Croatia 74% of the respondents in 2019 disagreed with the statement that the lynx population in Croatia is in good condition and in 2021 only 47% disagreed. One reason for that result might be that the number of people surveyed in Croatia in 2021 is 3 times larger than in 2019. Another reason might be that they might have heard about lynx reintroductions happening in Croatia and don't consider the population as so endangered any more. On the contrary, in Italy in 2019 only 31% disagreed with the statement saying that the lynx population in Italy is in good condition and in 2021 as many as 52% disagreed with that same statement.

In addition, the respondents have mostly agreed that the population is close to extinction (Figure 19).

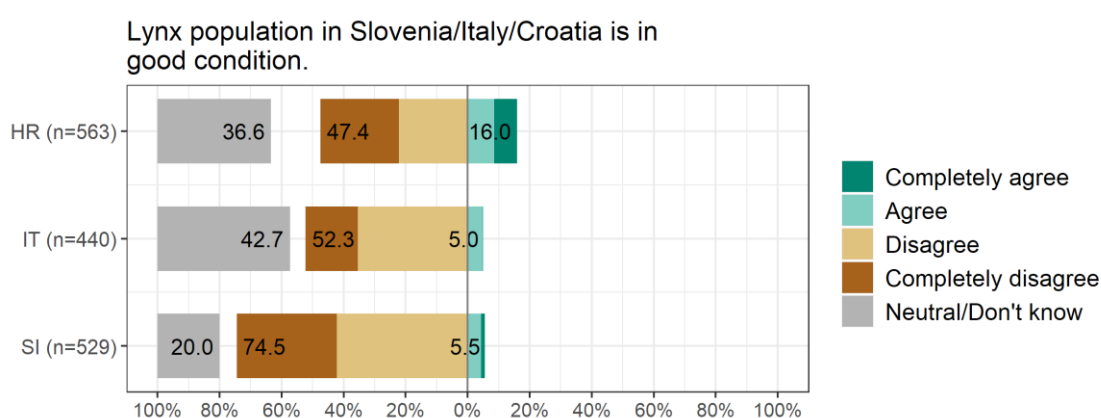


Figure 18

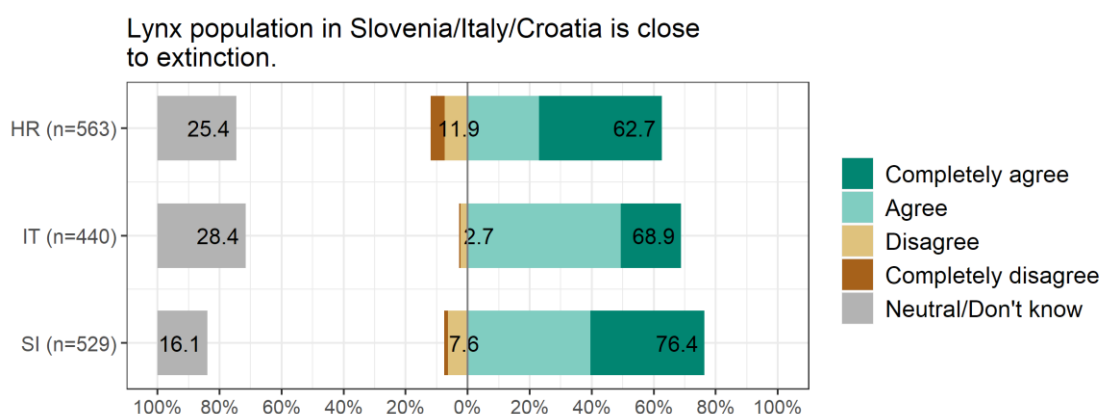


Figure 19

Prevalent support to increasing the number of lynx in their respective countries was documented in all three countries (Figure 20) as well as the opposition to hunting lynx (Figure 21), Croatia is the only country, where more respondents seem to support regular quotas for hunting lynx, than to not support that (Figure 22).

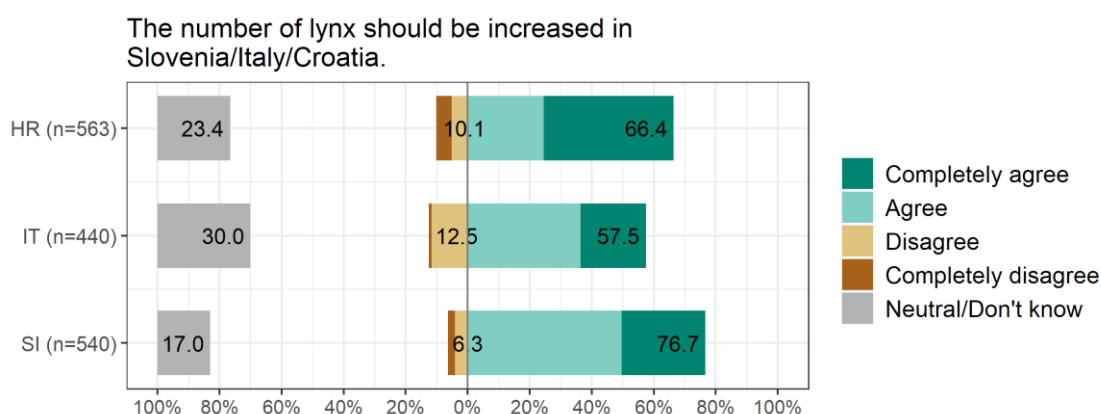


Figure 20

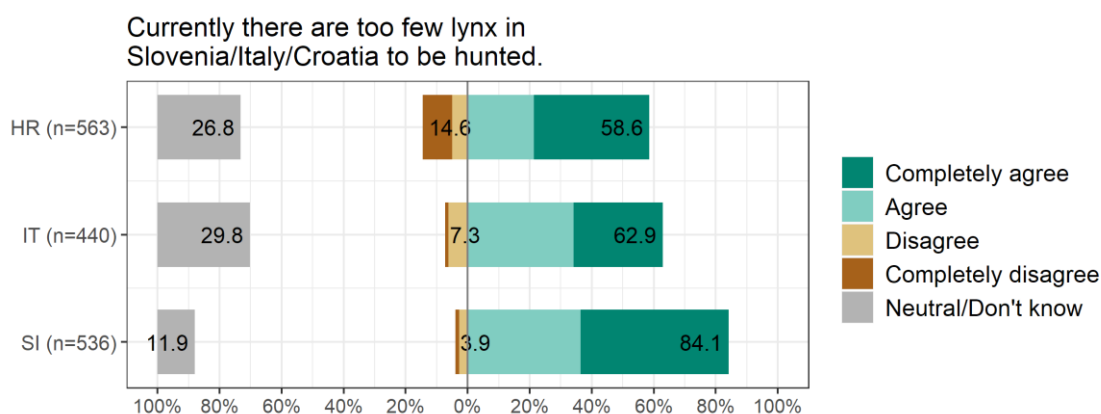


Figure 21

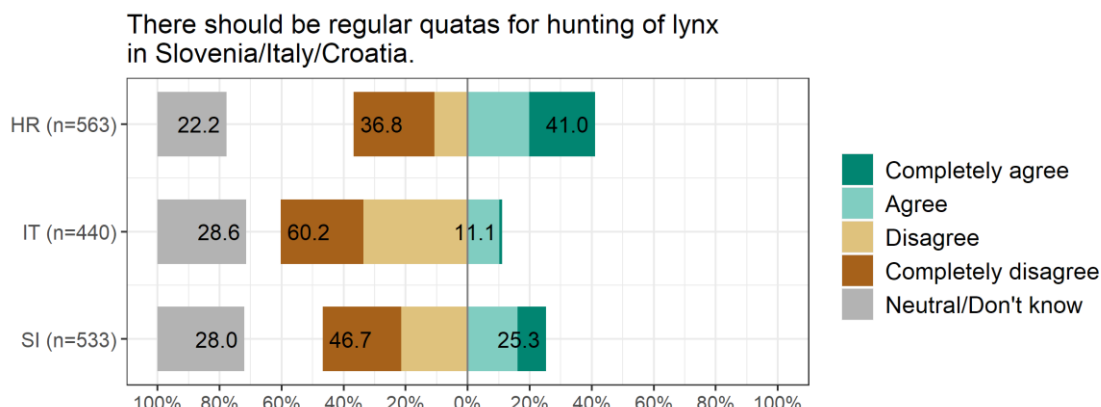


Figure 22

Over the years, several possible causes for lynx population deterioration were identified. Genetic analysis has confirmed that inbreeding depression was most likely the leading cause (Sindičić et al. 2013). Respondents from Slovenia have correctly identified this cause as the leading one (Figure 23), while respondents from Italy and Croatia ranked illegal killings as the main cause of deterioration of the population (Figure 26). With that said we can see that the opinions about the leading cause for lynx population deterioration in the specific countries in 2021 stayed as they were in 2019.

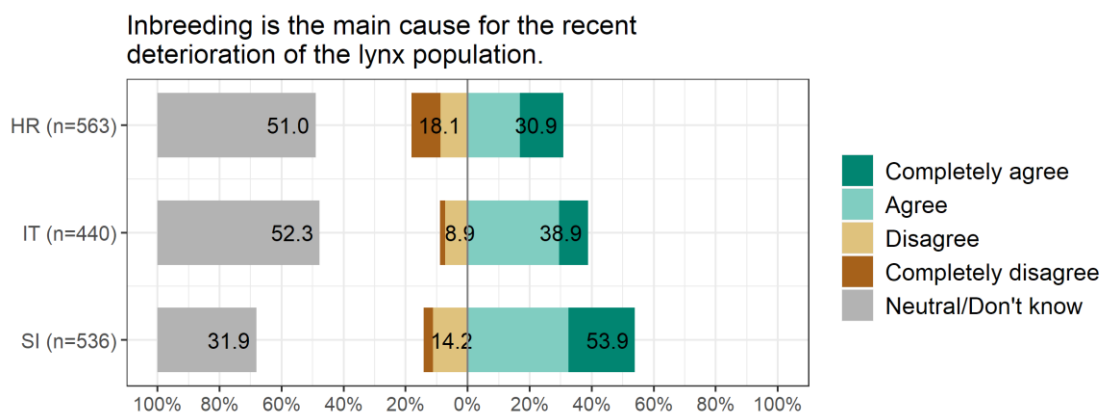


Figure 23

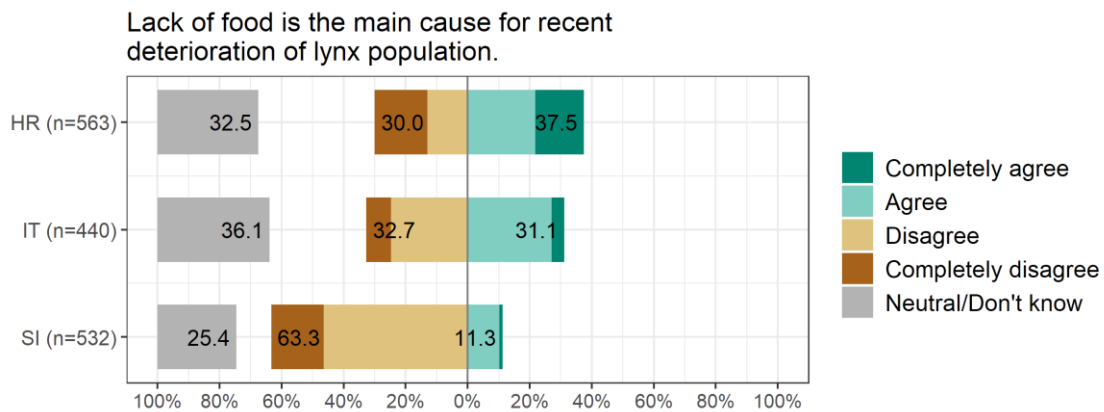


Figure 24

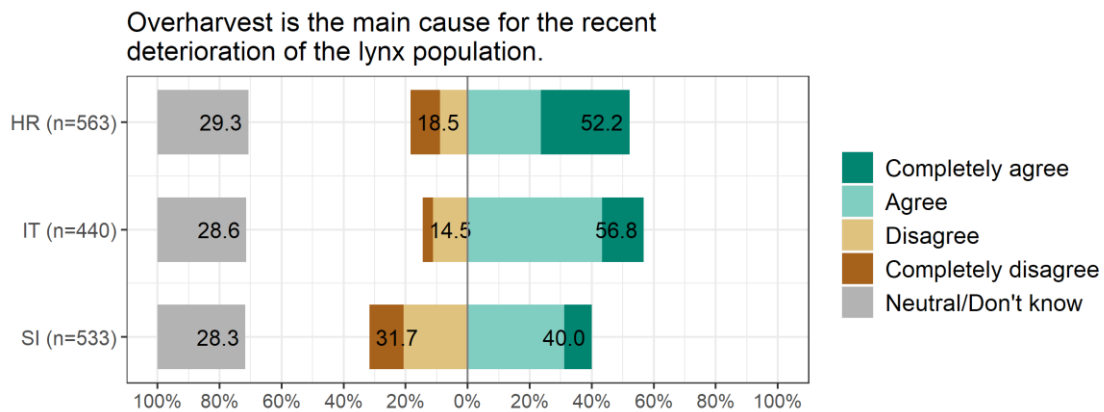


Figure 25

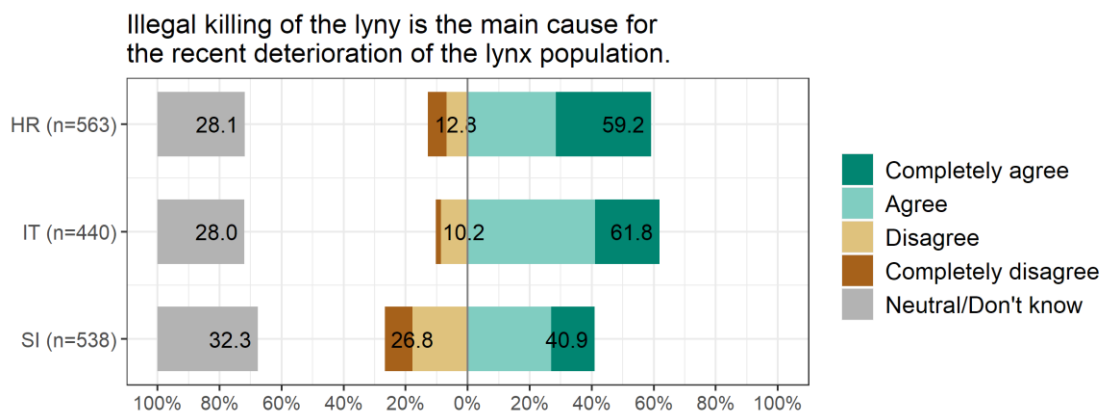


Figure 26

### Results by stakeholder group

All three stakeholder groups have correctly assessed population status of the lynx as critical  
(



Figure 27 and

Figure 28). Compared to 2019 we see that the percentage of hunters, who disagree, that the lynx population is in good condition, is smaller in 2021 (75% in 2019 and 56% in 2021). One reason why this happened might be that because of the reintroductions people do not regard lynx as endangered as before and also as already stated before, the sample of hunters is much larger this time than in 2019.

The increase of the number of lynx is clearly supported by respondents from all stakeholder groups (

Figure 29). In 2019 approximately equal shares (approx. 40%) of livestock owners supported and opposed an increase in lynx number, however, in 2021 the support for increase of lynx numbers seems to have increased to 43% and the opposition decreased to 36%. It also seems that hunters in 2021 (54% agree with the increase) are less in favour of increasing the lynx population than they were in 2019 (75% agreed with the increase). But as already mentioned, almost five times as many hunters participated in this survey (2021) as did in the previous survey, so we can assume that the latest results are more representative of the group of hunters than they were in 2019.

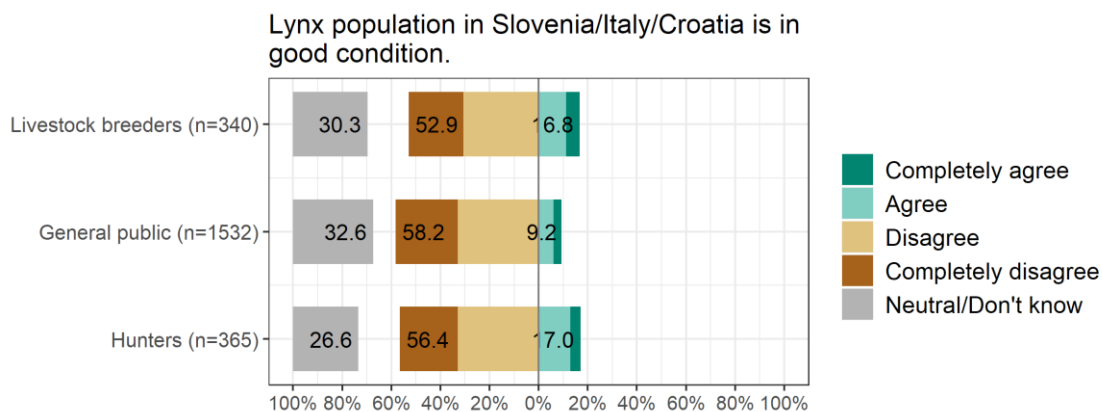


Figure 27

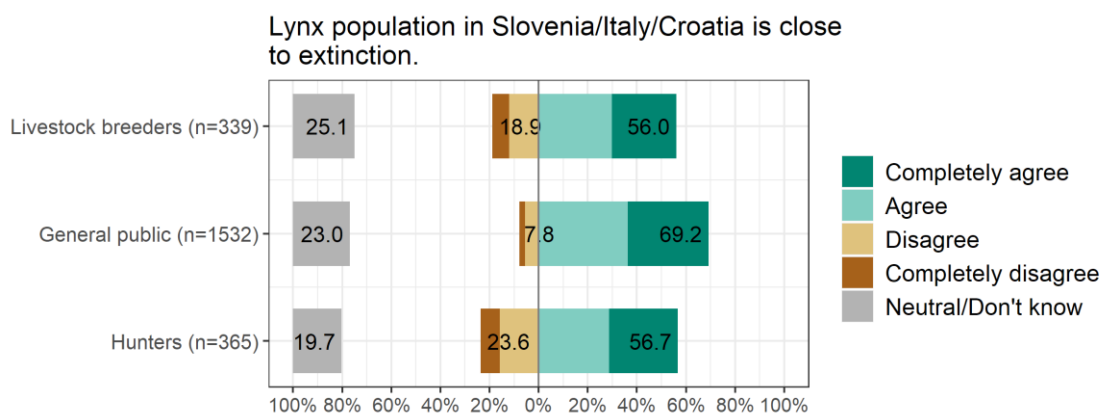


Figure 28

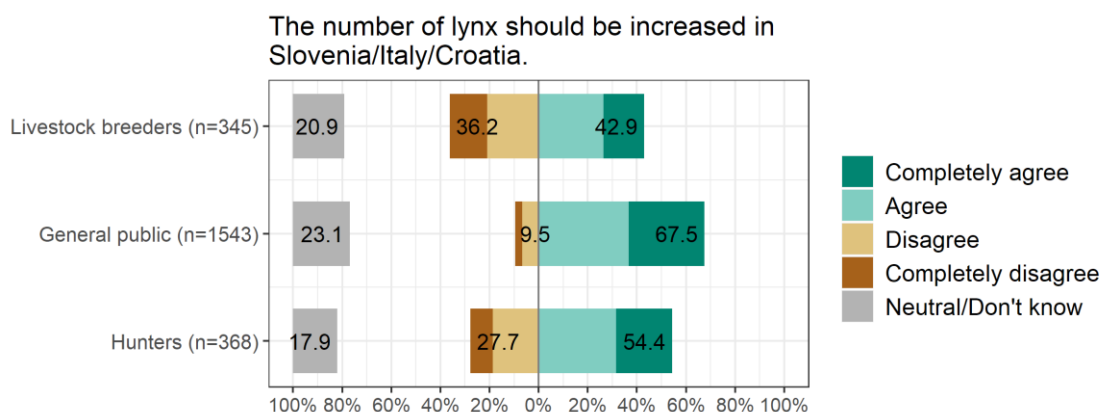


Figure 29

Respondents from all stakeholder groups support the notion that there are too few lynx to be hunted (Figure 30). We can see that the support to that notion from livestock breeders has increased over the years (51% in 2019 and 65% in 2021).

Respondents from the general public and hunters mostly oppose regular quotas for hunting of lynx, while among livestock breeders a higher share of respondents agrees with the quotas (40%) than disagrees with the quotas (34%).

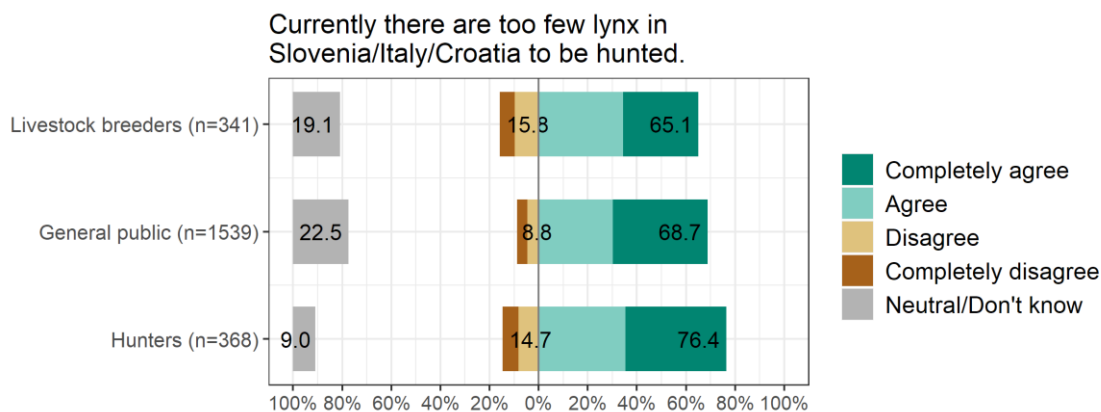


Figure 30

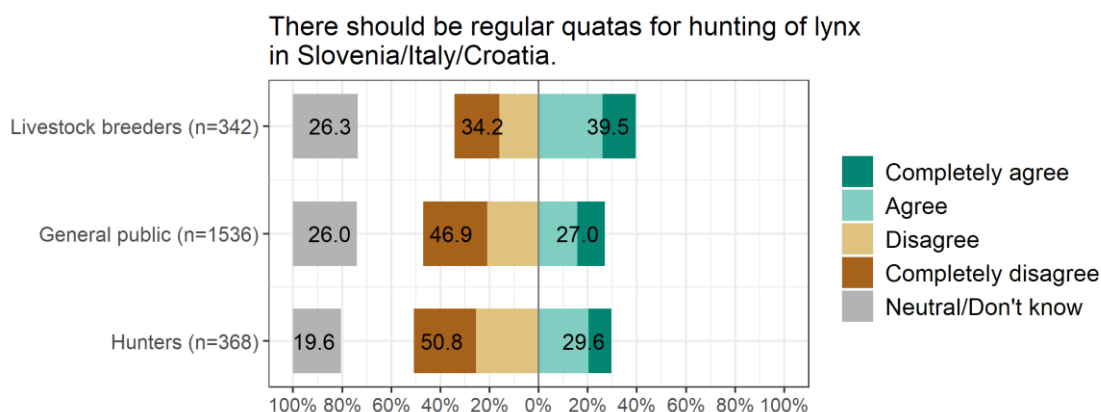


Figure 31

Livestock breeders and especially hunters seem to be much more familiar with the causes of lynx population deterioration than the general public. General public respondents identified overharvesting and illegal killings as main causes, while hunters and livestock breeders primarily ranked inbreeding as the main cause for the recent deterioration of the lynx population. Each of the three stakeholder groups in 2021 identified the same cause as the main one as they did in 2019.

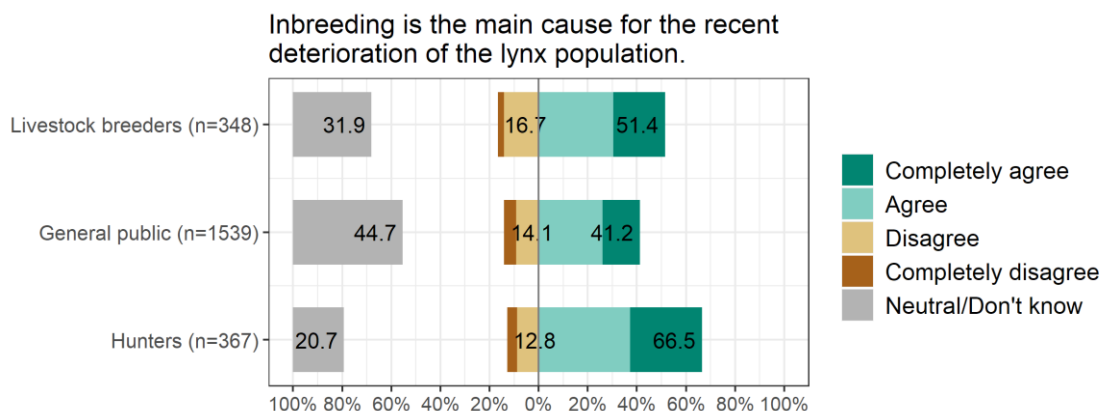


Figure 32

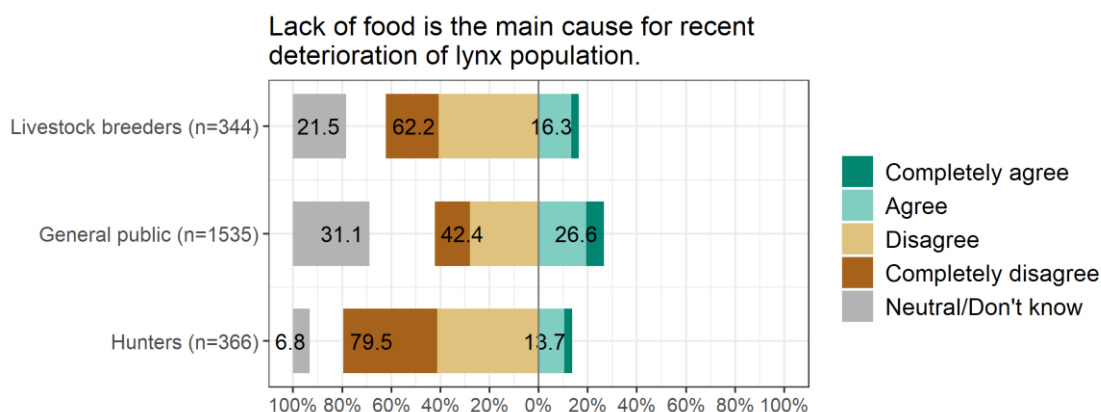


Figure 33

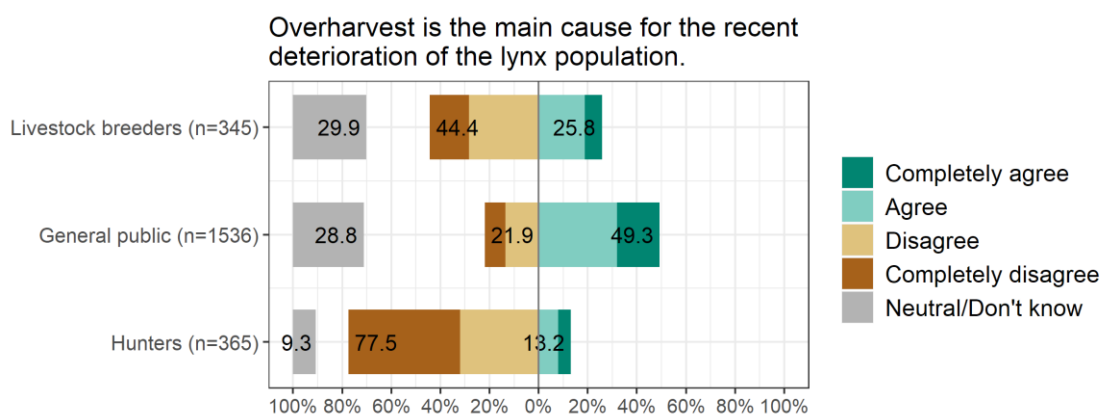


Figure 34

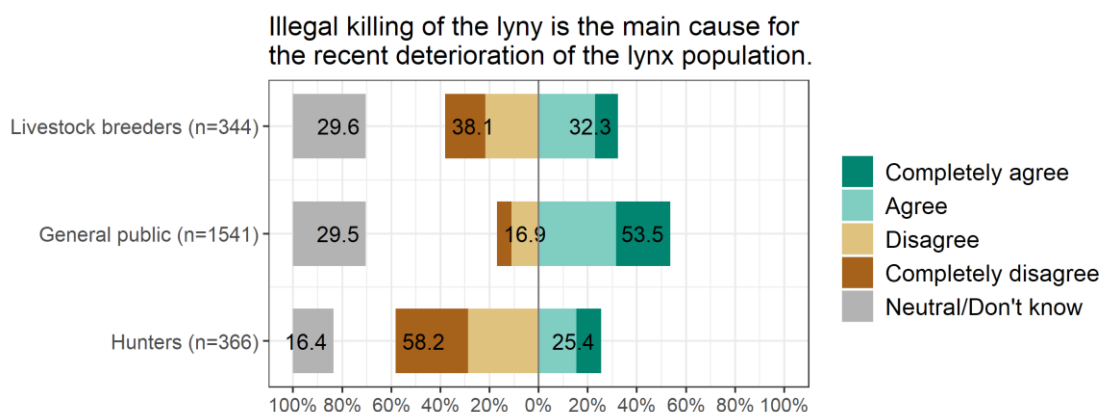


Figure 35

## Lynx population management – Population reinforcement

### General public by country

The only plausible way of addressing high inbreeding levels in the short term in the Dinaric

lynx population is to bring new, unrelated animals to the population. Public support of this action is crucial for maintaining the positive attitudes toward lynx. General public in all three countries supports population reinforcement ( Figure 36).

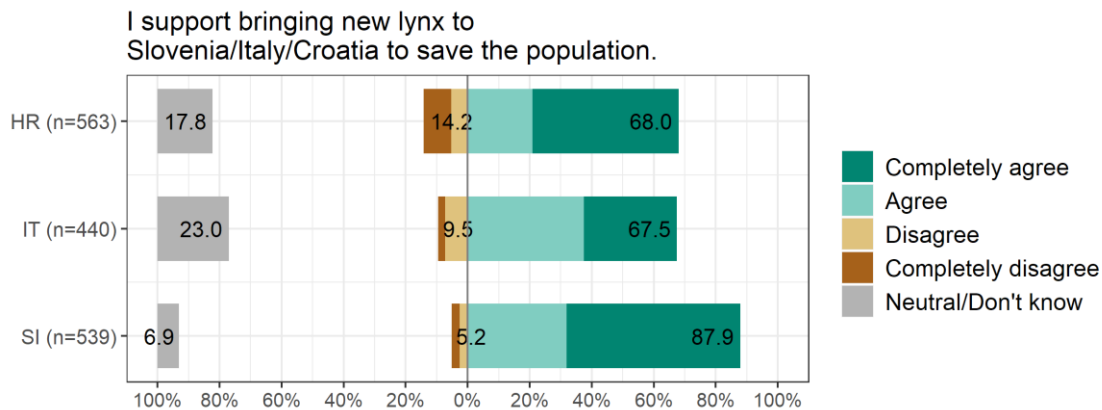


Figure 36

### Results by stakeholder group

Respondents from all stakeholder groups support bringing new lynx to Slovenia/Croatia/Italy ( Figure 37). Opposition to bringing new lynx to Slovenia/Croatia/Italy was documented primarily among livestock breeders and as the project continues to translocate new animals, this opposition could become more vocal.

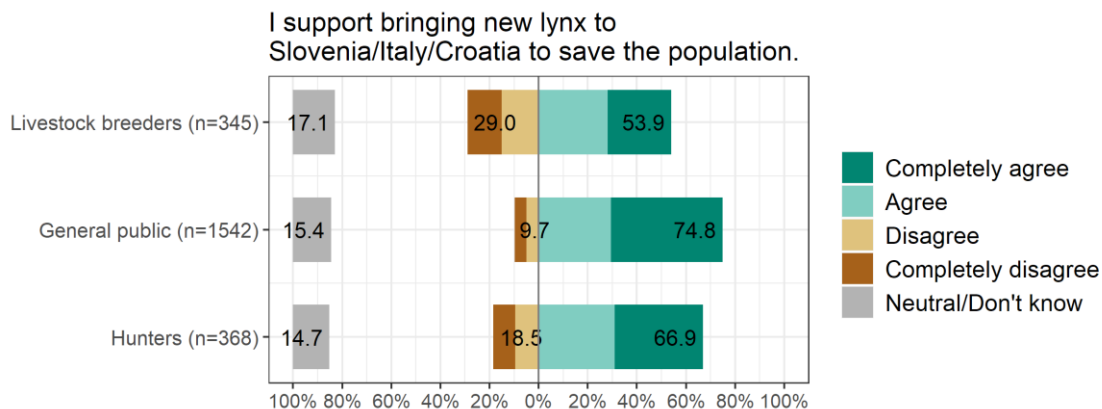


Figure 37

### Damages and damage prevention

#### General public by country

Lynx belongs to the least damage-causing large carnivore species. Nevertheless, there are concerns that increased lynx abundance could result in more damages in the agriculture. Damages caused by lynx in all three countries have been close to non-existing over the last decade. General public seems to be aware of this (

Figure 38). Even so, in Italy as much as 39% of respondents thought domestic animals represent lynx's main food source in the vicinity of pastures (Figure 39).

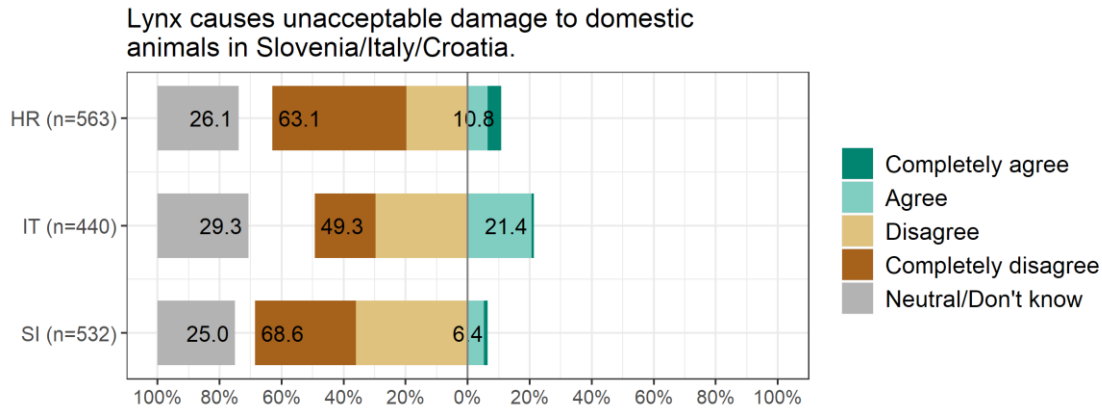


Figure 38

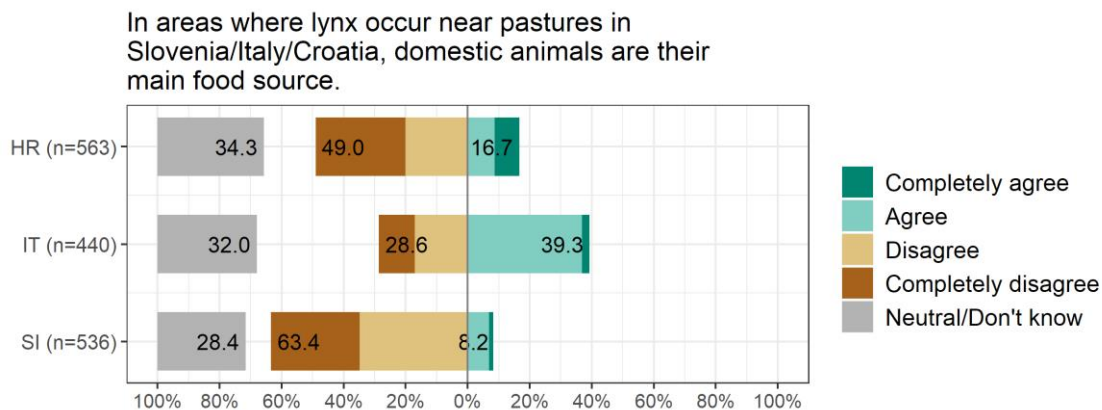


Figure 39

Among livestock guarding dogs, electric fences, and removal of lynx, the respondents in Slovenia and Croatia chose livestock guarding dogs most often as an effective measure for preventing lynx attacks on livestock (Figure 40). In Italy, electric fences (42%) and livestock guarding dogs (42%) were both understood as equally effective measures for preventing lynx attacks on livestock (Figure 40 and Figure 41). Removal of lynx as a damage control measure was opposed to by most respondents in all three countries (Figure 42).

Livestock guarding dogs are an effective measure for preventing lynx attacks on livestock,

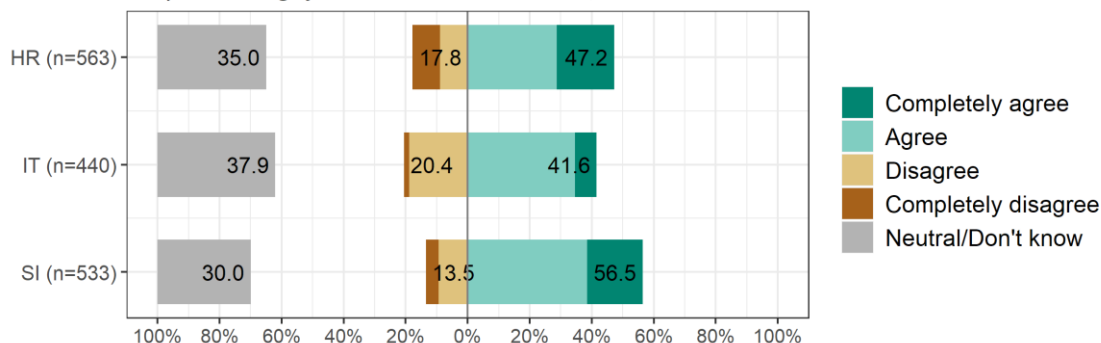


Figure 40

Electric fences used at pastures are an effective measure for preventing lynx attacks on livestock.

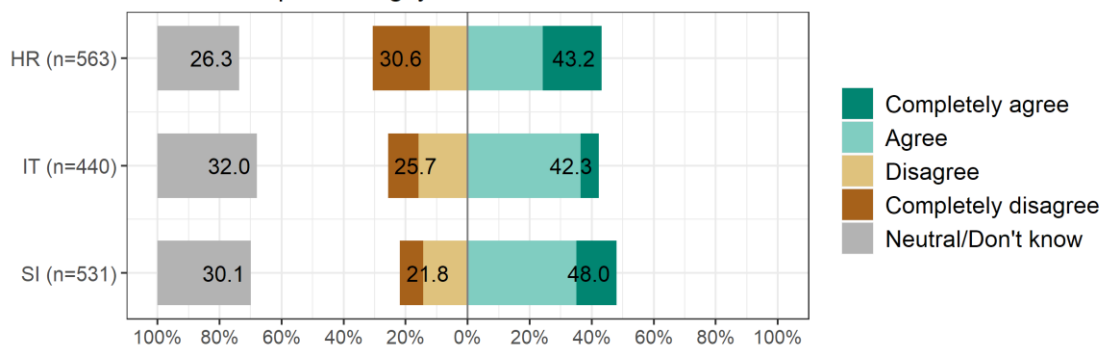


Figure 41

Removal of lynx is an effective measure for preventing damages in agriculture.

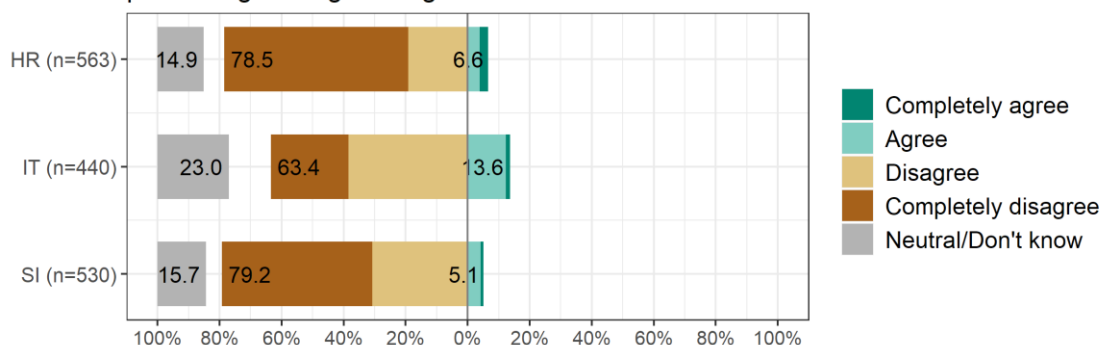


Figure 42

## Results by stakeholder group

More than 30% of livestock breeders thought that lynx causes unacceptable damage to domestic animals in their respective country even though the damages caused by lynx are practically non-existent in the last decade (Figure 43). This could indicate a tendency of generalising the experiences with other large carnivores – wolves and bears, or in other words, it is not important which large carnivore species is causing the damage.

All three groups mostly assessed livestock guarding dogs and electric fences as effective in preventing the damages. Removal of lynx to control the damages was to some degree supported only by livestock breeders. We can note that in 2021 a higher share of surveyed livestock breeders agreed that livestock guarding dogs and electric fences used at pastures are an effective measure for preventing lynx attacks on livestock than agreed in 2019.

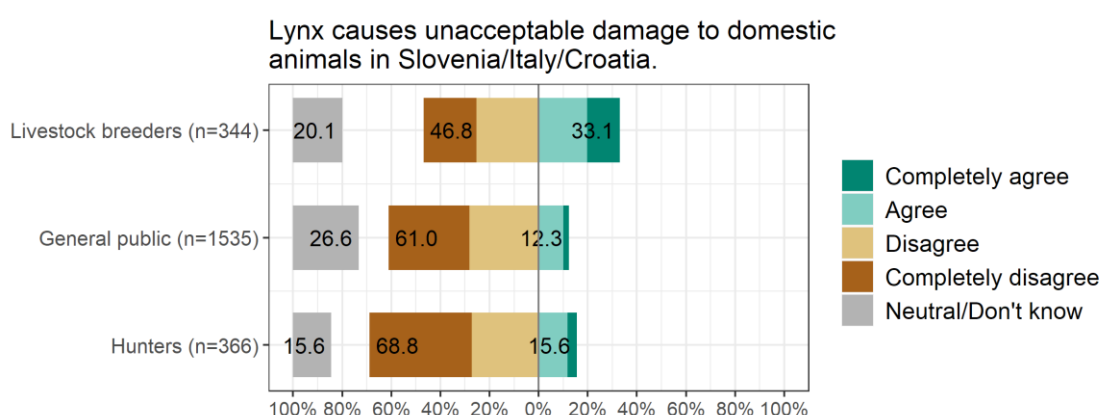


Figure 43

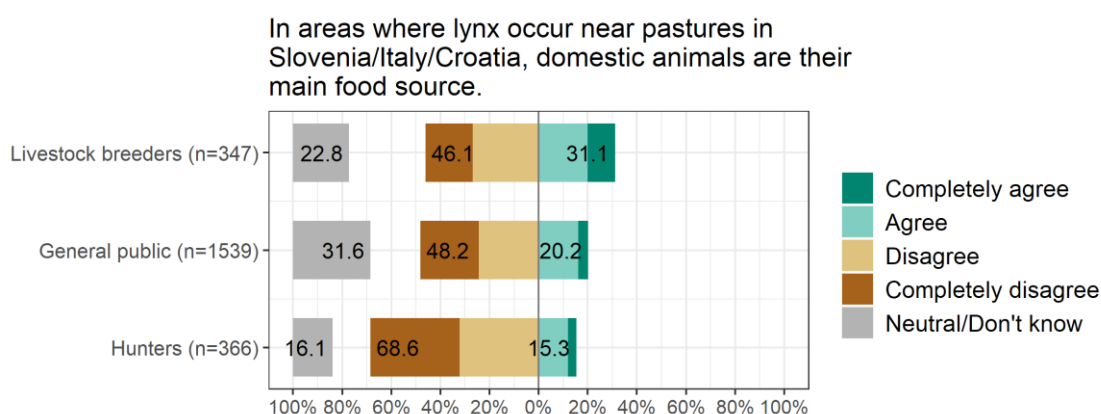


Figure 44



**Livestock guarding dogs are an effective measure for preventing lynx attacks on livestock,**

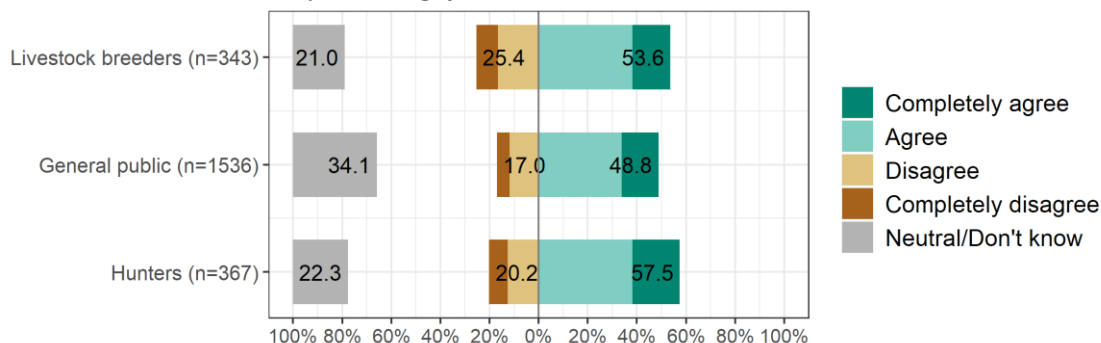


Figure 45

**Electric fences used at pastures are an effective measure for preventing lynx attacks on livestock.**

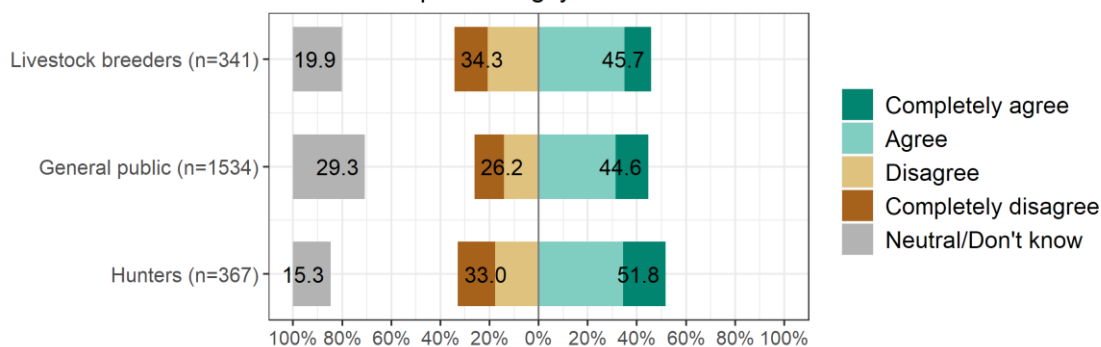


Figure 46

**Removal of lynx is an effective measure for preventing damages in agriculture.**

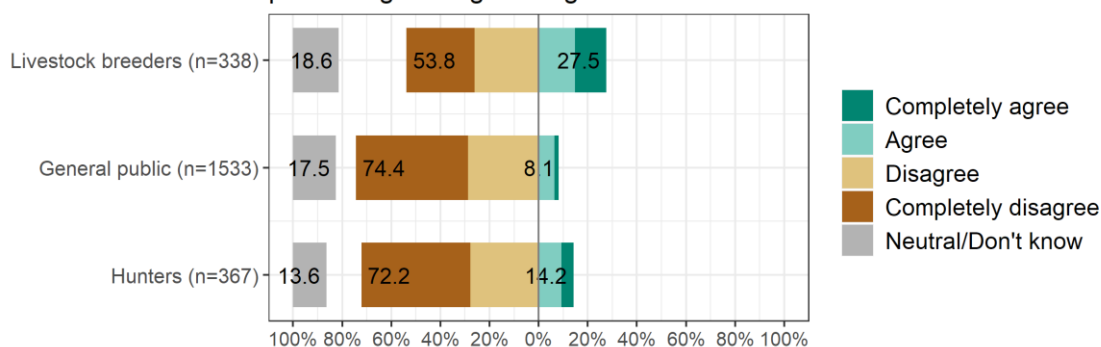


Figure 47

## Hunting and beliefs regarding lynx impacts on game species

### General public by country

The fact that lynx prey primarily on roe deer is often mentioned as a cause of lynx being disliked by hunters. We have assessed the extent of this issue by asking the respondents to answer two questions – one regarding the lynx's role in controlling the roe deer population and the other one regarding the impact of lynx predation to hunting opportunities. The general public respondents were largely undecided regarding lynx's role in controlling the roe deer population, especially in Italy and Croatia. Nonetheless, the respondents in all three countries also acknowledged the importance of lynx in regulating roe deer numbers (Figure 48). Majority of Slovenian respondents disagreed that lynx reduces opportunities to hunt ungulates, while Italian respondents were largely undecided. In Croatia similar shares of respondents were undecided and disagreed with the statement that presence of lynx reduces opportunities to hunt ungulates (Figure 49).

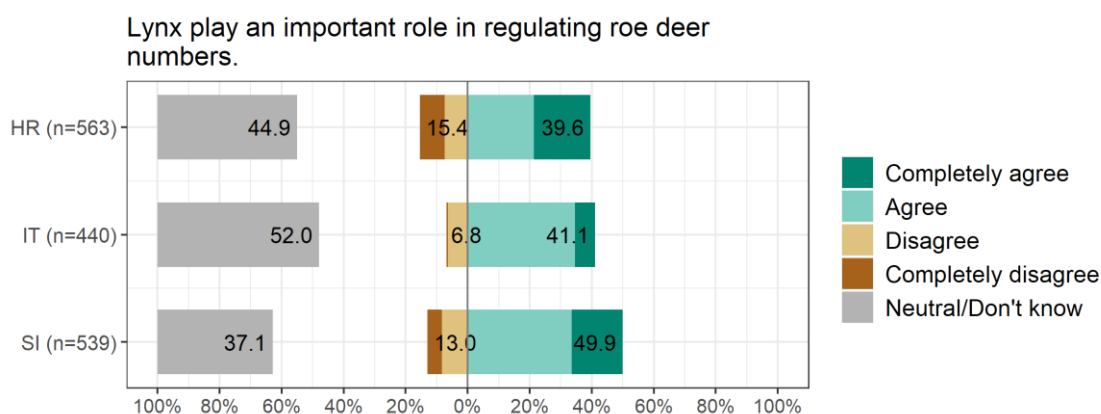


Figure 48

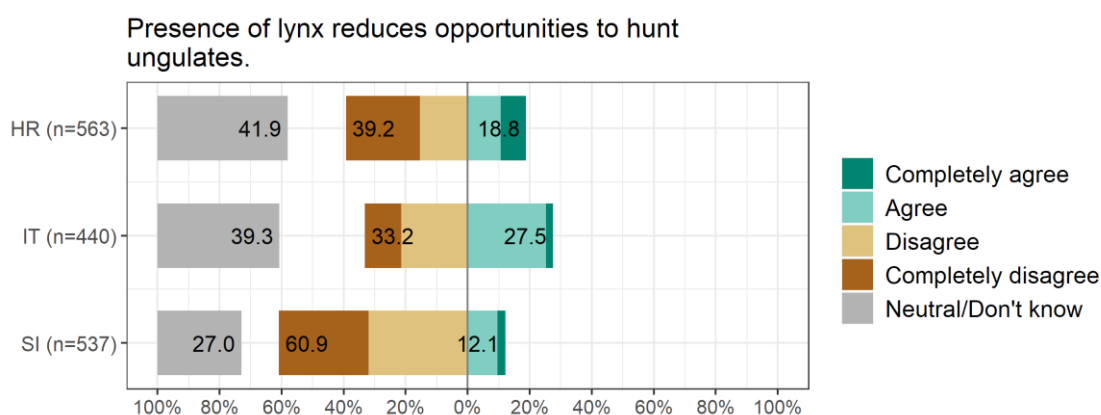


Figure 49

## Results by stakeholder group

Majority of hunters acknowledged the lynx role in regulating roe deer numbers (Figure 50). In addition, 39% of hunters thought the presence of lynx reduces their opportunities to hunt ungulates (Figure 51).

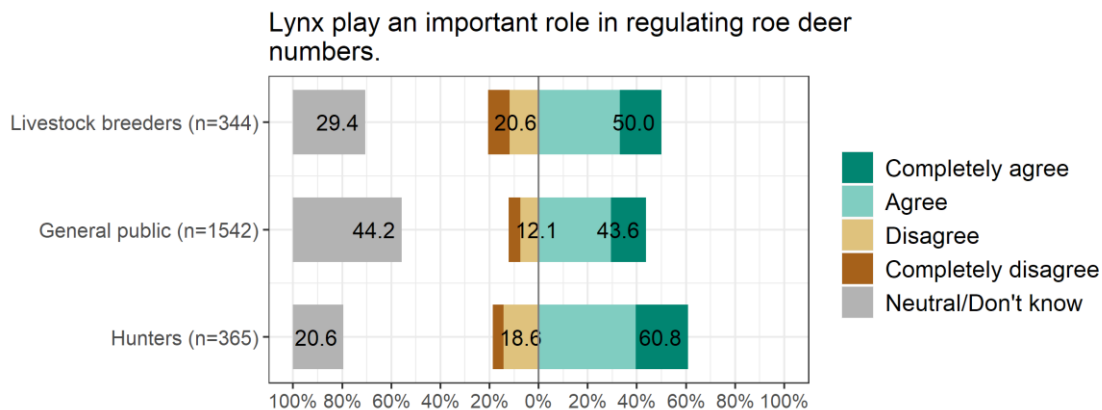


Figure 50

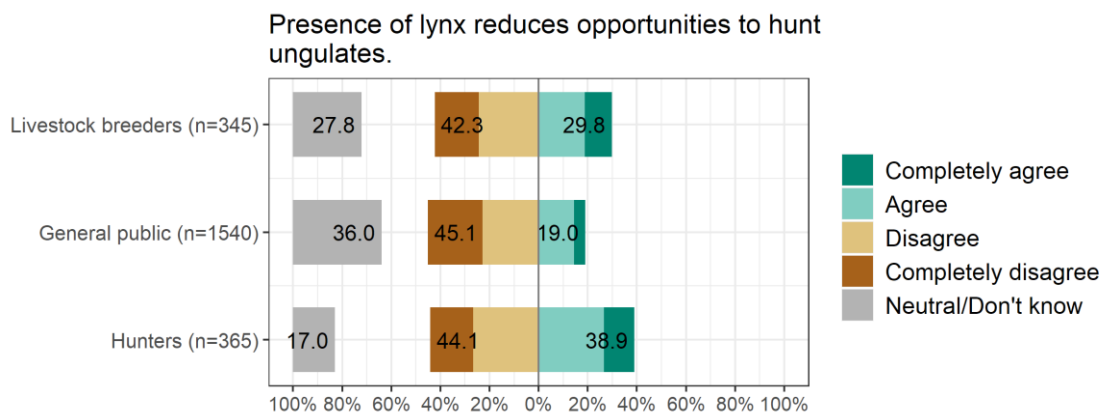


Figure 51

## Value of lynx

### General public by country

Apart from the standard 5-point Likert scale which measures degrees of respondent's agreement/disagreement to a statement, in the section designed to investigate the value of lynx to society, we've used semantic differential scale in order to better assess connotative meaning of lynx characteristics as perceived by society. Respondents were asked to rate their perception of lynx on a scale with opposite adjectives at each end (e.g. beautiful vs. ugly). We can see that the majority of the general public respondents in all three countries perceive lynx as a beautiful, interesting and useful animal (

Figure 52,

Figure 53,

Figure 55).

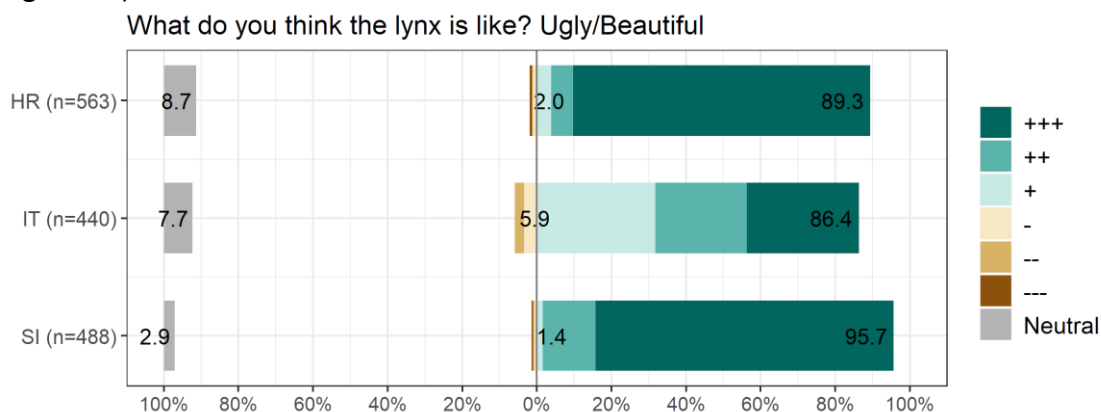


Figure 52

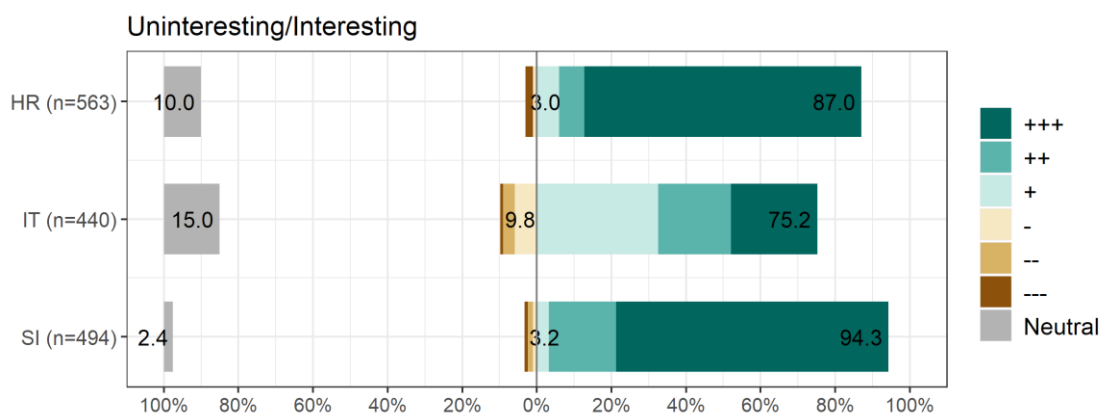


Figure 53

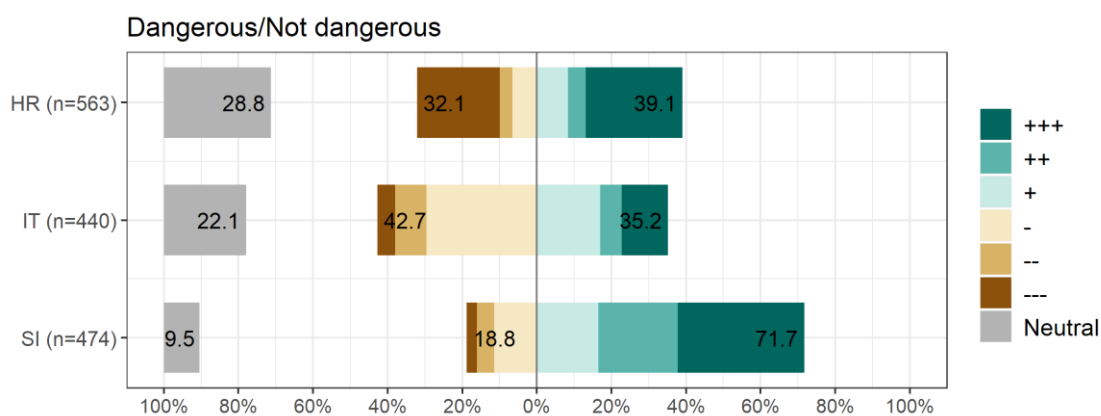


Figure 54

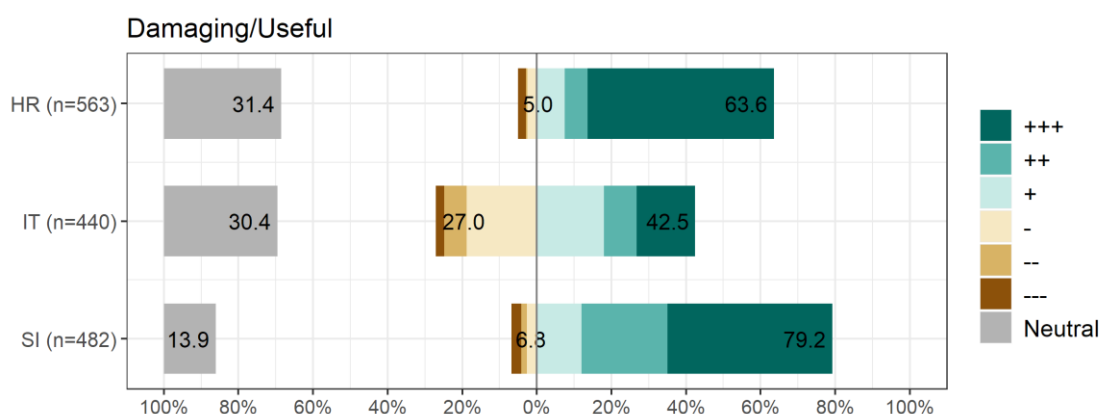


Figure 55

Respondents from general public from all three countries also overwhelmingly agree with the statement “Lynx represents a symbol of preserved nature” (Figure 56) and to some degree to the statement “Presence of lynx in Slovenia/Italy/Croatia is beneficial for tourism” (Figure 57).

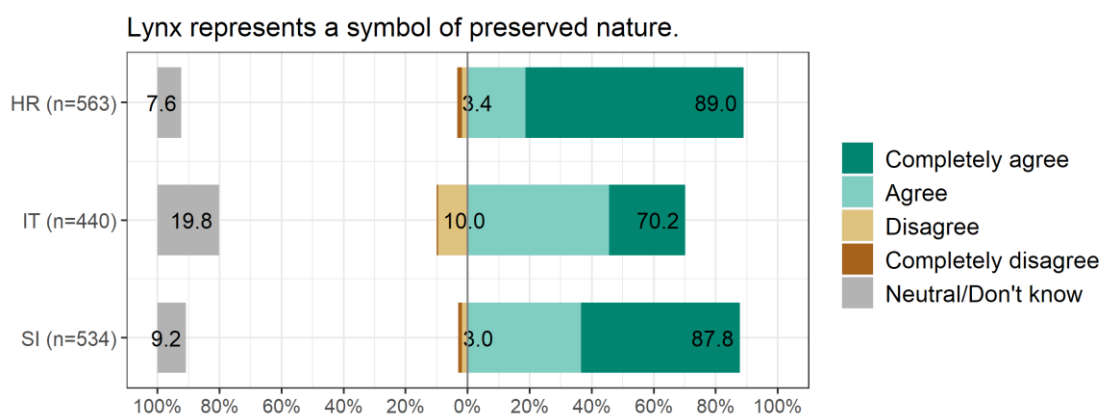


Figure 56

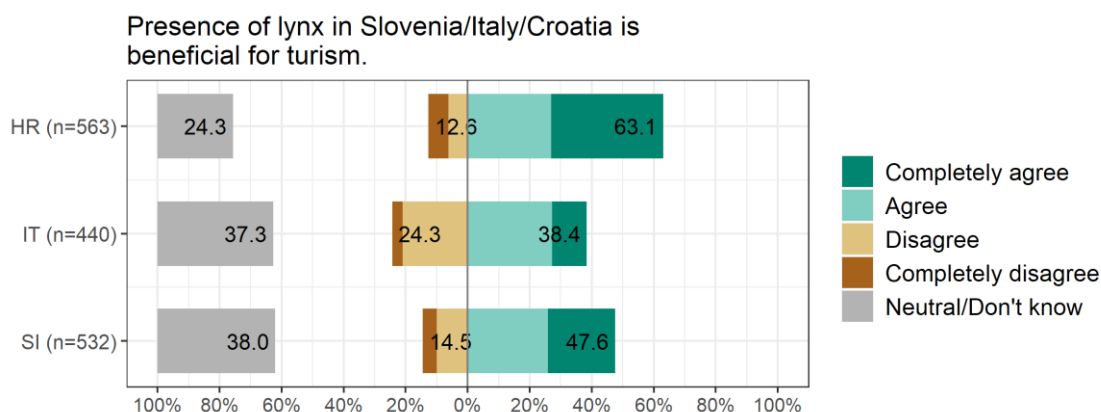


Figure 57

### Results by stakeholder group

The results show that the majority of respondents in all three stakeholder groups preferred positive adjectives to describe lynx. Adjectives “beautiful” and “interesting” had the highest ranks in all three groups indicating high aesthetic and educational values of the lynx. This result ought to be used by those wishing to successfully promote conservation of lynx.

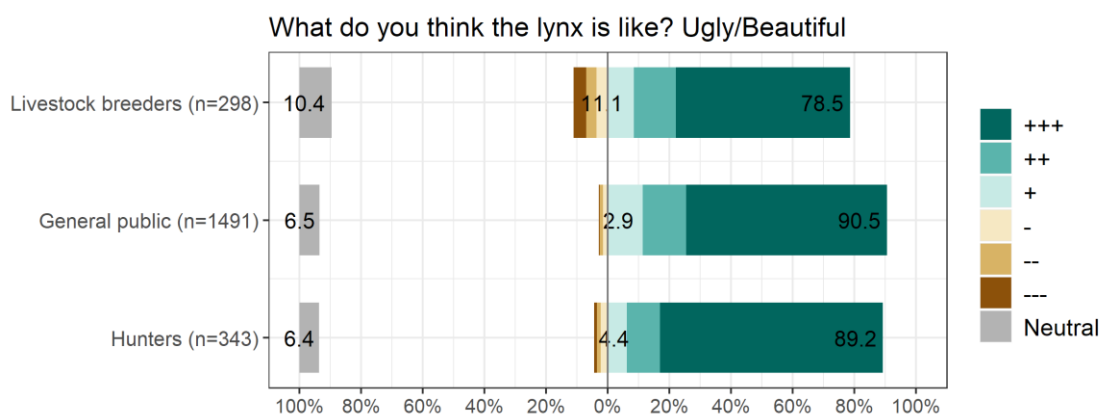


Figure 58

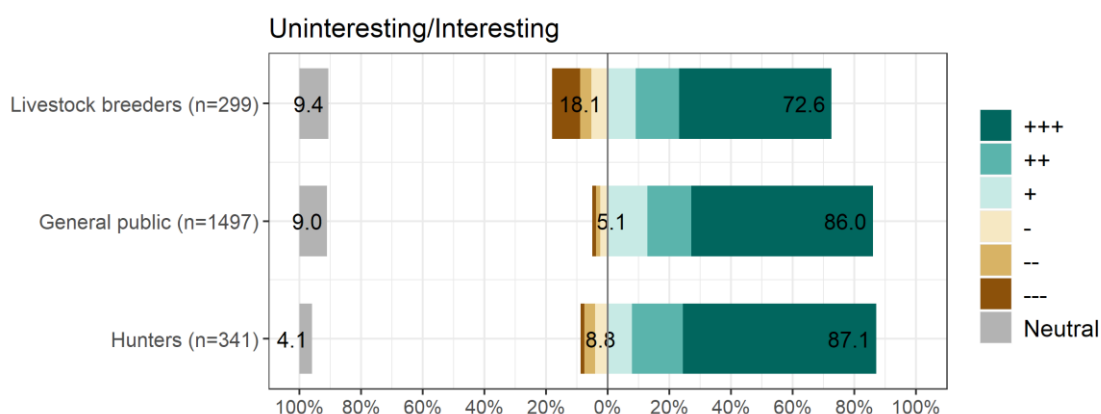


Figure 59

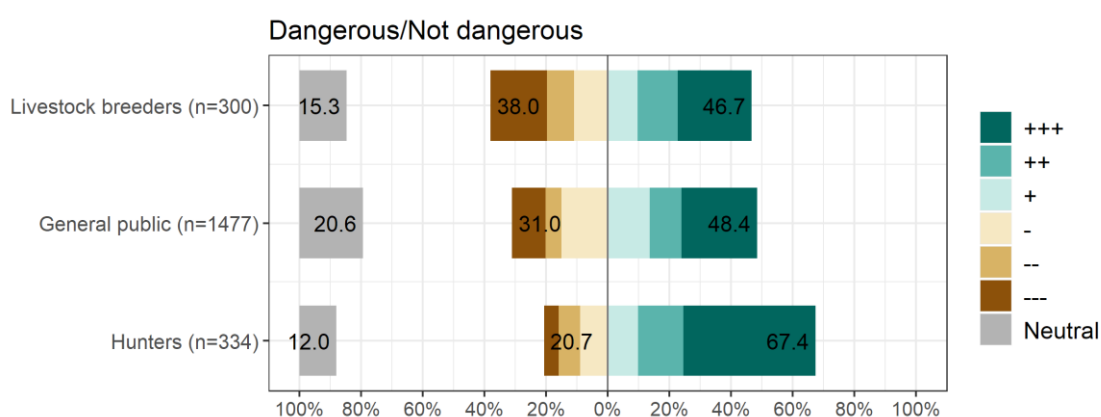


Figure 60

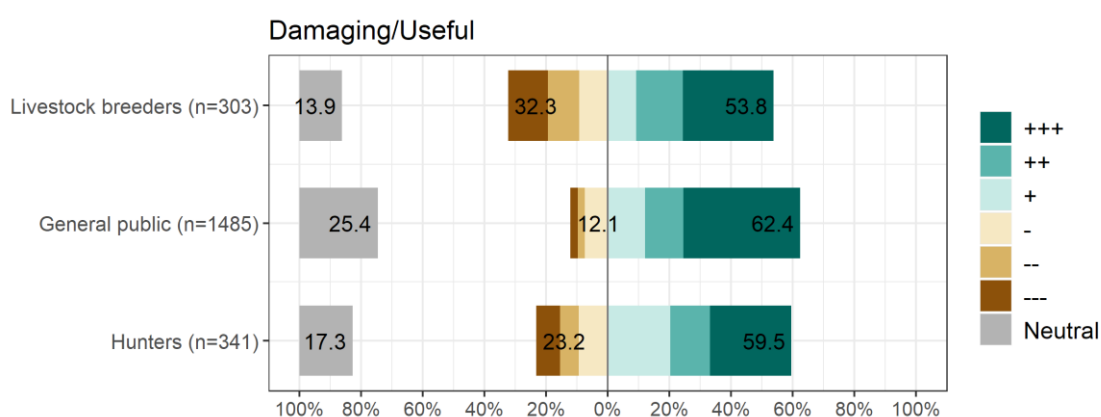


Figure 61

In line with the results described above, respondents from all three stakeholder groups also overwhelmingly agree with the statement “Lynx represents a symbol of preserved nature” ( Figure 62) and to some degree to the statement “Presence of lynx in Slovenia/Italy/Croatia

is beneficial for tourism” (Figure 63). General public among the three groups seem to have the highest appreciation of lynx as a natural heritage.

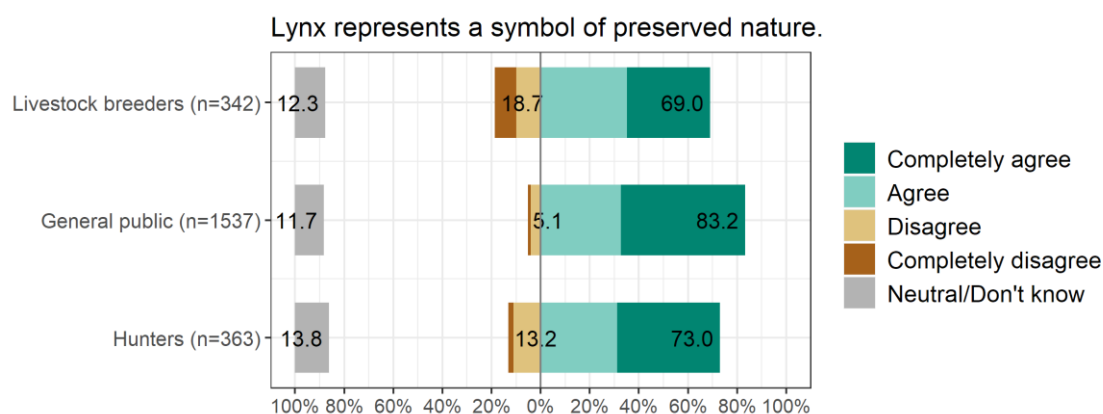


Figure 62

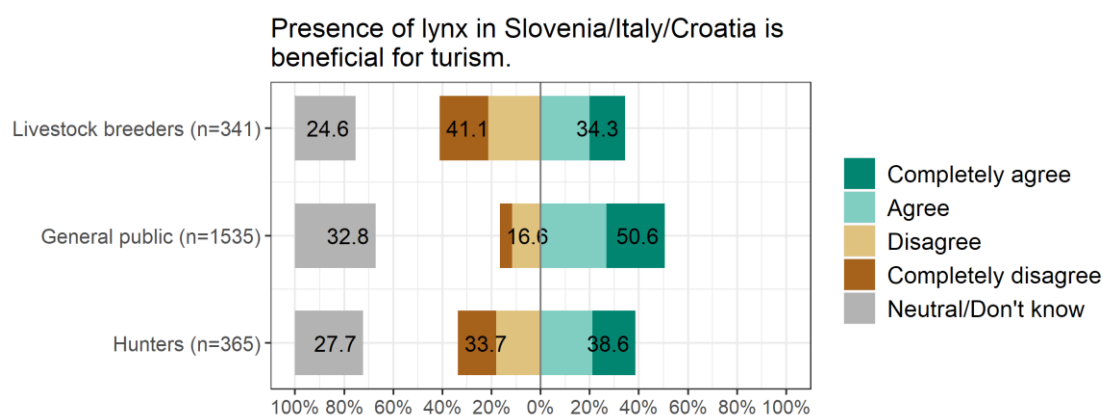


Figure 63



## Conclusions

In all three countries the majority of respondents described themselves as being in favour of lynx and supporting its conservation. In Italy, where the lynx is scarcest, the share of respondents that do not have a formed opinion about their attitudes towards lynx was much higher than in other two countries, similar to what was already noticed in the 2019 survey. Only livestock breeders were not so overwhelmingly in favour of lynx, as approximately quarter of them described themselves as being against lynx, similar to what was already noted in the 2019 survey.

Large carnivores invoke strong feelings in people, those often include admiration, hatred but also fear. Lynx avoid people and are not considered to be dangerous to them, which respondents from Slovenia and Croatia seem to be well aware of, while Italian respondents were not so sure about that, majority of them even answered that they would be afraid to go to the forest where lynx are present. Overall fear of lynx seems to be to some degree an issue among the general public and livestock breeders.

Among stakeholder groups, livestock owners are the ones concerned about the potential of economic damage caused by lynx. Nevertheless, they still overwhelmingly disagreed with the extermination or illegal killings of lynx.

Public perceptions about the species' abundance play an important role in shaping public support or opposition to different management measures. Most of our respondents, especially in Slovenia, did not believe the lynx population is in good condition. In addition, the respondents have mostly agreed that the population is close to extinction.

Prevalent support to increasing the number of lynx in their respective countries was documented among general public respondents in all three countries as well as the opposition to hunting lynx due to their low numbers. However, in Croatia a larger share of respondents agreed with the regular quotas for hunting of lynx in their respective country.

Livestock breeders and especially hunters seem to be much more familiar with the causes of lynx population deterioration than the general public. General public respondents identified overharvesting and illegal killings as the main cause, while hunters and livestock breeders primarily ranked inbreeding as the main cause for the recent deterioration of the lynx population.

The only plausible way of addressing high inbreeding levels in the short term in the Dinaric lynx population is to bring new, unrelated animals to the population which is also the main goal of the LIFE Lynx project. Public support of this action is crucial for maintaining the positive attitudes toward lynx. General public in all three countries supports population reinforcement. Some opposition to bringing new lynx to Slovenia/Croatia/Italy was documented primarily among livestock breeders and as the project continues to translocate new animals, this opposition could become more vocal.

Lynx belongs to the least damage-causing large carnivore species. Nevertheless, there are concerns that increased lynx abundance could result in more damages it causes in



agriculture. Damages caused by lynx in all three countries have been close to non-existing over the last decade. General public and hunters seem to be aware of this while around 33% of livestock breeders thought that lynx causes unacceptable damage to domestic animals in their respective country. This could indicate a tendency of generalising the experiences with other large carnivores – wolves and bears, or in other words, to the farmer, it is not important which large carnivore species is causing the damage. All three groups overall assessed livestock guarding dogs and electric fences as effective in preventing the damages. Removal of lynx to control the damages was to some degree supported only by livestock breeders.

The fact that lynx prey primarily on roe deer is often mentioned as a cause of lynx being disliked by hunters. Majority of hunters acknowledged the lynx role in regulating roe deer numbers. In addition, almost 39% of hunters thought the presence of lynx reduces their opportunities to hunt ungulates, confirming the existence of the concerns.

All stakeholder groups attributed high aesthetic and educational values to the lynx, the most positive about that were hunters and general public. The presence of lynx is perceived as beneficial to tourism, but mostly in Croatia.



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