Minutes of the Transboundary Monitoring of Brown Bear Population Workshop
23-24 May 2019, Biotechnical faculty, University of Ljubljana, Jamnikarjeva 101, Ljubljana

Participants: Barbara Boljte, Dejan Bordjan, Urša Fležar, Jernej Javornik, Klemen Jerina, Felix Knauer, Marjeta Konec, Ivan Kos, Bojana Lavrič, Christian Losso, Aleksandra Majić Skrbinšek, Meta Mavec, Anja Molinari-Jobin, Jasna Mulej, Hubert Potočnik, Slaven Reljić, Robin Rigg, Peter Skoberne, Tomaž Skrbinšek, Alaaedin Soultan, Astrid Vik Stronen, Stefano Vendrami, Vera Zgonik, Jack Hopkins, Rok Černe, and Andrej Rot

Written by: Meta Mavec and Aleksandra Majić Skrbinšek

At the start of the workshop Tomaž Skrbinšek welcomed everyone to the workshop and presented the schedule for the day. The main goal of the workshop was to overview the monitoring methods, discuss which of them work and how to move from national monitoring to transboundary monitoring (within EU) as wildlife management of one country also influences population in another country. Workshop was divided into two days. On the first day the main goal was identification of population level monitoring goals and priorities and preparation of country/ activity matrix. The second day was dedicated to further development of identified priority areas.

DAY 1: Presentation of monitoring systems of partner countries with discussion afterwards. Each presenter was asked to review pros and cons of their current management strategy.

CROATIA (Slaven Reljić)
Slaven pointed out that genetic monitoring works and is really well organized, however they had problems getting cooperation from hunters which required many individual meetings. Gaps in the project area also resulted in not enough samples. Croatian ministry agreed to plan more money for next monitoring to improve results (in 2023). As Croatian Hunting Association also agreed to become a partner in a new wolf project, it appears things are changing for the better.
Damages are another problem as local hunting families are responsible for paying the damages. Often many of the damages go unreported and Slaven is not sure how to change that. Considering that people are happy and not bothered by the current system, perhaps change is not needed???
Twice per year hunters are counting bears at the feeding sites. Klemen Jerina wanted to know how reliable are the data they receive. Slaven replied that at the feeding sites, camera traps are placed and hunters stay on sites for 6 hours. The problem is that counting sites are not permanent as some hunting grounds don't get bear quota each year. When that happens, they also don't count, however bigger hunting grounds count every year. As only areas with more bears are counting regularly, data is biased.

SLOVENIA (Rok Černe)

As the most critical Rok singled out funding for genetic monitoring. It is not regular and difficult to provide. While the current monitoring system works well for us, some things that are not important to us, are important for Austria and Italy and we should consider how to systemize data to make it

usable for all countries. Anja and Felix both asked about the monitoring in Slovenian Alps and expressed their hopes that genetic analysis of the bears in the low density areas of Slovenia will be done on an annual basis. The response was that Slovenian bear population monitoring in Dinarics is planned to be repeated every 8 years and every 4 years in the Alps. If this proposal will be accepted, Slovenia will have another genetic count of bears covering both areas - Dinarics and Alps in 2023. Tissue samples will also be analyzed but it is not sure when.

ITALY (Anja Molinari)

The aim is to monitor the spread of the bear population(s), health status and conflict levels. A minimal count of bears is done annually based on genetics. Genetic monitoring is supported by opportunistic sampling and radio-telemetry.

Monitoring needs to be harmonized between four regions (and even more institutions) which can be problematic as well as obtaining enough money. Other problems/questions brought up by Anja were the frequency of attitude surveys and lack of protocol for dead bear analysis. Harmonization of genetics is most urgent as everyone uses different methods which makes comparing data hard.

AUSTRIA (Felix Knauer)

Austria presented a wish list for all three countries in the Southeastern Alps (SLO, ITA, AUT) including: (1) focus on DNA-samples on damages and other sources, (2) analysis of genetic data once a year, (3)

microsatellite analysis with agreed set, (4) exchange of samples or extracted DNA when needed, and (5) immediate data exchange in case of bears with conspicious behaviour in border area. For advantages and disadvantages Felix pointed out that anything else but opportunistic sampling does not makes sense for Austria's monitoring system, but common protocol should still be set up.

Hubert suggested that data on border bears, especially migrating females are shared twice per year and pointed out a problem of volunteers and hunters asking about the samples they sent in a week after. Tomaž replied that this is a problem because lab work requires time and they have many projects going on at the same time. To solve this, we'd need a working database and better lab resources. Another possible problem with yearly sampling in the Alps could be motivating people.

After break presentations continued with Tomaž Skrbinšek who presented transboundary communication and sharing of brown bear monitoring data.

Data sharing and communication approaches

Tomaž Skrbinšek prepared an overview of monitoring goals, data needed as well as data sharing and communication approaches. At the moment most of the communications and data sharing are done manually with some face to face and manual-systematic communication. Ideally wish for most of data sharing and communicating to be automatic and manual-systematic with some face to face communication for coordination.

Cost-benefit analysis of different monitoring approaches

Klemen Jerina presented review of all monitoring approaches of brown bear population. For monitoring at the population level the goal is to form a smaller set of needed data that is collected throughout the project area for harmonization purposes.

Prioritizing the topics – Importance for monitoring at population level

After the presentations the group discussed what parameters we should measure for population monitoring and what methods are most suitable. Using the table Klemen prepared, three main categories were discussed:

- Bear population (population size, population size trend, functional integrity/connectivity, mortality, spatial distribution, spatial distribution of reproductive females, genetic diversity, effective population size, health)
- Human-bear interactions (conflict index, number of conflicts, type of conflicts, economic value of conflicts, spatial occurrence of conflict, cost of damage prevention -agriculture, cost of conflict prevention – garbage bins, attitudes towards bears)
- Other (Extent of eco-tourism, income from eco-tourism, data on beech masting, hunting effort per bear, content of anthropogenic food in diet, artificial feeding intensity, profit from hunting).

Participants were asked which parameters they believe are important for monitoring at the population level. That proved quite difficult as almost all parameters seemed important to participants. Afterwards some of them were recognized as important for national monitoring. As participants came from high or low bear density areas, it was requested that monitoring program be useful for both.

Figure 1). Topic "health status" was added.

Figure 1: Prioritization of the monitoring parameters topics within the category "bear population". Topic "Spatial distribution of reproductive females" was joined with "Sex structure of population" and "Natality".

Within **human-bear interactions** (Figure 2) category only conflict index was seen as less important for population level monitoring and direct monitoring of actual conflicts (incl. number, type, value, location) and attitudes toward brown bear seemed to be the most important (each got 11 points).
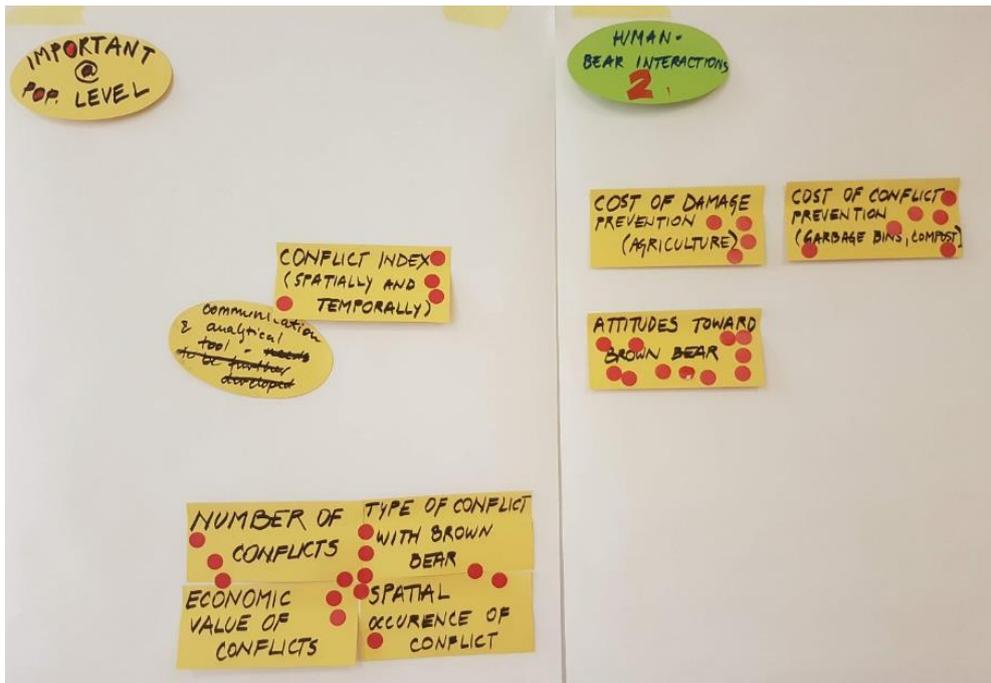
Figure 2: Prioritization of the monitoring parameters topics within the category "human-bear interactions".

In the last category - **other** (Figure 3), participants recognized two parameters (extent of eco-tourism and income from eco-tourism) as important for national monitoring and after further discussion participants agreed parameters "contents of anthropogenic food in diet" and "artificial feeding intensity" were important only for the Dinaric part of the population (Slovenia and Croatia). Later in the discussion "income from hunting" was also added in the "important for the Dinarics" group. Data on beech masting and hunting effort per bear were excluded as not-important/not-practical.

Figure 3: Prioritization of the monitoring parameters topics within the category "other".

DAY 2: Group work

For the second day of the workshop the goal was to outline practical solutions for transboundary monitoring. Working on topics that were recognized as most challenging the previous day, participants split into three groups according to the topics:

1. Population size and trend (Tomaž, Feliks, Klemen, Barbara, Meta K., Astrid)

2. Functional connectivity and spatial distribution (Dejan, Anja, Vera, Meta M.)

3. Anthropogenic food diet and artificial feeding (Ivan, Slaven, Urša, Jernej)

4. Public attitudes (Jasna, Aleksandra)

Topic "**Mortality**" was briefly discussed plenary and participants agreed that protocols for collecting data when bear mortality occurs need to be harmonized (Figure 4).

Each group was tasked with answering the following questions: How? When/How often? Who?
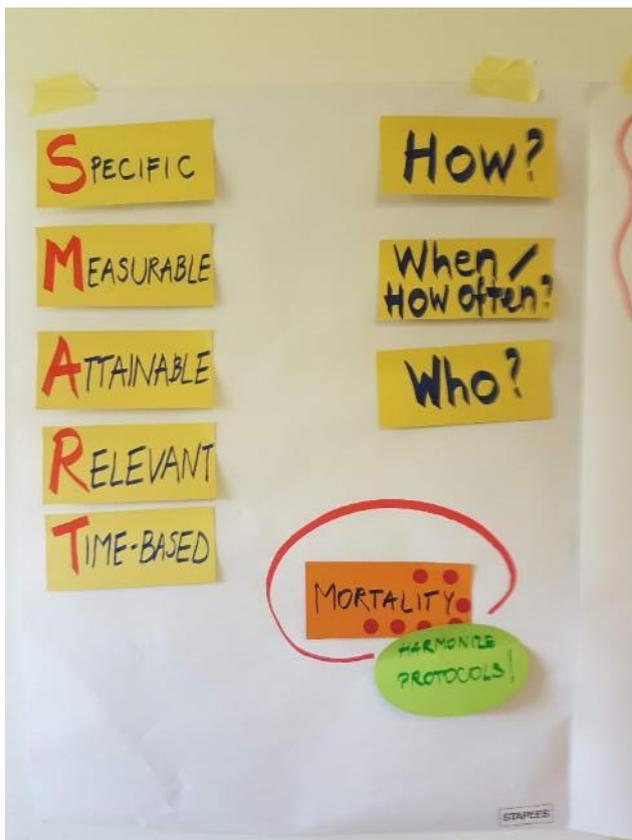
Figure 4: Instructions were given for group work, while topic "Mortality" was briefly discussed plenary.

Group 1: Population size and trend

Figure 5 shows key point from the discussion. As each country has its own priorities it makes sense to divide the areas into high and low bear density areas.

For **high density areas** noninvasive monitoring every 8 years is advised together with yearly population monitoring using mortality, counting at feeding sites and modelling to ensure good estimates of population between genetic monitoring's.

For **low density areas** Slovenians propose genetic monitoring every 4 years with noninvasive genetics. This is enough for Slovenia, however for really low density areas (IT and AT) this protocol is not enough as they want to monitor each animal on the yearly basis. It was suggested that yearly opportunistic sampling is organized also Alpine region in Slovenia as well as yearly sample analysis, however doubt was expressed on how much cooperation from volunteers we would get.

Besides organizing field work, preparing the materials and managing volunteers, a person to analyse data and write a report is also required. The total cost of monitoring for Slovenia was relatively low (about 200.000 EUR per year). Main problem is still low motivation of Slovenian government to increase intensity in the Alps. Increased pressure from IT and AT could perhaps change that.

Is it feasible to use Slovenia's model for Croatia and later other countries as well?

Croatia is already doing yearly counting, but they'd need to do the analysis as well. Genetic monitoring is included in management plan and is planned for 2023 (at the same time it will also be organized in Slovenia). On the years without genetic monitoring, population size will be estimated from modelling and data from mortality.
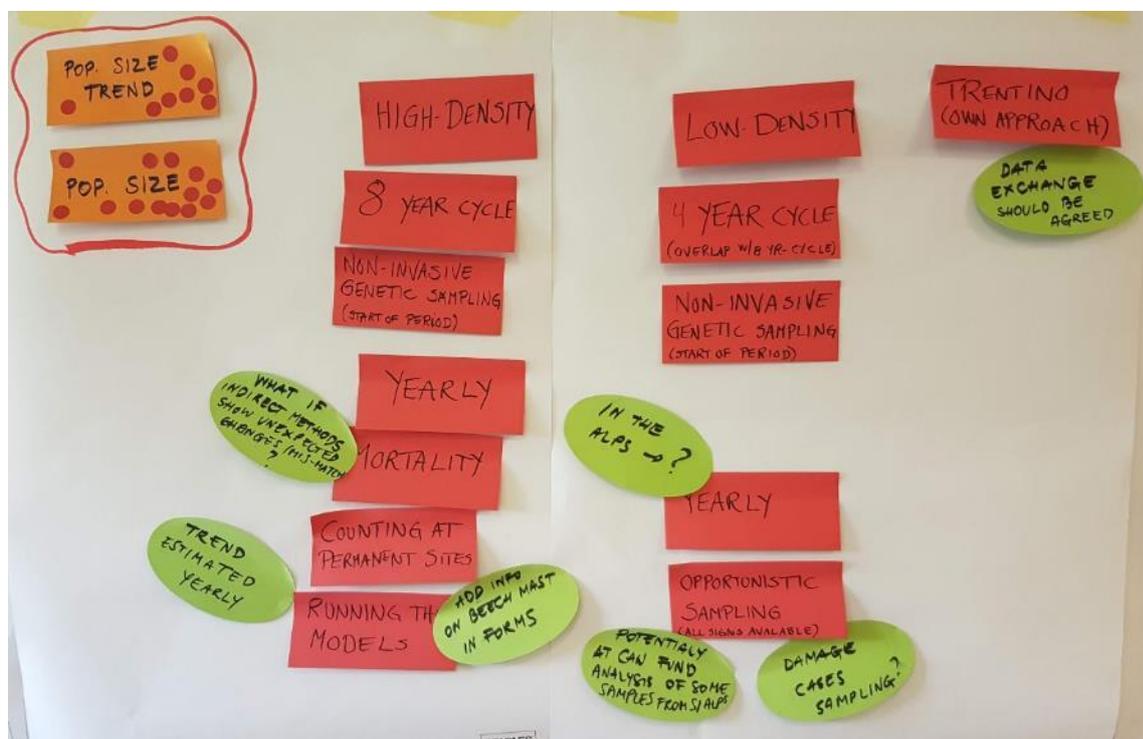
Figure 5: Key points from the "Population size and trend" discussion.

Group 2: Functional connectivity and spatial distribution

Participants all agreed that what we are already doing within DINALP BEAR project works great (Figure 6). It was recognized that we would need to produce the same **distribution map** as in DINALP BEAR. The data that are needed would come from other activities within monitoring (damages, mortality, signs of presence, genetics). We need data on location, genetics and whether cubs were also observed. All data is already being gathered so it would be up to each country to assign the institution responsible for collecting and organizing the data. A functioning joint database would greatly improve the implementation of the activity. Task of reporting on the population level however should be rotated between participating countries. Group also discussed inviting other bordering countries or regions that share same population (Bosnia, Serbia, Montenegro, Switzerland and Lombardy).

After DINALP BEAR project ends, Slovenia has no plans to continue gather samples at damage cases, however should consider at least gathering such data in low density areas as it would greatly benefit Austria and Italy where bear densities are low and each individual is monitored.

Overall, for **low density areas** following additional activities were proposed:

- Genetic analysis of damage cases and mortality cases,
- Camera traps at feeding sites and other sites of interest,
- Other signs of presence, especially for detecting females with cubs.

Genetics was identified as an appropriate method for assessing functional connectivity, however a technical issue was discussed was different lab methods (different markers). Exchange of information between different laboratories is difficult but a way to overcome it would be to share DNA of a few bears from both areas and see immigrants are detected in Dinaric population. Right now because new methods are developing so keeping everything harmonized is not easy.

Reporting was suggested at a four year intervals (together with other reports), however after further discussion between workshop participants it was agreed that yearly monitoring is ought to be proposed also for Slovenian Alpine region where bear density is low. That would greatly benefit Austria and Italy as well and show people in that region that bears are being monitored and followed.
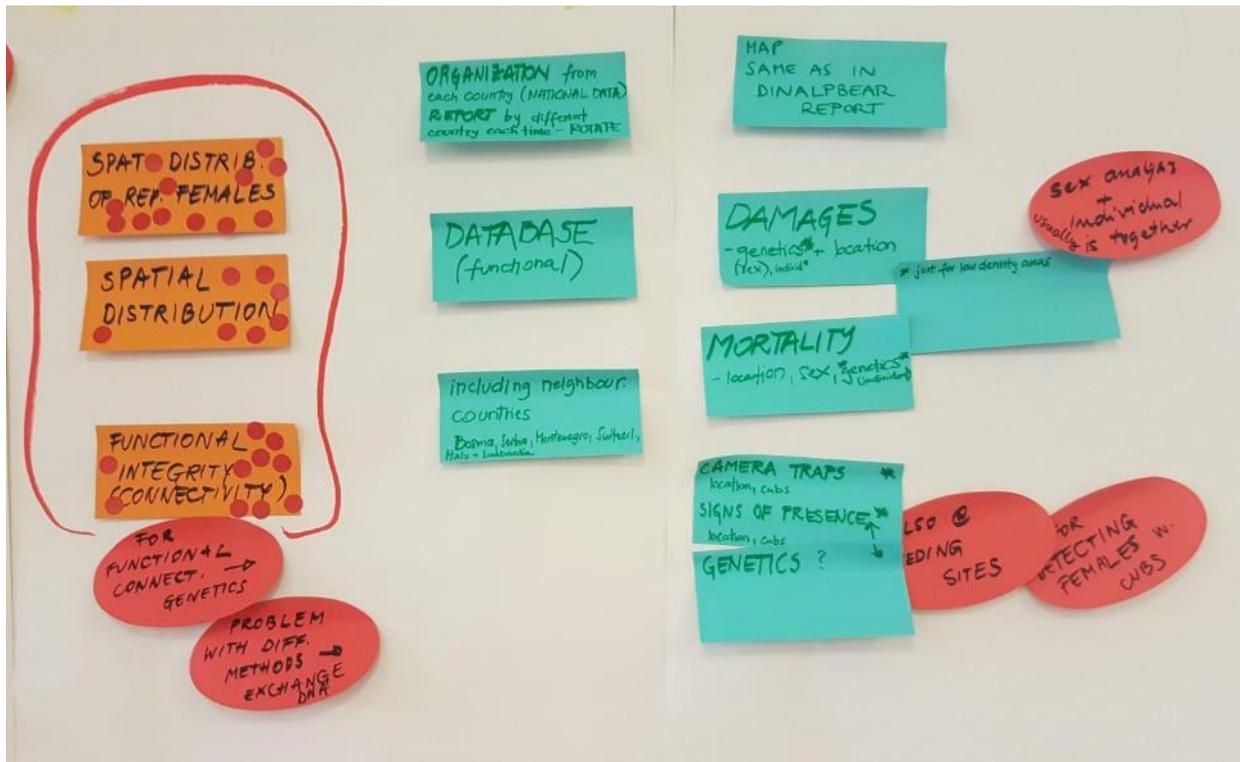
Figure 6: Key points from the "Functional connectivity and spatial distribution discussion".

Group 3: Anthropogenic food sources and artificial feeding

Participants defined the term anthropogenic food as food at feeding sites (intentionally placed) and food at anthropogenic food sites like garbage bins (unintentionally placed). Everyone agreed that monitoring discussed in this topic should focus on food placed at the feeding sites with a goal to decrease the amount of food placed there as well as the number of feeding places (Figure 7).

Croatia already keeps a record as hunting families have to report feeding places as well as the amount of food placed there. However not all feeding places/food is reported as they are not required to report boar feeding sites. The suggestion was that Ministry for agriculture would be responsible for gathering the data from hunters. Each person would list the feeding places in use and the amount of food they place there regardless of the species it is set for. Right now they haven't added this into management plan for next period (but it can be added into monitoring plan).

Slovenia already keeps a record of feeding places, but not a record of the amount of food that is placed there. The amounts of food placed for bears is usually not recorded and there is an abundance of food that is actually placed for ungulates and wild board but bears still visit such sites, it is thus difficult to know how much food was actually consumed by bears.

As corn is the most important food type we can monitor how its proportion in bear's diet changes with stable isotope analysis. For analysis tissues samples (liver) are required. Slovenia is already doing this however samples from bears culled throughout the year are used. As bears in the autumn eat a lot of corn but not all of it originates from feeding places that could present a problem for analysis,

so it was proposed that only samples from bears culled between March and April are used for this analysis. First suggestion was to repeat the analysis every 3-5 years and report how bear consumption of corn has changed in this time, however to coordinate better with population monitoring, we suggest stable isotope analysis is repeated every 4 years. In Slovenia institutions responsible for organization would be SFS and BF while in Croatia Ministry for agriculture would be responsible. Veterinary faculty (Zagreb) would be responsible for coordination between institutions.

As tissue samples are only taken from dead bears, we might have to reconsider limiting ourselves to a spring period as there might not be enough samples in that time. Jernej Javornik estimated we need around 30-40 samples from each country per spring with cost about 50-70 EUR per sample.

At the end of discussions, the group agreed we'll keep sampling throughout the year (spring and autumn) in both countries and results will be included in population size report (every four years).
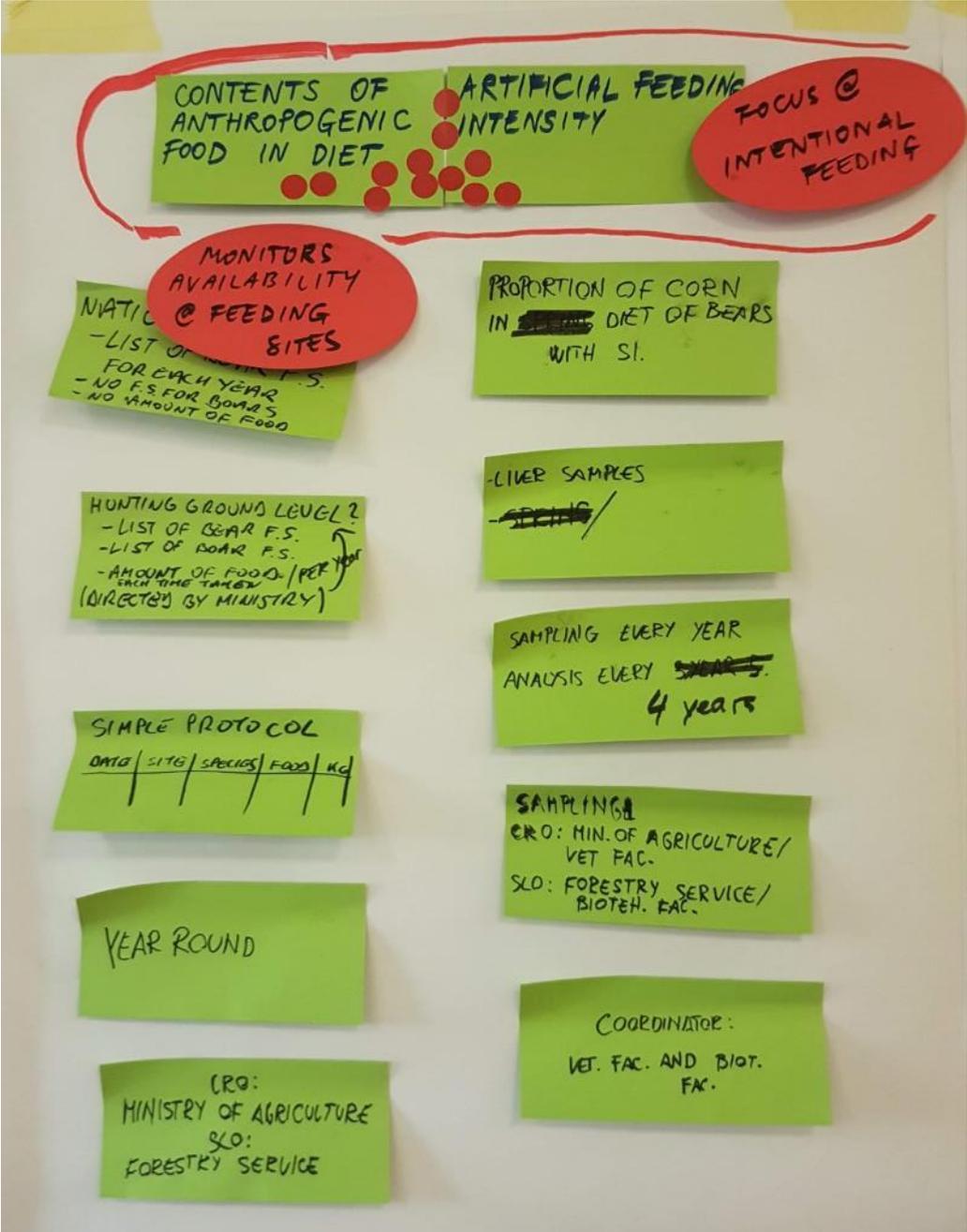
Figure 7: Key points from the discussion on anthropogenic food sources and artificial feeding.

Group 4: Attitudes

Group proposed that a joint set of key question is defined for attitude surveys targeting people in bear areas. Results are joint and presented in population status report. Having a set of approved key questions would allow easier comparison of the results. Whenever a country would decide to repeat the survey, they'd have a set of approved questions to pick from. Other members suggested that repeating attitude surveys should be harmonized between all countries so it happens at the same time. Another suggestion was that it is repeated a year before action plan is prepared so data from the survey can be used there as well (Figure 8). Results of attitude survey are of great importance for management at the local level, less for population level management.
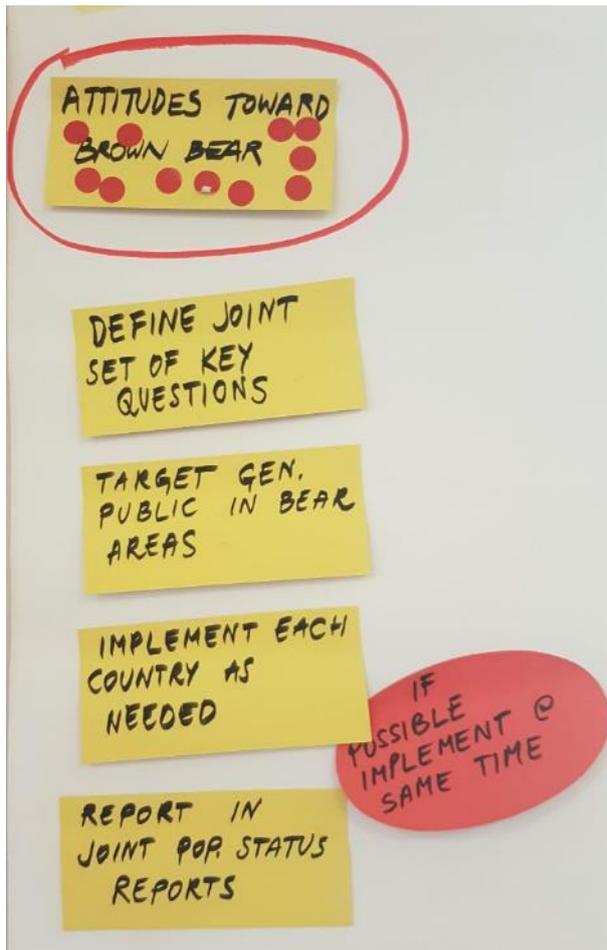
Figure 8: Key points from the discussion on public attitudes.

Coordination, collaboration and joint reports

Geodata base

All participants agreed that database will be used if it is functional. Right now there are still problems to be worked out (entering data, getting data from other sources without taking the credits, problems with low density data). SFS agreed they will be responsible for maintaining the database.
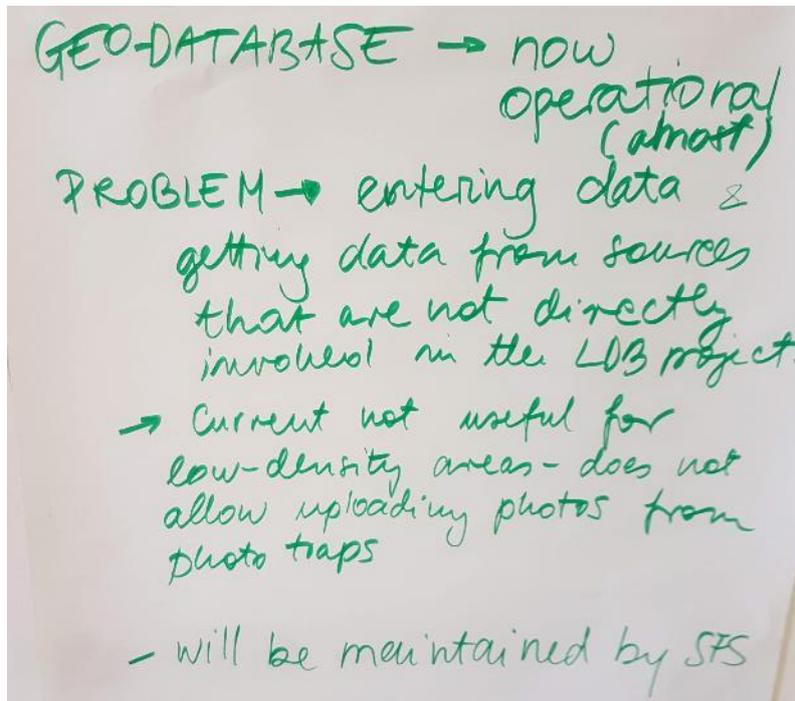
Figure 9: Key points from the discussion on geodatabase.

Coordination of population level monitoring

Group discussed how to continue coordinating after LIFE DINALP BEAR ends. Everyone agreed we would still need to meet regularly, so establishing a platform of export (similar to SCALP or WAG) would help to ensure that. Keeping DINALPBEAR name was suggested as it is already well recognized. Funding is another question that needs to be discussed in the future. SCALP has a 10% position paid for by the Swiss government, so we would need to find funds for that (WAG functions without regular funding). More money would also be needed to maintain the database.

Participants discussed who or which organization would be responsible for:

- Collection of data (SFS through the database)
- Analysis and production of report
    1. Maps (UL – Tomaž Skrbinšek)
    2. Tables (SFS – Rok Černe)
    3. Descriptions of special events (Anja J. Molinari)
    4. Compilation at population level/editing (VF – Slaven Reljić)

Figure 10: Key points from the discussion on post-LIFE DINALP BEAR coordination (part 1).

Figure 11: Key points from the discussion on post-LIFE DINALP BEAR coordination (part 2).

It was estimated that production of the report will require about 15 days of work. Everyone agreed that report is produced annually and the same format as DINALP BEAR reports is used. One problem recognized by all participants was getting the data. For that reason, it was agreed that person in charge of collecting the data will send three reminders. Data that is still missing afterwards will not be included in the yearly report. Local experts will prepare and compile maps and texts for their area. This is important because they have the knowledge of local situation others don't. It will also provide yearly checks for the database.

All members will be sent last year's report, asked to update it and send it back. Person responsible for organizing all the data will then write an updated report and shared it with everyone. On the years when genetic data will not be available, report will state in the current year funding for genetic monitoring was not planned, so this data is not available, however we can report other data.

Next meeting is planned for 2021 and will be organized by SFS, next meeting someone else will take over the organization. Topics to discuss at the meeting: which data and under which standards are included. We should also discuss if maps should be included annually. Inviting neighbouring countries (Bosnia, Serbia, Montenegro, Switzerland, and Lombardy) was suggested and agreed upon by all participants.