

## Role of acoustic monitoring in bird surveys and atlases: results of EBCC acoustic monitoring questionnaire

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**Abstract.** In order to understand the importance and future potential of the currently quickly developing acoustic methods of research, the questionnaire with 36 questions about acoustic monitoring and its role was distributed in Autumn 2024 among the EBCC network. Answers of the respondents from 32 countries showed the interest of the EBCC community in this topic and a lot of possibilities for implementation of acoustic monitoring methods within EBCC. Some countries use it a lot already, some haven't started yet, so EBCC can bring them together for effective and productive collaboration to improve the data sets on bird distribution and abundance across Europe.

### Introduction

Acoustic monitoring plays an increasingly important role in ornithological studies. Thousands of recorders are deployed around the world, with high coverage in Europe — for example only for citizen science BirdWeather PUC devices the known number of active stations is more than 1200 items (BirdWeather). The huge amount of AudioMoth, SongMeter Mini, SongMeter Micro is difficult to estimate not only because there are a lot of official projects (some of them can be found here: [ecoSound-web](https://ecoSound-web.org)), but also due to many private devices. They are especially important to reveal the status of cryptic and difficult to study species either diurnal like Rock Ptarmigan or nocturnal like owls, in remote, effort-consuming areas, regions where there is a lack of ornithologists etc. As the goals of EBCC first of all are “to bring together ornithologists who are interested in the study of distribution, numbers, and demography of European birds and to encourage monitoring of bird distribution, numbers, and demography aimed at improving their conservation and management”, it is important to estimate the scale of using acoustic monitoring for all those activities. The questionnaire, which was sent to the EBCC network, was aimed to do it. On the other hand, the important task of EBCC is encouraging and creating specialist working groups to tackle relevant topics, that is why AMOG — Acoustic Monitoring Group — was created (see Bird Census News p. 3, of this volume) to bring together

acousticians from all around Europe and to develop acoustic methods which can be integrated into current EBCC monitoring activities.

### Materials and methods

The questionnaire was distributed among EBCC national delegates and national coordinators of PECBMS and EBBA2 projects in September 2024. The questionnaire was also advertised in the EBCC Newsletter, which is distributed quarterly among a wider audience interested in bird monitoring work. 47 responses were received from 32 countries, including 43 organisations and four private persons. From most of the countries (65% of all of them) just one answer was received, one quarter of the countries provided two answers, two countries gave three answers, and it was one country which provided four answers from 2 different organisations.

The questionnaire included 36 questions (see Annex). There were different kinds of them:

- multiple choice restricted with some particular options, so the respondent has to choose one (Q. 1, 2, 3, 4, 31).
- score questions restricted with the answer in certain numbers (Q. 5–30, 32) — mostly about importance of acoustic monitoring.
- open-ended, so the respondents could answer in a free manner (Q. 33–36) — comments, suggestions etc.

## Results and discussion

The questionnaire results show that there is an interest in developing and using methods of acoustic monitoring that prevails among the survey participants. All the questions and distribution of the replies are shown in the Annex. In open-ended questions some relevant comments have been shown. According to the responses the potential of acoustic monitoring lies in complementing existing monitoring methods and schemes, and the complementarity can also mean that acoustic monitoring brings data on presence/absence of species in remote areas, areas with few bird-watchers, or for species difficult to detect. There are positive expectations from acoustic monitoring playing a role in both atlases and monitoring, but most of the respondents believe that acoustic monitoring gives more valuable data for atlases and inventory than for monitoring as monitoring is about numbers, abundance and trends. Despite the fact that AI Identifiers are developing very fast nowadays, they are still weak in quantity estimation and most probably it will take a few more years to train them to identify not only the presence/absence of the bird species, but also the number of individuals, if at all. In general, caution prevails among the respondents about using ID apps by fieldworkers. The risks are, among others, the data being not compatible with the data obtained by traditional methods. Despite the accuracy of identification for some species being very good, there are species which are almost invisible for classifiers even if the quality of recordings is high, and validation and data processing is time consuming. That is why “blind” use of ID Apps is currently not recommended by EBCC while making surveys for PECBMS or EBP. In some cases it was possibly one of the reasons for the answer “No” on the question about general interest in acoustic monitoring. On the other hand, even if there was no interest in acoustic monitoring from the organisation, acoustic methods were considered as useful in some study areas.

Most of the respondents emphasised that acoustic monitoring was especially important for cryptic, rare and nocturnal species research (including nocturnal migration) and for research with dedicated topics like vocalisation, phenology, individual recognition (for some species individual marking can be done as the peculiarities of the song are easier to detect than catching/ recatching the same individual to check the ring num-

ber) etc. and it makes research together with other taxa more efficient as just only one method/device is used for bats, birds, mammals, frogs and insects. The answers have shown that using acoustic devices will probably not significantly reduce the travel costs or costs for volunteer training — despite even one recorder replaces human hours in the field, the amount of the recorders is increasing, and travel costs are needed not only to deploy and bring them back to the office, but also to maintain them like changing batteries or memory cards. Furthermore, the computational capacity to analyse the data will also be higher than analysing traditional survey data.

Nearly half of the respondents think the acoustic monitoring will change the community of the fieldworkers. For instance, by opening monitoring to people with lesser expertise in bird ID (incl. foresters or experts on other taxa). There are examples of this type of work from some countries when recordings for common bird species monitoring are mostly done by protected areas staff, and further identification is run by professional ornithologists. It allows large areas to be covered and significant amounts of data collected. On the other hand, huge amounts of data must be analysed, verified and stored somehow, and it makes it complicated for the countries which either have lack of resources for that or collect that much data by implementing acoustic monitoring a lot.

There were no worries that the attitude of the bird watcher community would be negative, but some doubts regarding engagement of people with birds and nature — no need to spend hours in the field for bird counts, all the fieldwork is about deploying the recorders and maintaining them. The good aspect of it is that acoustic devices can be installed under any weather conditions and at any time of the day, in some cases months in advance if needed, so all the problems with finding the best time for the survey can be skipped — later the researcher can decide which files to use depend on the aim of the study. On the other hand, there is a concern about losing a link between the work and the community of fieldworkers.

Most of the respondents have expressed no concern about privacy, although in many countries it is forbidden by the legislation to record people’s voices without their permission. In accordance with the answers given, the safety of equipment also is not something that is too concerning —

most modern devices are small, cryptic-coloured and easy-to-hide. As prices significantly decreased and quality increased (high humidity protection, solar panel for long-lasting, live data transfer throughout GSM or satellite like in EcoPi (Recording technology — ecoPi) and similar devices) within the last five years, they became more affordable and more widespread.

Nobody of the respondents expects that acoustic devices will completely replace standard human-based monitoring in the longer term. However, some level of complementarity is expected — in remote and difficult to access areas, regions where there is a lack of ornithologists or bird-watchers, within the work with rare/cryptic/nocturnal species and other cases which demand a lot of efforts to collect the data by humans. At the moment there are a lot of projects among EBCC partners, in which acoustic monitoring is already used. These are ones mentioned by the respondents:

some separate species monitoring like Rock *Lagopus muta* and Willow Ptarmigan *Lagopus lagopus*, White-winged Snowfinch *Montifringilla nivalis*, nightjars *Caprimulgus* sp., Eurasian Woodcock *Scolopax rusticola*; multiple species monitoring like common bird surveys, farmland birds, nocturnal migration and nocturnal breeding species, including owls. Nearly half of the respondents does not expect any support from EBCC in these activities, but others believe that EBCC can:

- develop guidelines, education and trainings;
- facilitate and implement projects focusing on acoustic monitoring;
- stimulate discussion within EBCC on how to integrate acoustic monitoring in current monitoring schemes;
- become the European reference point for standards on how to mobilise/integrate acoustic data in long term monitoring projects.

## References

ecoSound-web: [https://ecosound-web.de/ecosound\\_web/](https://ecosound-web.de/ecosound_web/)

BirdWeather: <https://www.birdweather.com/>

Recording technology — ecoPi: [https://www.oekofor.de/en/portfolio/erfassungstechnik\\_en/](https://www.oekofor.de/en/portfolio/erfassungstechnik_en/)

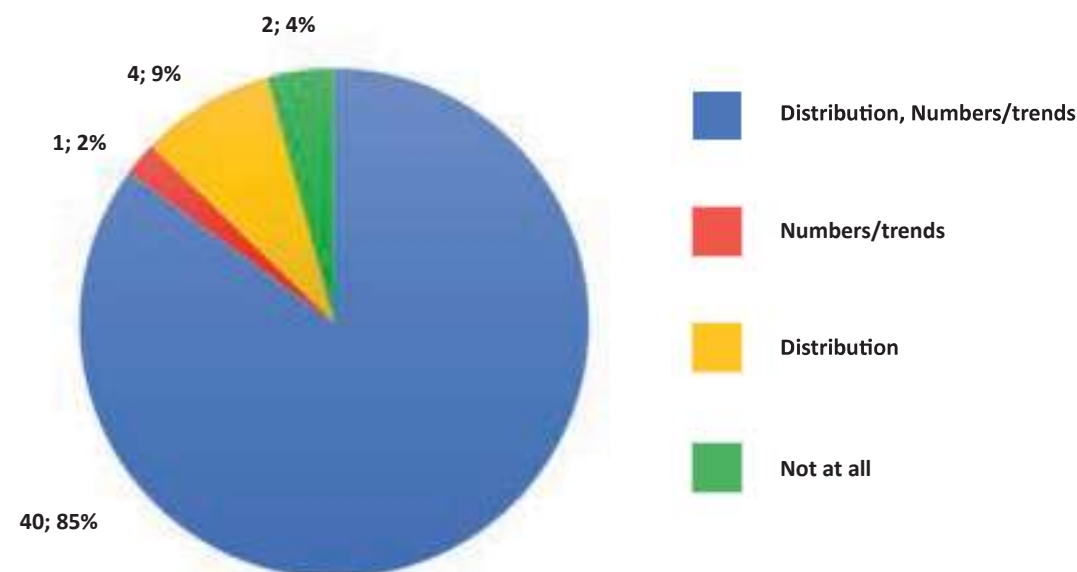
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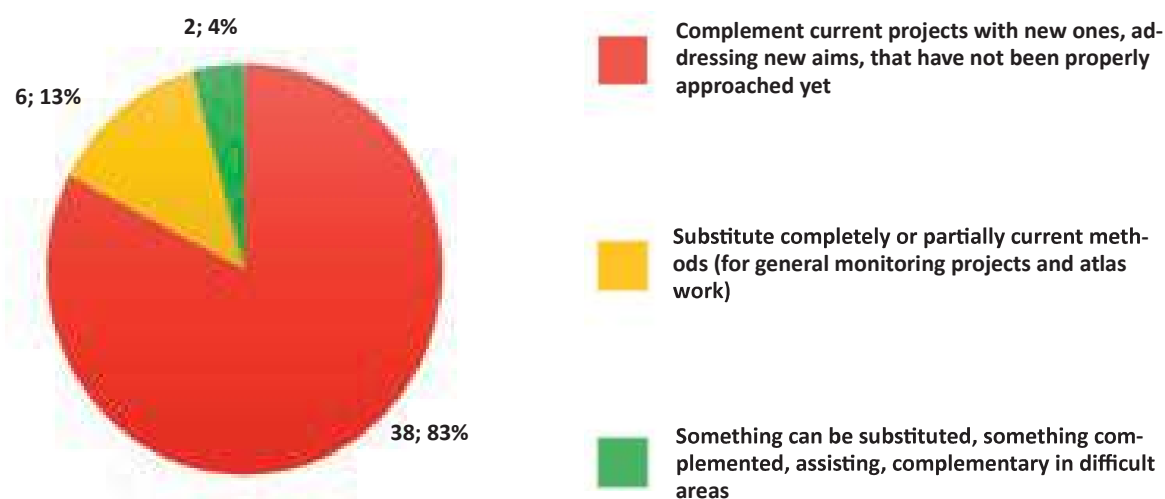
## Annex

### Questions and results

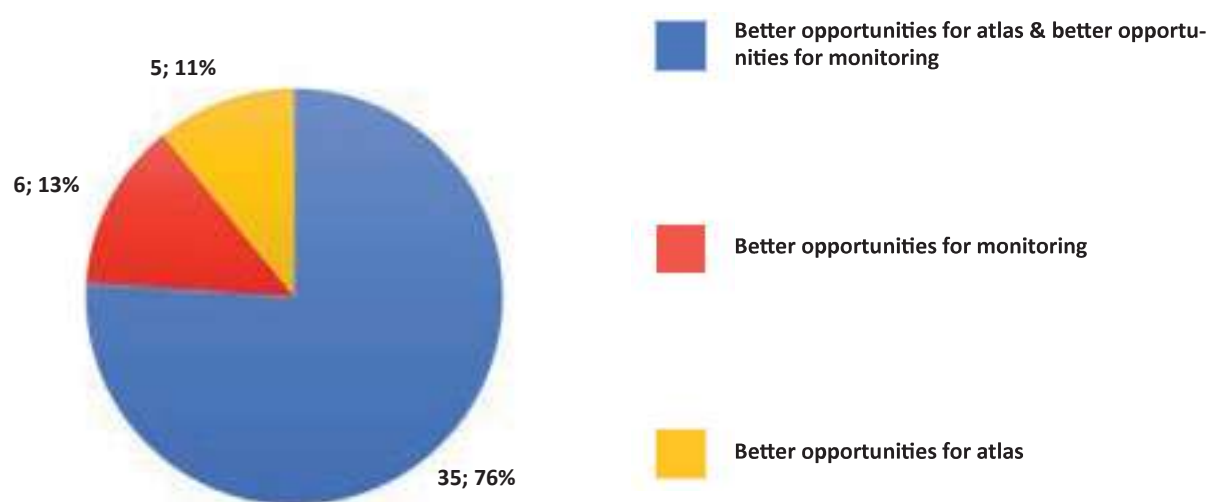
1. Is your organisation interested in acoustic monitoring to monitor bird populations?



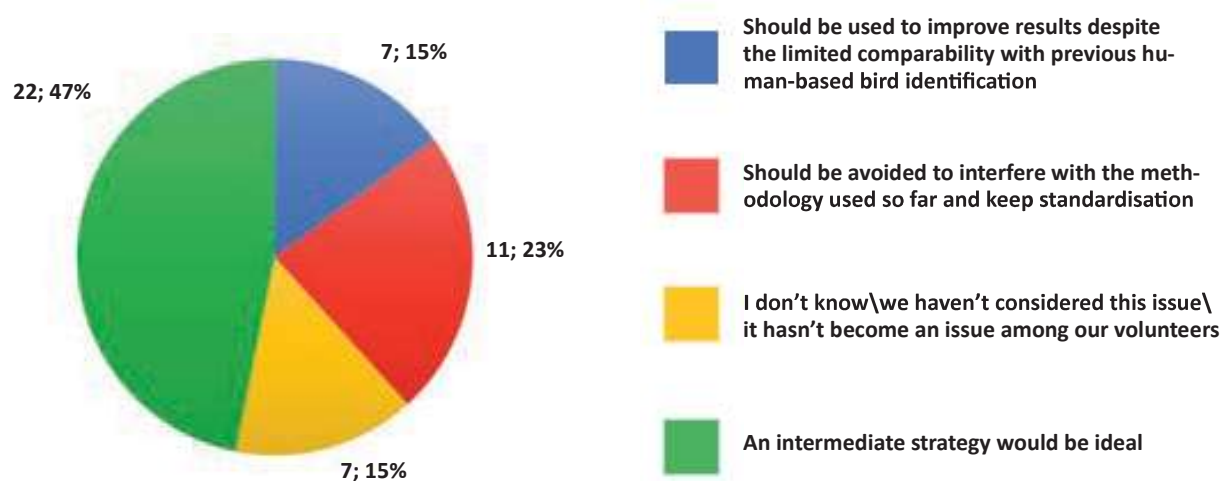
2. In your view, what are the main expected outputs from acoustic monitoring? Will it complement or substitute completely or partially current methods (for general monitoring projects and atlas work)



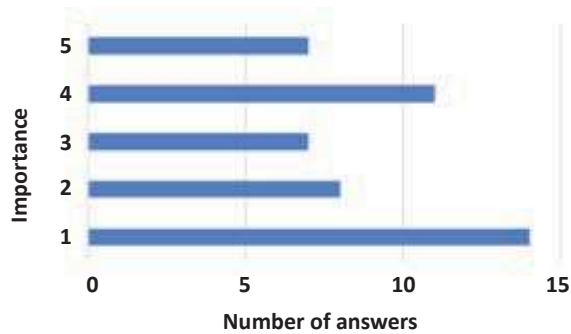
3. What do you think will acoustic monitoring bring to the regular monitoring (temporal dimension) or atlas work (spatial dimension)?



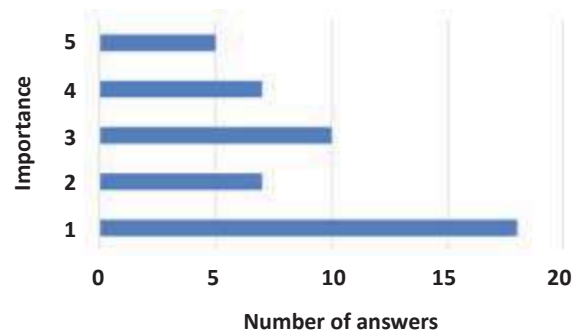
4. What is your view on how volunteers can use auto-identification apps during fieldwork?



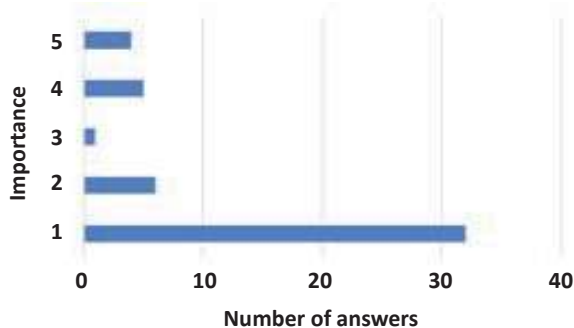
5. Please score the following monitoring activities for how much you think acoustic monitoring devices will be complementary to current projects (1 = important to 5 = unimportant) [Breeding bird monitoring in areas with a limited number of ornithologists and birdwatchers (a person non-trained in bird identification could contribute to monitoring)]



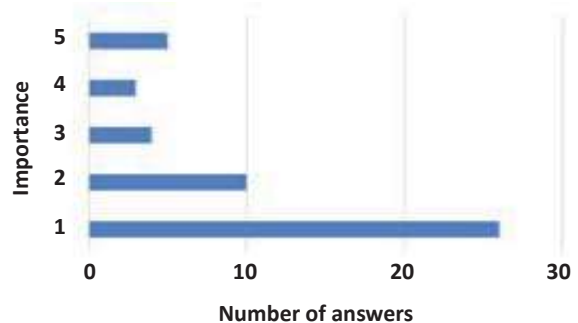
6. Please score the following monitoring activities for how much you think acoustic monitoring devices will be complementary to current projects (1 = important to 5 = unimportant) [Atlas/inventory work in areas with a limited number of ornithologists and birdwatchers (a person non-trained in bird identification could contribute to monitoring)]



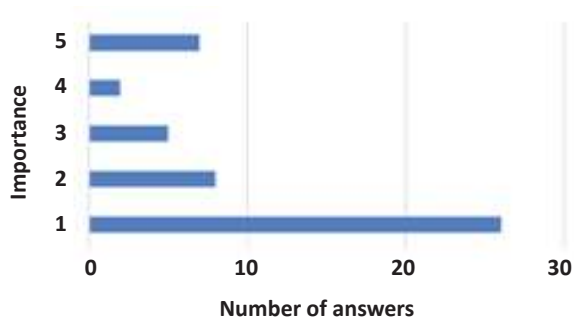
7. Please score the following monitoring activities for how much you think acoustic monitoring devices will be complementary to current projects (1 = important to 5 = unimportant) [Dedicated research projects e.g. focussed on particular sites or species]



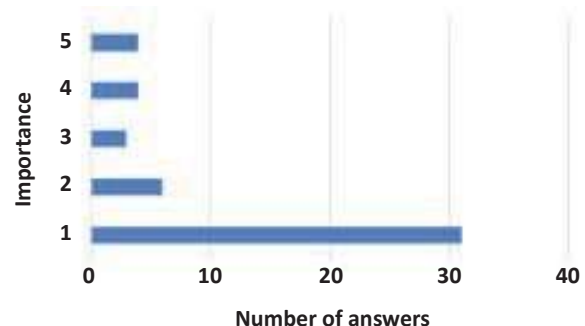
8. Please score the following monitoring activities for how much you think acoustic monitoring devices will be complementary to current projects (1 = important to 5 = unimportant) [Nocturnal breeding bird species]



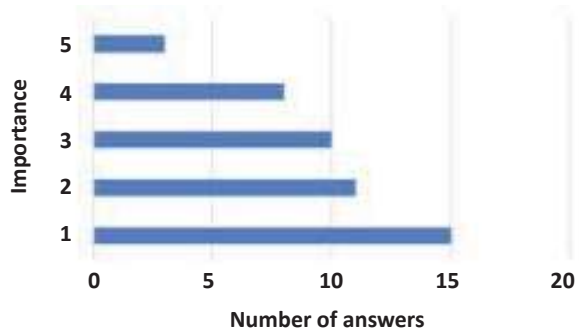
9. Please score the following monitoring activities for how much you think acoustic monitoring devices will be complementary to current projects (1 = important to 5 = unimportant) [Nocturnal migration]



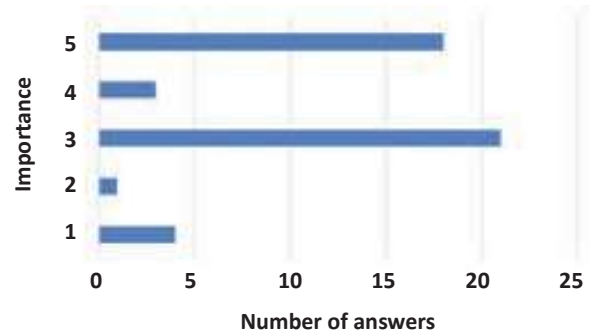
10. Please score the following monitoring activities for how much you think acoustic monitoring devices will be complementary to current projects (1 = important to 5 = unimportant) [Monitoring of some rare or cryptic species]



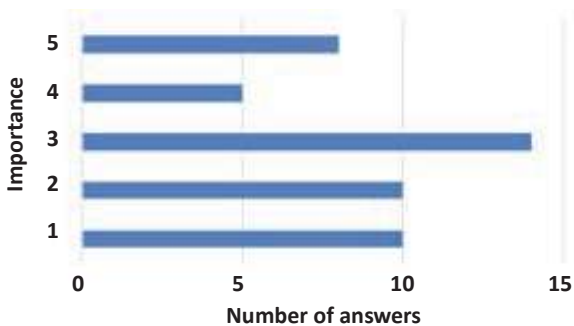
11. Please score the following monitoring activities for how much you think acoustic monitoring devices will be complementary to current projects (1 = important to 5 = unimportant) [Complementarity with the monitoring of other taxa]



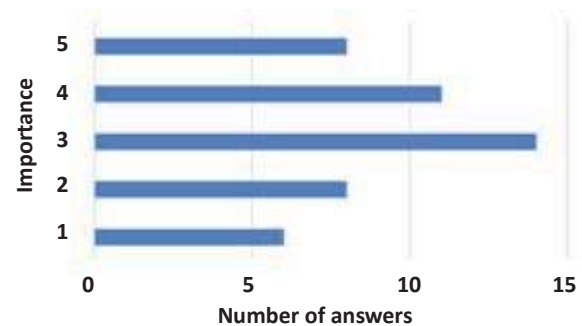
12. Please score the following monitoring activities for how much you think acoustic monitoring devices will be complementary to current projects (1 = important to 5 = unimportant) [Other (please specify in comments)]



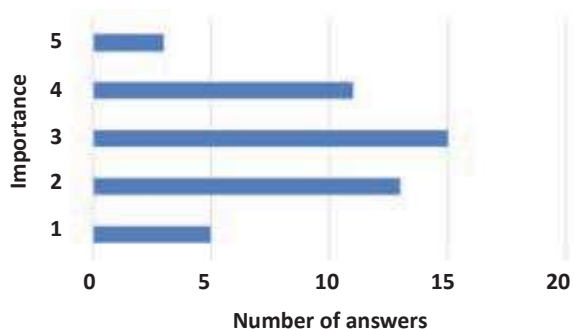
13. Please score the following for how important they are in shaping the value of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Reduced travel costs]



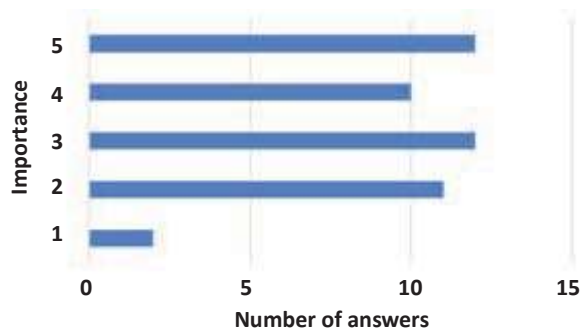
14. Please score the following for how important they are in shaping the value of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Reduced costs of volunteer training]



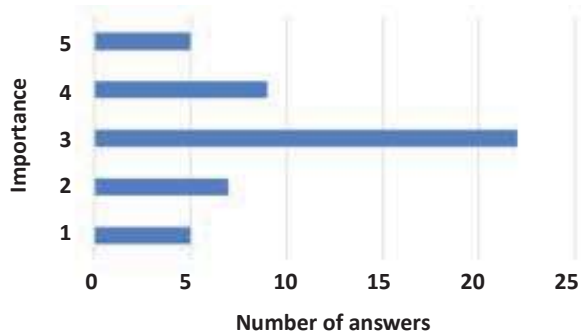
15. Please score the following for how important they are in shaping the value of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Increased accessibility allowing greater diversity of volunteers]



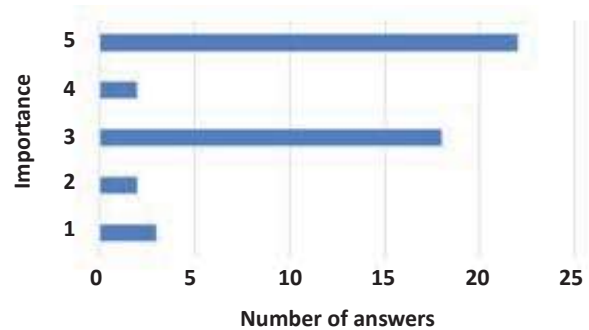
16. Please score the following for how important they are in shaping the value of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Other]



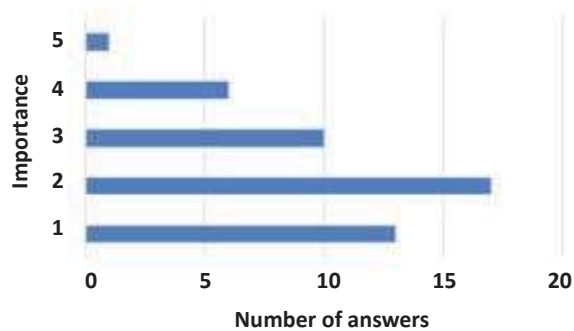
17. Please score the following for how important they are in shaping the value of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Positive attitude of the bird watcher community]



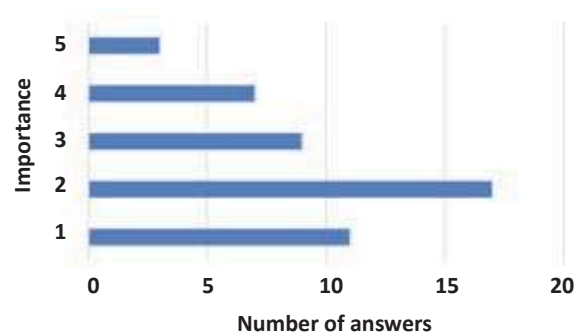
18. Please score the following for how important they are in shaping the value of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Other]



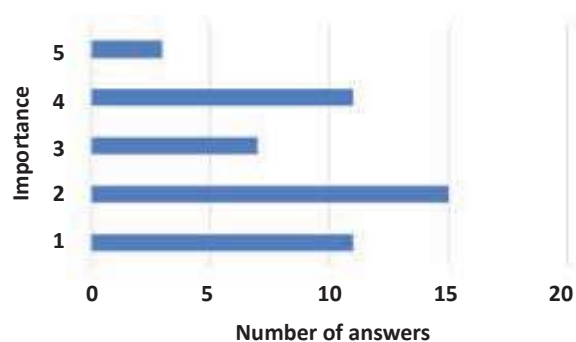
19. Please score the following for how important they are in constraining the use of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Cost of devices]



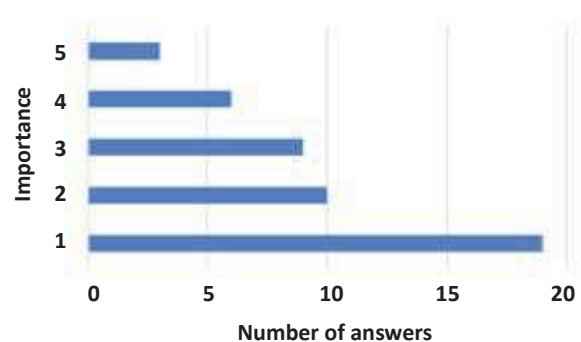
20. Please score the following for how important they are in constraining the use of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Cost of IT infrastructure]



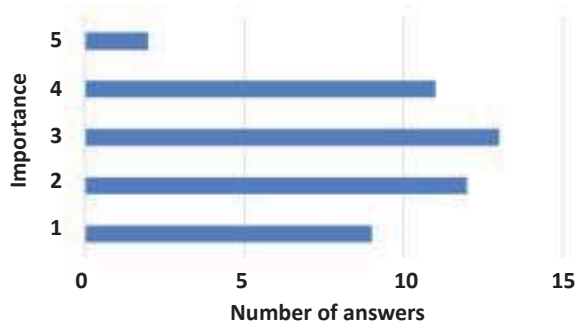
21. Please score the following for how important they are in constraining the use of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Cost of storing data]



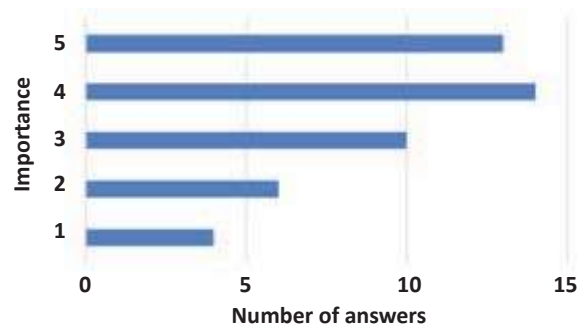
22. Please score the following for how important they are in constraining the use of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Cost of processing and verifying data]



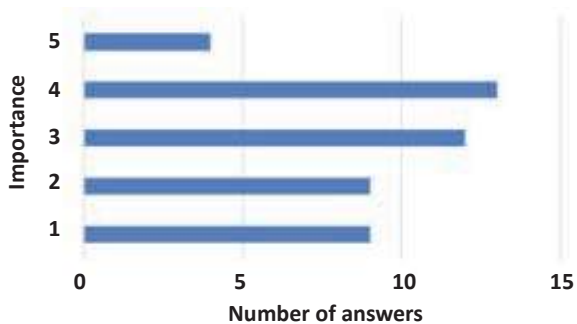
23. Please score the following for how important they are in constraining the use of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Lack of in-house expertise for acoustic projects and data management]



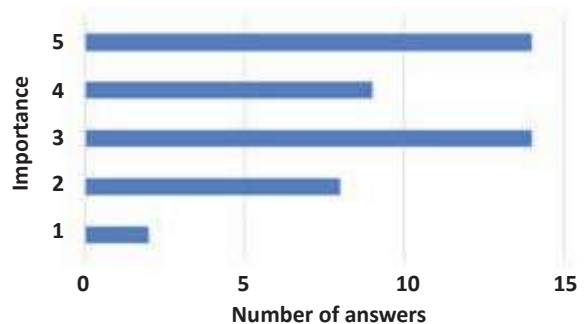
24. Please score the following for how important they are in constraining the use of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Concerns about privacy]



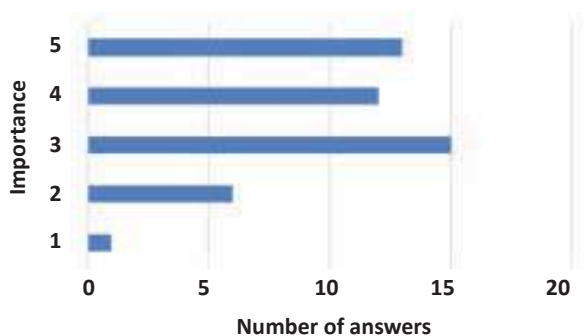
25. Please score the following for how important they are in constraining the use of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Safety of equipment]



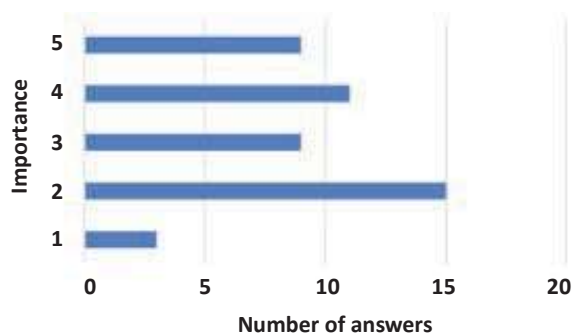
26. Please score the following for how important they are in constraining the use of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Diminished support by sponsors]



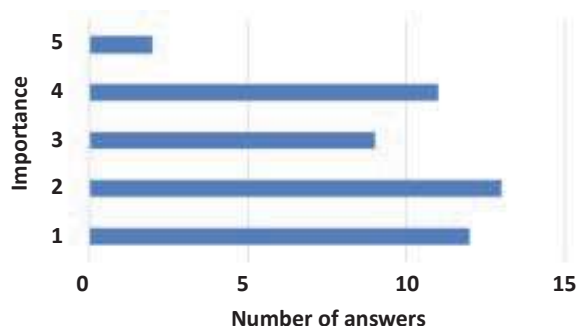
27. Please score the following for how important they are in constraining the use of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Negative attitude of the bird watcher community]



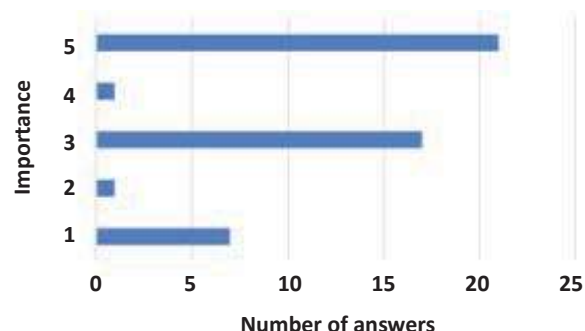
28. Please score the following for how important they are in constraining the use of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Reduce engagement of people with birds/nature]



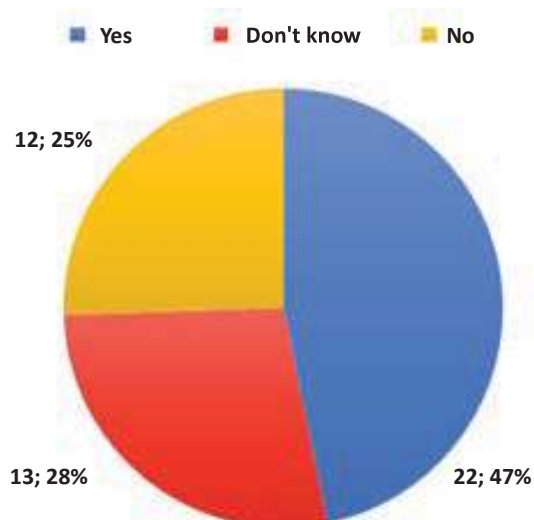
29. Please score the following for how important they are in constraining the use of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Limited comparability with the data collected so far by humans]



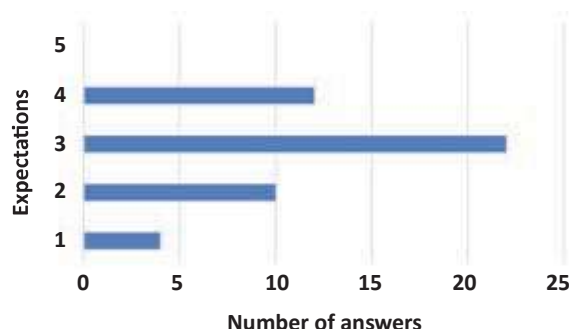
30. Please score the following for how important they are in constraining the use of acoustic monitoring in bird monitoring (1 = important to 5 = unimportant) [Other (please specify in the Comments)]



31. Do you think acoustic monitoring development would change the type of collaborators in fieldwork? If yes, please elaborate in the Comments.



32. Evaluate from 1 (no expectation at all) to 5 (complete replacement of current monitoring human-based approach) your 20-year future vision on acoustic monitoring in bird monitoring and atlas work. Please comment on it in the Comments.

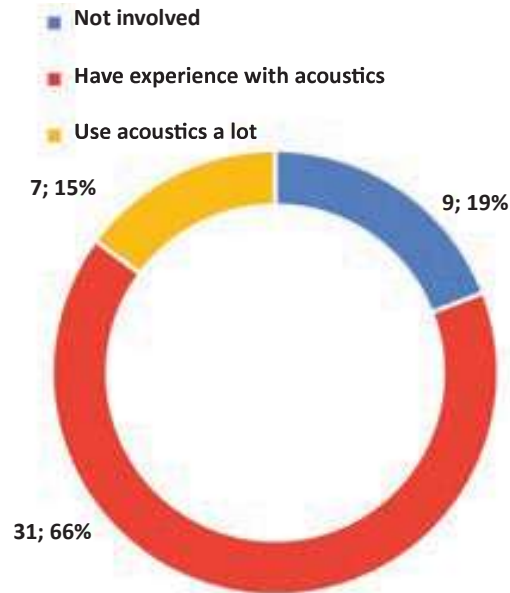


33. Is there anything that EBCC could do to support you/your organisation/scheme in the implementation of acoustic monitoring?

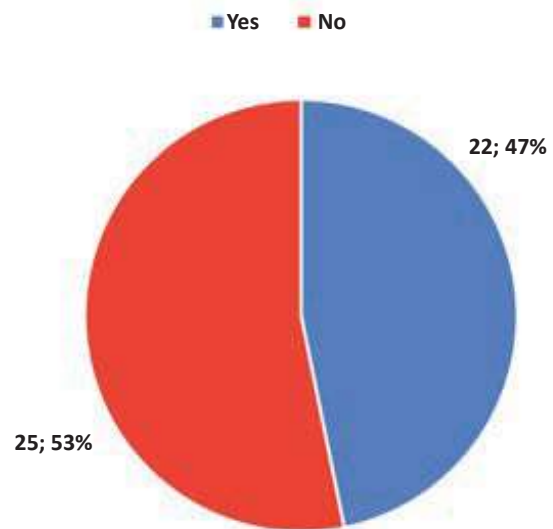
Some remarkable comments are given below:

- develop guidelines, education and trainings;
- facilitate and implement projects focusing on acoustic monitoring;
- stimulate discussion within EBCC on how to integrate PAM [Passive acoustic monitoring] in current monitoring schemes;
- become the European reference point for standards on how to mobilise/integrate acoustic data in long term monitoring projects.

34. Is your organisation already involved in monitoring work which uses acoustic monitoring? If yes, please provide answers according to the following structure directly in the text. If there are more projects, please add info on all of them.



35. Are you aware of any consultants undertaking acoustic monitoring in your country? If yes, please provide comments, if possible.



### 36. Comments

Some remarkable comments are given below:

- *'...We are very positive to using acoustic techniques for very specific and local surveys. But for long-term large-scale monitoring — DON'T GO THERE!'*
- *'My biggest fear with the development of passive acoustic monitoring is the loss of the link with the work of volunteers and the grassroots community. The main challenge is to manage to combine the two in harmony.'*
- *'...Consistent data, which is not dependent on the observer's abilities and skills, gathered for longer periods of time, fully comparable between different sampling places. It feels like a right way to the general aim of any science — finding out the truth.'*