

CA16224 - European Raptor Biomonitoring Facility
Working Groups 1 - 4 Workshop
BTO Scotland, Stirling, Scotland, 16-19 April 2019



Proof of Concept Development and Future Funding

WORKSHOP REPORT



Tawny Owl carcass © Keith Tompkins/BTO Images Library

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Introduction and objectives

This workshop was convened by WGs 1-4 to develop further a proof of concept (PofC) case study for the ERBFacility from ideas originally outlined by Rafa Mateo (IREC, Ciudad Real, Spain) at the working group meetings in Thessaloniki ([see report here](#)) and Florence ([see report here](#)). The aim was to develop the objectives, design and deliverables of the PofC case study in more detail and further plan how it could be implemented.

During the workshop our objectives were:

- To agree and outline clearly a range of modular options for implementation of a PofC case study, the scale of delivery of which will be dependent on the level of in-kind resources and/or external funding that can be found. This is because there are no resources available within the ERBfacility COST Action to fund staff time or laboratory analyses.
- To clearly document the rationale for the design of the study and all decisions taken (e.g. in relation to choice of contaminants, species, sampling strategy etc), so as to facilitate feedback to, and ideas input from, the rest of the ERBFacility network (which is particularly important because the Stirling meeting had to be convened at short notice with a limited number of places available).
- To discuss how to make the proof of concept case study as inclusive as possible, and how to promote involvement across the ERBFacility network.
- To provide opportunity to identify and discuss the relevance to ERBFacility work of a range of potential funding sources (both to support the proof of concept study and to contribute to other potential ERBF-linked activities).

Workshop Welcome and Introductory Session

The workshop began in the late afternoon with a welcome to Stirling by the local organiser, Chris Wernham, and her team from BTO Scotland. There followed a [presentation from Chris Wernham \(ERBF Working Group 4 Lead\)](#) with background to the workshop and to the role and objectives of Working Group 4 and then a [presentation by Antonio Juan García-Fernández \(ERBF Working Group 2 Lead\)](#) reminding the group of Working Group 1 & 2 objectives. We then heard a [presentation by Ben Darvill \(Development and Engagement Manager at BTO Scotland\)](#) on the raptors of the local area and some relevant research and engagement work carried out by BTO Scotland and the [Scottish Raptor Monitoring Scheme](#).

Workshop Topic 1

Setting priorities for a Proof of Concept study – feedback from the WGs 1-4 workshop in Thessaloniki

Wednesday morning began with a [presentation by Richard Shore](#) to update all participants on the workshop on setting priorities that had taken place in Thessaloniki in February 2019 ([see report here](#)) and summarising the key take-away messages from that meeting. Richard explained how participants in Thessaloniki had worked on deciding priority groups of compounds on which ERBfacility and the PofC study should focus, with 5 groups identified as of most interest/highest

priority by participants in Greece: pharmaceuticals (non-steroidal anti-inflammatory drugs – NSAIDs); agrochemicals; rodenticides; metals (e.g. mercury, lead and arsenic); and perfluorinated compounds. He also summarised the preliminary discussions that took place in Greece around criteria for choosing suitable species and matrix types, giving examples for metals (Pb and Hg) and rodenticides. He then reminded participants that some of these compounds identified as high priority are already being considered further in other strands of ERBFacility work (e.g. pharmaceuticals in the work on visceral gout reporting) and that some participants considered that pan-European biomonitoring networks were already in place and functioning effectively (e.g. focused on White-tailed Eagle to assess a range of pollutant types including Hg, POPs, nBFRs, PFASs – [see presentation for examples](#)).

Key messages that Richard Shore highlighted from the Thessaloniki workshop were:

- Numbers, species, compounds, matrices and sampling effort (new samples/banked samples) all needed to be considered carefully (this was done in the next section – see below).
- We need to be clear of what are we trying to demonstrate—spatial coverage/temporal coverage/both/something else?
- Can we usefully/feasibly analyse isotopes in addition to contaminants?
- We need to make the PofC timeframe realistic for sample collection.
- We should not make life overly difficult or over-think this, as it is a proof of concept not a full blown scientific study.
- Once there are some data, these will throw up lots of questions, logistical, analytical and interpretative issues – this is the whole point of doing the PofC case study.
- Will need to consider carefully how to logistically interpret the findings and outputs.

Workshop Topic 2

Introduction to the Proof of Concept study and agreeing its objectives

Our work to further develop the PofC case study started with a [presentation by Chris Wernham](#), outlining the ideas that were originally put together by Rafa Mateo earlier in the year and adding in the suggestions made in further discussions with the ERBFacility network participants in Thessaloniki (February 2019) and Florence (March 2019). The presentation updated everyone on what had been suggested already in terms of: study objectives (what it should and should not try to do); possible sampling design; choice of contaminants/matrices/suitable species; how to source samples; and criteria for suitable sample selection.

In summary, the presentation recommended the following issues to be addressed as far as possible during the workshop:

1. Agree clear objectives (what will and will not be done).
2. Agree a suitable scientific study design (in phases of increasing ambition).
3. Agree recommendations for chemical(s), sample type(s), focal species, analytical methods.
4. Discuss logistics – recommend how to obtain samples.
5. Discuss logistics – how to get samples analysed and the results reported.
6. Discuss and identify resources – how to get the work done!
7. Seek pledges of resource (e.g. lab capacity) and plan the use of STSMs.
8. Consider/review additional sources of funding for which we might collectively apply.

9. Make sure we plan for inclusiveness and give justification for design decisions so that they can be explained clearly to participants who are interested but were not able to be in Stirling.

We then heard a [presentation by Marcello D'Amico \(IDAEA-CSIC\)](#) providing ideas on how we could source additional carcasses via road kills and the Road Ecology network. Marcello highlighted the Barn Owl as a potentially suitable species for consideration because it is the species most frequently found killed on roads but also highlighted some disadvantages of focusing on Barn Owl, particularly its breeding distribution (which is not truly pan-European).

We then had a discussion to agree the objectives that we considered most feasible to meet in the PofC study and these were agreed as follows:

- To provide a quantitative measure of "recent pan-European" spatial variation in exposure to a selected small number of contaminants in one or a small number of related species
- To test and demonstrate the operation and sustainability of ERBF networks (ERBioMS, ERSpeB and ERSamP) and their value to future funders and participants
- To identify gaps in sources and quality of samples (ERSamP)
- To test the storage capacity, constraints and gaps identified by WG3 (ERSpeB)
- To identify gaps and variability in "quality" in analytical capability
- To test pathways of movement for samples and constraints at all stages
- To produce data to start to assess issues re-sample pooling, statistical power, uncertainty and required sample sizes for monitoring purposes
- To test and demonstrate transfer pathways (information/data flows/feedback etc) to all parts of the network
- [to demonstrate temporal trends in contamination levels, if the information obtained has a sufficient temporal coverage]*

We also explicitly discussed objectives that were not feasible to include in a PofC study with limited resources and these were agreed as:

- Will not attempt to demonstrate the best species to sample for particular contaminant types
- Will not attempt to analyse for all contaminants
- Will not attempt to demonstrate the effects of contaminant(s)
- Will not be specifically designed to demonstrate temporal trends in contamination levels*

[* There were some slight differences of opinion over whether the study should set out to demonstrate temporal variation in contaminant exposure, in addition to spatial variation, with concerns expressed over the likely inadequacy of sample sizes to give sufficient statistical power to detect temporal variation. Currently we consider that the study will be designed to demonstrate spatial variation but we can consider any potential to look at temporal changes dependent on the range of samples that can be obtained and analysed with the resources available.]

Workshop Topic 3

Choice of contaminants, sample matrices and focal species

Choice of contaminants

The five priority contaminant groups selected at the [Thessaloniki workshop](#) in February 2019 were considered further in relation to a range of selection criteria, including:

- Current capacity of labs with an interest in these contaminants
- Costs of analysis
- Availability of established certified reference materials
- Potential to analyse multiple compounds in the same lab
- Numbers of existing published studies
- Policy interest in compounds – including current relevance to EHCA and EFSA
- Extent to which strong spatial variation in exposure would be expected
- Extent to which there may be difficulties of standardizing analytical methods between labs
- Extent to which it may be difficult to control for variation between samples due to e.g. sex, age, migratory status, nutritional status

Comparisons between the compound groups considered, and some of the rationale for final selection, are presented in [Stirling workshop summary spreadsheet 1](#).

Workshop participants agreed that the PofC study should focus on two groups of contaminants: metals (mercury and lead); and second generation anti-coagulant rodenticides (SGARs). The latter were further considered and some priority compounds selected at the subsequent workshop on the topic in Madrid in April 2019 ([Madrid report](#)).

Choice of sample types

Following the selection of focal contaminant types, participants further discussed the most appropriate sample matrices for measuring exposure in the PofC study, and decisions around whether the PofC study should focus on ‘passive sampling’ (use of carcasses) or ‘active sampling’ of other tissues by field participants of various types. This discussion was influenced by considerations of:

- The extent to which different tissue types are suitable for measuring exposure to contaminants and comparative turnover times (some have been the subject of many studies and are of proven value whereas for other tissue types there is a higher degree of uncertainty around their utility)
- The ease of getting different types of samples (and the skills and licensing required by field participants – which might take to capacity build)
- The resources (funding and in-kind) likely to be available for the PofC study, so that the numbers of samples that can be analysed will need to be limited

Some of the considerations are summarised in [Stirling workshop summary spreadsheet 1](#).

Workshop participants agreed that the PofC study should initially focus on obtaining suitable fresh or frozen carcasses, from which to obtain the most appropriate tissues for analysis – liver and/or kidney.

However, there is strong recognition that the passive sampling of carcasses will only test one part of the potential future European Raptor Sampling programme (ERSamP), so there is a strong aspiration from Working Group 4 participants in particular for the PofC study to also test the collection of some

other sample material that requires different field 'actors' to collect successfully (e.g. blood from nestlings, feathers etc).

It was concluded that whilst the first phase of the PofC study would focus on passive sampling of carcasses, it was important to try to find ways of showing the potential of a future network to collect active samples. If resources can be found to analyse some active samples too, it was agreed that these should be for the same compounds and species as the passive samples so that direct comparisons of usefulness could be made.

Choice of focal species

Following the selection of focal contaminant types and suitable sample tissues, participants discussed the most appropriate raptor species from which to seek samples. Comparisons between a short list of potentially suitable species (the latter identified during the Thessaloniki workshop in February 2019) are shown in [Stirling workshop summary spreadsheet 1](#). A number of criteria for suitability were considered, including:

- The range of each species within Europe (looking for species with a breeding range covering as much of Europe as possible)
- The migratory status of each species (resident species having greater suitability for measuring exposure to local contaminant sources than those that are migratory; the latter being exposed to contaminants across their whole migratory pathway)
- Dietary preferences – their relevance to the contaminants of interest and understanding of diet variation across Europe
- Habitat preferences - their relevance to the contaminants of interest and effect of habitat selection on pan-European range
- Any other advantages or disadvantages (e.g. ease of sampling nest box species)
- The specific agreed objectives of the PofC study – focusing on spatial variation and not temporal trends in exposure

Given all of the above criteria, Tawny Owl and Common Buzzard ranked highly as suitable focal species, although some still felt that other species (e.g. Barn Owl and perhaps Common Kestrel) merited inclusion (e.g. because of the ease of accessing carcasses). It was agreed that resources were only likely to allow the PofC study to focus on a small number of species (probably two) and that the next step in making a final decision should be to assess what existing material (carcasses and analysed samples) was already available for the most suitable of these species (or what capacity would be offered from labs to analyse samples from particular species).

Whichever species are selected, participants agreed that there are likely to be gaps in range in some parts of Europe (e.g. no Tawny owl or Common Buzzard in Iceland; no Tawny Owl in Ireland). If the PofC study is to be truly pan-European, we need to consider whether surrogate species with similar traits could be analysed from countries from which the focal species are absent. It was considered that if this were to happen, it would also be important to analyse compounds in both the focal species and the surrogate species from areas where the range overlapped (benchmark one against the other).

Workshop Topic 4

Funding and other resources for the Proof of Concept Study

A break-out session was spent by participants trying to identify potential funding sources that could be explored to further fund an ERB Facility Proof of Concept study, or wider implementation of

ERBFacility goals (ERBioMS, ERSpeB, ERSamP). A list of potential funding sources was compiled (see [Stirling workshop summary spreadsheet 2](#)). Following discussion with, and guidance from, the ERBFacility Chair, Guy Duke, and Pof C study originator, Rafa Mateo, by Skype later in the workshop, **we agreed that there was no immediate opportunity identified from which extra funding for the PofC study could be sought. We agreed that further exploration of any opportunities from the regulatory agencies should be explored and that all should continue to look out for new opportunities to apply for external funding. In the meantime, we agreed that the main route to getting PofC work initiated would be via working collaboratively with interested labs which may be able to offer some sample analyses for free if they can benefit scientifically from the collaboration. We agreed to continue to review funding opportunities at regular intervals.**

Workshop Topic 5

Further consideration of study design and planning for delivery, including conclusions and next steps

The final workshop session on Friday morning focused very tightly on planning the next steps for delivery of the Proof of Concept study, and on the issues around ensuring the whole project is as inclusive as possible of the ERBFacility network as a whole. Ideas and next steps were summarised – see [Stirling Workshop Summary Spreadsheet 3](#) for full details.

The agreed key next steps were:

1. To write a concise project proposal summarising the agreed elements of the project and justification for the decisions taken at workshops, for sharing with the whole ERBFacility network and encouraging as many countries and labs as possible to take part. This was kindly drafted by Rui Lourenço and Philippe Berny, with subsequent input from Rafa Mateo and Chris Wernham and is available through the following link ([Latest version of ERBF Proof of Concept summary proposal](#)).
2. To draft and circulate a questionnaire to all known relevant labs asking them what samples and existing analyses they already have available to contribute to the PofC study, and asking them if they would like to collaborate and whether they can contribute any in-kind lab analyses to the project (in the absence of any external funding to pay for sample analysis). The hope is that some labs will feel able to collaborate in this way if they can derive scientific benefits (e.g. peer reviewed publications) from being involved in the PofC study.
3. To discuss with the Core Group and Working Group Leads to what extent Short-Term Scientific Missions (STSMs) can be made available to support the PofC work. Participants identified 5 STSMs required to run a modest PofC study, 3 of which would be required in Grant Period 3 and 2 in Grant Period 4 (see [Stirling Workshop Summary Spreadsheet 3](#)). It was subsequently agreed by the Core Group that all 3 suggested missions for GP3 would be advertised.
4. To ensure effective communication of the Proof of Concept study ideas to the rest of the ERBFacility network as soon as possible, encouraging as much involvement from others, and making the PofC study as inclusive as possible. The participants in Stirling considered this particularly important because the Stirling workshop had to be arranged at quite short notice. This meant that some participants who would have liked to have come were not able to attend, and the number of places for participants also had to be limited due to available budget.

Attendees and acknowledgements

The workshop in Stirling was fully attended in person by 13 participants representing 8 countries (Estonia, France, Italy, Portugal, Slovenia, Spain, Sweden and UK). Rafa Mateo (Spain) and Guy Duke (UK) also attended for part of the workshop via Skype.

The local organisation for this workshop in Scotland was carried out by Rebecca Cranston and Chris Wernham (BTO Scotland, Stirling), to whom we are extremely grateful. We also thank the staff of the Stirling Court Hotel, Stirling University Campus.

Development and running of the scientific programme was led by Chris Wernham (WG4 Lead) and Richard Shore (WG1 Lead). We are grateful to other BTO Scotland staff and volunteers who were involved in hosting the meeting and associated activities (John Calladine, Anne Cotton, Ben Darvill, Neil Morrison, Nina Schönberg and Mark Wilson) and to all the other workshop participants who gave freely of their time, skills and experiences to make workshop discussions and outputs so productive (Arianna Aradis, Philippe Berny, Alessandra Cincinelli, Marcello D'Amico, Andreia Freitas, Antonio Juan García-Fernández, Ulf Johansson, Madis Leivits, Rui Lourenço, Emma Martínez-López and Al Vrezec).



Appendix 1 – Workshop Programme

PROGRAMME

Tuesday 16 April	Stirling Court Hotel
17:00 - 17:30	Arrival & registration
17:30 - 19:30	SESSION 1 - INTRODUCTORY PRESENTATIONS & PLAN FOR THE WORKSHOPS
	1.1 Introduction to the workshop/domestics/overall plan for the week (Chris Wernham)
	1.2 Reminder of the vision for the ERBfacility COST Action and in particular what we mean by ERBioMS, ERSpeB & ERSamP and link to development of proof of concept study (Antonio García-Fernández, Chris Wernham & Guy Duke)
	1.3 Comfort break (visit the bar)
	1.4 Presentation on local area raptors/monitoring, research & engagement work locally (Ben Darvill, Engagement and Development Manager at BTO Scotland)
19:30	DINNER - Stirling Court Hotel
Wednesday 17 April	Stirling Court Hotel
09:00 - 11:00	SESSION 2 - DEVELOPING THE PROOF OF CONCEPT IDEAS
	2.1 Refresh on proof of concept ideas outlined previously following discussions at WG4 workshop in Florence (Chris Wernham & Richard Shore)
	2.2 Additional ideas on use of road kills /road ecology network (Marcello d'Amico)
	2.3 Group work to capture overall objectives for the proof of concept and justification (criteria) for the study design (with the intention of explaining our choices to the rest of the network and providing opportunities for others to engage with the study)
11:00 - 11:30	COFFEE BREAK
11:30 - 13:00	SESSION 3 - FIRMING UP THE DESIGN & METHODS OF DELIVERY
	3.1 Firm up on design elements and justification for each element/decision
	3.2 Think about pledges of resourcing from those present
	3.3 Think about how to make the proposals as inclusive as possible / how to get others to pledge resources/support
	3.4 Mechanics of delivery - who will make it happen? How to coordinate work/samples/analyses by country? Linked STSMs? Timescales for delivery?
13:00 - 14:00	BUFFET LUNCH
14:00 - 16:00	SESSION 4 - DEVELOP MODULAR ASPIRATIONAL PROPOSAL
	4.1 Think further about modules of the proposal which are increasingly aspirational - from quick wins (year 1) to more ambitious proposals collecting new samples....
	4.2 Start research into funding possibilities (participants to please bring ideas for funding sources)
	4.3 Prepare summary to present later to Rafa Mateo and others in Skype session
16:00 - 16:30	COFFEE BREAK

Wednesday 17 April	Stirling Court Hotel
16:30 - 18:00	SESSION 5 - DISCUSSION OF PROOF OF CONCEPTS IDEAS DEVELOPED - SKYPE SESSION: Rafa Mateo available via Skype
	5.1 Short presentation to feed back any new thinking to Rafa Mateo & others attending remotely
	5.2 General discussion of state of proposals and any problem areas identified - plan work for following day
19:00	DINNER - Stirling Court Hotel
Thursday 18 April	Stirling Court Hotel
09:00 - 11:00	SESSION 6 - ASSESSMENT OF FUNDING SOURCES - FOR PROOF OF CONCEPT WORK & WIDER ERBFACILITY WORK / FUTURES
	6.1 Ideas on possible future funding sources to explore further (All)
	6.2 Discussion and further work to develop modular proposals and match them to funding sources - opportunity to do some writing of sections/further research into funding possibilities.
	6.3 Consider any extra suggestions/concerns raised by others in the Skype on Wed afternoon
11:00 - 11:30	COFFEE BREAK
11:30 - 13:00	SESSION 7a - CORE GROUP MEETING FOR CORE GROUP ONLY
11:30 - 13:00	SESSION 7b - Work in groups to research funding sources and suggest matches to proof of concept / other future ERBF work
13:00 - 14:00	BUFFET LUNCH
14:00 - 15:30	SESSION 8 - FUTURE FUNDING & INVOLVING THE REST OF THE NETWORK
	8.1 Feedback from groups who have researched funding sources
	8.2 Consideration of how to maximise inclusivity - ways to involve the wider network in the proof of concept study?
15:30 - 16:00	COFFEE BREAK
16:00	DEPARTURE FOR DINNER VENUE BY BUS

Friday 19 April	BTO Scotland (meeting room), Beta Centre, Stirling University Innovation Park
09:15	Meet at entrance to Stirling Court Hotel for guiding to BTO Scotland offices.
09:30 - 12:30	SESSION 10 (with coffee) - SUMMING UP & NEXT STEPS
	Flexible schedule. Time to talk further about the Action as a whole and how the proof of concept fits in. Opportunity to assess again how inclusive the proposed study can be and what the options are for people/countries to get involved. Agree forward plan of action and reporting back to network
12:30	CLOSE OF MEETING & OPTIONAL LUNCH TOGETHER

Appendix 2

LIST OF PARTICIPANTS

Full participants		
Arianna Aradis	ISPRA	Italy
Philippe Berny	Vetagro Sup, Campus Veterinaire	France
Alessandra Cincinelli	University of Florence	Italy
Marcello D'Amico	IDAEA-CSIC	Spain
Andreia Freitas	INIAV	Portugal
Antonio Juan García-Fernández	University of Murcia	Spain
Ulf Johansson	Riksmuseet	Sweden
Madis Leivits	Institute of Veterinary Medicine and Animal Science	Estonia
Rui Lourenço	Universidade de Évora	Portugal
Emma Martínez-López	University of Murcia	Spain
Richard Shore	Centre for Ecology and Hydrology	UK
Al Vrezec	University of Ljubljana	Slovenia
Chris Wernham	BTO Scotland	Scotland (UK)
Inputting via Skype		
Rafael Mateo	IREC, Ciudad Real	Spain
Guy Duke	Oxford University Centre for Environment	UK
BTO Scotland staff assisting		
Rebecca Cranston	BTO Scotland Senior Administrator	Local organiser
John Calladine	Senior Research Ecologist	Field visit
Ben Darvill	Engagement and Development Manager	Tuesday evening
Nina Schönberg	Scottish Raptor Monitoring Coordinator (Maternity Cover)	Field visit
Mark Wilson	Research Ecologist (and Scottish Raptor Monitoring Scheme)	Tuesday evening
Neil Morrison	Raptor monitoring collaborator	Field visit

Appendix 3 – List of supplementary information available (presentations and summary outputs)

Presentations

[Presentation from Chris Wernham \(ERBF Working Group 4 Lead\) – Introduction to Workshop & WG4](#)

[Presentation by Antonio Juan García-Fernández \(ERBF Working Group 2 Lead\) – Introduction to WGs 1&2](#)

[Presentation by Ben Darvill \(Development and Engagement Manager at BTO Scotland\) – Local raptors and raptor work in Scotland](#)

[Presentation by Richard Shore – Feedback from ERBF Thessaloniki Workshop \(Feb 2019\)](#)

[Presentation by Chris Wernham – Development of Proof of Concept ideas so far](#)

[Presentation by Marcello D’Amico – Carcasses and road kill network](#)

Other related outputs

[ERBF Stirling Workshop Summary Spreadsheet 1 – objectives, selection of contaminants/matrices/species](#)

[ERBF Stirling Workshop Summary Spreadsheet 2 – exploration of potential funding sources](#)

[ERBF Stirling Workshop Summary Spreadsheet 3 – project planning, tasks and next steps](#)

[Latest version of ERBF Proof of Concept summary proposal](#)