European Raptor Biomonitoring Facility Newsletter

April 2021

Introduction to the Newsletter

This, our second newsletter, provides news on the wealth of progress being made by our COST Action, notwithstanding the Covid-19 pandemic, and our forward plans.

Since our last Management Committee Meeting in Porto in February 2020, shortly before lockdowns hit across Europe, we have made remarkable progress. This has included: three very successful Working Group meetings (led by WG4, WG1&2 and WG3); 9 virtual Core Group meetings; major advances with our Proof of Concept study, including completion of a major survey (in collaboration with the LIFE APEX project) and shipment of samples to labs across Europe for analysis; three virtual short-term scientific missions; and the production of two dissemination videos.

Our current Grant Period 4, originally scheduled to run from 1 May 2020 to 30 April 2021, has been extended to 16 October 2021 with top-up funding of €45000 recently approved, and we have requested an extension of the Action to 16 April 2022.

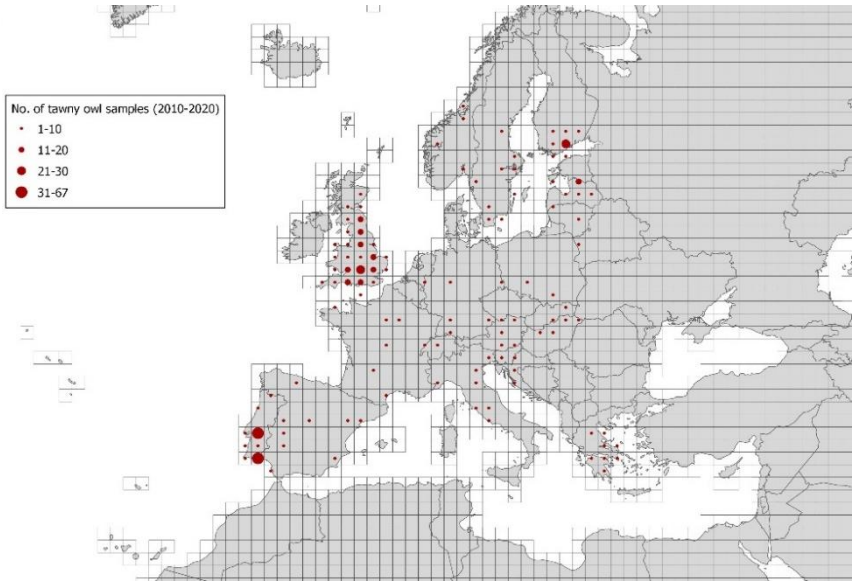
Happy reading!

Guy Duke, Chair
on behalf of the Core Group

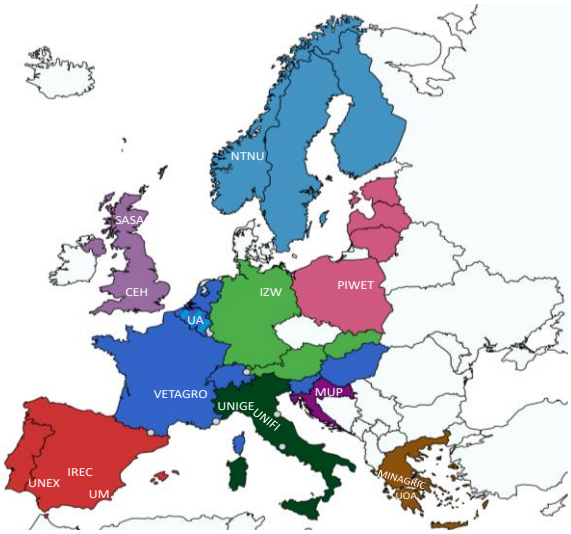
PROOF OF CONCEPT

State of Play – 14 April 2021

The main goal of the Proof of Concept (PoC) is to test the capacity of the European Raptor Biomonitoring Facility for pan-European monitoring in raptors. The Proof of Concept is specifically testing the capacity to assess spatial variation in contaminant residue levels across Europe, based on a 100x100 km grid. The PoC will test the capacity to: (1) obtain raptor samples from collections and other institutions (the Collections Arena), (2) fill gaps in spatial coverage through new field acquisition of samples (the Field Arena), (3) coordinate shipping of samples (both within countries and internationally) from collections and other institutions to toxicology laboratories (the Analysis Arena); (4) analyse samples following agreed quality controls (the Analysis Arena); and (5) to interpret results at European scale. The study will focus on one family of pesticides (anticoagulant rodenticides) and two heavy metals (mercury and lead).



Spatial distribution of Tawny Owl *Strix aluco* samples in a 100x100 km grid for the 2010-2021 period



Laboratories that will perform the analysis of samples

Some months ago, we contacted over 320 natural history museums, specimen banks and other institutions across Europe, on behalf of both the COST Action European Raptor Biomonitoring Facility (ERBFacility) and the LIFE APEX project, to take part in a survey on frozen raptor carcasses and frozen raptor liver samples. The purpose of the survey was to understand the availability of samples for ground-breaking pan-European contaminant studies being carried out by the two projects, in support of better chemicals management in Europe. The survey was focused on four species: Common Buzzard *Buteo buteo*, Tawny Owl *Strix aluco*, Barn Owl *Tyto alba* and Common Kestrel *Falco tinnunculus*.

By the end of February 2021, we have received an excellent response from more than 60 sample providers and have identified over 3700 available carcasses and/or livers, from 27 countries. The Tawny Owl was selected as the focal species for the PoC, having 587 samples belong to Tawny Owls, covering 118 squares (100x100km) and 22 countries for the period of interest (2010-2021).

The Tawny Owl samples have been distributed between 16 laboratories in different European countries. These laboratories have started requesting samples for analysis to sample providers and analysing them for second generation anticoagulant rodenticides (SGARs), mercury (Hg) and lead (Pb). Analyses are foreseen to be concluded in the summer 2021.

COST Association approves top-up funding for Grant Period 4

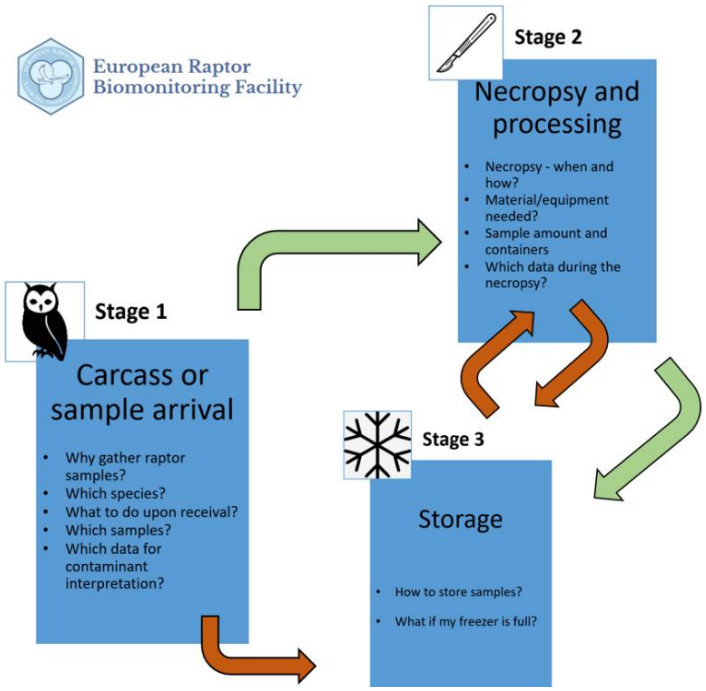
In a strong vote of confidence in ERBFacility, the COST Association has recently approved top-up funding of €45000 for the current Grant Period 4 (which runs to 16 October 2021). This funding is added to the original GP4 grant of €109,940, providing a total for the Grant Period of €154,940.

Of course, we have made very limited expenditure to date in GP4 due to Covid-19 travel restrictions. However, in seeking top-up funding, Core Group has assumed that the roll-out of vaccines in Europe and increasing evidence of the efficacy of vaccines in slowing the transmission and severe health effects of Covid-19 may enable face-to-face activities by late summer or early Autumn 2021.

The amended Work Budget and Programme for GP4 provides for: a large Management Committee meeting and General Meeting in late September or early October; two small workshops, for WG3 (Collections Arena) and WG4 (Field Arena) in September/October 2021; a WG1&2 (Analysis Arena) training school on raptor poisoning in July/August 2021; 3 short-term scientific missions; 2 ITC Conference Grants and 2 Dissemination Meeting Grants (for ITC early stage researchers and senior ERBFacility representatives, respectively, to attend SETAC Europe Virtual Conference 3-6 May and Raptor Research Foundation Conference, Idaho, US, 8-14 October 2021); 8 open access papers; and shipping costs for Proof of Concept samples.

The Core Group will keep the Covid-19 situation under review and will make decisions about proceeding with face-to-face, hybrid or virtual meetings, missions and trainings nearer the time. If face-to-face meetings prove not possible, we will proceed with virtual activities and the greater part of the budget will remain unsent. Any unspent funds cannot be rolled forward to GP5.

WG3 SHORT-TERM SCIENTIFIC MISSION: STANDARDS AND PROTOCOLS FOR COLLECTIONS FOR GATHERING, PROCESSING AND STORING RAPTOR SPECIMENS/SAMPLES DESTINED FOR CONTAMINANT MONITORING



Initial structure of the protocol

A short-term scientific mission (STSM) is being conducted virtually to develop a detailed protocol, tailored for natural history museums (NHMs), for the gathering, processing and storage of raptor specimens/samples, with a view to subsequent contaminant analyses.

Thousands of raptor carcasses arrive annually at Europe's NHMs, and while many of these carcasses are discarded, many others are stored in freezers. Contaminant biomonitoring in raptors is relatively novel for most of these museums, and very few process and store raptor carcasses with contaminant analyses in mind. NHMs are very important collection partners for European contaminant biomonitoring activities, and a protocol is therefore needed to provide clarity to museums on how to gather, store and process raptor specimens for the purpose of contaminant monitoring.

The STSM holder is Giuseppe Cicero, Research Associate at University of Palermo (Italy), who first made a rapid review of existing standards and protocols, and he is now finalizing the draft protocol that will start from the receipt of a raptor carcass at a collection, and will cover the initial processing of the carcass, its temporary storage in freezer and subsequent preparation (necropsy) and storage of tissue samples for contaminant analyses.

The STSM is hosted by Dr Silvia Espín, Dr Pablo Sánchez Virosta, Dr Pilar Gómez Ramírez and Prof Antonio J. García Fernández (University of Murcia, Spain), and supervised by Dr Paola Movalli (Naturalis Biodiversity Center, Netherlands).

WG3 MEETING - THE ROLE OF COLLECTIONS FOR CONTAMINANT MONITORING IN RAPTORS ACROSS EUROPE

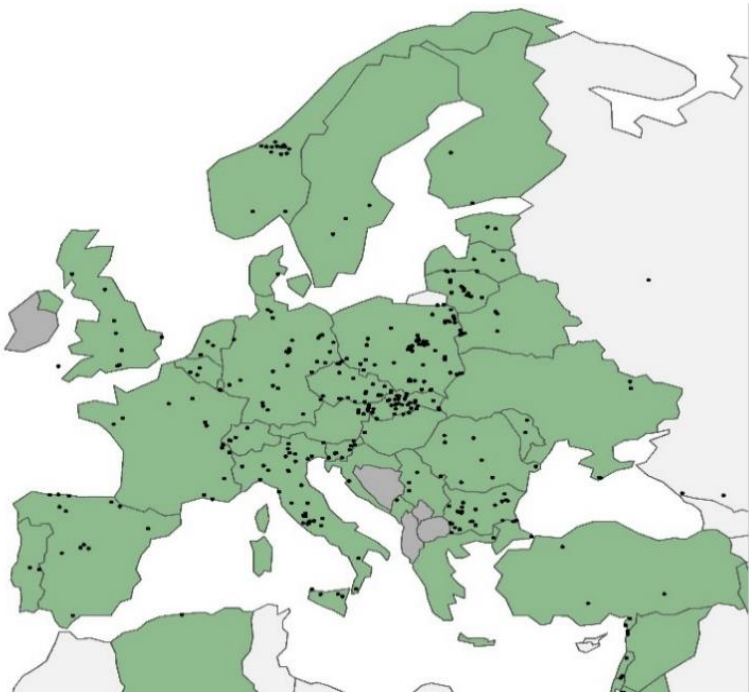
A very successful Working Group 3 (Collections) virtual meeting was held on 11-12 February on The Role of Collections for Contaminant Monitoring in Raptors across Europe – State of Play and Next Steps. The meeting was set up to inform and inspire natural science collections to engage in pan-European contaminant monitoring and was attended by around 100 participants from 28 countries. Presentations included overviews of ERBFacility and of WG3, work done under WG3 short-term scientific missions and next steps for WG3 towards a framework for a European Raptor Specimen Bank, updates on work under WG1&2 (Analysis Arena) and WG4 (Field Arena) and links to WG3, and state of play on the Proof of Concept including sample provision by collections.

The meeting also heard three presentations from the related project LIFE APEX, including on the contribution made by collections, the importance of contaminant monitoring data for regulatory applications, and the analytical methods used by LIFE APEX. Collaboration with the Distributed System of Scientific Collections (DiSSCo) in relation to the establishment of a European Raptor Specimen Database was also highlighted. The meeting also premiered two new ERBFacility videos on: Monitoring contaminants in raptors for better chemicals management in Europe - The role of natural science collections (including commercial film footage, by permission of EMS Films), https://youtu.be/T90eFwmiE1M; and Processing Raptor Carcasses for Contaminant Monitoring - A Brief Guide for Natural Science Collections https://youtu.be/prgAW66A838. Some amendments will be made to finalise the processing video, and multi-language versions of this video are planned.

Plans are being developed to produce multiple language versions of the latter video – anyone interested to help with this please contact Paola Movalli (**paola.movalli@naturalis.nl**).

VIRTUAL SHORT-TERM SCIENTIFIC MISSION IN WG4: A REVIEW OF TAWNY OWL POPULATION CONTEXTUAL DATA AND BEST PRACTICE FOR COLLECTING THEM

The aim of this short-term scientific mission (STSM), which is being conducted via virtual meetings due to COVID situation, is to overview the contextual data for the Tawny Owl (*Strix aluco*), the selected ERBFacility Proof of Concept species, across Europe, assess geographical variation in each variable across Europe and to draft best practice guidance for monitoring of selected population contextual data variables. The Tawny Owl is a generalist raptor, distributed across Europe and extensively studied, and thus very appropriate as the Proof of Concept species. Urška Ratajc, a PhD student at the National Institute of Biology (Slovenia), is carrying out this STSM and is currently reviewing the literature on data about the diet, population density, and dispersal, which are all relevant for assessment of the species' contaminant exposure. She will also assess some variables more relevant for contaminant impact assessment, such as population trends and different measures of breeding success (and trends in these).
Visualization of the spatial variation of selected parameters will help us to identify regions with a lack of data and serve as a baseline for interpretation of the ecotoxicological results coming from the Proof of Concept study. The STSM is hosted by Dr Rui Lourenço (University of Évora, Portugal) and supervised by Assist Prof Dr Al Vrezec (National Institute of Biology, Slovenia), Dr Chris Wernham (BTO-Scotland, UK), Dr Silvia Espín and Dr Pablo Sánchez Virosta (University of Murcia, Spain).



Current spatial distribution of compiled published studies on the Tawny Owl (*Strix aluco*) diet in Europe (marked with dots) and missing countries (shaded in grey)

Tawny Owl (*Strix aluco*) was selected as an appropriate species for the Proof of Concept study, for which ecotoxicologically relevant contextual data on the diet, population size and breeding performance have been extensively studied in many parts of Europe (photo: Al Vrezec)

WG4 VIRTUAL MEETING – APRIL 2021 – TAKING FORWARD AN EUROPEAN RAPTOR SAMPLING PROGRAMME & THE ERBF ADVICE HUB

This virtual meeting is open to all ERBFacility COST Action participants and anyone else who is interested in our work, across all three arenas. A working draft of the ERBF Advice Hub is being made available to participants ahead of the meeting. At the meeting, we will explain further to network participants why we hope the Hub will be valuable and hear suggestions from participants, as well as any offers to help to write some of the remaining sections. We will also discuss how best to disseminate the Advice Hub and encourage its use by people from all three ERBF arenas (field, collections and analysis). The meeting has two further aims.

We will update the whole network on the progress we have made with development of ideas for an European Raptor Sampling Programme (ERSamP). We will also review and consolidate the work we have done already to look at current capacity across Europe to take part in a future ERSamP, and where training and future capacity building may be most required. This will inform our final reporting and recommendations at the end of the COST Action. We will provide an update on progress and a link to the meeting report in our next newsletter.

VULTURE GUIDANCE FOR BIOMONITORING

A guidance for biomonitoring using vultures as indicators of contamination in the environment is being compiled under the ERBFacility COST Action. Vultures have a high potential for biomonitoring environmental quality on vast geographic scales due to their wide-ranging foraging behaviour and extensive distribution area. As highly specialized carrion feeders, vultures are more susceptible to pharmaceuticals given to livestock, which are their dominant food sources. They are also exposed to other anthropogenic contaminants such as organophosphorus and carbamate pesticides from agricultural practices, and lead from hunting ammunition. These characteristics make vultures suitable for reflecting the health of the environment and give warning to problems caused by exposure to environmental contaminants that need our attention and awareness.

The guidance starts with a brief introduction and a description of the four European vulture species [Griffon Vulture (*Gyps fulvus*), Bearded Vulture (*Gypaetus barbatus*), Cinereous Vulture (*Aegypius monachus*) and Egyptian Vulture (*Neophron percnopterus*)]. It also includes the main threats affecting vulture species (including poisoning and exposure to toxic compounds), and a description of top contaminants that may pose a risk for them (i.e., lead, pesticides, barbiturates, veterinary pharmaceuticals, topical antiparasitics and anticoagulant rodenticides).

Griffon vulture (*Gyps fulvus*) in Murcia, Spain

The document presents guidance on sample collection, including a field sampling protocol for biomonitoring and a list of the main sample types that can be used for different contaminant analyses. Links to important legislation, capacity building and interesting references are also provided, as well as an annex showing a list of research and conservation projects on vultures.
The Vulture Core Group is composed by Jovan Andevski, Arianna Aradis, Yael Choresh, Silvia Espín, Pilar Gómez-Ramírez, Antonio J. García Fernández, Pablo Sánchez Virosta and Stavros Xirouchakis. They are now finalizing the guidance document that will be put out for consultation by vulture experts and the whole network.

Diagram of the brief protocol for blood and feather collection in vultures in the field

REQUEST FOR EXTENSION OF THE ACTION

The Chair, on behalf of the Core Group, with the approval of the Management Committee, has recently submitted a request to the COST Association for extension of the Action to 16 April 2022.

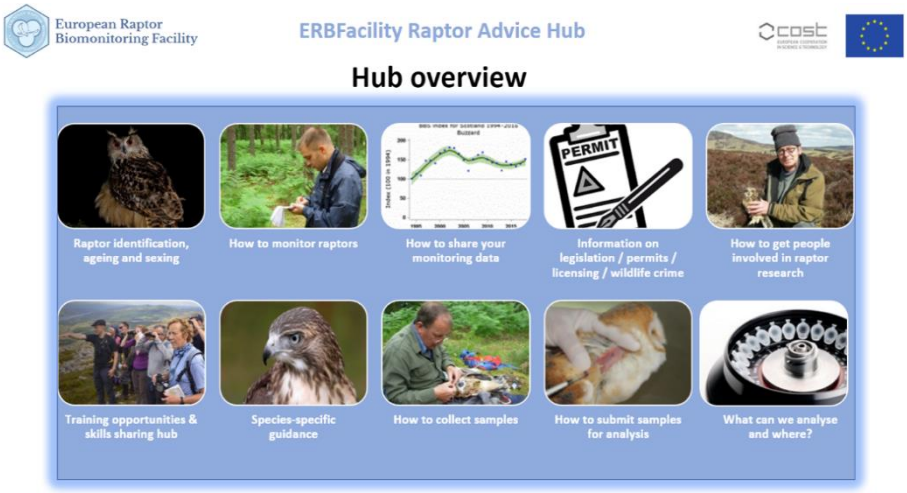
The request proposes a Work Budget and Programme for GP5 (starting 17 October 2021) to include: a cross-Working Group meeting to bring together the frameworks for the European Raptor Sampling Programme, European Raptor Specimen Bank and European Raptor Biomonitoring Scheme (including review of the Proof of Concept); two Training Schools for WG3 (Collections Arena) and WG4 (Filed Arena) participants; three ITC Conference Grants for early stage researchers from ITCs to attend key conferences (SETAC North America meeting, 14-18 November 2021, Portland, USA; European Ornithologist' Union meeting, 14-18 March 2022, Giessen, Germany; European Bird Census Council meeting, 4-8 April 2022, Lucerne, Switzerland), 2 Dissemination Meeting Grants for senior researchers to attend key conferences (SETAC North America meeting; European Ornithologist' Union meeting); and publication of 7 Open Access papers.
A Virtual Management Committee meeting is also proposed towards the end of the Action.

Publications

- Ramello, G., Duke, G., Dekker, R., van der Mije, S., & Movalli, P. (in press) A novel survey of raptor collections in Europe and their potential to provide samples for pan-European contaminant monitoring. Environmental Science and Pollution Research
- Espín S., Andevski J., Duke,.G., Eulaers I., Gómez-Ramírez P., Hallgrimsson G.T., Helander B., Herzke D., Jaspers V.L.B., Krone O., Lourenço L., María-Mojica P., Martínez-López E., Mateo R., Movalli P., Sánchez-Virosta P., Shore R.F., Sonne C., van den Brink N.W., van Hattum B., Vrezec A., Wernham C., García-Fernández A.J. (in prep) A schematic sampling protocol for contaminant monitoring in raptors. Poster, SETAC Europe 2021
- Movalli P., Cicero G., Ramello G., Sbokos G., Vlachopoulos K., Dekker R., Espin S., Garcia-Fernandez A., Gomez-Ramirez P., Hosner P., Koureas D., Kristensen J.B., van der Mije S., Sanchez-Virosta P., Sharif O., Krone O., Leivits M., Shore R.F., Vrezec A., Walker L., Wernham C., Lopez Antia A., Lourenco R., Mateo R., Badry A., Fuisz T.I., Guiraud M., Johansson U., Pavia M., Pauwels O., Pereira G., Töpfer T., Väinölä R., Vangeluwe D., Alygizakis N., Cincinelli A., Drost W., Gkotsis G., Glowacka N., Koschorreck J., Martellini T., Nika M.C., Nikolopoulou V., Slobodnik J., Thomaidis N.S., Treu G., Duke G. (in prep) Building a novel role for collections in pan-European contaminant monitoring. Poster, SETAC Europe 2021

WG4 & cross-WG VIRTUAL WORKSHOP – OCTOBER 2020 – TAKING FORWARD GOOD PRACTICE GUIDANCE, THE PROOF OF CONCEPT STUDY & PLANNING FOR THE FUTURE OF THE NETWORK

This small, two-day workshop took place to allow WG4 team members, Core Group and the Proof of Concept leads to progress a number of areas of ERBF work that were difficult to progress because we had been unable to have face-to-face meetings. During the two days, we worked on various sections of the forthcoming ERBF 'Advice Hub', which is being designed to be a web-based first point of contact for people interested in contributing to a future ERBFacility. The idea is to provide summarised information and links to more detailed information, including all relevant good practice guidance, opportunities and ways to participate. Some participants also spent part of the meeting working on specific good practice guidance for vultures, which we hope will be circulated within the ERBFacility network for comment soon.



The draft Advice Hub has since been made available for network participants to view and has been discussed at a meeting for all network participants during April 2021. Part of the workshop was set aside for reviewing progress with the Proof of Concept study, discussing and resolving any problems and planning the next steps (see the separate article in this newsletter for an update).

As we now enter the latter stages of our COST Action, we spent the final part of the workshop planning how we would bring together ideas for the European Raptor Biomonitoring Scheme (ERBioMS), European Raptor Specimen Bank (ERSpecB) and European Raptor Sampling Programme (ERSamP) into a 'blue-print' and feasibility assessment for a future European Raptor Biomonitoring Facility – the overall goal of our COST Action. We thought about options (and potential funding) for extending the work of our network after our COST Action ends, so that we can leave a strong legacy and take further steps towards an operating ERBFacility in future. You can read the workshop report on our web site https://erbfacility.eu/events/wg4-meeting-taking-forward-good-practice-guidance-proof-concept-study-planning-future.

SETAC Europe 31st Annual Meeting

A session entitled "Effects of contaminants in wildlife: Endocrine disruption, immunomodulation, oxidative stress and other biomarker responses" will be co-chaired by Silvia Espín, Pablo Sánchez Virosta (University of Murcia, Spain), Nico van den Brink (Wageningen University, Netherlands) and Mason King (Simon Fraser University, Canada) in the virtual SETAC Europe 31st Annual Meeting (3-6 May 2021). This session aims to present the state-of-the-science regarding the chronic effects of different contaminants on emerging, non-standard effect pathways, e.g. endocrine disruption, immunomodulation, oxidative stress, vitamin levels and other biomarker responses, to increase our understanding of how toxic compounds affect wildlife physiology. Better resolving effects on wildlife physiology will aid in the essential, albeit difficult goal of linking molecular alterations to potential individual or population impacts.

Another session entitled "Emerging and legacy contaminants in wildlife: biomonitoring, exposure, and effects" will be co-chaired by Laura Laura Monclús, Veerle Jaspers (both Norwegian University of Science and Technology), Lee Walker (UK Centre for Ecology & Hydrology) and Pilar Gómez-Ramírez (University of Murcia, Spain) will present advances on research related to emerging contaminants in wildlife (wild vertebrate species). We also welcome studies combining the analysis of emerging and legacy contaminants. Abstracts can cover, but are not limited, to:
a) exposure and bioaccumulation of emerging (and legacy) contaminants in wildlife species in marine, freshwater and terrestrial environments,
b) individual and population effects of short and long-term exposure,
c) identification of important contaminant sources and trends over time and space, and
d) biomonitoring using apex predators at national and international scales and related efforts to organize sample collections, assure data quality and data harmonization.

All sessions submitted by the Wildlife Toxicology Interest Group are a tribute to Prof. Richard F. Shore (UK Centre for Ecology & Hydrology).

Find the news about the future meetings and events at https://erbfacility.eu/events and on ERBFacility Facebook page.

Stay safe and healthy,
ERBFacility Core Group