DISCUSSING SPECIFIC ENCOUNTERS FOR EASTERN EUROPEAN SCIENTISTS: INVOLVEMENT AND ACCESS TO MEA'S

A VARIETY OF REFLECTIONS BASED ON PRACTICE

Part 1: Dr. Ancuta Fedorca (Senior Researcher, National Institute for Research and Development Forestry Marin Dracea, Romania)

Part 2: Dr. Elena Buzan (Professor, University of Primorska, Slovenia)

PART 1
NETWORKS, INDICATORS OF GENETIC DIVERSITY AND NBSAP

Dr. Ancuta Fedorca

Senior Researcher, National Institute for Research and Development Forestry
Marin Dracea, Romania

Convention on Biological Diversity

2020 UN BIODIVERSITY CONFERENCE
COP 15 - CP/MOP 10 - NP/MOP 4
Ecological Civilization-Building a Shared Future for All Life on Earth
KUNMING – MONTREAL

Who am I?

- Molecular ecologist coordinator Wildlife Department – Molecular Genetics Lab at INCDS Marin Dracea Romania since 2012
- I coordinate a team of 20 people working on population genetics and conservation management of large mammals
- I am involved in making conservation genetics a practical tool to inform management actions
- I was co-leading a WG2 in G-BIKE

https://g-bikegenetics.eu/en

NETWORKING – A CHANCE FOR AN EASTERN EUROPEAN SCIENTIST

- G-BIKE (2019-2023)
- 43 countries and other associated partners more than 120 participants (scientists and practioners)
- Workshops, Trainings, Exchanges, Short Term Scientifc Missions, Virtual Mobility Grants, Conferences, Meetings
- Leadership and co-leadership for researchers from Eastern Europe countries
- A unique opportunity for to be involved with CBD National Focal Points, COP15 and other policy
- G-BIKE continues working with >30 active collaborators: SBSTTA and COP16 – providing advice and support to countries at CBD

Initiatives: Activities during COP15

- Helped wording of the genetic Target and indicators
- Side-event seminar >100 participants in person, >100 online
- Information booth
- Direct contacts with NFPs, media, webpage, social media, etc.

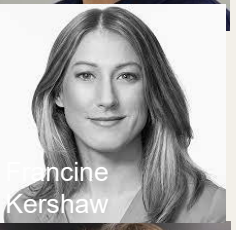
G·BiKE

THE COALITION FOR CONSERVATION GENETICS

GEO BON
Group on Earth Observations
Biodiversity Observation Network


Catherine Grueber


Gernot Segelbacher


Francine Kershaw


Anna MacDonald


Sean Joban


Maggie Hunter


Mike Bruford

International team of conservation genetics researchers joined forces to provide advice to CBD policy makers

Improvements for genetic diversity urgent!

Also need means to measure change – indicators are vital!

CONSERVATION GENETICS SPECIALIST GROUP

IUCN International Union for Conservation of Nature


Alicia Mastretta-Yanes


Robyn Shaw

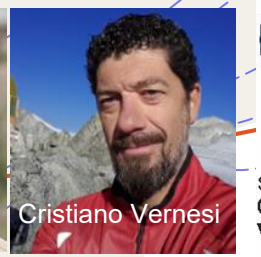

David O´Brien


W. Chris Funk


Mariah Meek


Cinnamon Mittan


Rob Ogden


Cristiano Vernesi

Society for Conservation Biology
Conservation Genetics
Working Group

1. Case study of international collaboration – measuring genetic diversity - with or without DNA data

- Designation of several indicators **using DNA data OR using *proxies***, getting at genetic processes without DNA-based genetic data – using available data with an affordable, inclusive approach

Indicator PM
The proportion of Populations Maintained within species

Indicator Ne 500
The proportion of populations within species with an effective population size (Ne) > 500

Indicator DNA-monitoring
The number of species in which genetic diversity is being monitored with DNA-based methods for at least one population

There are other useful complementary genetic indicators which are not mentioned in this case study

Hoban et al 2020, Laikre et al 2020, Hoban et al 2021, Laikre et al 2021, O'Brien et al 2022, Frankham 2022, Hoban et al 2023 a, b

Nine countries pilot

- Goal of 50-100 species per country
  - Australia, Belgium, Colombia, France, Japan, Mexico, South Africa, Sweden, USA
- Working with personnel in biodiversity agencies
- A data collection form for entering (KoboToolbox)
- Each population's Nc, Ne, or both
- Extant and extinct populations
- Other species information

Controlled vocabulary, rules for data entry, brief explanations on what is needed and linked to a detailed manual.

In the next phase we plan to include Eastern Europe countries

Hoban et al 2023. Monitoring status and trends in genetic diversity for the Convention on Biological Diversity: An ongoing assessment… *Cons Lett*

Mastretta-Yanes et al 2023. Multinational evaluation of genetic diversity indicators for the Kunming-Montreal Global Biodiversity Monitoring framework. Pre-print https://ecoevorxiv.org/repository/view/6104/

Summary of findings

- 919 species and >5000 populations' data
- More than 80% of species **had data for at least one indicator**
- Main conclusions
  - Many populations are **too small to maintain genetic diversity**. Species' populations need restoration and management (to increase the indicator)
  - Most species maintain most populations – for now. We must **prevent further losses** (keep indicator value high)

Multinational evaluation of genetic diversity indicators for the Kunming-Montreal Global Biodiversity Monitoring framework
-ecoevorxiv, https://ecoevorxiv.org/repository/view/6104/

The results of a 9-country pilot study showed

- Genetic diversity indicators

- feasible at scale
- leveraging on country biodiversity efforts (e.g. Red Listing, local and national nature management)
- working for all types of species
- making genetic monitoring affordable, inclusive, accessible, and useful
- highlight critical conservation message
- helped with genetic capacity on assessing species for which there are no genetic studies

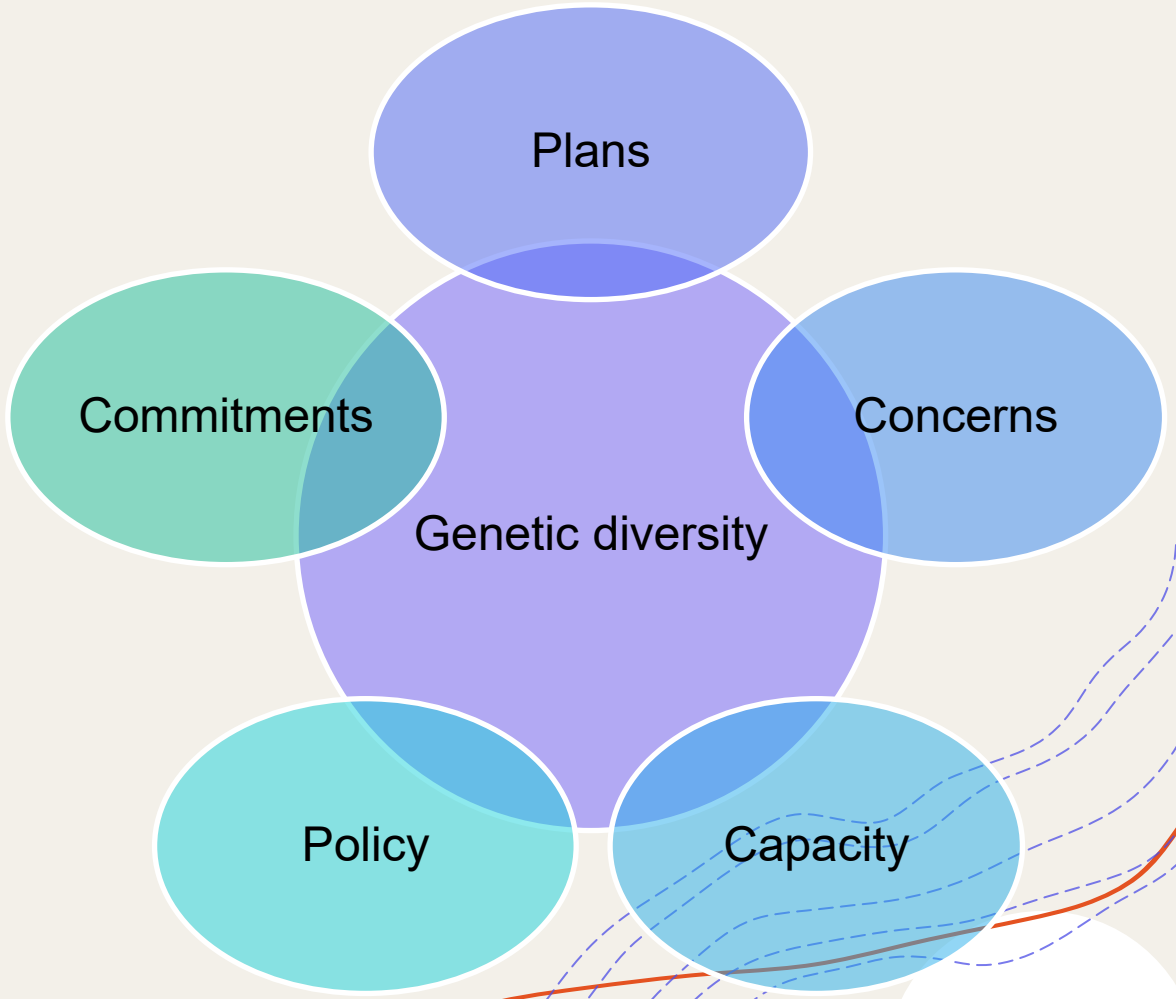
2. Case study on National Biodiversity Strategies and Action Plans - Kunming-Montreal Global Biodiversity Framework

- **Laikre et al. 2010** showed that genetic diversity conservation had been neglected both in NBSAPs and in National Reports
- **International collaboration** advice from many people around world
- **NBSAPs** should
  - ❖ have high-level support from policy makers as a product of cross-ministerial cooperation
  - ❖ include actions that can help maintain and restore genetic diversity, tailored to each country's capacity
  - ❖ co-development with communities to foster widespread societal ownership and investment in biodiversity
  - ❖ include monitoring, evaluation and review, including choice of appropriate indicators

National Biodiversity Strategies and Action Plans - Kunming-Montreal Global Biodiversity Framework

- Current work Hoban et al. 2024 builds guidance in how NBSAPs should include greater recognition and conservation of genetic diversity (GBF Goal A Target 4)

Why is it important?



Eastern Europe in the context of CBD and GBF

- **Capacity building** – international cooperation and cross-ministerial-experts cooperation, supporting genetic diversity assessments for conservation problems and greater recognition of conservation of genetic diversity in NBSAP;
- **Raise awareness** about the value and importance of genetic diversity in key stakeholder groups;
- Promote **transnational** mutual experience exchange, and the active participation of Eastern European countries;
- Build **genetic monitoring programmes** with long-term allocation of resources not limited to a project lifespan;

PART 2: MONITORING OF GENETIC DIVERSITY ACCESS AND BENEFIT SHARING

Dr. Elena Buzan

Professor, University of Primorska, Slovenia

UNIVERSITY OF PRIMORSKA

FACULTY OF MATHEMATICS, NATURAL SCIENCES AND INFORMATION TECHNOLOGIES

Molecular and Computational Ecology

Faculty of Mathematics, Natural Sciences and Information Technologies

+ **Applying molecular techniques** to wildlife ecology, management, and conservation

- **Understanding how citizen science** can complement data collection about **genomic/genetic information**, which can assist **conservation policymaking**
- **H2020 Step Change and BEPREP, HE Biodiversity genomic Europe, and ProCoast**
- **Fully equipped for genomics**

Follow us on Twitter @MolecularEcolUP

G·BiKE

cost EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

Funded by the European Union

Maintenance of wild population genetic diversity (PGD)

development of indicators of genetic diversity

- Screen where the **monitoring of PGD** is being conducted **across Europe**
- Identified populations **near the hot–dry limits of species' ecological distributions**

nature ecology & evolution

Article https://doi.org/10.1038/s41

Monitoring of species' genetic diversity in Europe varies greatly and overlooks potential climate change impacts

Pearman et. al. 2024

Methods

- 38 countries and 518 candidate monitoring studies
- At the end 151 national-level monitoring studies were eligible

Monitoring efforts

- Vary greatly among European countries
- **Strong taxonomic bias** in monitoring programmes

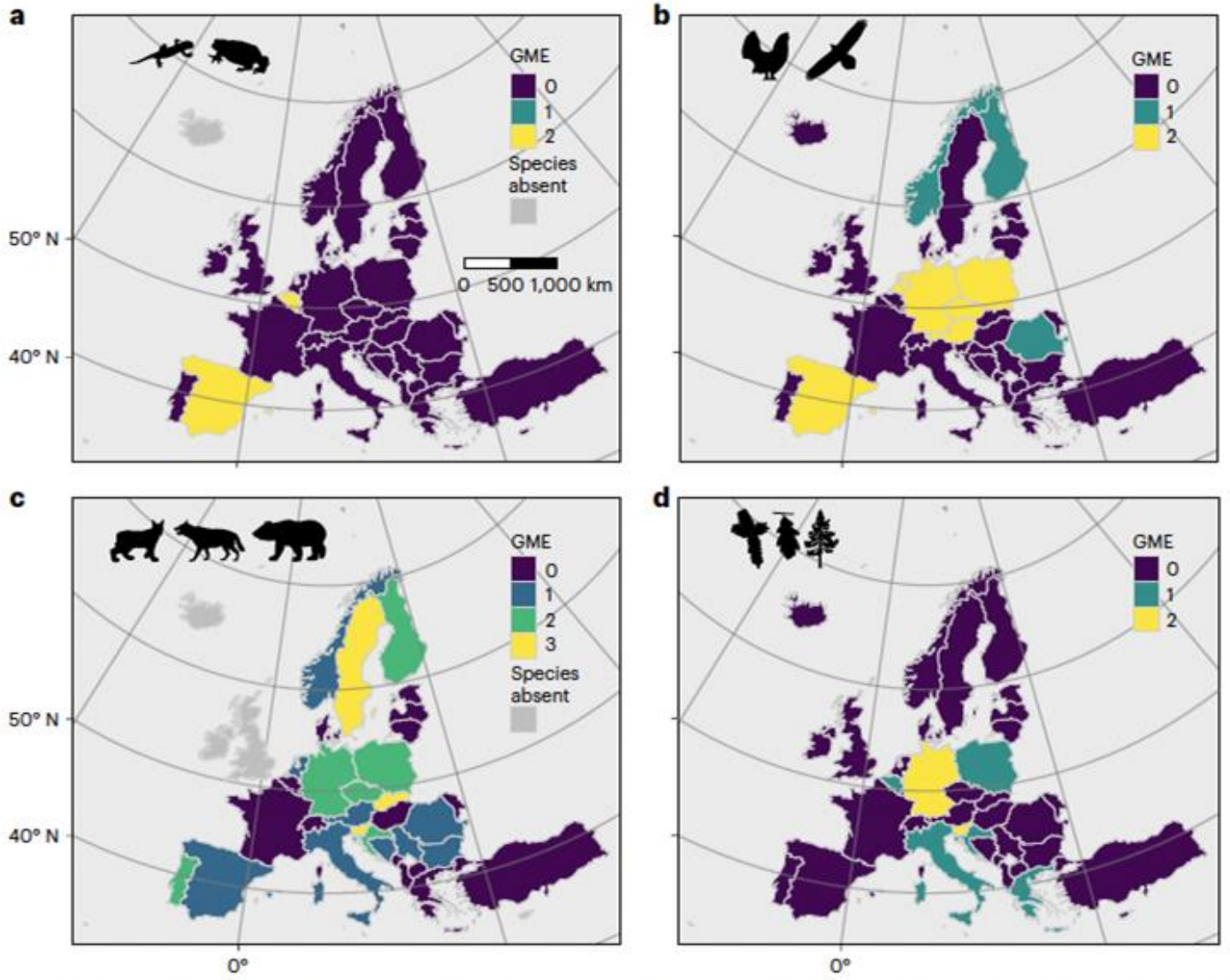


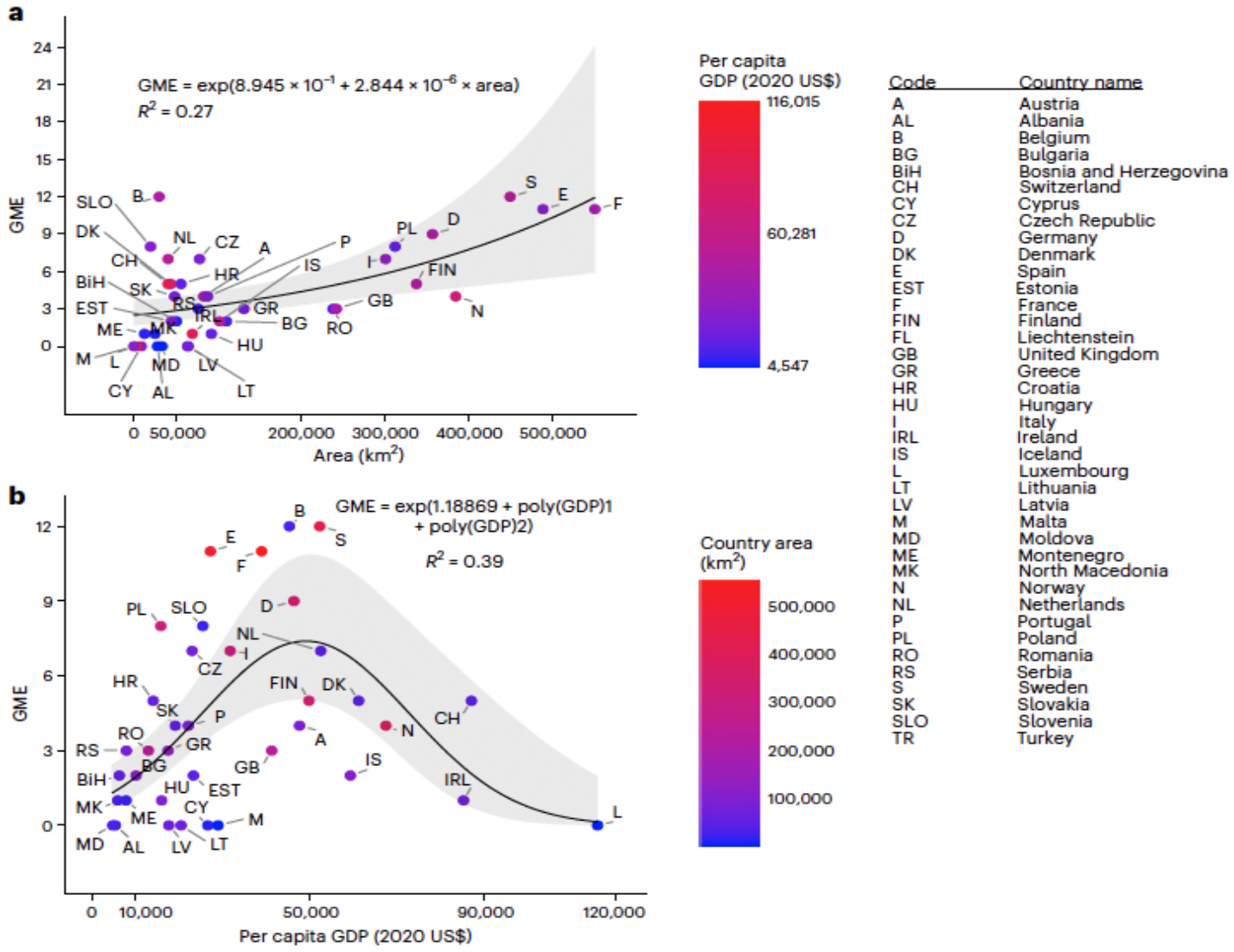
Fig. 1 | Geographic distribution of effort to monitor population genetic diversity (GME), for purposes of conservation or management, among COST full-member countries. a–d, The tally of genetic monitoring programmes for amphibians (**a**), birds (**b**), carnivorans (**c**) and forest trees (**d**). The programmes included here are consistent with the requirements for Category II monitoring, and they offer documentation of multiple estimates over time of at least one index of genetic diversity. Few countries have GME for amphibians, while most countries have established at least one programme for a carnivoran species.

Genetic monitoring effort

Conclusion:

- Monitoring effort needs to be expanded — **especially in south-eastern Europe**

- The eastern Adriatic coast, central Turkey and the Carpathian Mountains can serve as foci for international, cooperative monitoring programmes.



Genetic monitoring efforts of COST full-member countries as a function of area per capita GDP.

Guidelines for future Monitoring efforts

- Broadened beyond narrowly focusing on flagship species such as large carnivores.
- Include amphibians, forest trees, and others, that are likely to suffer severe impacts from climate change.
- Neutral genetic markers and indicators can be **enhanced with genome-wide study of adaptive genetic diversity**.

GENOMICS COMMUNITIES

EARTH BIOGENOME PROJECT
sequencing life for the future of life

ERGA
EUROPEAN REFERENCE GENOME ATLAS

Capacity
Establish functioning biodiversity **networks** at the European level

Production
large-scale biodiversity genomic **data generation pipelines** for Europe

Biodiversity Genomics Europe

Application
Apply genomic **tools** to enhance **understanding** of pan-European biodiversity and biodiversity declines

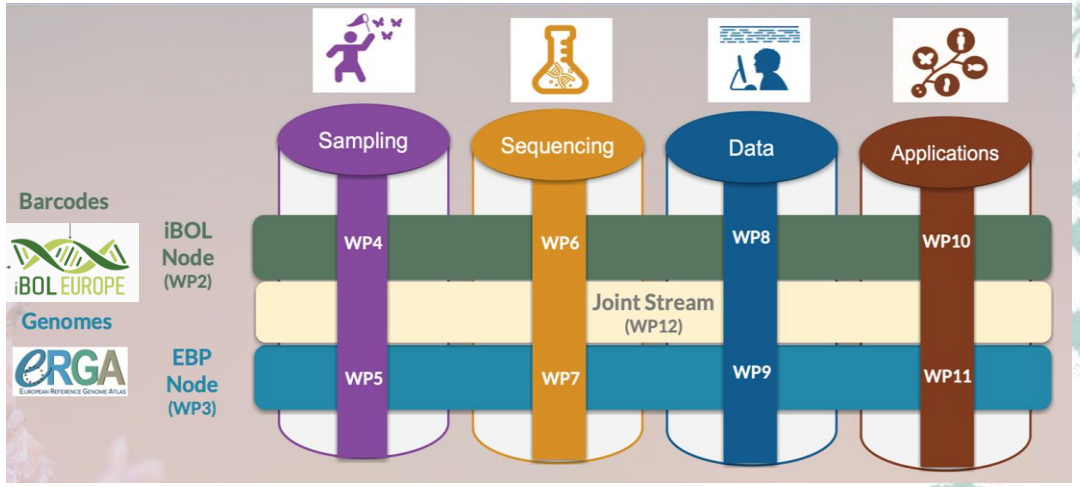
international BARCODE OF LIFE

iBOL EUROPE

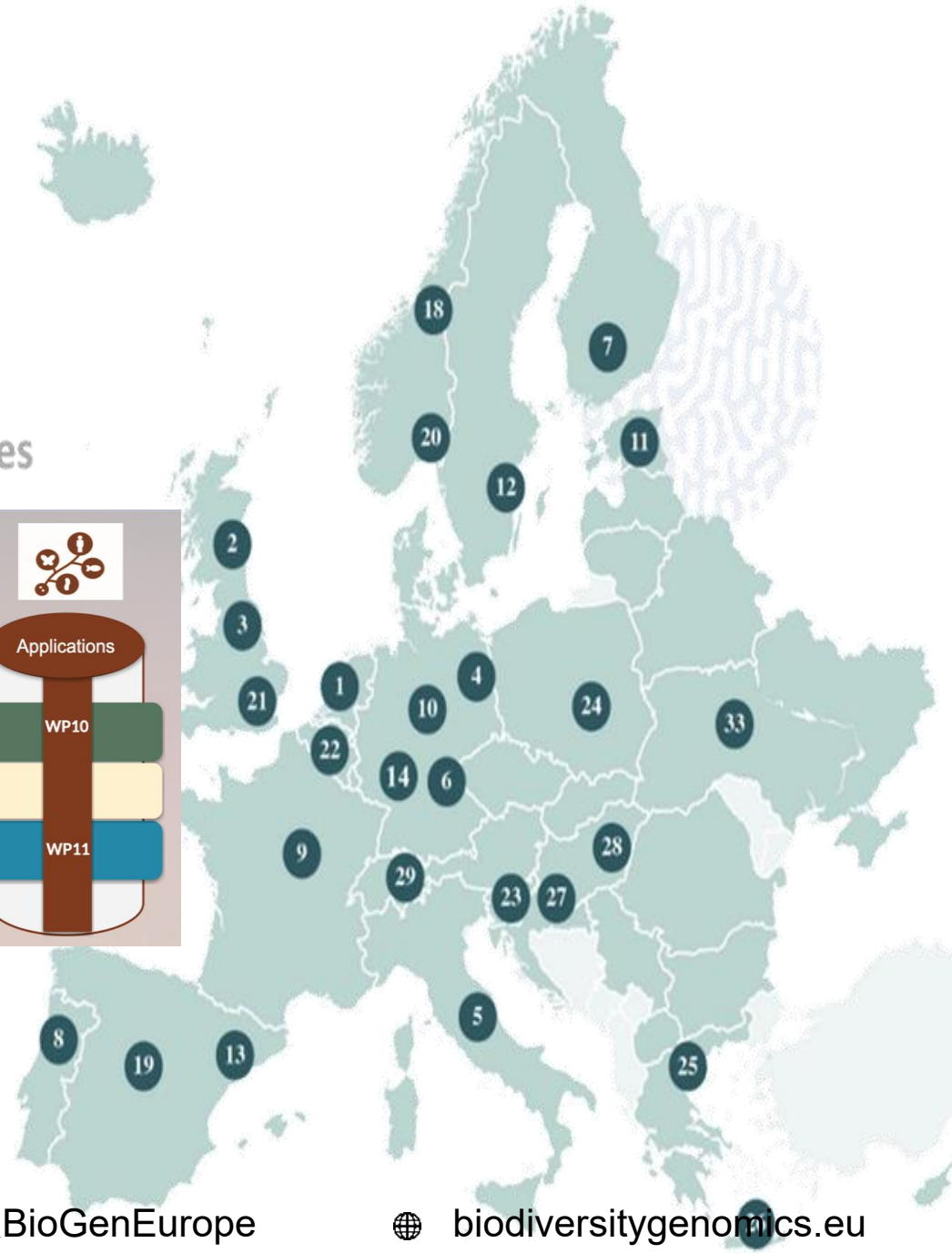
Biodiversity Genomics Europe

BiodiversityGenomics.eu

two continental-wide networks joining forces



The two networks represent more than 200 European organisations



Biodiversity Genomics Europe Partners

1 Naturalis Biodiversity Center
2 Royal Botanic Garden Edinburgh
3 Wellcome Sanger Institute
4 Leibniz Institute for Zoo and Wildlife Research
5 University of Florence
6 Bavarian Natural History Collections
7 University of Jyväskylä
8 Research Center in Biodiversity and Genetic Resources
9 Genoscope
10 Zoological Research Museum Alexander Koenig
11 University of Tartu
12 Uppsala University
13 Center for Genomic Regulation
14 European Molecular Biology Labaratory
University of Freiburg *(affiliated entity)*
Earlham Institute *(affiliated entity)*
University of Manchester *(affiliated entity)*
18 Norwegian University of Science and Technology
19 Spanish National Research Council
20 University of Oslo
21 Natural History Museum, London
22 Consortium of European Taxonomic Facilities
23 University of Primorska
24 University of Lodz
25 Aristotle University of Thessaloniki
26 Natural History Museum of Crete
27 University of Zagreb, Faculty of Science
28 Hungarian Natural History Museum
29 University of Lausanne
33 V. N. Karazin Kharkiv National University

Associated Partners

30 International Barcode of Life Consortium
31 Vertebrate Genomes Project, Rockefeller University
32 Earth BioGenome Project, University of California, Davis

- > 1000 Europe-based scientists
- >200 Research Institutions
- 39 countries

Biodiversity Sequencing

BioGenome Applications

Genomics for Society

New collaborative Networks

Distributed across Europe and the Eukaryotic Tree

From Critical Biodiversity and Biodiversity Hotspots

>500 genomes

Biodiversity Genomics Europe

ERGA

European Reference Genome Atlas

Knowledge sharing

SOPs development

Analysis toolkits

Genomics training

Knowledge sharing platform

Sequencing Centres

Computational

Training

Molecular labs

Multi-national infrastructure

EBP European node

Consolidation as EBP Regional node

Plan scaling up reference genomes production

2 Sample collection and storage

Before collecting the samples, ensure you are aware of all the required Sample Manifest fields to be filled in later (See Section 3)

a. **Collect** the samples, following the requirements specified from your assigned Sequencing Facility (SOP, Table 1).

b. Separate a **specimen Voucher,** when possible (following taxon-specific standards) and take **scaled pictures.**

c. Dissect your specimens following the taxon/sequencing facility specific guidelines, and separate samples for:

Barcode your samples prior to sample shipping (**1 tube only**), following **this SOP**.

Biobank: Reserve one tissue tube to be stored at a Biobank Facility, following these **requirements**.

Sequencing : collect **one lentil-sized piece of tissue per tube** and place it in pre-chilled tubes.
Collect **5-10 tubes***, if possible from different tissues.

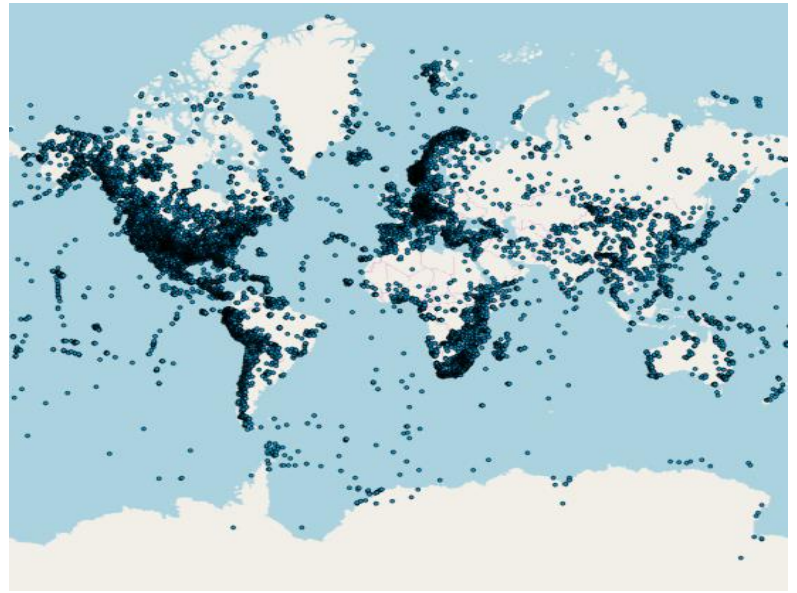
* Recommended tubes: **1.9 mL FluidX tubes** (provided)

d. **Flash-freeze and store** the tubes in
- dry ice, LN2 Dry Shippers (< -150ºC) or at -80ºC freezer

Wet ice and -20ºC freezers are not suitable for the storage of FluidX tubes containing samples.

Cell culture (optional) : If planning to send samples for Cell culture, please follow these instructions, and get in touch with ERGA-cells@upf.edu for guidance.

Vouchering / Biobanking



>5M samples

>110 members
~40 countries

Global Genome Biodiversity Network (GGBN.org)

Eastern European Countries
Lack of infrastructure

deposition of Molecular vouchers (DNA, tissue, or cells) in biobanks is not yet as established

Eastern European Countries

Not members of EU

Lack of guidelines for

Sampling permits

Ethics permits (not yet established)

CA	CB	CC	CD	CE	CF	CG	CH	CI
ETHICS_PERMITS_REQUIRED	ETHICS_PERMITS_DEF	ETHICS_PERMITS_FILENAME	SAMPLING_PERMITS_REQUIRED	SAMPLING_PERMITS_DEF	SAMPLING_PERMITS_FILENAME	NAGOYA_PERMITS_REQUIRED	NAGOYA_PERMITS_DEF	NAGOYA_PERMITS_FILENAME

Permits need to be uploaded in a single (concatenated) **pdf** named:

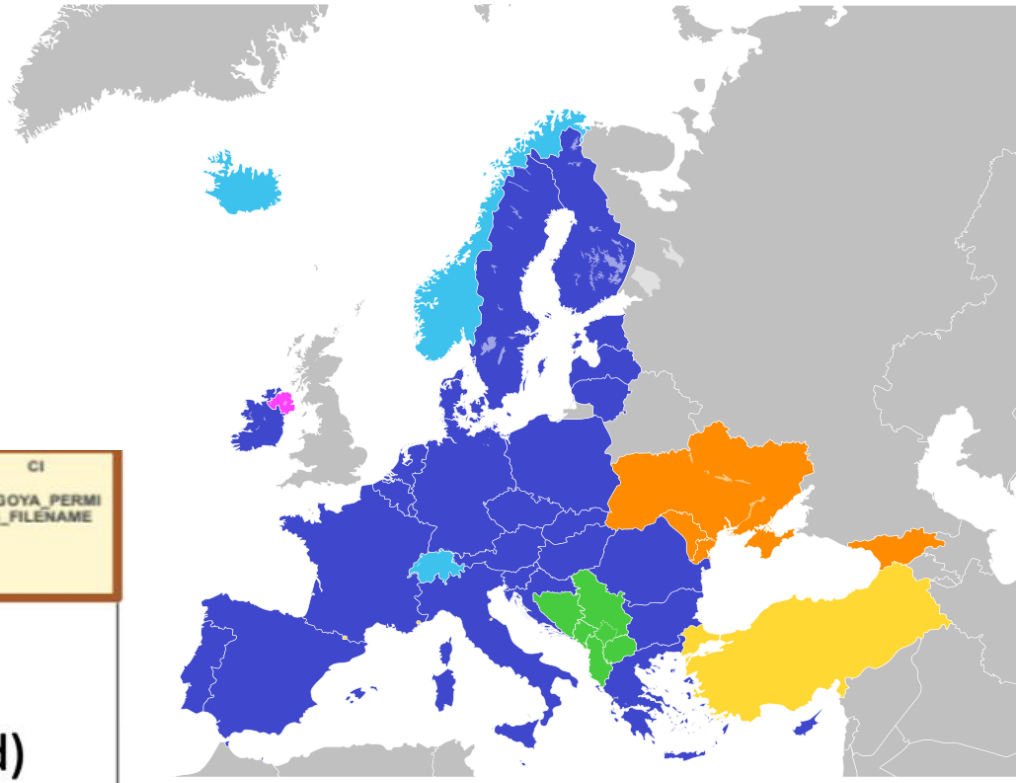
CA - SPECIMEN_ID_ETHICS_PERMITS.pdf

CC - SPECIMEN_ID_SAMPLING_PERMITS.pdf

CA - SPECIMEN_ID_NAGOYA_PERMITS.pdf

EUDAT Collaborative Data Infrastructure

Data shared and preserved across borders and disciplines



EU Regulations and Directives are applicable in all EU 27 Member States

- all Countries of the Schengen Area, i.e. Switzerland, Norway and Island
- in Northern Ireland
- and may be aligned with national laws in further non-EU Countries

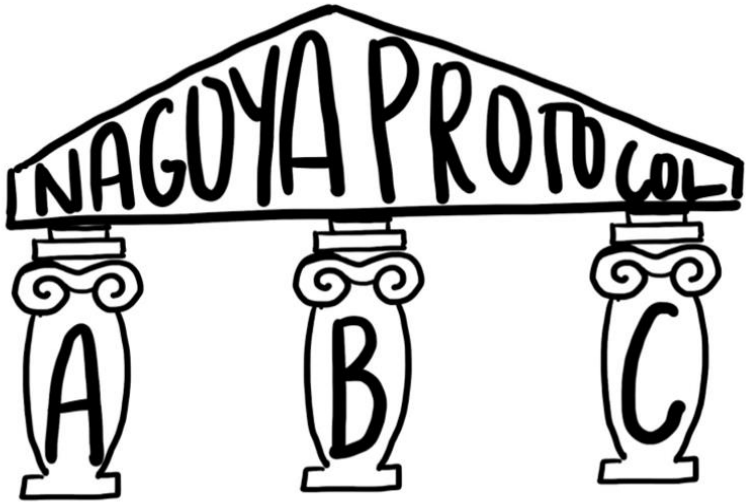
Access and Benefit-sharing (ABS)

- benefit-sharing should contribute to conservation and sustainable use of biodiversity

❑ **DILIGENCE OBLIGATIONS OF THE EU ABS Regulation, Art 4 (1) (EU) No 511/2014**

- Date and place where material was collected
- Description and identification of the used material
- Source where material was directly obtained
- Relevant Permits (e.g. collecting, access, export, import permits)
- Who is the responsible scientist for the samples
- Where I can find samples and documents in 20 years

Eastern European Countries
Not members of EU (not obliged)
.



NOT implemented at EU Level – each state/Party decides if they establish rules, incl. EU member states

Subject to contractual agreements between provider country and user

EU ABS regulation – due diligence obligations for all users

Each country can decide IF and HOW they regulate their resoures

❑ **NAGOYA PROTOCOL**

Eastern European Countries

More support needed from policy makers

Focal contact point

ABS rules might precede the NP

Access date ≠ collection date

THANK YOU FOR YOUR ATTENTION!

Contact:
Ancuta Fedorca ancutacotovelea@yahoo.com
Elena Buzan elena.buzan@upr.si

Explanation: Proportion of populations [or breeds] with an effective population size (Ne) above 500

Relevant: “Sufficiently large” to prevent genetic erosion/ inbreeding, and maintain adaptive capacity

Understandable: Already used in forestry (seed orchards), agriculture (breeds), fisheries (hatcheries)

Below Ne 500, genetic diversity decreases quickly!!

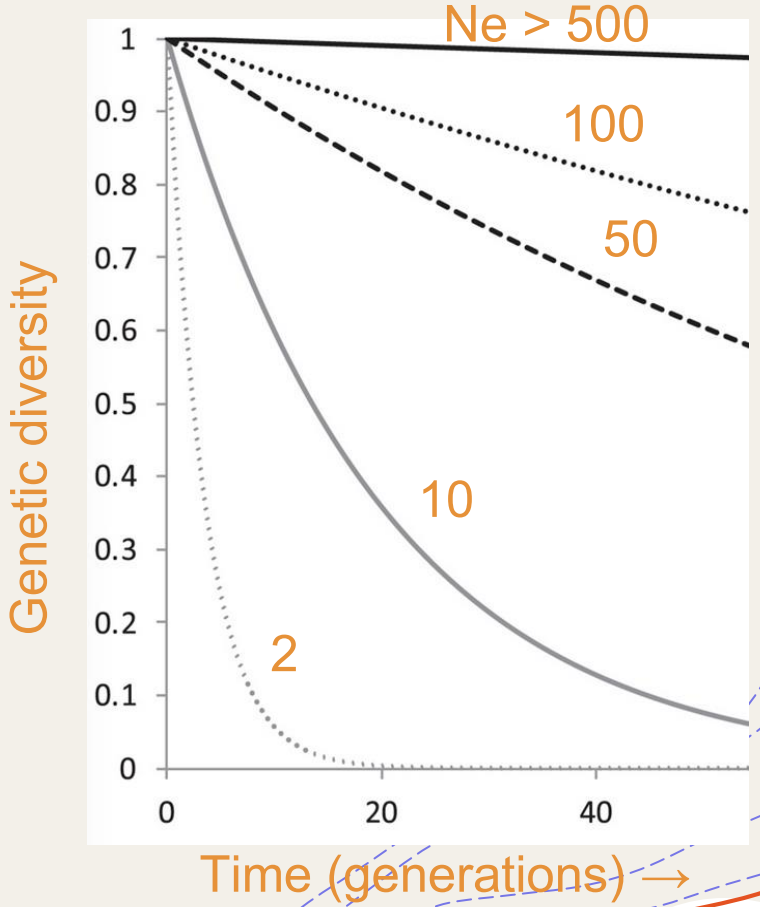


Figure modified from Willi et al 2021, PNAS