umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

Status Quo on Ecological Connectivity in Austria

AlpPlan workshop “Advancing Green Infrastructure Planning in the Alpine region“

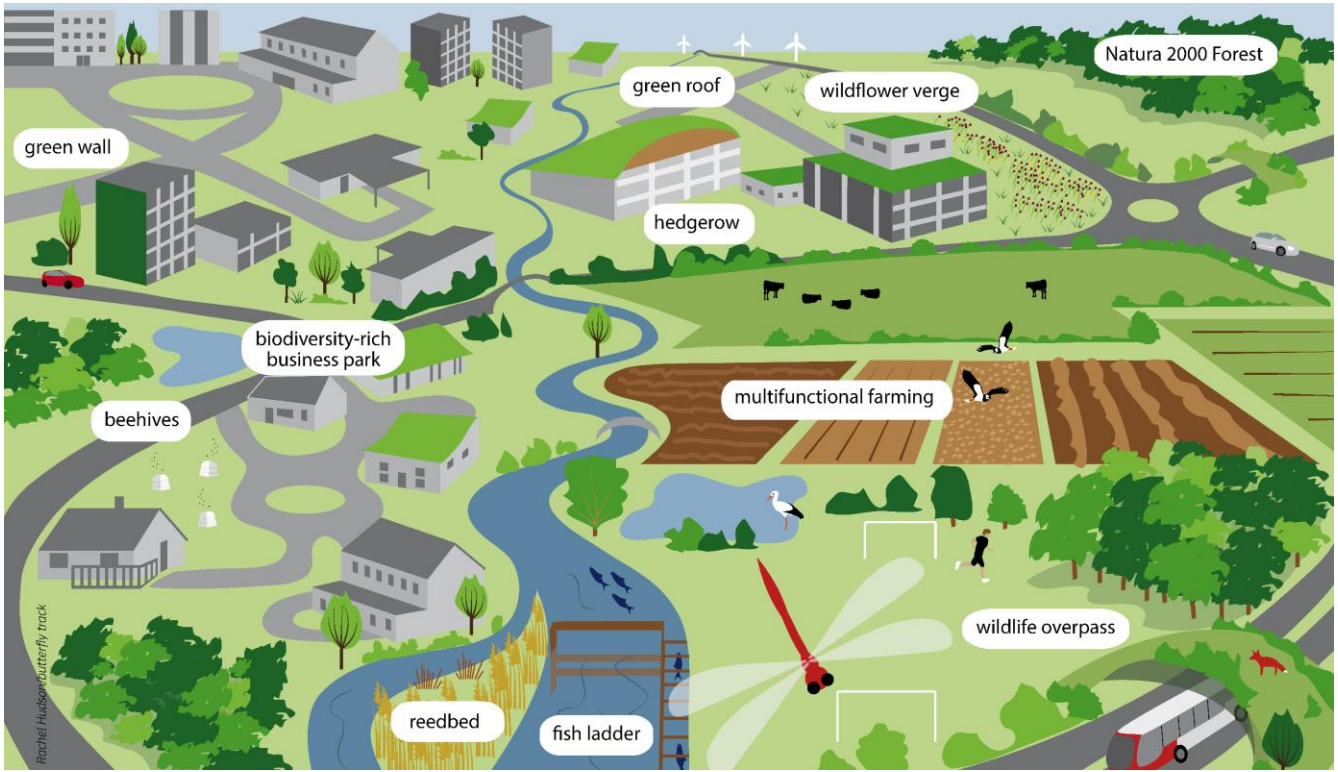
Florian Danzinger, 07.11.2022

WHAT IS GREEN INFRASTRUCTURE?

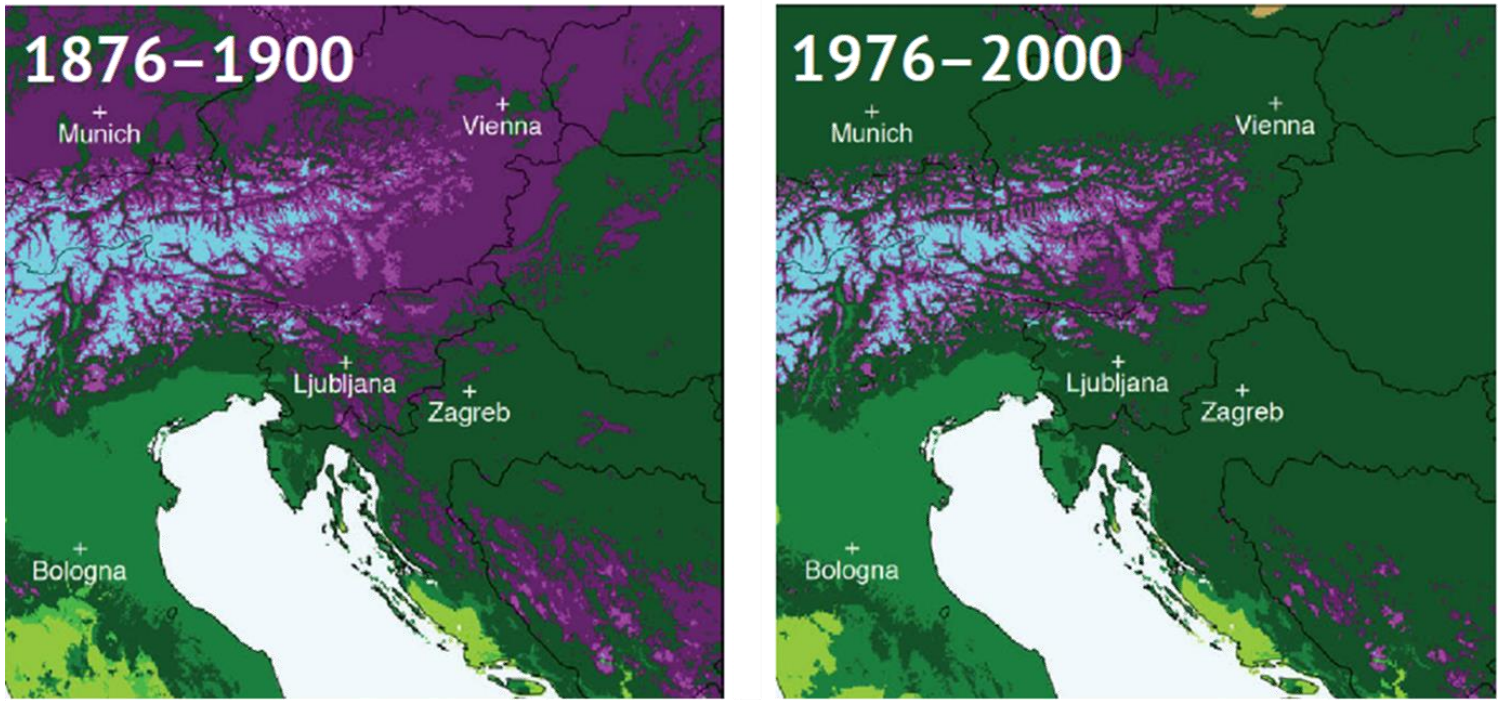
‘Green Infrastructure is a **strategically planned network** of **natural and semi-natural areas** with other environmental features designed and managed to deliver a **wide range of ecosystem services and functions** such as water purification, air quality, space for recreation and climate change mitigation and adaptation. This **network of green (land) and blue (water) spaces** can improve environmental conditions and therefore citizens' health and quality of life. It also supports a green economy, creates job opportunities and enhances biodiversity.’

(DG Environment: http://ec.europa.eu/environment/nature/ecosystems/index_en.htm)

WHAT IS GREEN INFRASTRUCTURE?

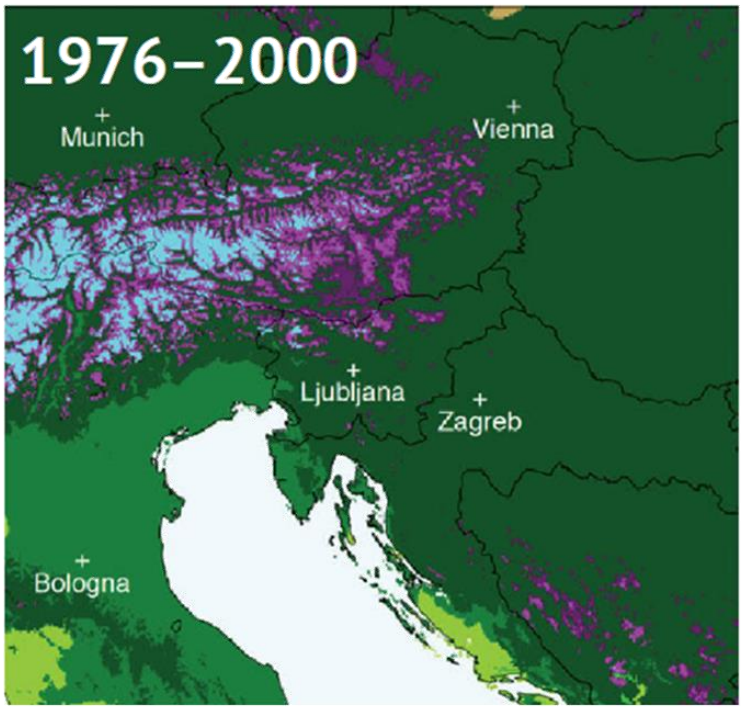


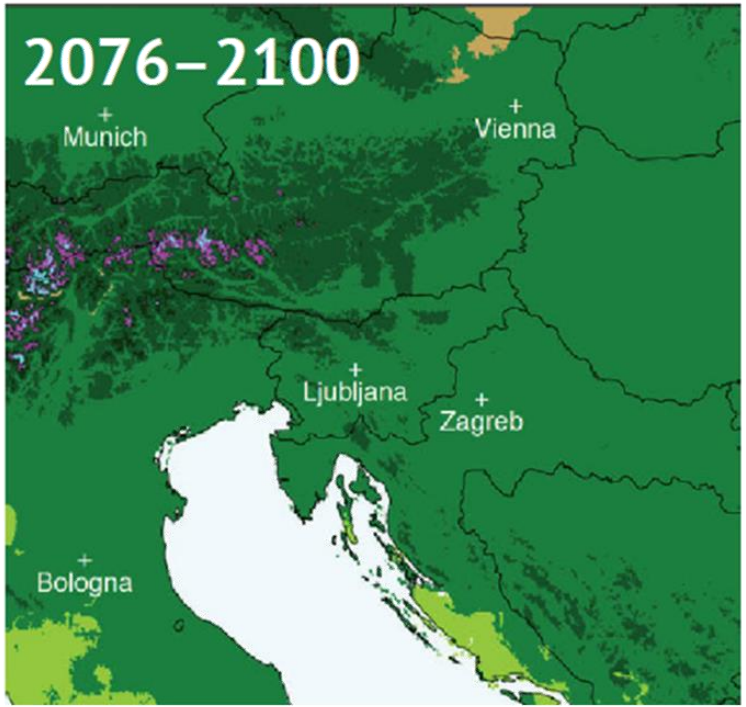
CLIMATE ZONES AROUND THE ALPS, YESTERDAY AND TODAY



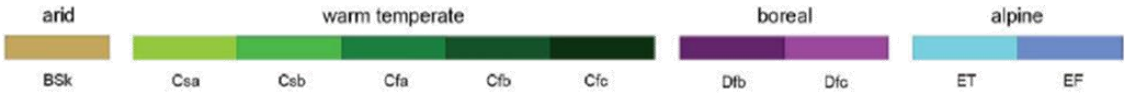
Source: Rubel et al. (2017)

CLIMATE ZONES AROUND THE ALPS, TODAY AND TOMORROW



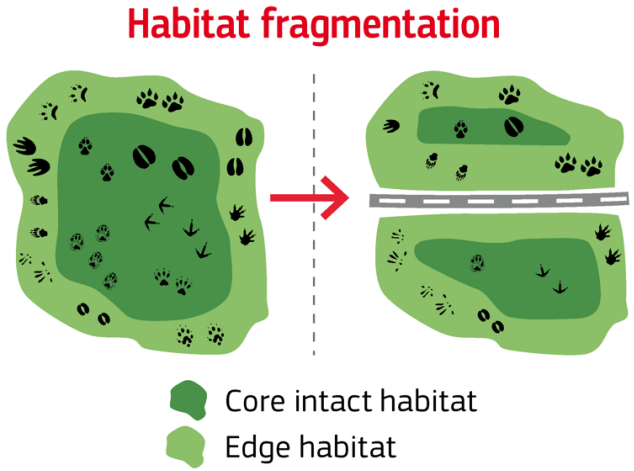


Source: Rubel et al. (2017)



EUROPE: A FRAGMENTED CONTINENT

- Decline in traditional forms of land use
- Intensification of agriculture as a whole
- Large parts of Europe urbanised
- Increasing fragmentation due to dense transport networks



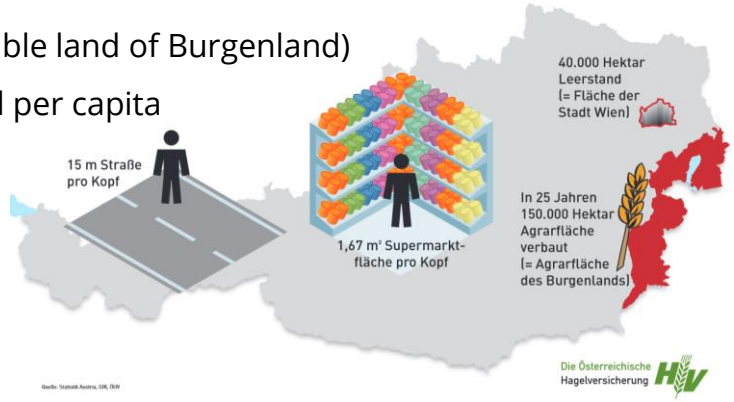
Source: Habitat fragmentation (EEA, 2011)

European Environment Agency statistics 2004-2014:

- **5% of the EU's land is sealed** or converted to semi-natural areas.
- Europe's **motorways** have become **about 41% (15 000 km) longer** and are expected to increase by another 12 000 km in the coming years
- Average size of **continuous land units** now only **20 km² in densely populated countries** like Belgium (EU average: 130 km²)

LAND CONSUMPTION IN AUSTRIA

- **every day 11.5 ha of farmland and meadows** are built up (16 football fields)
- annual **loss of 0.5 %** of agricultural land
- with 1.7 m² the **highest supermarket area per capita**: IT 1.0 m², FR 1.2 m²
- **one of the densest road networks** with 15 m per capita: DE 7.9 m, CH 8.1 m
- 13,000 ha of **industrial brownfields** and 40,000 ha of **built-up vacant land**
- Sealing of 150,000 ha of farmland and meadows in 25 years (= arable land of Burgenland)
- 1950: 2,400 m² arable land per capita | 2022: 1,600 m² arable land per capita



Source: Bodenverbrauch Österreich (Österreichische Hagelversicherung, 2020)

BIODIVERSITY IN AUSTRIA: STATUS QUO

- Endangered in Austria:
  - 90 % of grassland biotope types,
  - 83 % of peatland biotope types,
  - 57 % of woodland biotope types

- Endangered according to Red Lists:
  - 37 % of mammals,
  - 36 % of birds,
  - 64 % of reptiles and
  - 60 % of amphibians and fish

Photo: Florian Danzinger

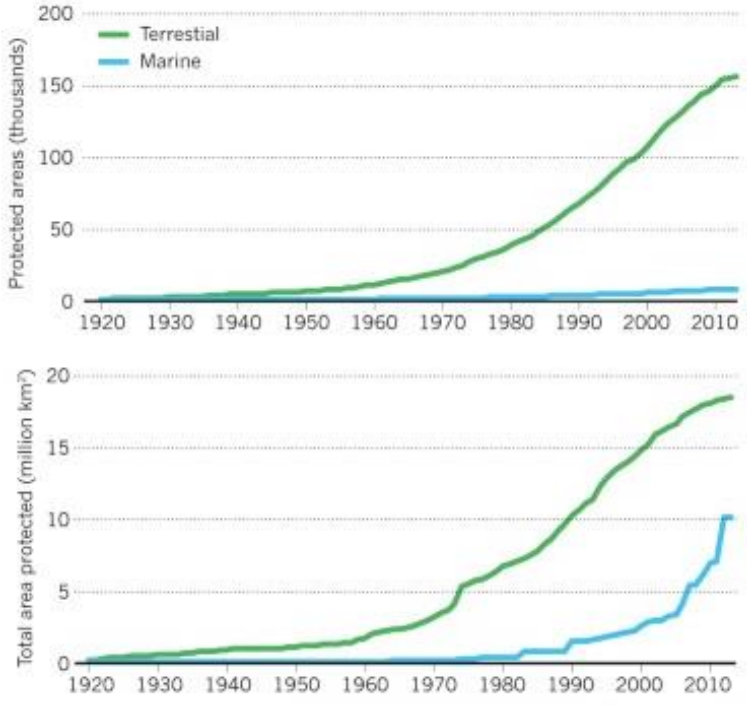
Photo: Margit Gross

Photo: NP Thayatal/D. Manhart

Photo: Franz Kovacs

Source: Biodiversität in Österreich: Status Quo (Umweltdachverband, 2020)

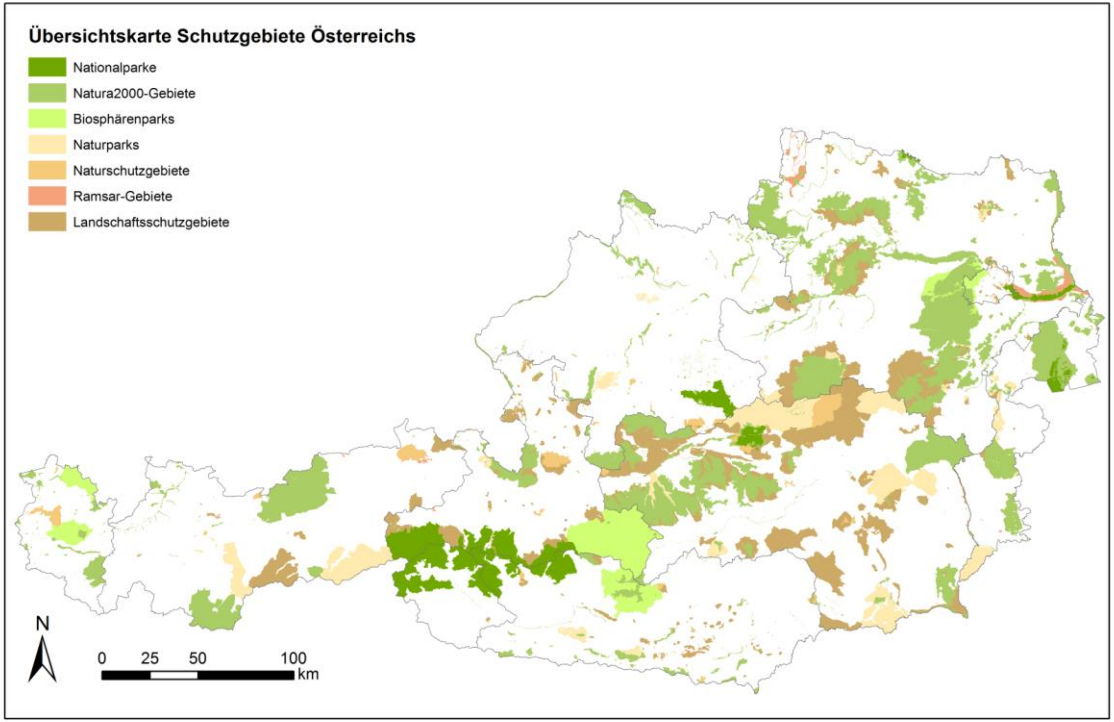
AND ALL THIS DESPITE THE FACT THAT PROTECTED AREAS HAVE BEEN EXPANDED GREATLY



Source: Watson et al. 2014 Nature

PROTECTED AREAS IN AUSTRIA

28.8% of land is covered by protected areas



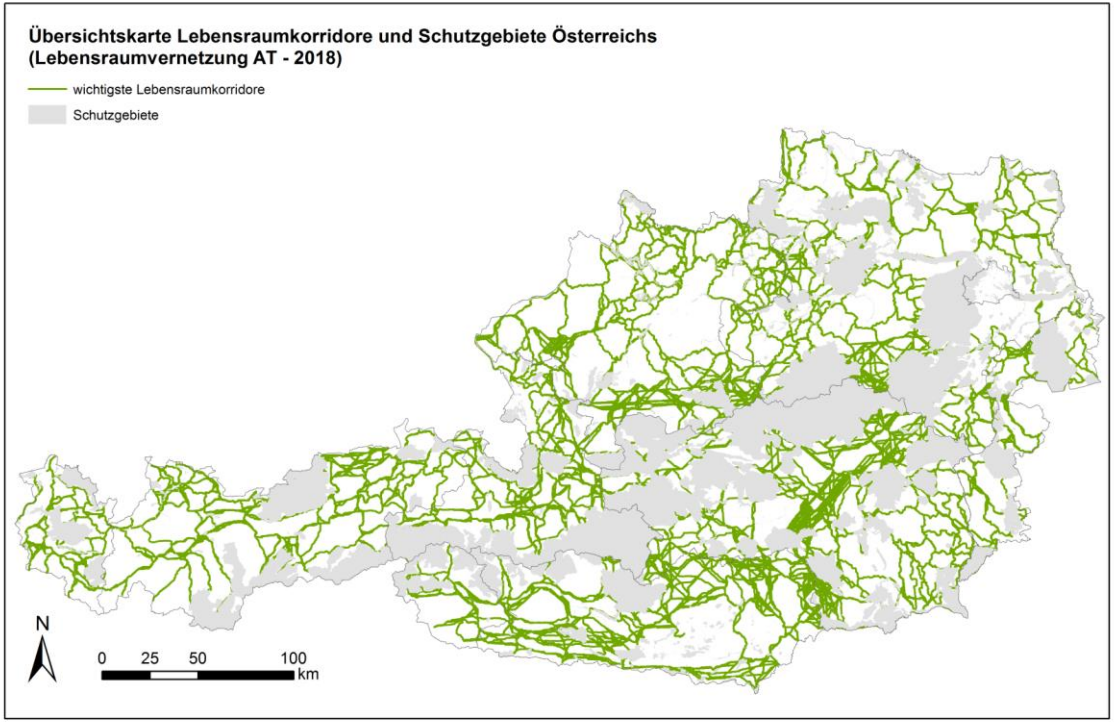
Übersichtskarte Schutzgebiete Österreichs, Version 1.0, Stand 16.10.2019
Universität Wien, Department für Botanik und Biodiversitätsforschung
Abteilung für Naturschutz, Vegetations- und Landschaftsökologie

universität wien

PERSPEKTIVEN FÜR UMWELT & GESELLSCHAFT umweltbundesamt

PROTECTED AREAS IN AUSTRIA

How can we reconnect them?



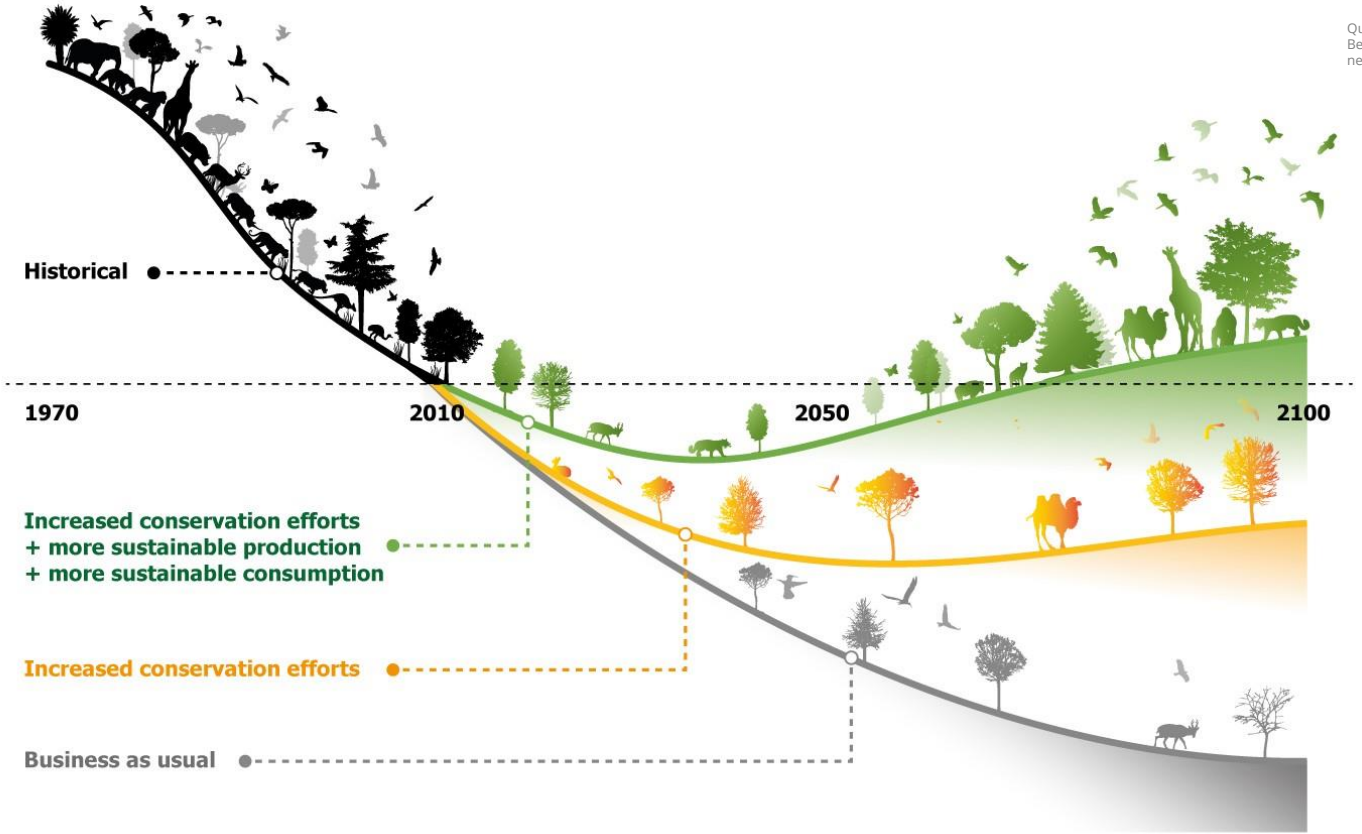
Übersichtskarte Lebensraumvernetzung und Schutzgebiete Österreich, Version 1.0, Stand 16.10.2019
Universität Wien, Department für Botanik und Biodiversitätsforschung
Abteilung für Naturschutz, Vegetations- und Landschaftsökologie

universität wien

PERSPEKTIVEN FÜR UMWELT & GESELLSCHAFT umweltbundesamt

BIODIVERSITY CHANGE - BENDING THE CURVE OF BIODIVERSITY

Quelle: Leclère, D., Obersteiner, M. et al. (2020) Bending the curve of terrestrial biodiversity needs an integrated strategy. Nature.

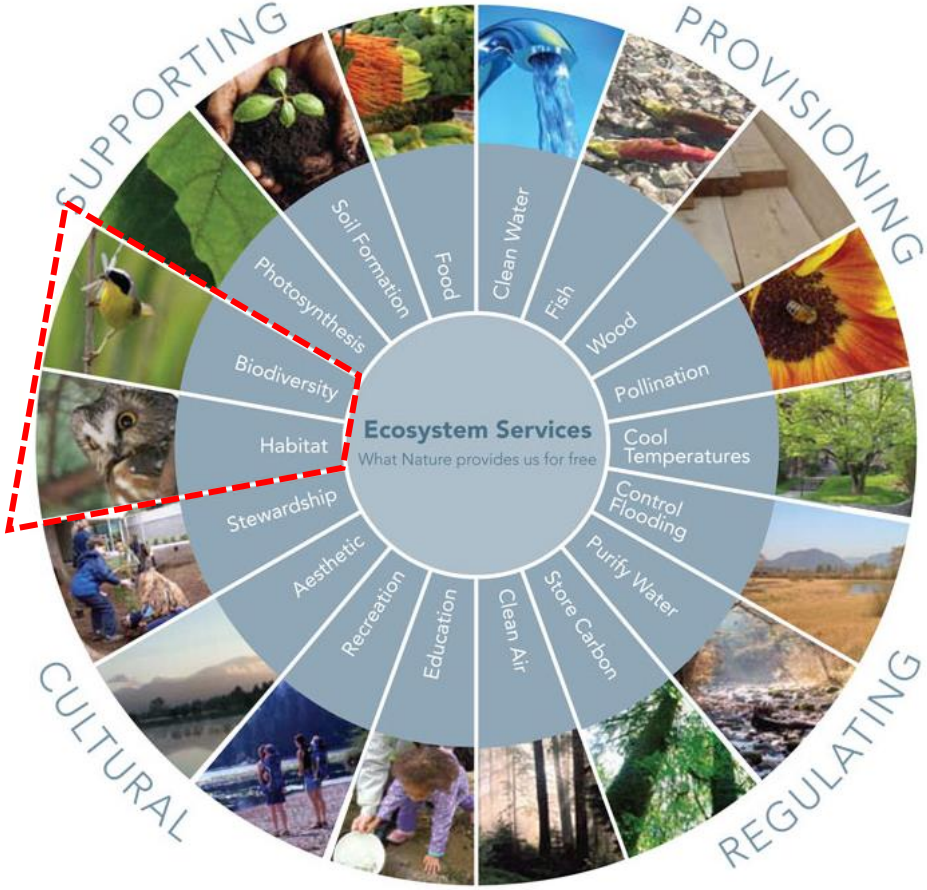


This artwork illustrates the main findings of the article, but does not intend to accurately represent its results (https://doi.org/10.1038/s41586-020-2705-y)

ECOSYSTEM SERVICES

Ecosystem services are those **functions** of natural systems that **provide value to humans** free of charge. **Ecological land management** enhances ecosystem services such as pollination, flooding control, carbon storage, biodiversity, and recreation.

Source: TEEB Europe



EU GREEN INFRASTRUCTURE STRATEGIES

- The EU Biodiversity Strategy to 2020
  - Halt biodiversity loss in Europe by 2020

    "**Maintain and enhance ecosystems and their services** through GI and **restore** at least 15% of already **degraded ecosystems** by 2020."

- EU Biodiversity Strategy for 2020
  - Release of at least 20 billion euros per year for Natura 2000 and GI
  - **Systematic integration** of intact ecosystems, green infrastructure and nature-based solutions **in all areas of spatial planning**

- Building a Green for Europe Environment Infrastructure
  - Mainstreaming green infrastructure into **key EU policies**
  - **Supporting GI projects** at EU level
  - Facilitating **access to funding** for GI projects

GREEN INFRASTRUCTURE IN AUSTRIA

- Biodiversity Strategy Austria 2020+

  Goal 11: Biodiversity and ecosystem services are **taken into account** in the areas of **spatial planning and transport/mobility**

  - Priority areas for ecological functions (green infrastructure) are **considered** or designated **in local and supra-local spatial planning** (2020+)

- Nature Conservation Concept Lower Austria

  Green infrastructure (GI) is seen as one of the **most important tools** to counteract further biodiversity loss due to fragmentation and habitat loss, as well as land use change.

  - **(Re-)connect** important core areas
  - Improving the **permeability of the landscape** for wildlife

HABITAT NETWORKING - DEFINITION

Habitat corridors:

Landscape sections that **still have a high connectivity potential** (= have high structural connectivity).

- Landscape areas in which **animals can move** (= migration)
- Landscape areas in which **plants can spread** (= dispersal)
- Valuable **habitats** for small mammals | insects | amphibians | ...

Characteristic:

- Landscape areas that are largely **free from built-up areas**
- Landscape areas (regions) which **still have high habitat quality and connectivity** for **woodland and grassland**

HABITAT NETWORKING - OBJECTIVES

Habitat Networking:

- **Visualization** and/or **safeguarding** of habitat corridors
- **Establish wildlife crossing aids** where roads and railroads dissect habitat corridors
- **Establish a data base** for prioritizing ecological compensation areas/restoration/...

HABITAT NETWORKING - SAFEGUARDING

What do we mean by safeguarding?

- **First premise**: Keep clear of building development!
- **No restrictions** of any kind **on traditional agricultural management** practices within the corridor areas
- Qualitative improvement of habitat connectivity through measures such as
  - **Improving landscape structure** and increasing the number of landscape elements with positive effects on habitat connectivity
  - Promotion of certain management practices
  - etc.

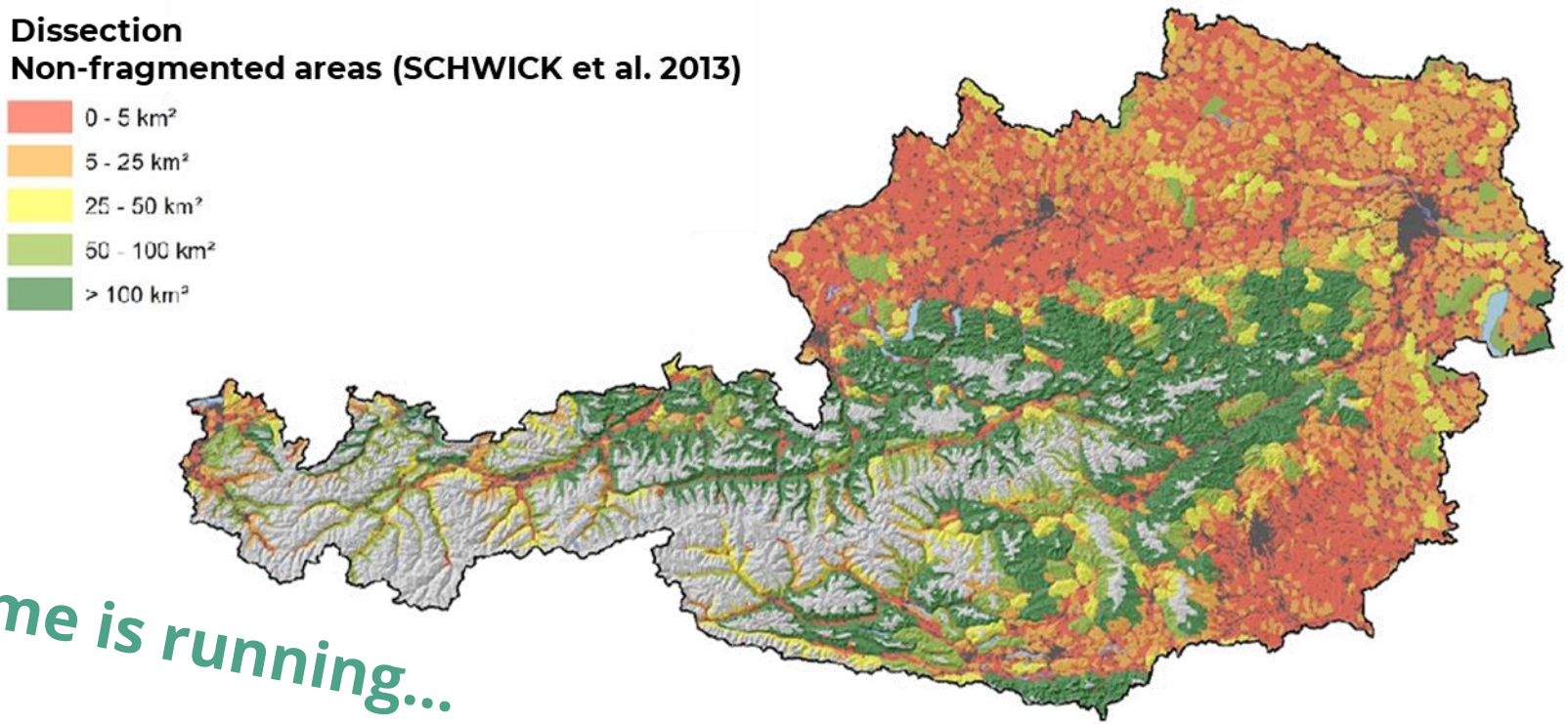
must be carried out **on a voluntary basis by landowners**.

HABITAT NETWORKING - SAFEGUARDING

What do we mean by safeguarding?

- **Political decision-makers** are required to **develop appropriate incentive systems**
  - **Regionalization** of Austrian Agri-environmental Programme (ÖPUL) **subsidies**
  - Account for **compensation areas**: assign **higher value to areas** that **fulfill multiple ecological functions**

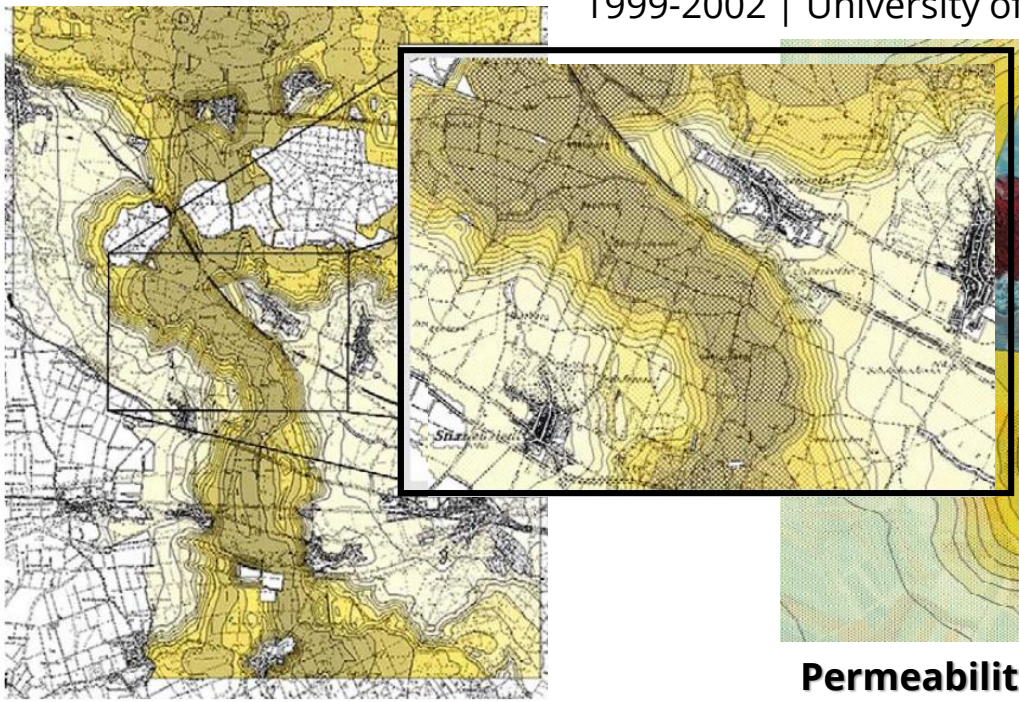
SITUATION IN AUSTRIA?



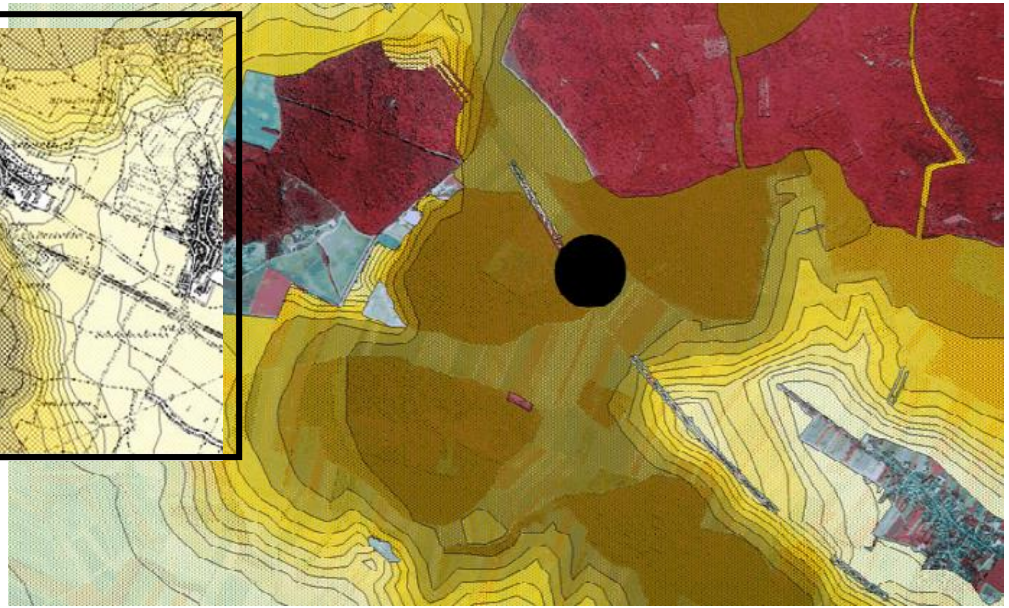
Time is running...

PROJECT „WILDLIFE CORRIDORS“

1999-2002 | University of Natural Resources and Life Sciences



Source: https://www.grillmayer.eu/wp-content/uploads/2015/02/Agit2002_finished.pdf

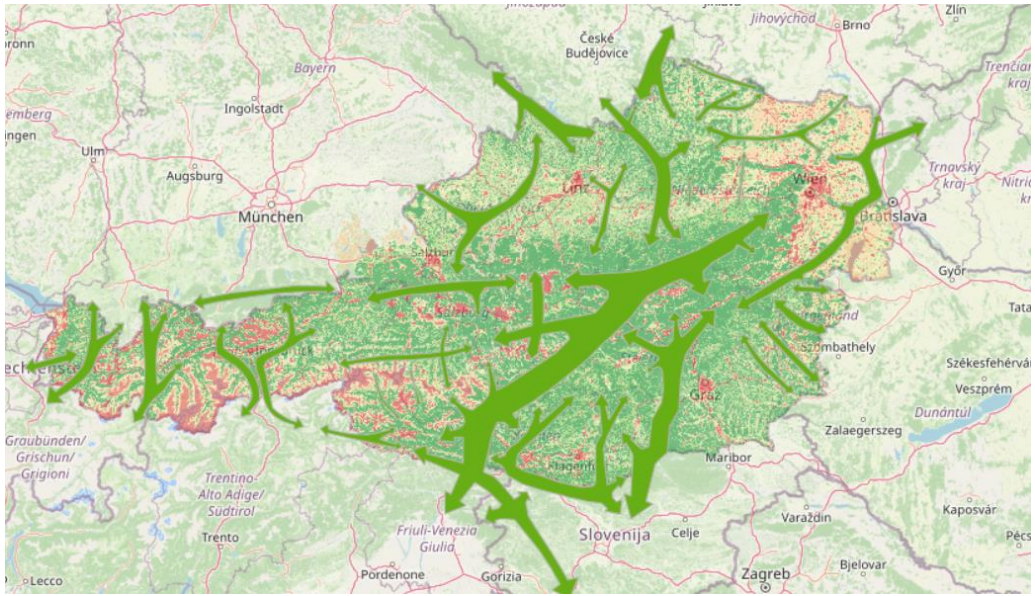


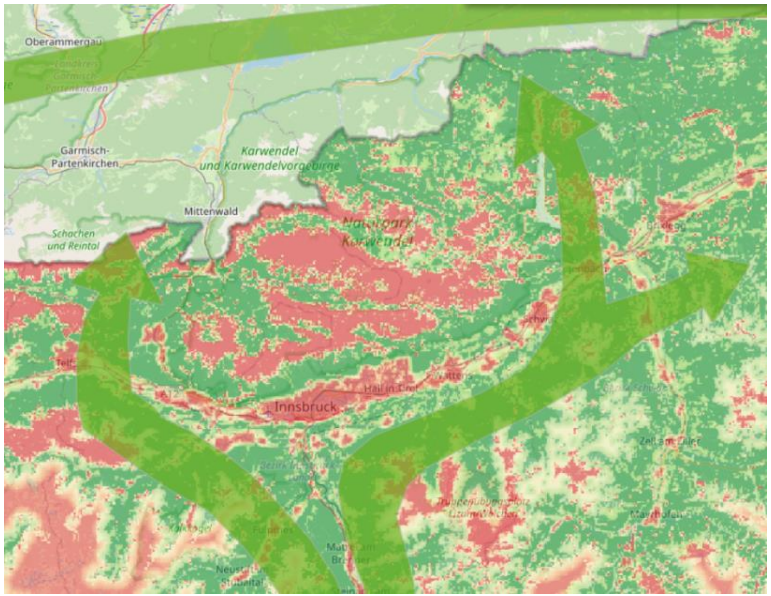
Permeability model for red deer (Cervus hippelaphus)

A long time ago...

PROJECT „HABITAT NETWORKING IN AUSTRIA“

2005 | GIS modeling of **mobility resistance** values for forest-preferring wild large mammals in Austria
DI Clemens Köhler

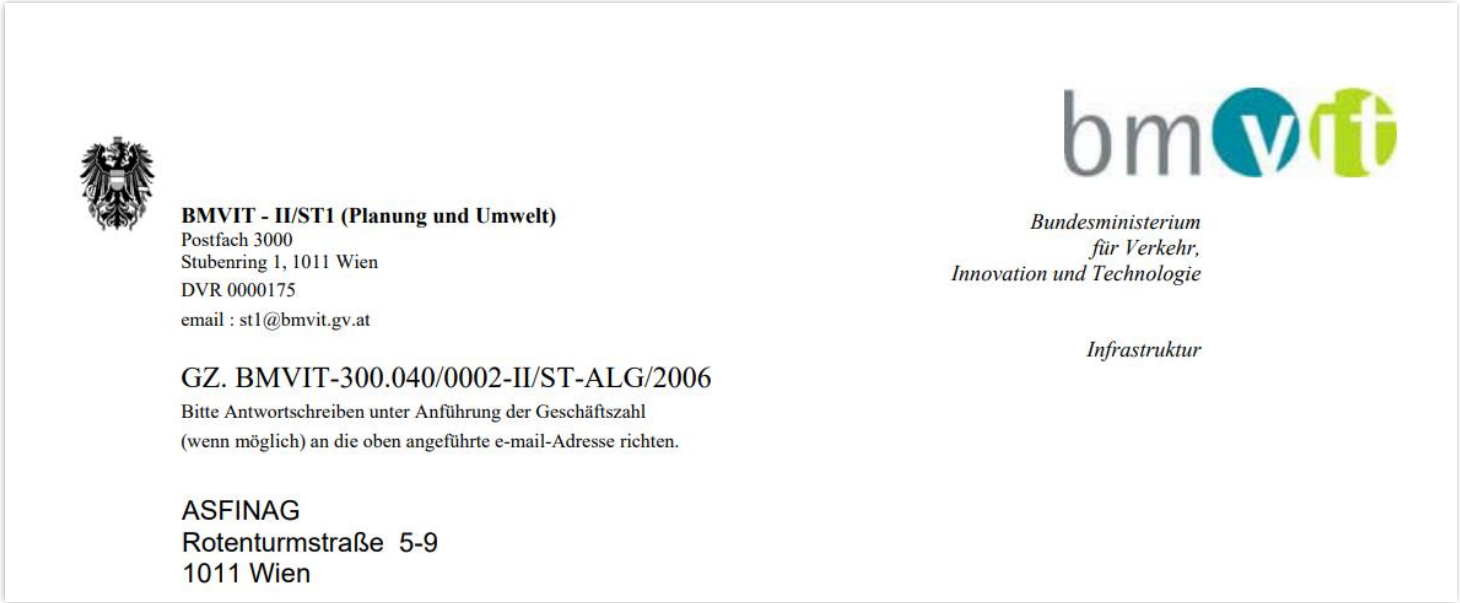




Source: https://www.wildkatze-in-oesterreich.at/pages_file/de/14/DA_Clemens_Koehler.pdf

DIRECTIVE „HABITAT NETWORKING WILDLIFE“

Source: https://www.bmk.gv.at/dam/jcr:e766ccb1-7178-4694-89d6-59c3575fe3a4/wildtiere.pdf



BMVIT - II/ST1 (Planung und Umwelt)
Postfach 3000
Stubenring 1, 1011 Wien
DVR 0000175
email : st1@bmvit.gv.at

Bundesministerium
für Verkehr,
Innovation und Technologie

Infrastruktur

GZ. BMVIT-300.040/0002-II/ST-ALG/2006
Bitte Antwortschreiben unter Anführung der Geschäftszahl
(wenn möglich) an die oben angeführte e-mail-Adresse richten.

ASFINAG
Rotenturmstraße 5-9
1011 Wien

2005 | Federal Ministry for Transport, Innovation and Technology > ASFINAG - Motorway and Expressway Financing Joint-Stock Company

DIRECTIVE „HABITAT NETWORKING WILDLIFE“

3. Nachrüstungen an Bestandsstrecken

Fachliche Grundlage bilden die Ergebnisse des Forschungsprojektes zum Thema "Kostenreduktion bei Grünbrücken durch deren rationellen Einsatz" (VÖLK et. al., 2001; Straßenforschung, Heft 513, dort insbesondere die Auflistung der Nachrüstungsvorschläge in Tabelle 16, Seite 63).

Gemäß Umsetzungskonzept des WWF „Strategische Planung für die Lebensraumvernetzung in Österreich – Prioritätensetzung für Nachrüstungsvorschläge für Grünbrücken über Autobahnen und Schnellstraßen“ (PROSCHEK, 2005) für die Errichtung von überregional bedeutsamen Wildquerungshilfen (WQH, Kategorie A) an Bestandsstrecken sind die darin beurteilten 20 Bauwerke bis zum Jahr **2027** zu realisieren. Dadurch soll die Lebensraumvernetzung für großräumig lebende Wildtierarten langfristig gesichert werden.

Um Fehlinvestitionen zu vermeiden, ist die jeweils aktuelle raumplanerische Situation im Umfeld der zu planenden WQH hierbei zu berücksichtigen, da durch Umwidmungen von Grünland in beispielsweise Betriebsgebiet die Korridore beidseits der WQH für Wildtiere unterbrochen werden können und somit die Funktionsfähigkeit der WQH nicht mehr gegeben wäre.

Die RVS 04.03.12 „Wildschutz“ ist bei der Planung und Ausführung der Bauwerke anzuwenden.

Source: https://www.bmk.gv.at/dam/jcr:e766ccb1-7178-4694-89d6-59c3575fe3a4/wildtiere.pdf

Retrofitting on existing roads

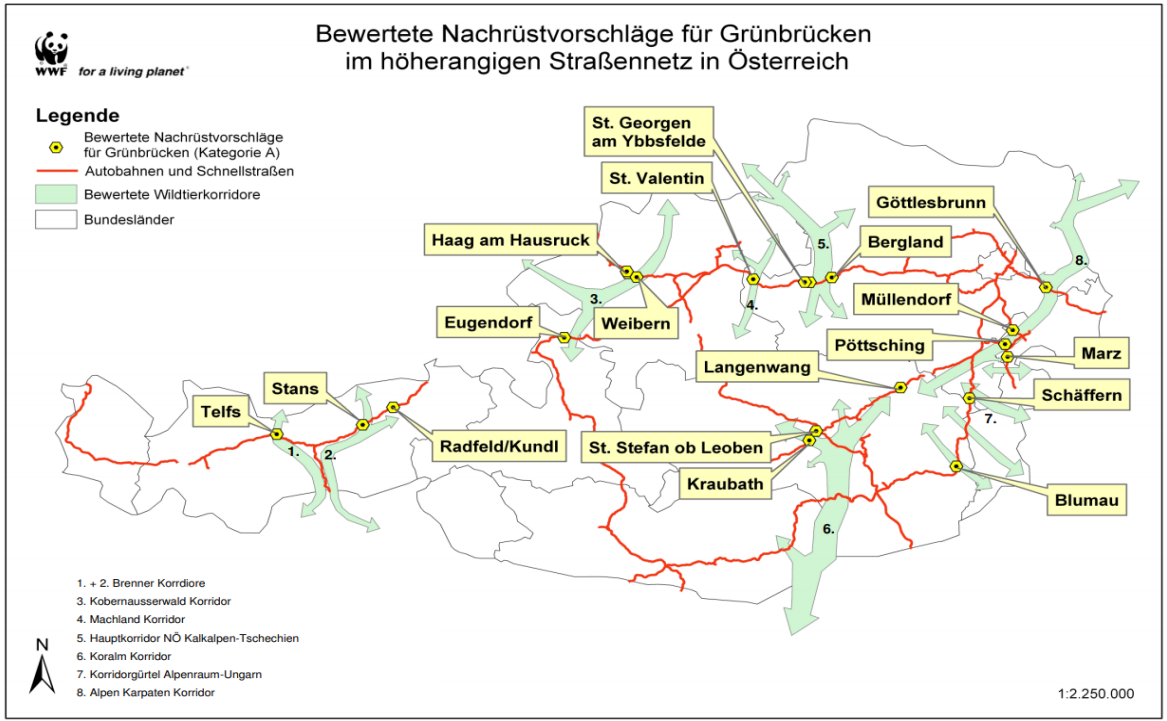
- 20 crossing structures to be realized by 2027
- taking into account the current spatial planning situation in the vicinity of the wildlife crossing aid to be planned

PRIORITIZATION OF GREEN BRIDGES

Strategic planning for habitat networking in Austria
Prioritization of proposals for retrofitting of green bridges over motorway and expressways

Source: Proschek, M. (2005). Strategische Planung für die Lebensraumvernetzung in Österreich. Prioritätensetzung für Nachrüstungsvorschläge für Grünbrücken über Autobahnen und Schnellstrassen, Wien.

PRIORITIZATION OF GREEN BRIDGES



Source: Proschek, M. (2005). Strategische Planung für die Lebensraumvernetzung in Österreich. Prioritätensetzung für Nachrüstungsvorschläge für Grünbrücken über Autobahnen und Schnellstrassen, Wien.

Evaluated retrofit proposals for green bridges in the superordinate road network in Austria.

UPDATE ON THE STUDY FOR THE PRIORITIZATION OF GREEN BRIDGES

Evaluation of 20 green bridge sites and their associated transregional habitat corridors in Austria (2016)

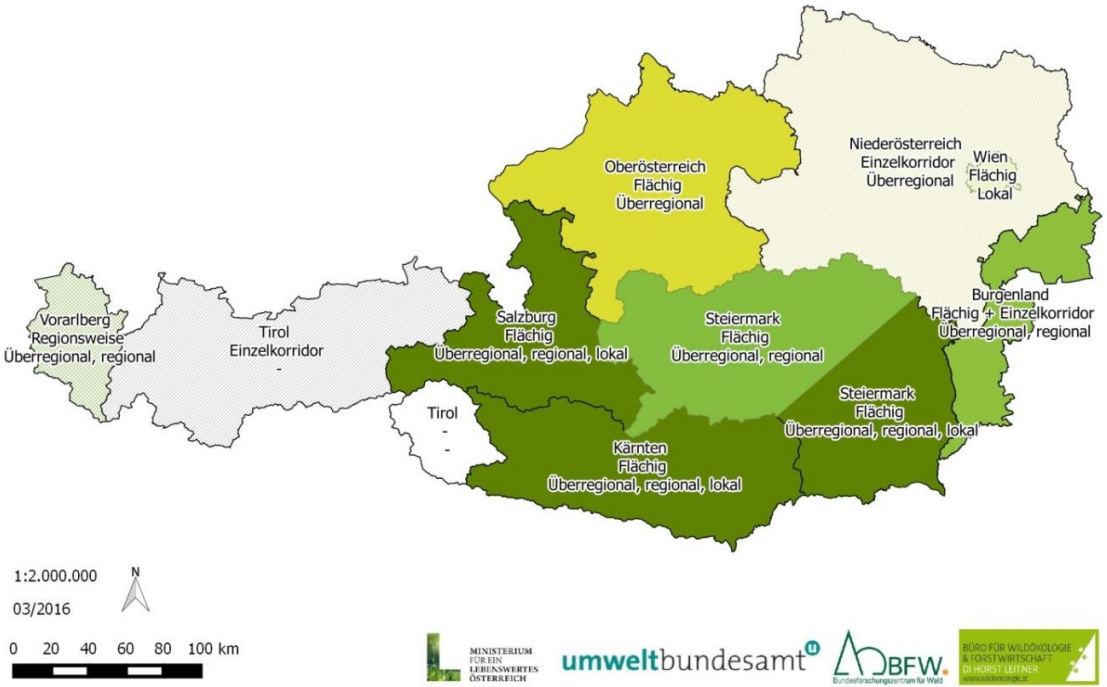
Further development of methods for an Austria-wide designation and evaluation of habitat axes

COMPLETED PROJECTS AT ENVIRONMENT AGENCY AUSTRIA

Status quo on habitat connectivity in Austria (2016-2017)

- Data collection and **publication** of all **existing designations** of habitat corridors in Austria
- Overview of the **current protection of habitat corridors** in Austria by different **spatial planning instruments**
- Identification of **fields of action**

STATUS QUO ON HABITAT CONNECTIVITY



Data basis from scientific and public sector projects

Very different forms of implementation in the various federal states

COMPLETED PROJECTS AT ENVIRONMENT AGENCY AUSTRIA

Habitat networking in Austria as a contribution to safeguarding biodiversity (2018-2019)

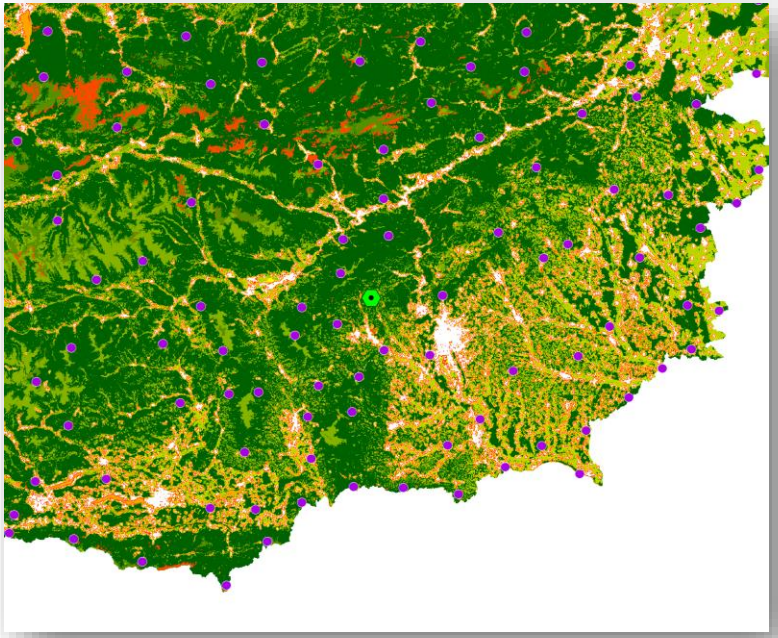
- **Uniform designation** of the most important supra-regional **habitat corridors** in Austria

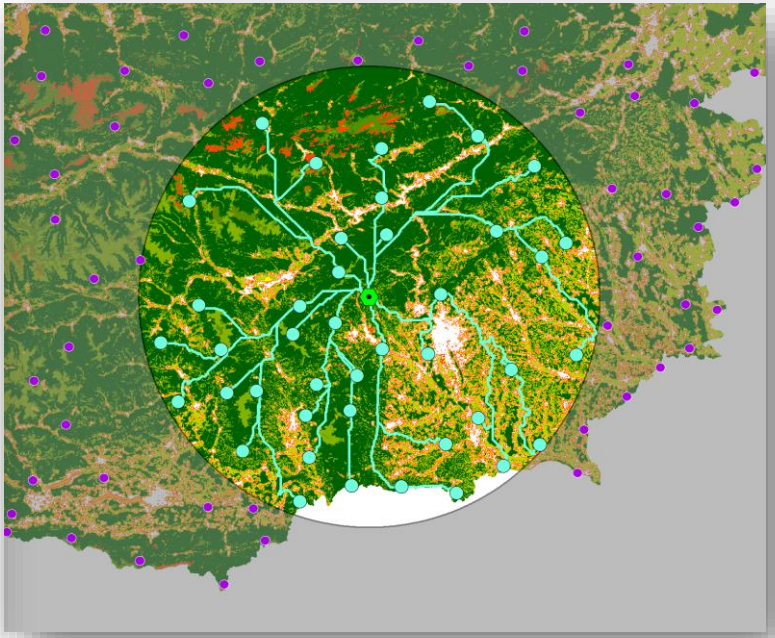
= **minimum configuration** of supra-regional/national habitat corridors to **safeguard and restore habitat connectivity** and to ensure the coherence of the protected area network

- **Common agreement** on the designation with the **respective experts** of the federal states

AUSTRIA-WIDE UNIFORM DESIGNATION OF HABITAT CORRIDORS

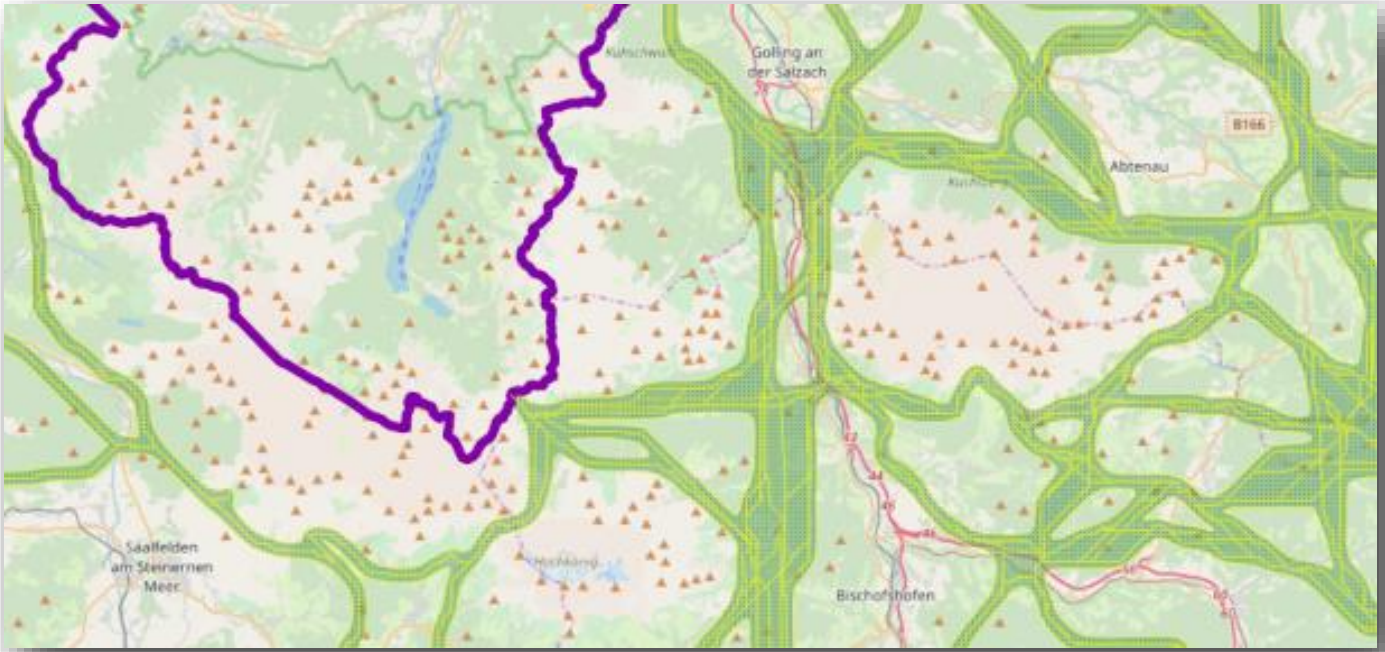
Methodology - modelling





AUSTRIA-WIDE UNIFORM DESIGNATION OF HABITAT CORRIDORS

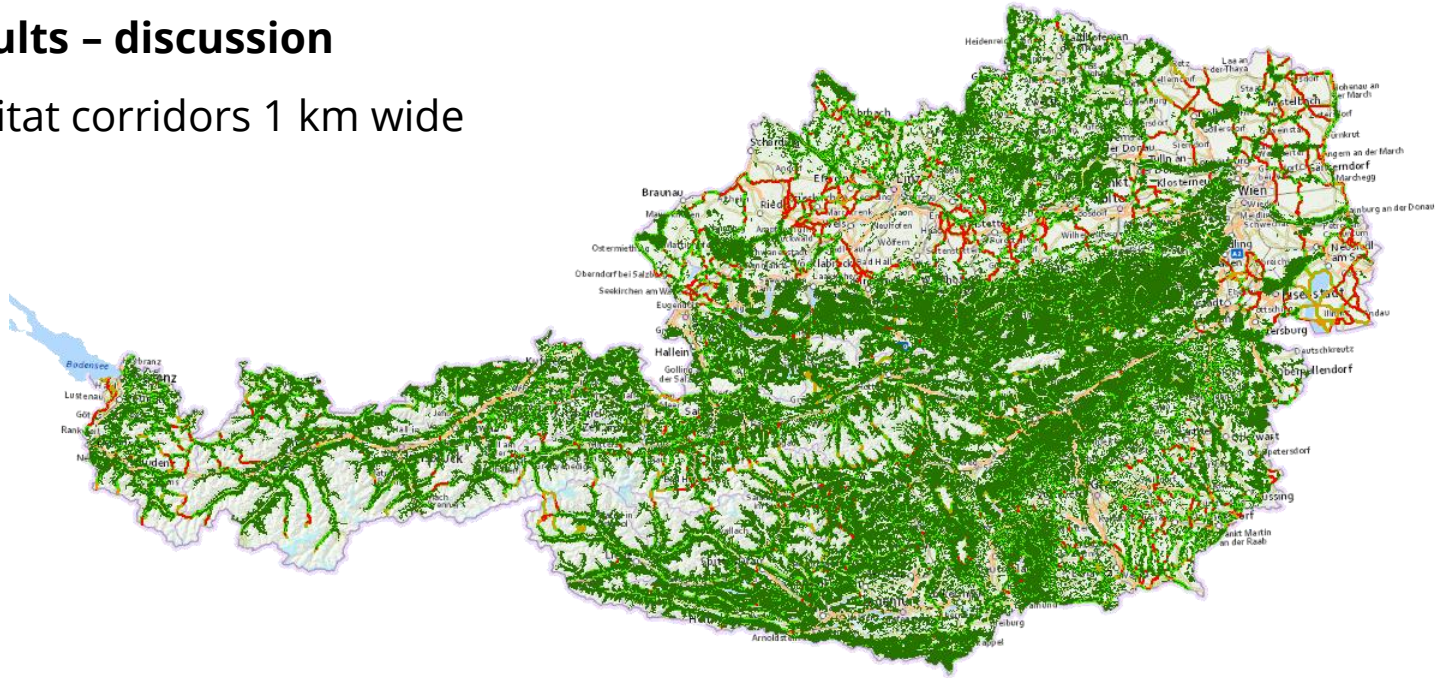
Methodology - modelling



AUSTRIA-WIDE UNIFORM DESIGNATION OF HABITAT CORRIDORS

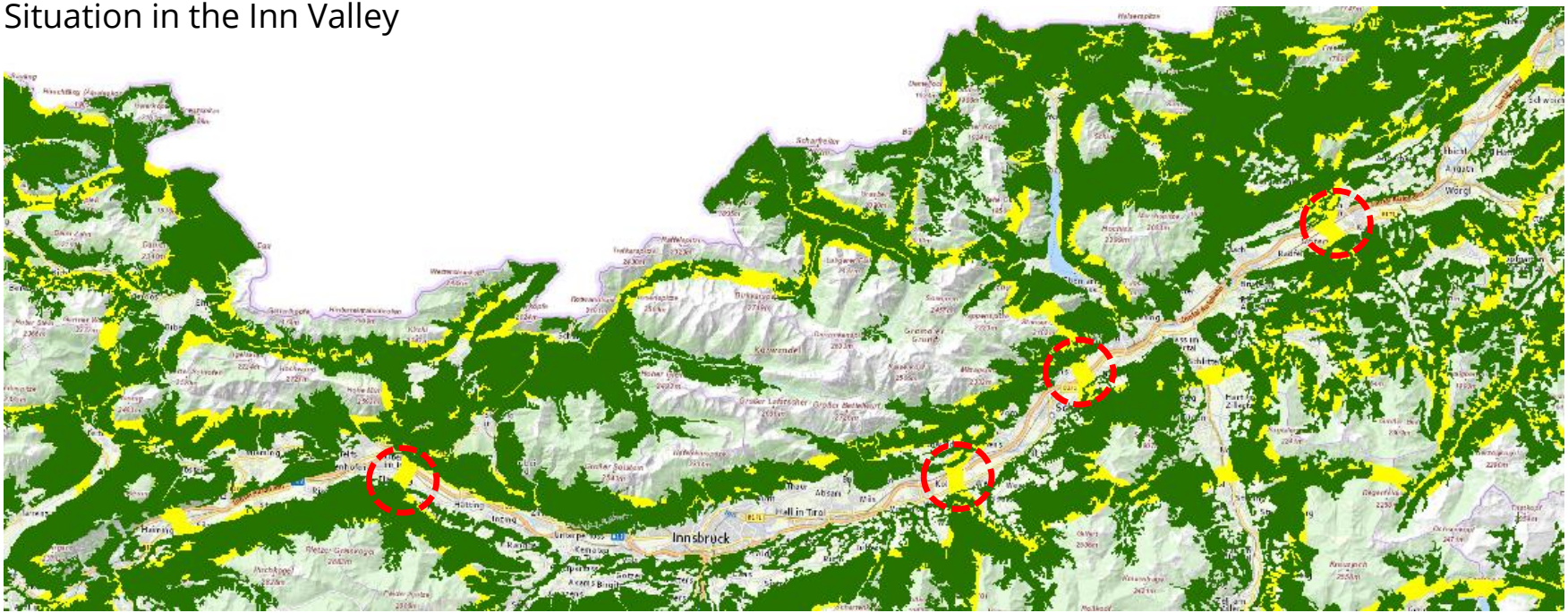
Results – discussion

Habitat corridors 1 km wide



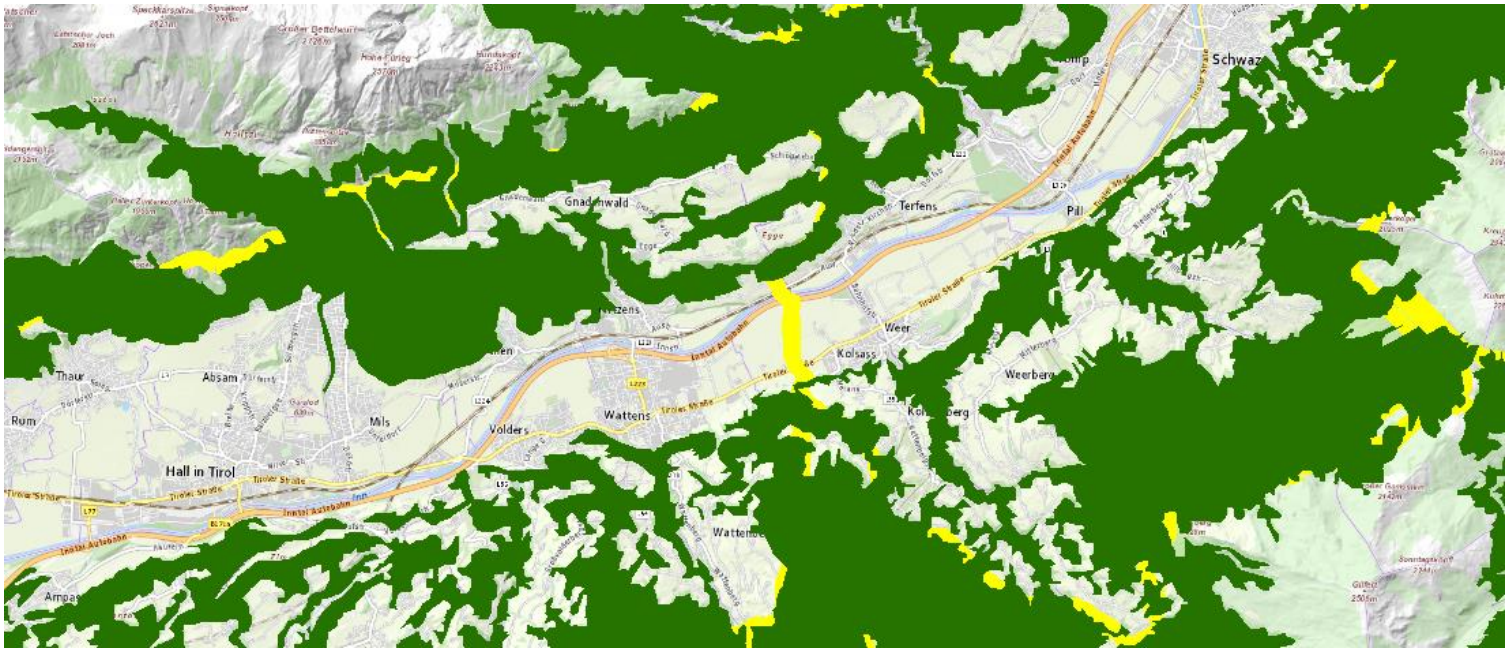
IF NOT NOW - WHEN?

Situation in the Inn Valley



IF NOT NOW - WHEN?

Situation in the Inn Valley



COMPLETED PROJECTS AT ENVIRONMENT AGENCY AUSTRIA

Habitat networking in Austria as a contribution to safeguarding biodiversity (2018-2019)

- **Workshops on habitat networking**
  - Raising awareness and clarification of possible safeguarding strategies by the different specialized departments of the federal states
  - Validation of the designated habitat corridors by the relevant departments of the federal governments
- **School events in Lower Austria (2) and Vienna (3)**
  - Workshops on the topic of habitat networking
  - Themed school excursion

ONLINE PORTAL

RUNNING PROJECTS AT ENVIRONMENT AGENCY AUSTRIA

Habitat networking for insects (2020-2022)

- Further development of the topic of habitat networking from **structural connectivity** to a designation of **functional connectivity**
- Habitat corridors as habitat for insects

GUIDELINE FOR THE ASSESSMENT OF REGIONAL PERMEABILITY

Development of a **guideline for assessing regional permeability**

- Requested by the agricultural sector to increase planning security

Contents:

- Construction of farm buildings on grassland
- Impacts of land consolidation
- Removal of landscape elements such as woodlots and field margins
- Fencing
- Guidelines will be developed in cooperation with representatives of the Austrian Chamber of Agriculture

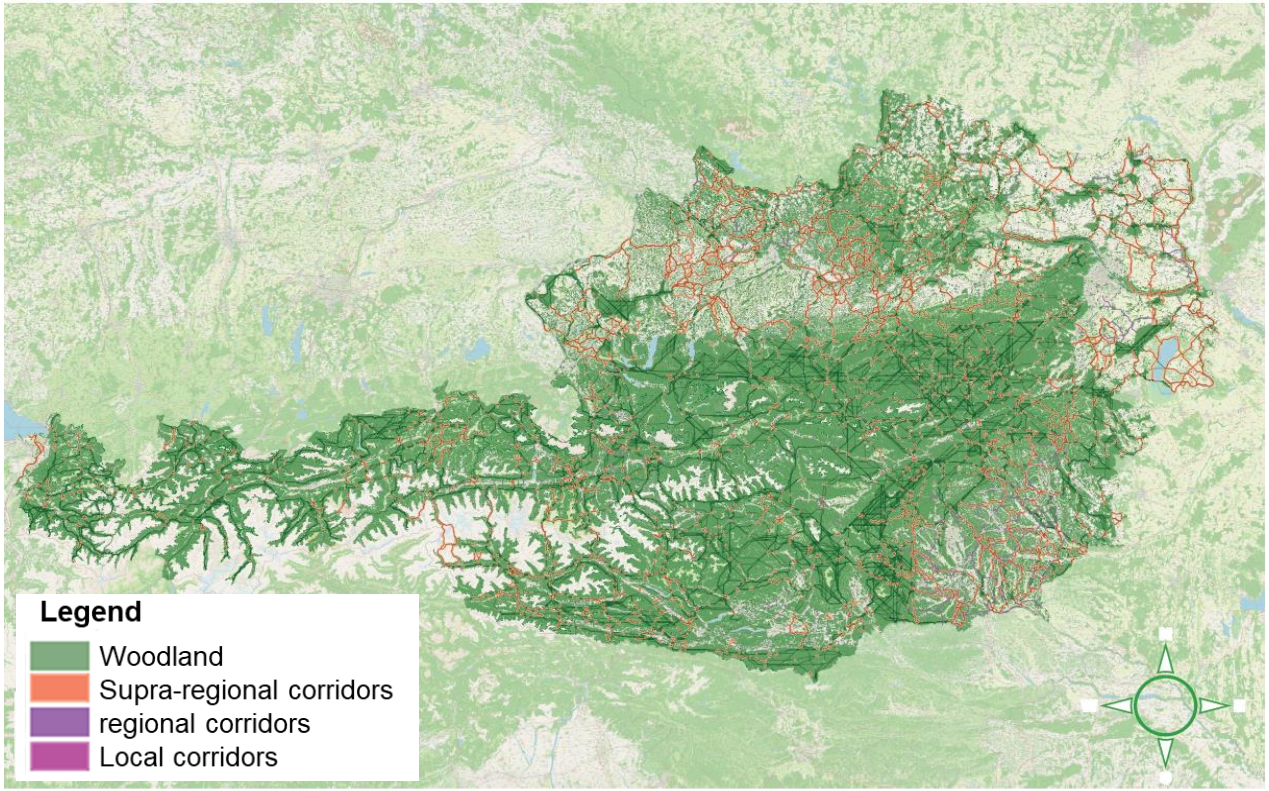
GUIDELINE FOR THE ASSESSMENT OF REGIONAL PERMEABILITY

The developed guideline provides an **important basis** for the assessment of project proposals and their impact on regional permeability, especially for **civil engineers** in the context of their

- expertise activities (environmental impact assessments (EIA),
- Environmental impact statements (EIS),
- revision of zoning plans

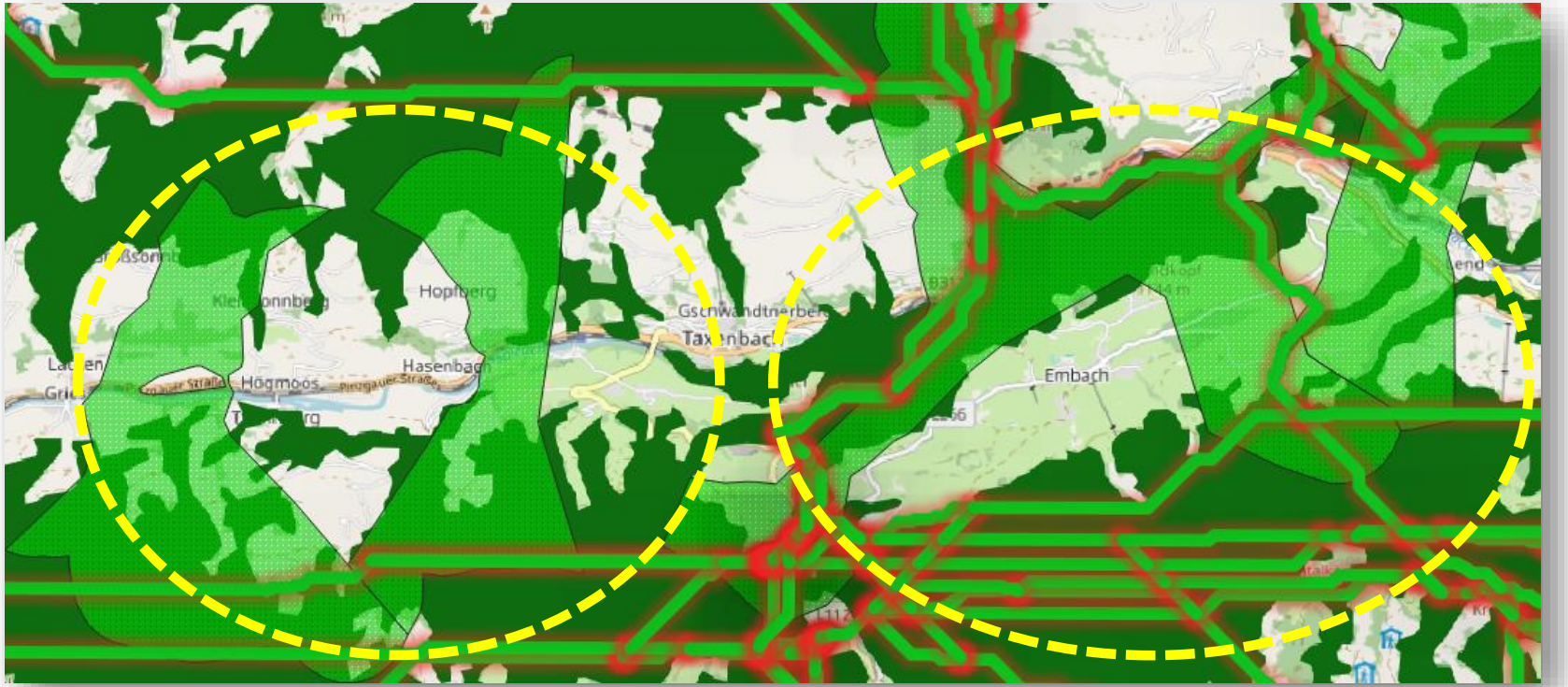
and should contribute to objectification and transparency of the expert opinions.

DATASET I: INTEGRAL DATASET FOR HABITAT NETWORKING IN AUSTRIA

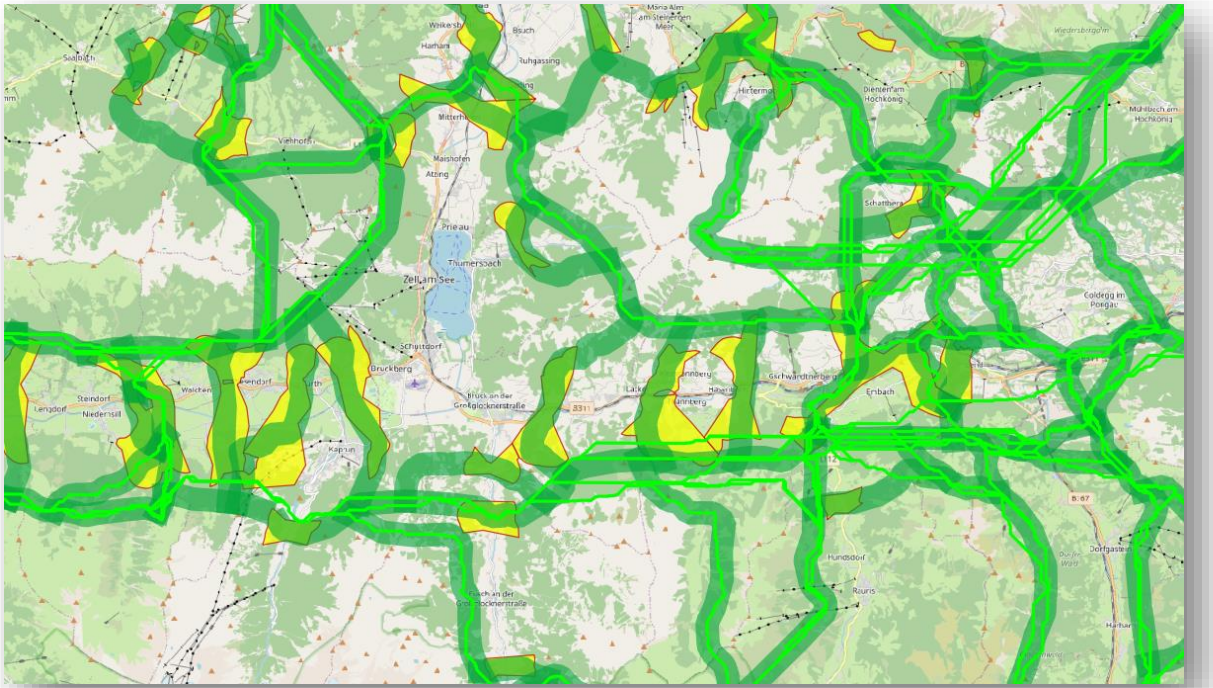


Habitat corridors Austria
Current state 2022

DATASET I: INTEGRAL DATASET FOR HABITAT NETWORKING IN AUSTRIA

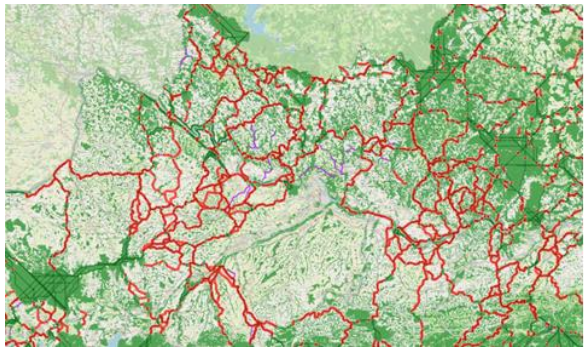


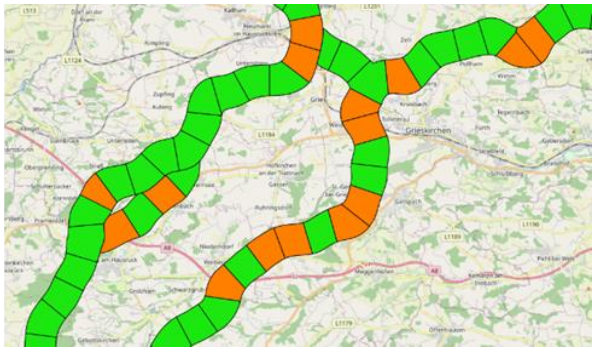
DATASET I: INTEGRAL DATASET FOR HABITAT NETWORKING IN AUSTRIA



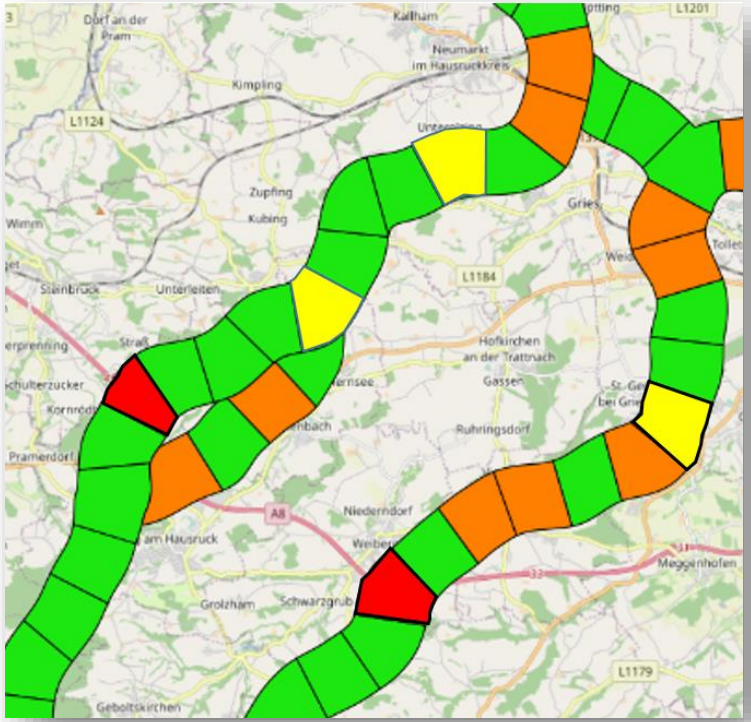
DATASET II: ASSESSMENT OF LANDSCAPE STRUCTURE AND CONNECTIVITY OF HABITAT CORRIDORS AUSTRIA

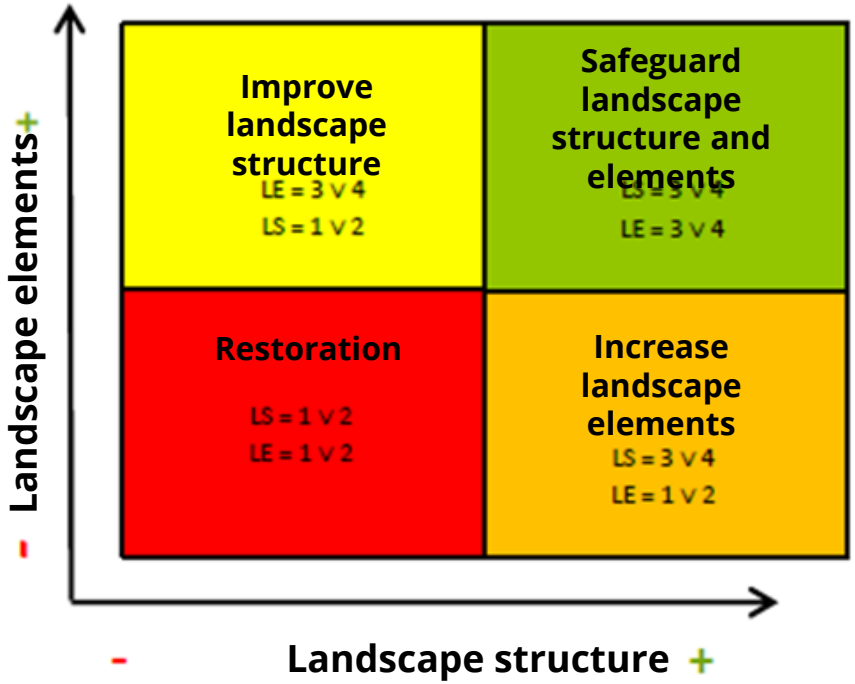
- Creation of a **comprehensive overview of the functional connectivity** of habitat corridors in Austria
  - Restoration of ecologically valuable landscape areas and habitats
  - Thematic complex of compensation and replacement areas
- The developed methodology can be applied for a **cost-efficient, area-wide monitoring of functional connectivity** in Austria





DATASET II: METHODOLOGY





DATASET III: SPECIAL MAPS ON HABITAT NETWORKING FOR THE FOREST DEVELOPMENT PLAN AUSTRIA (WEP)

Examples from Styria

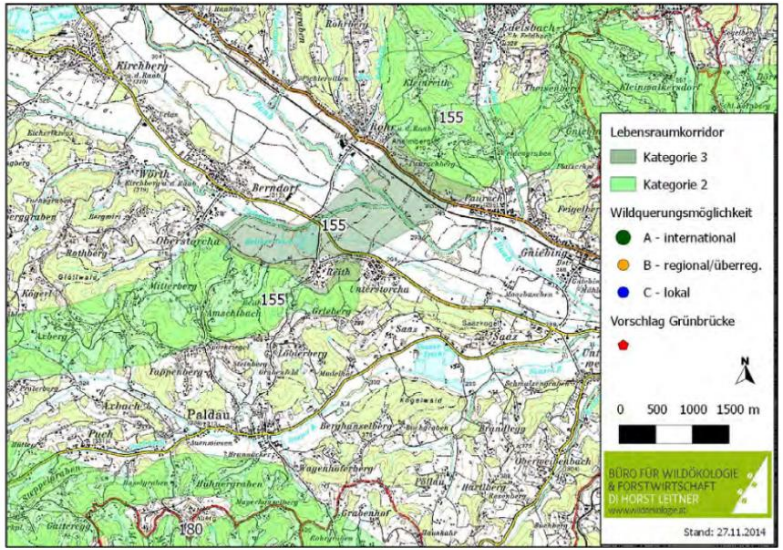


Abbildung 3-6 Lebensraumkorridor Nr. 155

Lebensraumkorridor: Kategorie 3 = sehr hoher Schutzbedarf, Kategorie 2 = hoher Schutzbedarf; Wildquerungsmöglichkeit an Autobahnen und Schnellstraßen: A = international, B = regional/überregional, C = lokal (VÖLK ET AL. 2001); Standortvorschlag für Grünbrückennachrüstung (VÖLK ET AL. 2001)

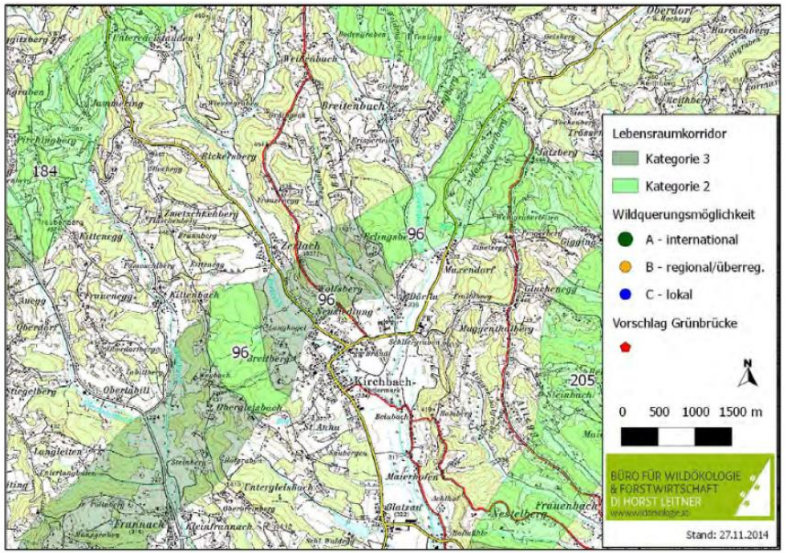
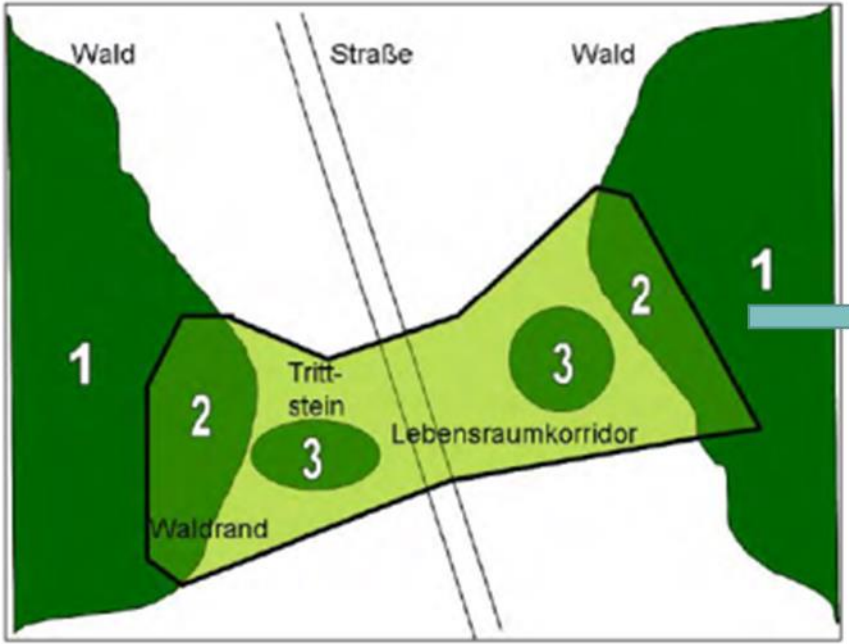


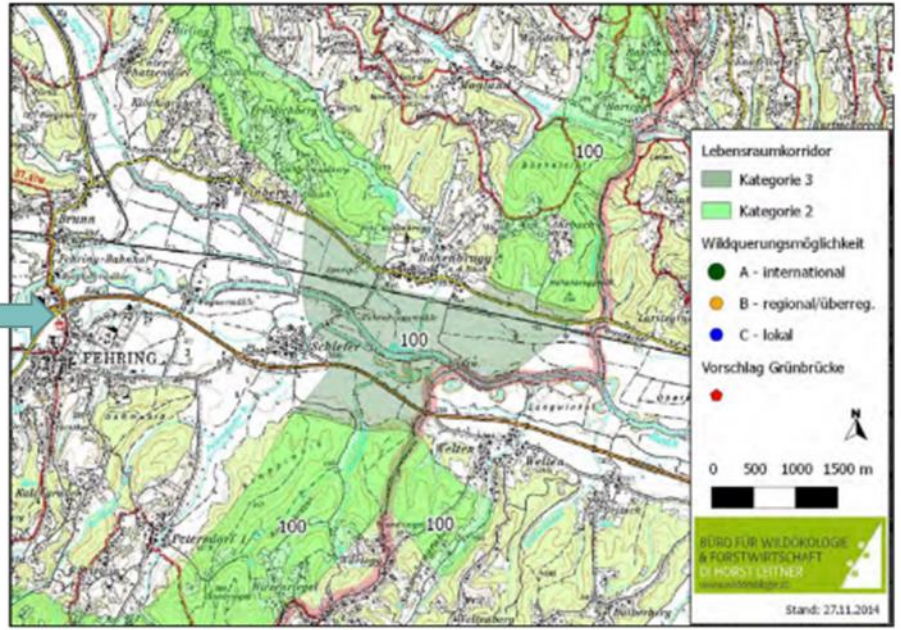
Abbildung 3-7 Lebensraumkorridor Nr. 96

Lebensraumkorridor: Kategorie 3 = sehr hoher Schutzbedarf, Kategorie 2 = hoher Schutzbedarf; Wildquerungsmöglichkeit an Autobahnen und Schnellstraßen: A = international, B = regional/überregional, C = lokal (VÖLK ET AL. 2001); Standortvorschlag für Grünbrückennachrüstung (VÖLK ET AL. 2001)

VISUALIZATION OF AUSTRIAN HABITAT CORRIDORS IN THE FOREST DEVELOPMENT PLAN (WEP)

Cartographic processing and automation





SAVEGREEN

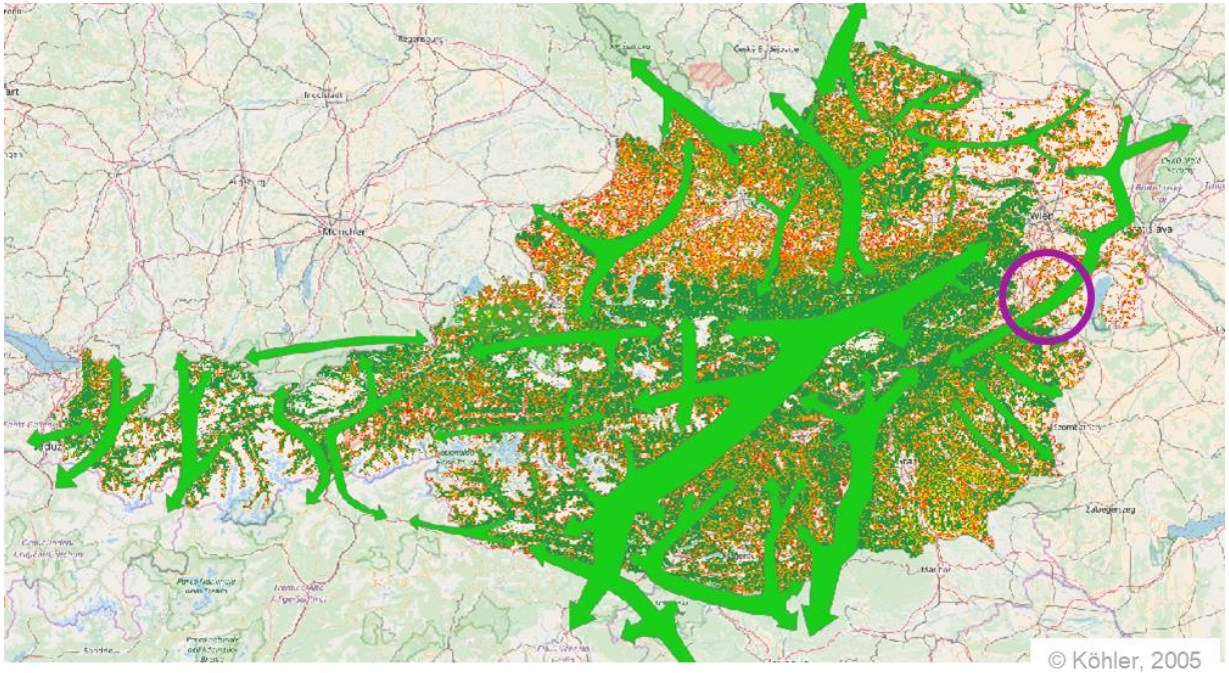
Interreg
EUROPEAN UNION
Danube Transnational Programme
SaveGREEN

umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

SaveGREEN will contribute to **improving** structural and functional **ecological connectivity in bottleneck areas** by adapting land use and management in the surroundings involving **stakeholders from different fields of experience** in Austria, Bulgaria, Czech Republic, Hungary, Romania, Slovakia and Ukraine.

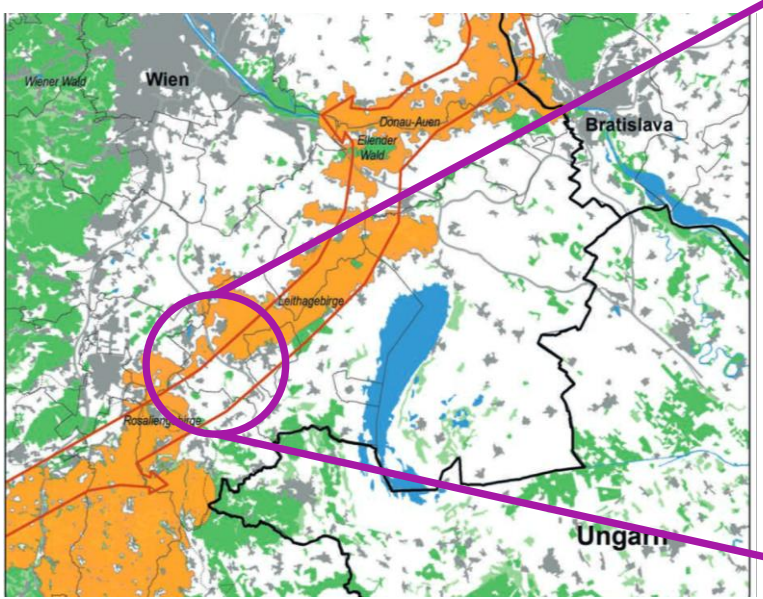
PILOT AREA PÖTTSCHING

Part of Alpine-Carpathian Corridor

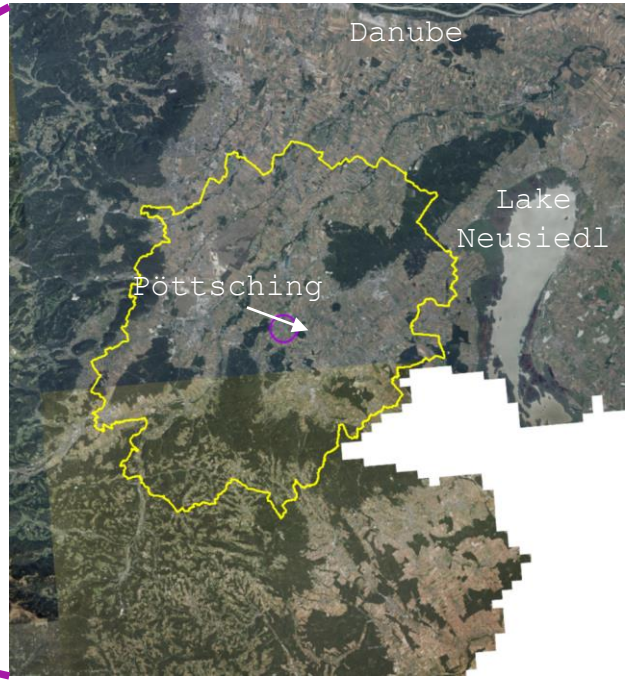


PILOT AREA PÖTTSCHING

Part of Alpine-Carpathian Corridor



© Suppan (2012)



© basemap.at

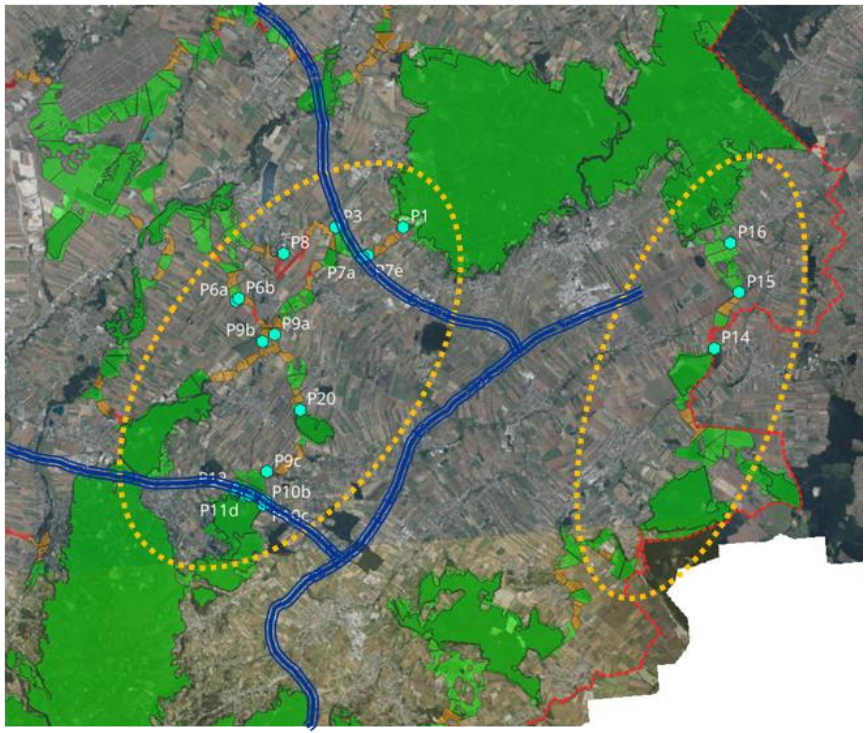
MONITORING OF ANIMAL ACTIVITIES

umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

Interreg
Danube Transnational Programme
SaveGREEN

Camera traps

- 26 monitoring sites
- 04.12.2021 - 29.05.2022 ff.
- Day and night
- 12,252 specific sightings



MONITORING OF ANIMAL ACTIVITIES

umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

Interreg
Danube Transnational Programme
SaveGREEN

Functional connectivity

umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

Interreg
Danube Transnational Programme
SaveGREEN

MONITORING OF ANIMAL ACTIVITIES

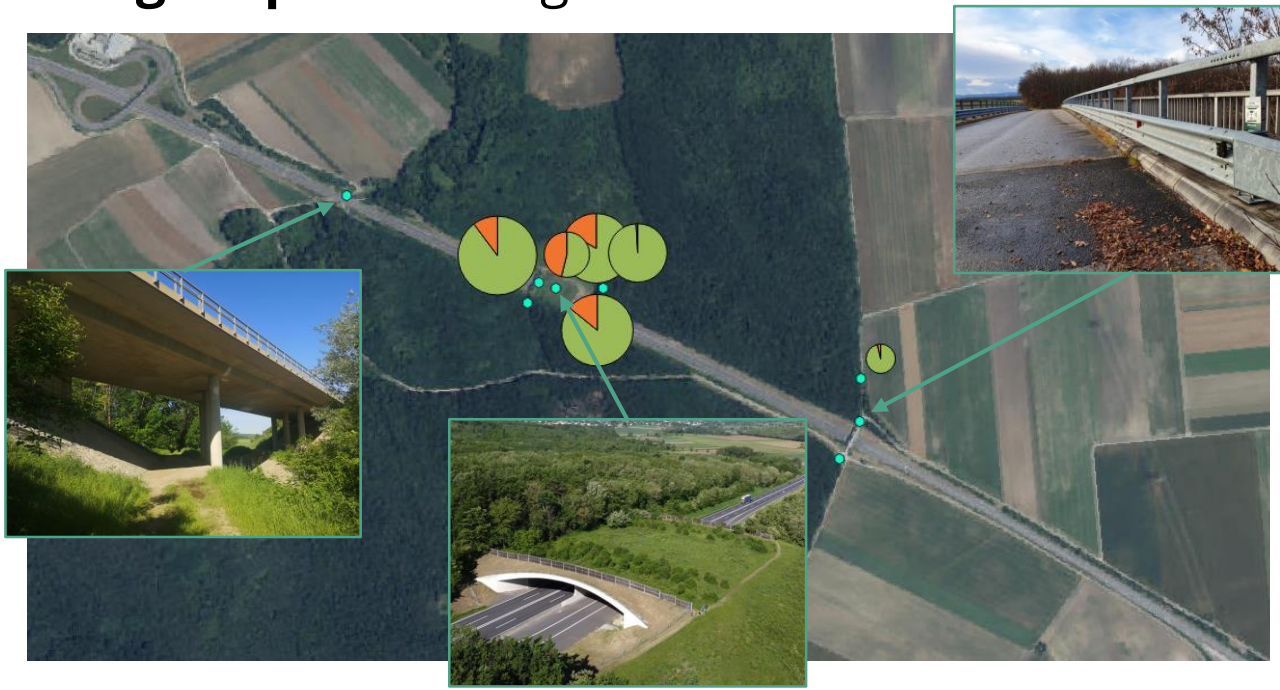
Target Species: Large herbivores

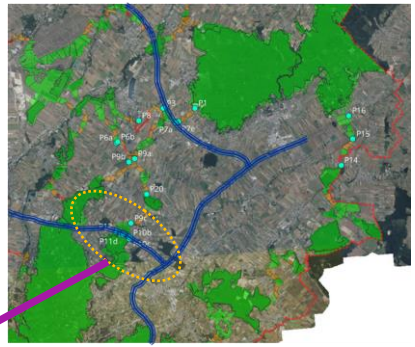
umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

Interreg
Danube Transnational Programme
SaveGREEN

MONITORING OF ANIMAL ACTIVITIES

Target Species: Large herbivores





Wild boar
Red deer

CONCLUSIONS

- Even the best **data-based modeling** results **require validation** using **real world data** obtained in the field
- The **green bridges** studied are **located at suitable sites** in the bottleneck area
- They clearly have **structural and functional connectivity** to support animal migration
- However, the **surrounding landscape**, which **integrates the bridge** into the larger **biotope network** or corridor in the first place, does not support the structural and functional connectivity or even has a **barrier effect**, especially for forest-bound species.
- Also the most advanced **green bridges** in the ideal locations **need efficient "feeder/supply roads"** = well structured environment with landscape elements as guiding features and stepping stones

FURTHER INFORMATION ...

- Workshop on habitat networking in spatial planning: 08. November 2022, Online [DE]

  Online: https://meet.goto.com/RolandGrillmayer/lebensraumvernetzung (15:00-18:00)

- Final Conference on habitat networking in Austria: 23. November 2022, Purkersdorf [DE]

  Registration: https://forms.office.com/r/mM7FUYEYK4

- SaveGREEN Final Conference: 6. - 7. December 2022, Vienna [ENG]

  Registration: https://www.interreg-danube.eu/approved-projects/savegreen/section/final-conference

umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

TEAM MEMBERS

Roland Grillmayer
roland.grillmayer@umweltbundesamt.at
http://grillmayer.eu

Gebhard Banko
gebhard.banko@umweltbundesamt.at

Florian Borgwardt
florian.borgwardt@umweltbundesamt.at

Horst Leitner
horst.leitner@wildoekologie.at
https://www.wildoekologie.at/

Florian Danzinger
florian.danzinger@umweltbundesamt.at

Christoph Bauerhansl
christoph.bauerhansl@bfw.gv.at

umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

CONTACT & INFORMATION

Florian Danzinger

Remote Sensing / Expert on habitat networks, green infrastructure and GIS

+43 (0)664/780 155 41

florian.danzinger@umweltbundesamt.at

www.umweltbundesamt.at

twitter.com/umwelt_at

www.linkedin.com/company/umweltbundesamt

Status Quo on Ecological Connectivity in Austria

Vienna, 07.11.2022