Connectivity Analysis of Riverine Landscapes – a methodological approach within the Alpine Space Project ECONNECT

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The Alpine Space Project ECONNECT aims at the enhancement of ecological connectivity across the Alpine range.

Objectives

- Protection of biodiversity in the Alps
- Ecological connectivity
- Cross-border conservation

http://www.econnectproject.eu/

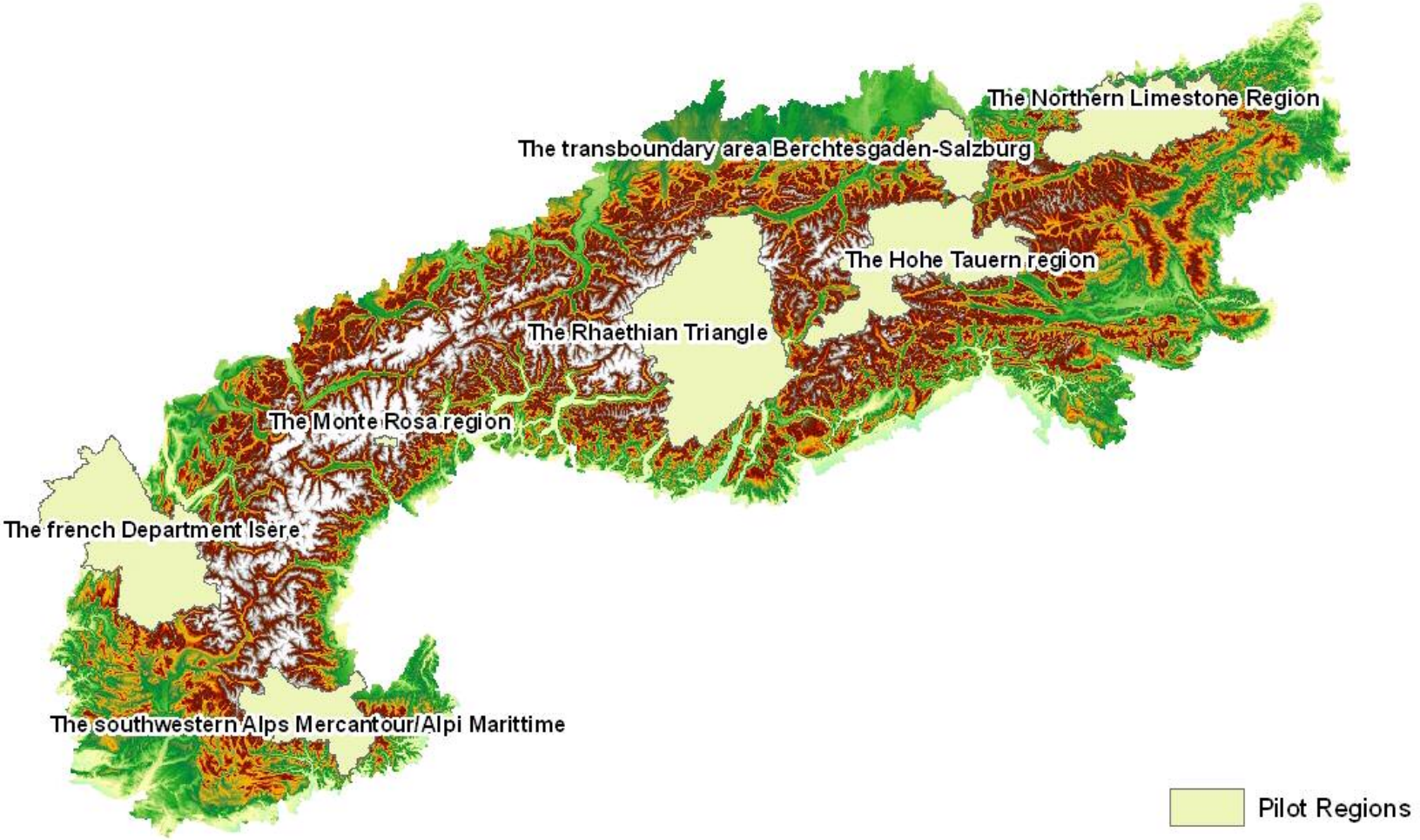
Caused by

- Hydropower
- Damms
- Settlement
- Land use
- Streets, Railways

Effects

- Habitat quantity and quality
- Barriers for migrating animals
- Isolation of populations
- Loss of species

ECONNECT – Investigation Area



ECONNECT – Focal Species

- Mammals (6 species)
- Fish (8 species)
- Amphibians (6 species)
- Reptiles (2 species)
- Birds (9 species)
- Crayfish (3 species)
- Insects (3 species)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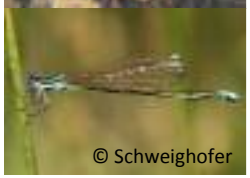
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species	english
Chondrostoma nasus	Common Nase
Phoxinus phoxinus	Minnow
Salmo salar	Salmon
Salmo trutta fario	Brown trout
Thymallus thymallus	Grayling
Salvelinus alpinus salvelinus (L.)	Arctic char
Cottus gobio	Bullhead
Barbus barbus	Barbel
Bombina variegata	Yellow-bellied Toad
Bufo bufo	Common Toad
Hyla arborea	Common Tree Frog
Rana temporaria	Grass Frog
Triturus alpestris	Alpine Newt
Triturus vulgaris	Smooth newt
Carabus clathratus	Carabus clathratus
Aeshna caerulea	Azure Hawker
Cordulegaster boltonii	Golden-ringed Dragonfly
Austropotamobius pallipes	White-clawed crayfish
Astacus astacus	European crayfish
Austropotamobius torrentium	Stone crayfish

species	english
Charadrius dubius	Little Ringed Plover
Actitis hypoleucos	Common Sandpiper
Ardea cinerea	Grey Heron
Alcedo atthis	kingfisher
Cinclus cinclus	Dipper
Motacilla alba	White Wagtail
Motacilla cinerea	Grey Wagtail
Acrocephalus palustris	Marsh Warbler
Acrocephalus schoenobaenus	Sedge Warbler
Cervus elaphus	Red Deer
Lutra lutra	European Otter
Myotis daubentonii	Daubenton's Bat
Neomys anomalus	Miller's Water Shrew
Neomys fodiens	Water Shrew
Castor fiber	European Beaver
Natrix natrix	Grass Snake
Emys orbicularis	European Pond Turtle
Myricaria germanica	German false tamarisk

University Innsbruck: Leopold Füreder, Andrea Bou-Vinals

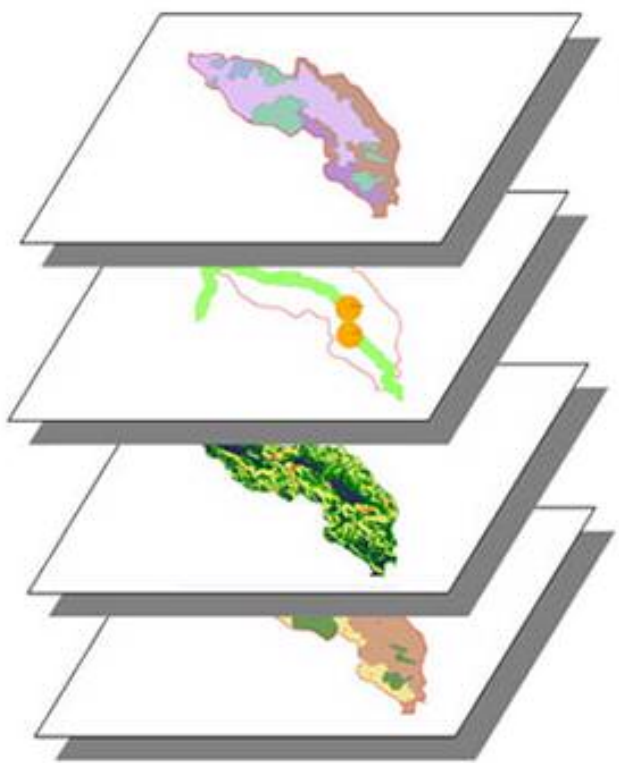
Connectivity Analysis of Riverine Landscapes - Methodology

A) Definition of the Riverine Landscapes

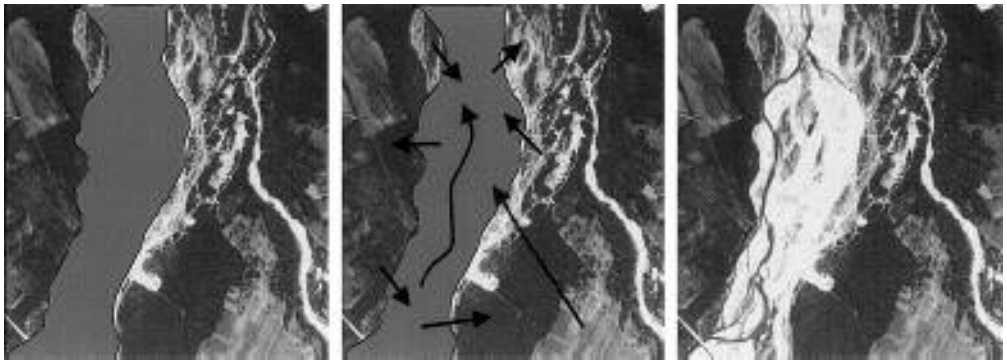
B) Fragmentation and Connectivity

3 Foci:

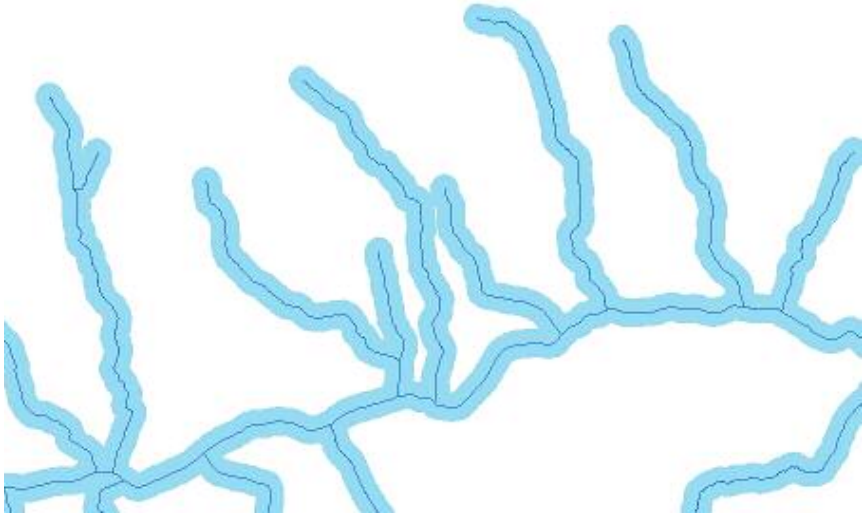
1. Spatial analysis of **fragmentation**
2. Characterisation of the **barriers**
3. Analysis of **connectivity** and **corridors**



Definition of Riverine landscapes



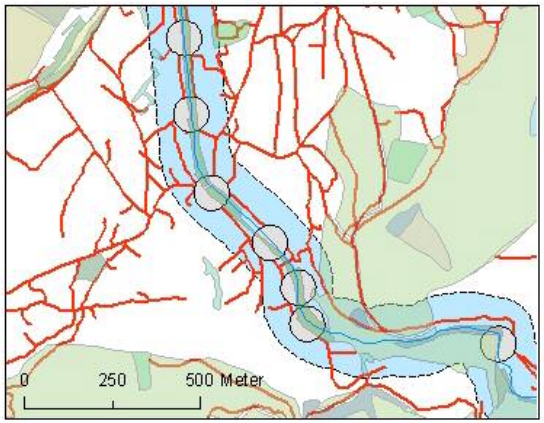
Wiens_2002

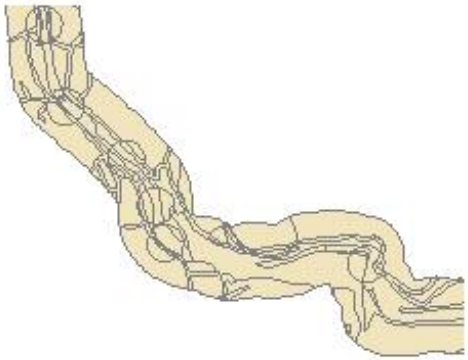


Focus 1: fragmentation

Application of fragmentation indices for running water systems to visualise the fragmentation of riverine landscapes.

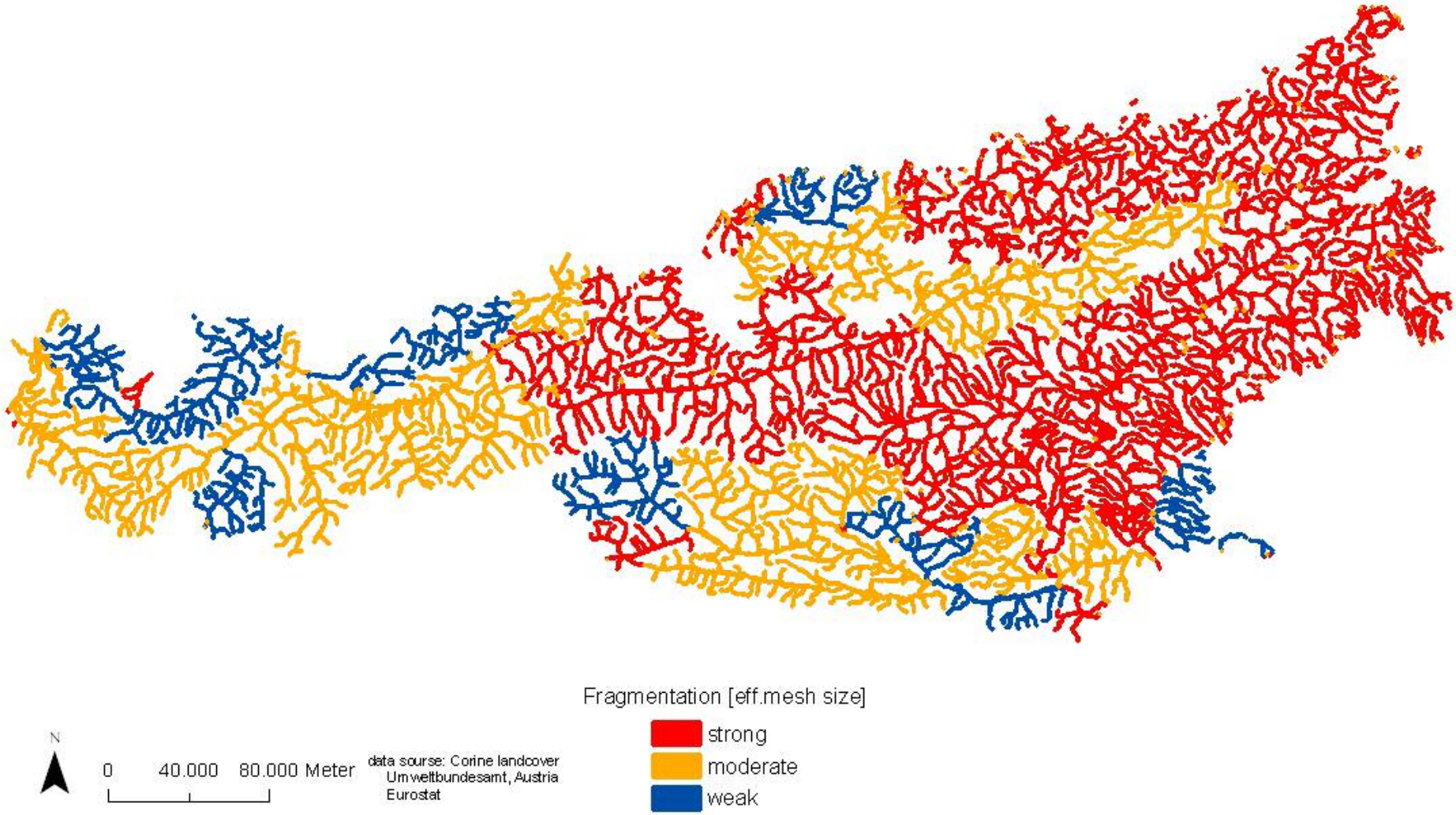
Identify connectivity and fragmention by calculating “effective Mesh size” (meff) and “degree of landscape division” (D) in ArcGIS with the extension of ArcGis “V-Late 1.1” *(LANG, S., TIEDE, D., 2003)*





Fragmentation - effective mesh size

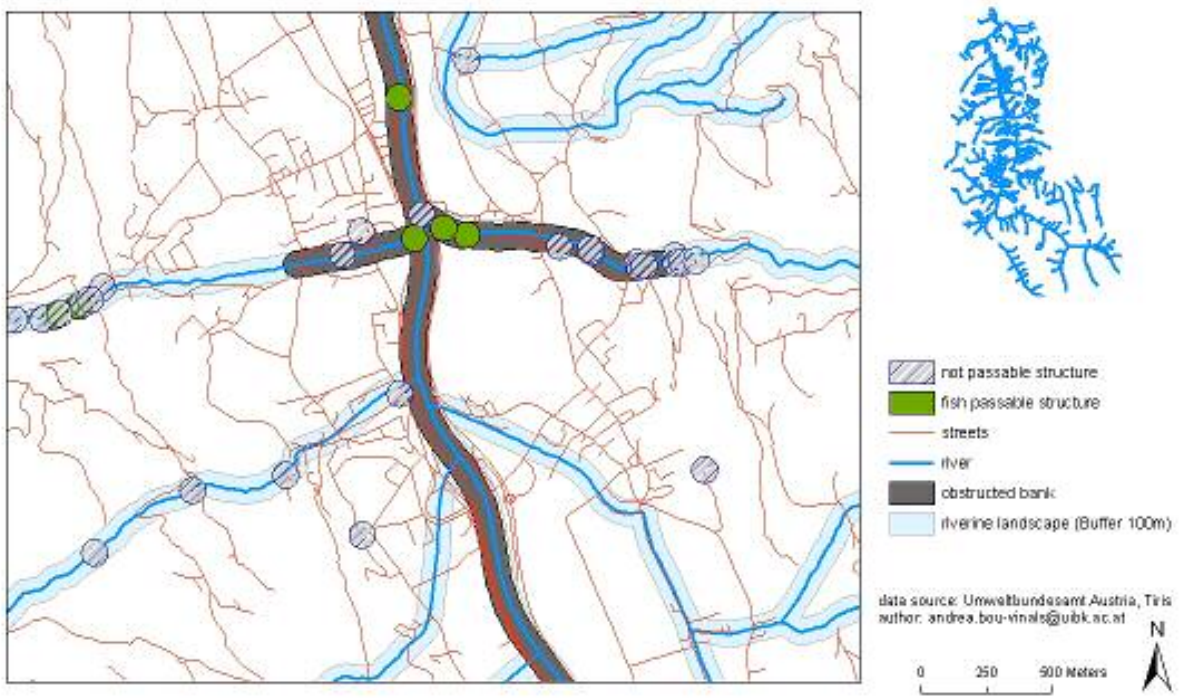
[average for small catchment basin]



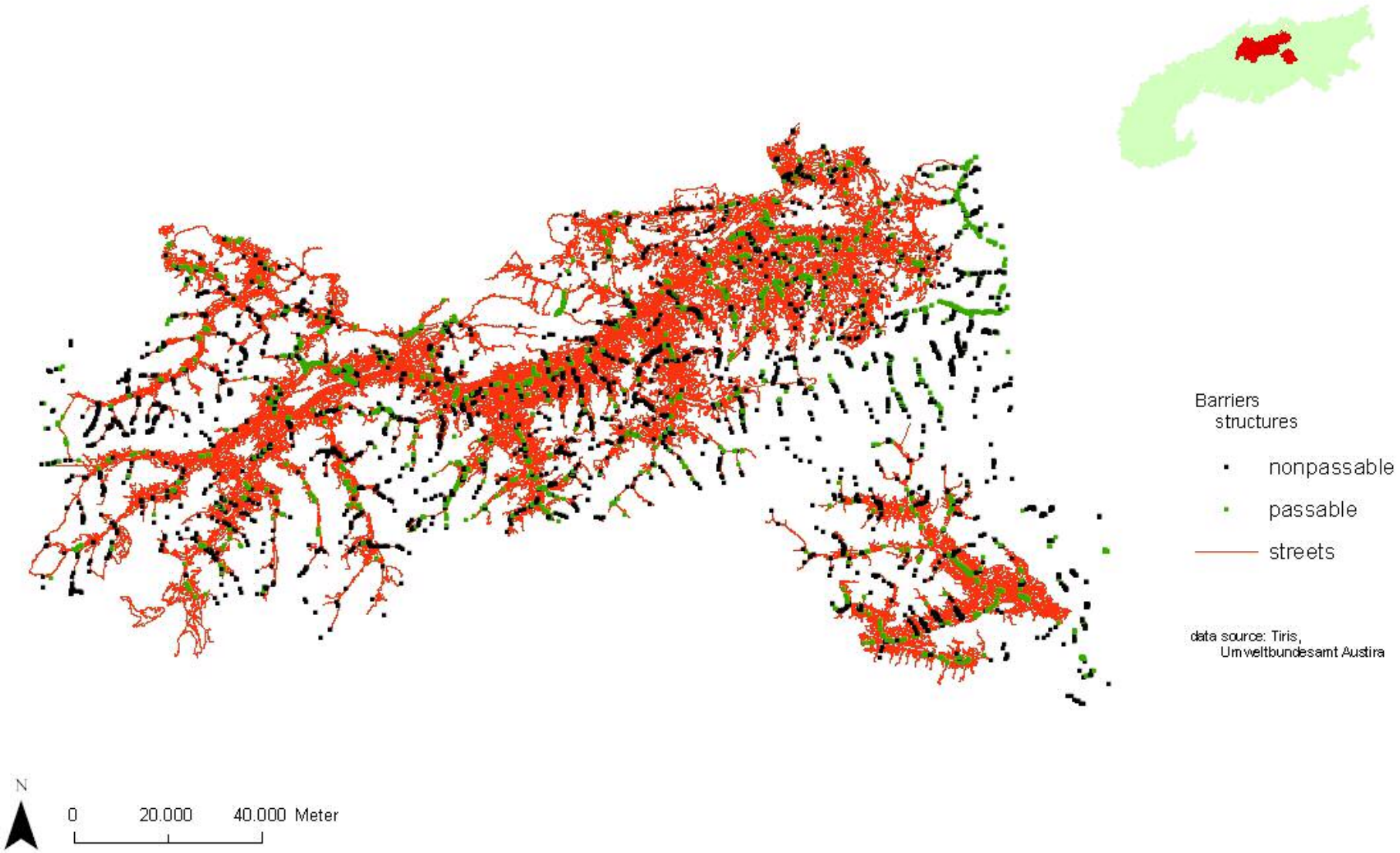
Focus 2: barriers

Identify/create a map of potential barriers in ArcGis for selected taxa/ focal species

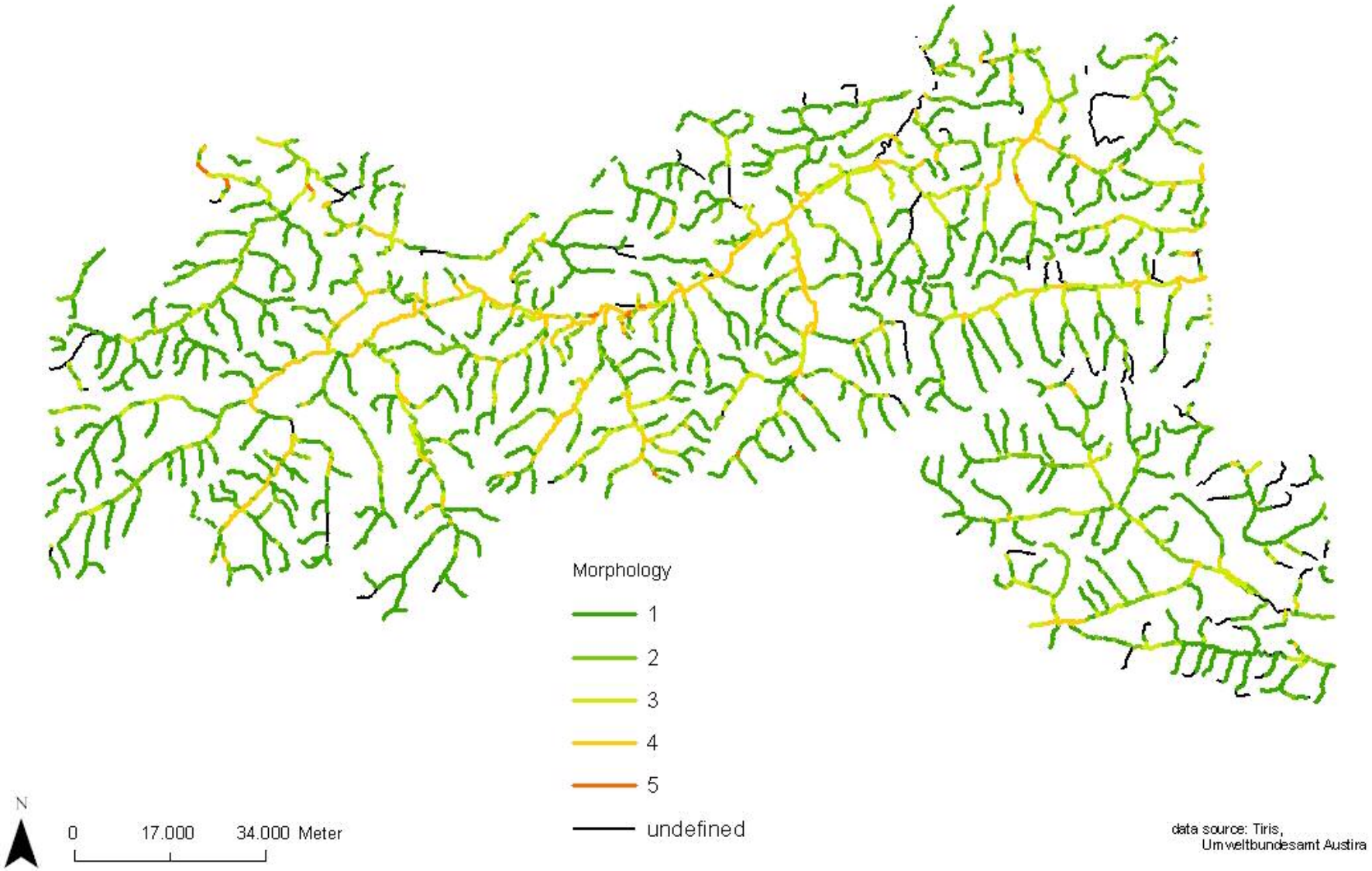
Analysis of impacts from barriers on habitat fragmentation (habitat dynamics) and distribution/dispersal and/or migration of focal species or taxa



Barrier Analysis – First Results



Rivermorphology, Tyrol - Austria



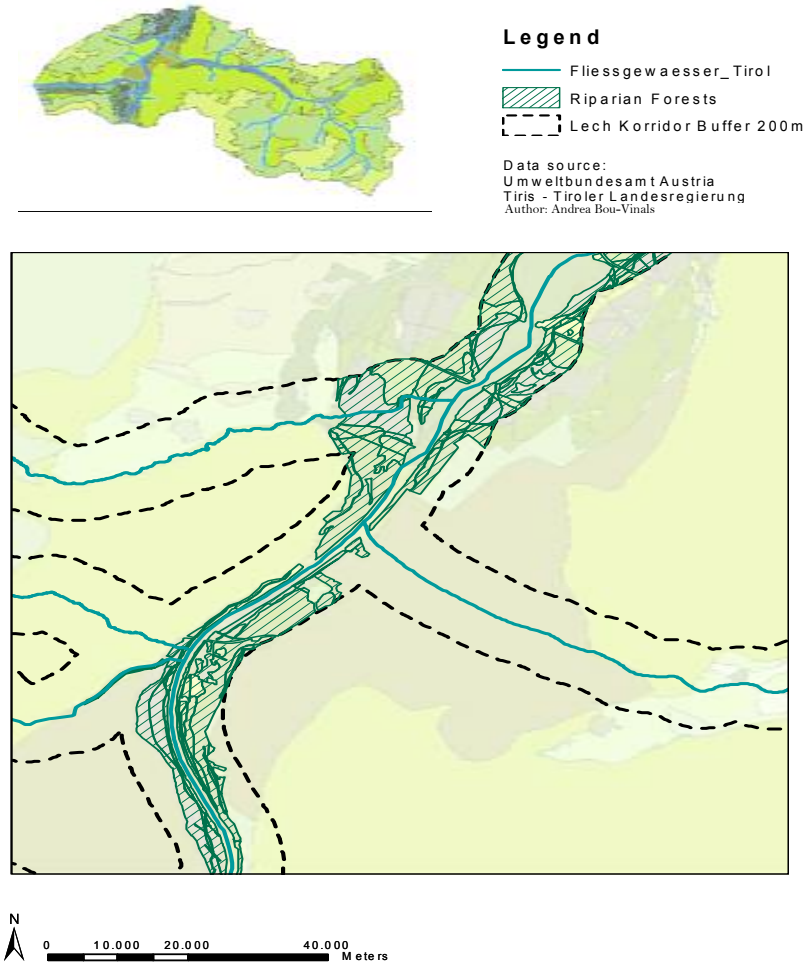
Connectivity Analysis - Methodology

Focus 3: connectivity and corridors

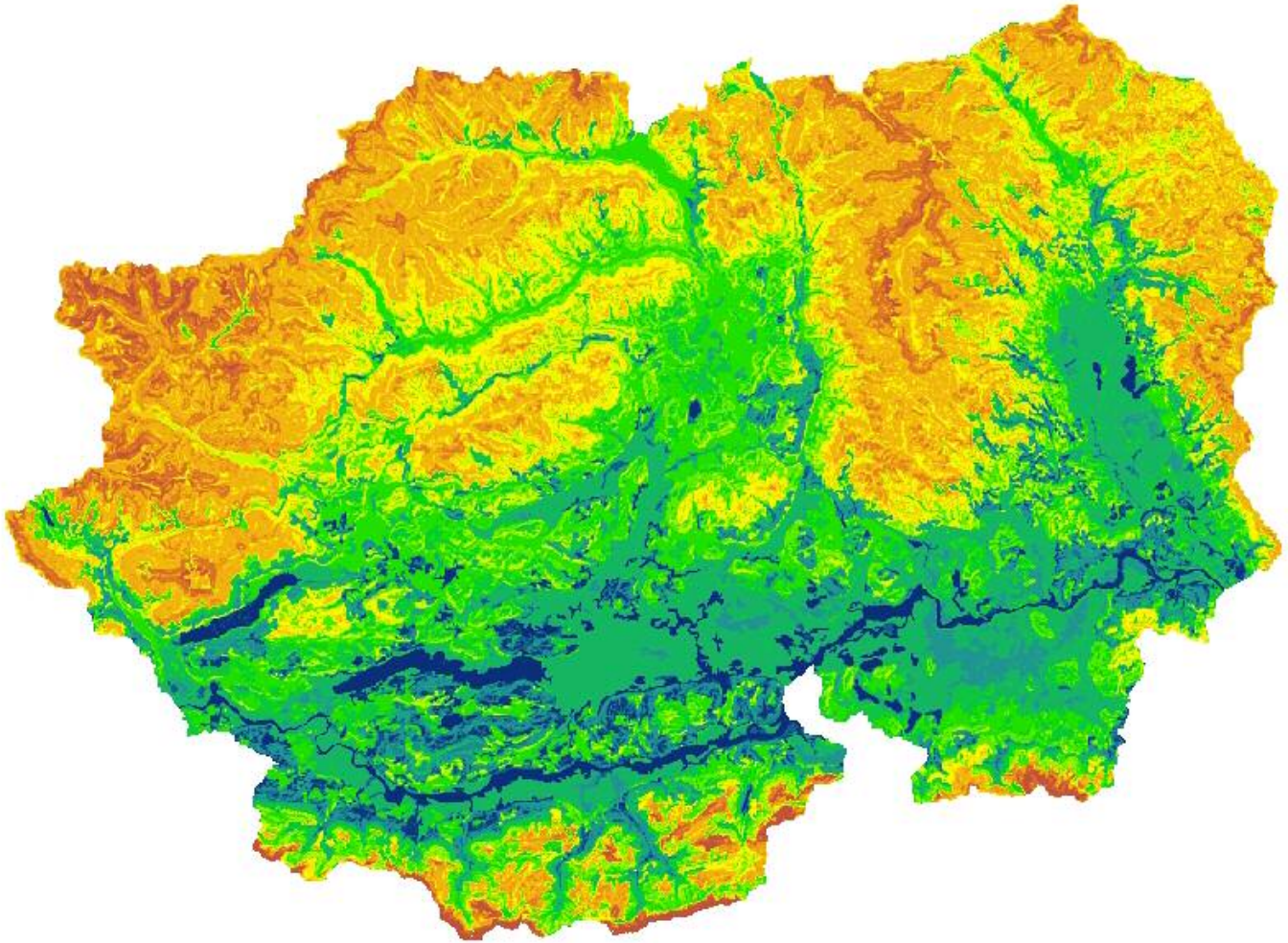
Overlay/intersect results of fragmentation and barrier analysis with distribution maps of the focal species

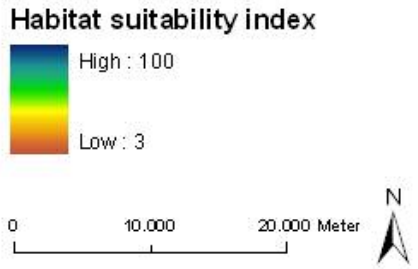
Quantitative analysis of **habitat connectivity** by applying representative indices (e.g. class coincidence probability, proximity index, contagion index)

Definition of **potential corridors** for each focal species and/or taxa

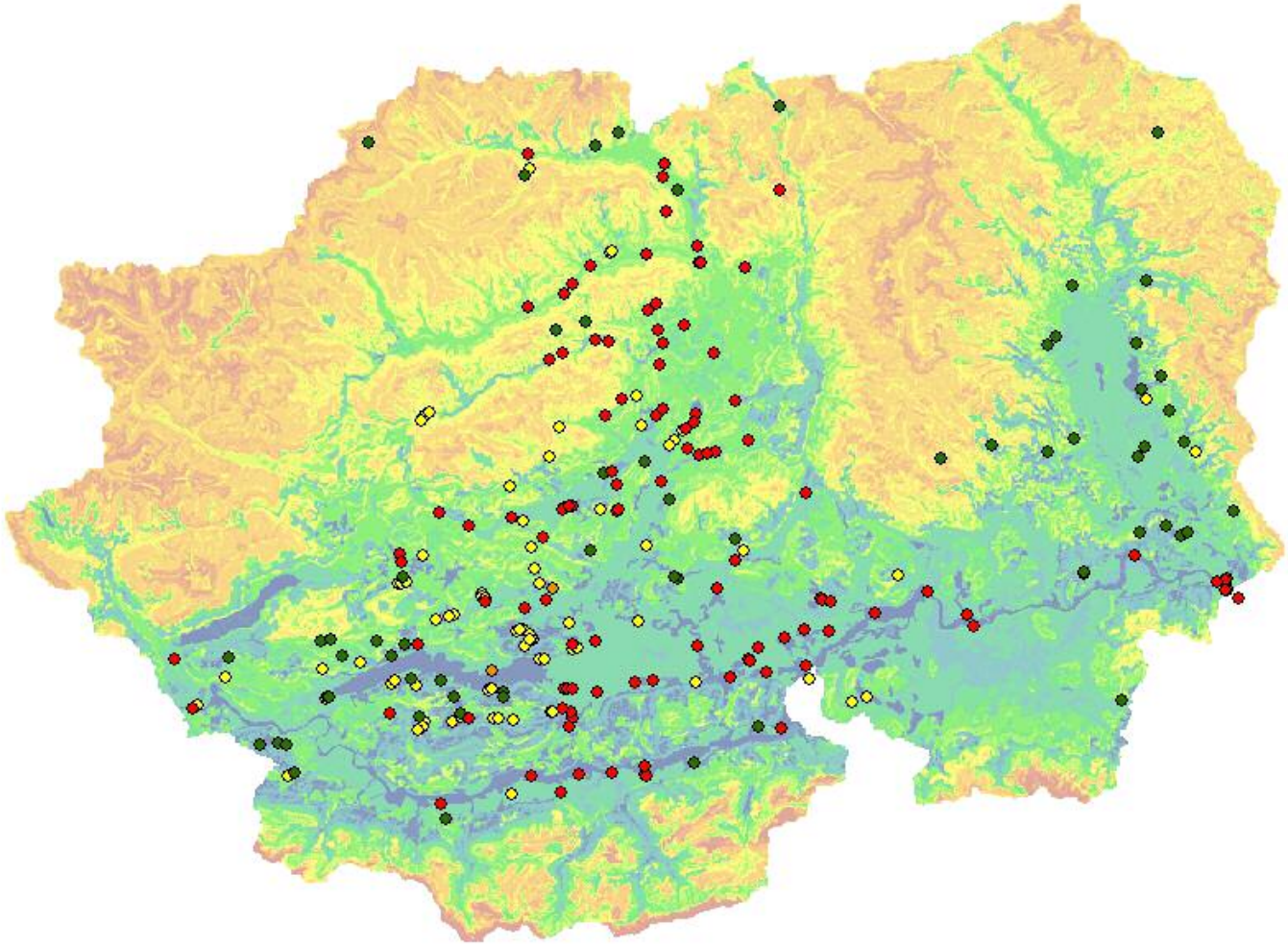


Habitat Suitability – Crayfish





Connectivity – Overlay HSM and Distribution Data



Crayfish species

- Astacus astacus (ASA)
- Astacus leptodactylus (ASL)
- Austropotamobius torrentium (AUT)
- Pacifastacus leniusculus (PAL)

Habitat suitability index

High : 100

Low : 3

0 10.000 20.000 Meter

N

Data needed

Catchments

Morphology of Water Features e.g substrate, river bed, longitudinal structures, temperature,...

Artificial structures (which affect rivers and brooks) powerstations, dams, weirs, culverts, canalisation,…

Riparian vegetation (habitat mapping) e.g.floodplain forests

Fishregions

Distribution data: presence data, point data of aquatic species

econnect
Restoring the web of life

Thank you for your attention