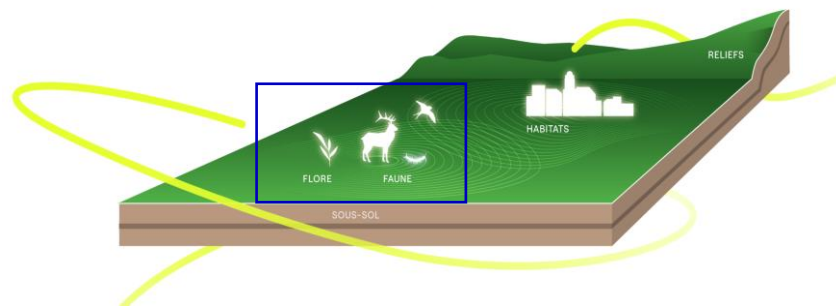


FCC: first results from the environmental aspects analysis



FCC meeting.

London. 05-09 June 2023

Objectives

In the context of the feasibility study of the FCC, the objectives are:

- To investigate the current environmental conditions for geotechnical and geophysical investigations (i.e. boreholes and seismic lines).
- To investigate the current environmental conditions of future surface sites.

Two complementary objectives:

Regulatory objective: obtain authorisation to carry out the subsurface site investigations in order to complete the feasibility study of the FCC



Example of a surface site in Versonnex (LHC point 6, France)

Environmental objective: to identify the existing environmental constraints and to minimize effects on natural environments.

Legal framework for subsurface investigations

In France

Land

- Application for temporary occupation permit

Water law

- Declaration file

Natural habitats

- Application for a Natura 2000 incidence study

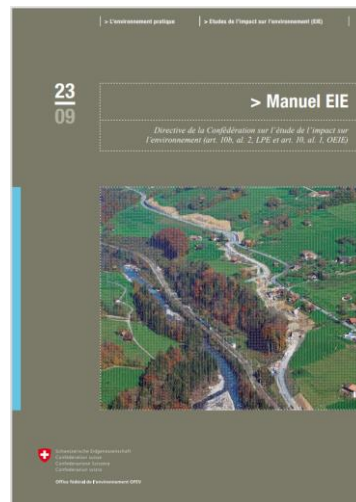
Protected species

- Potential derogation request file

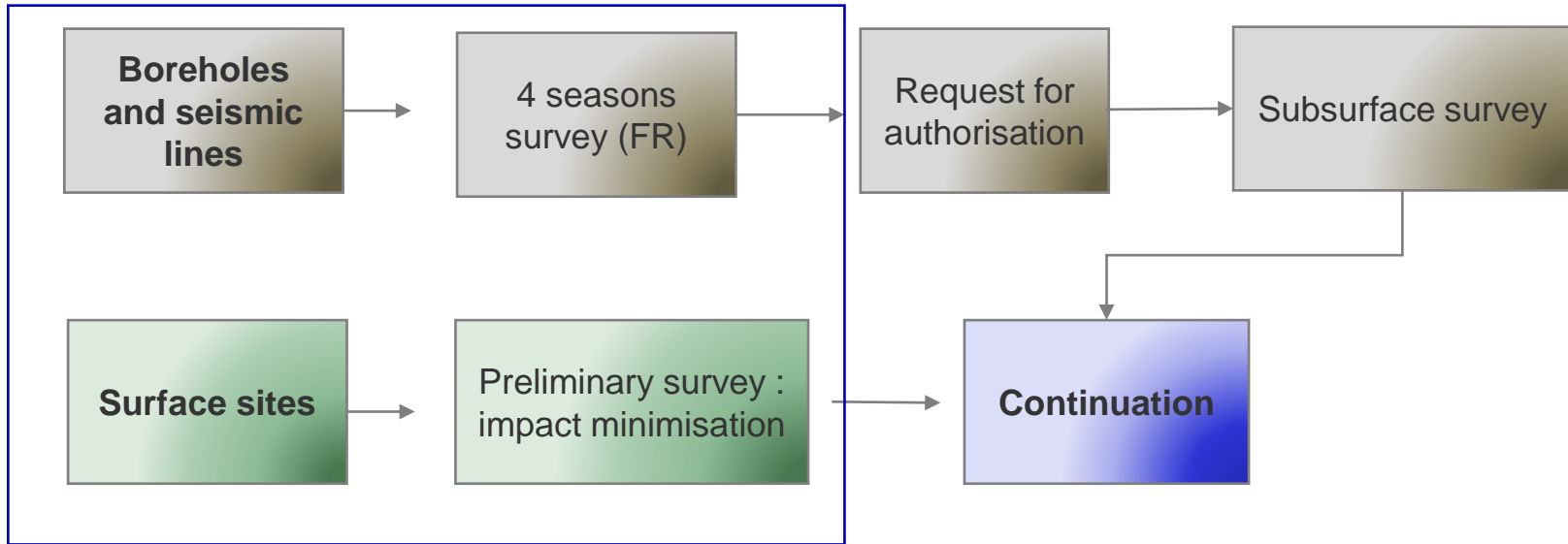
Subsurface

- Declaration file

In Switzerland



Part of the feasibility study



Current investigations in 2023

Boreholes

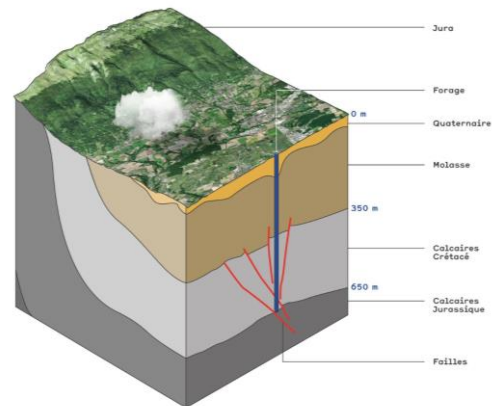
47 geotechnical boreholes

➔ with a depth between 100 m and over 400 m

What are the impacts on the environment?



Surface: 150 m².



Seismic lines

96 km of seismic lines to investigate the subsurface

Use of different techniques depending on site constraints and geological context:

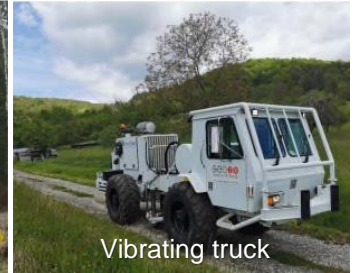
Seismic reflection

- High resolution using a vibrating truck
- Very high resolution using a wheelbarrow (off-shore for the lake of Geneva)

Seismic refraction

Falling weights or explosives depending on the sensitivity of the sectors.

What are the impacts on the environment?



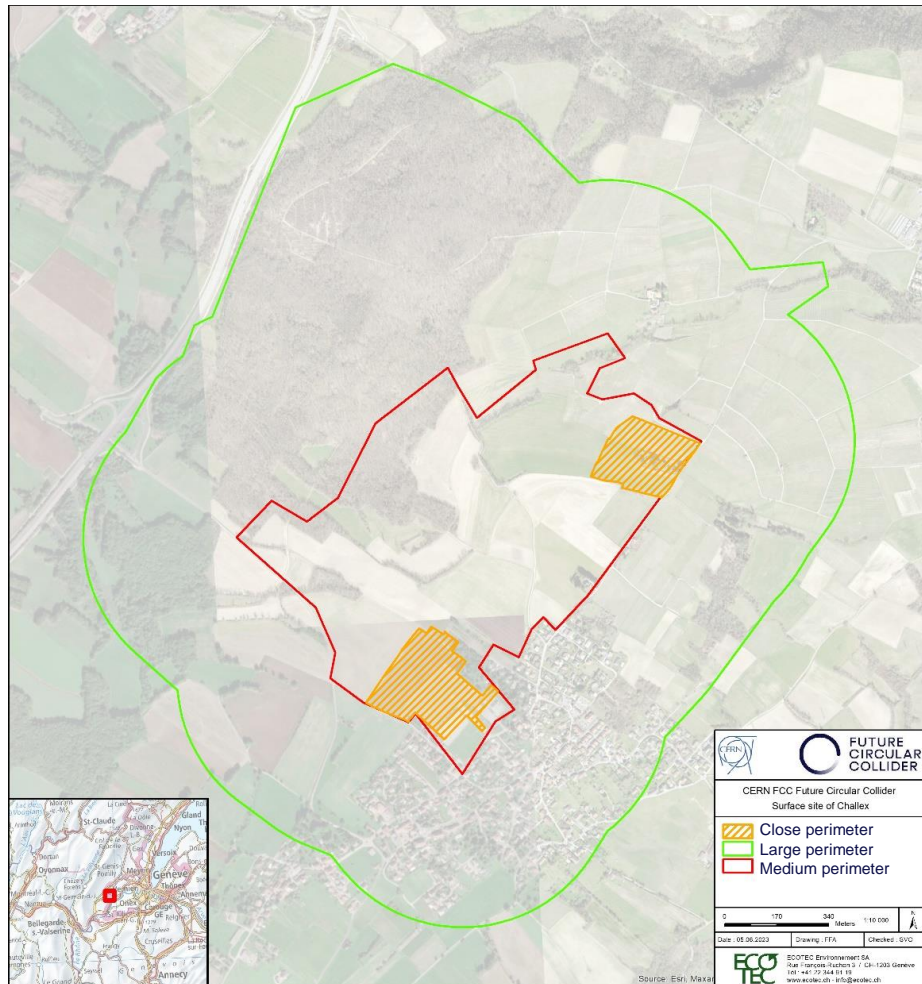
Surface sites

8 surface sites

- ➡ In Switzerland and France
- ➡ Minimize the effect on nature
- ➡ 3 levels of investigations

What are the current environmental and natural conditions of future surface sites?

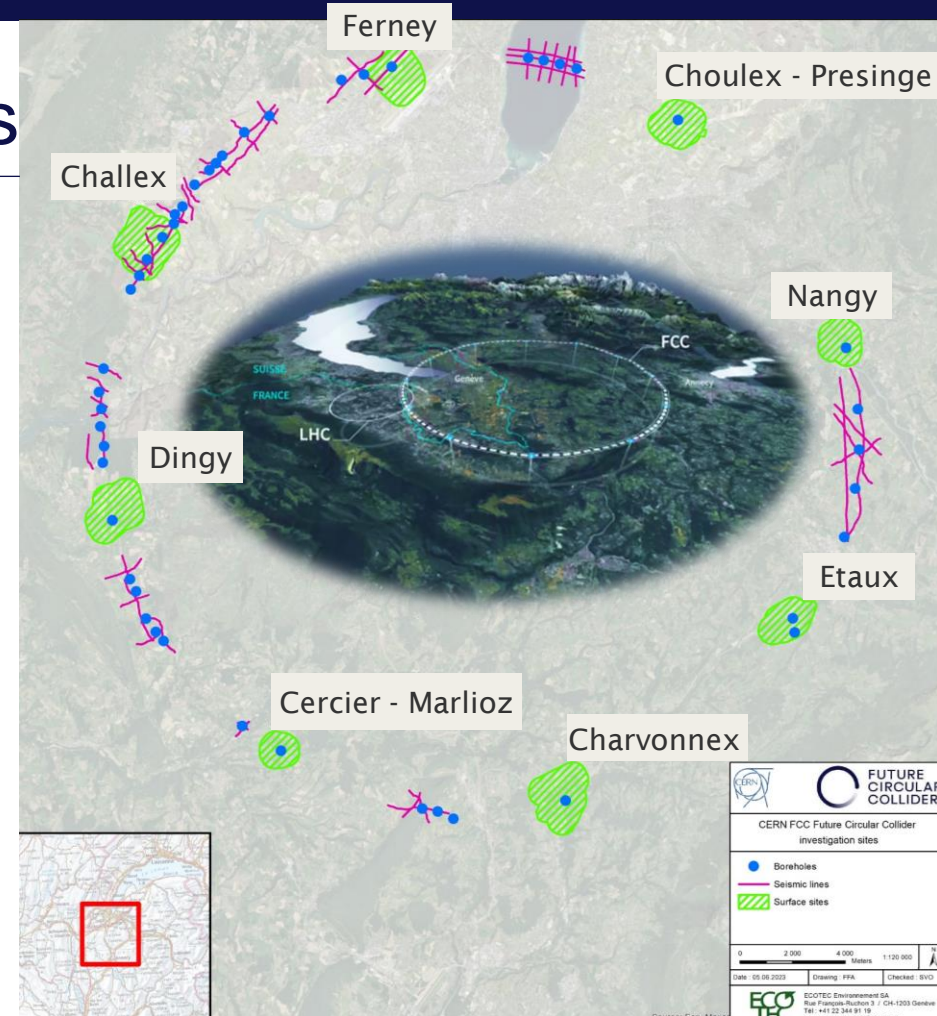
Can we avoid or minimize the potential effects ?



Where ? Investigations sites

General situation

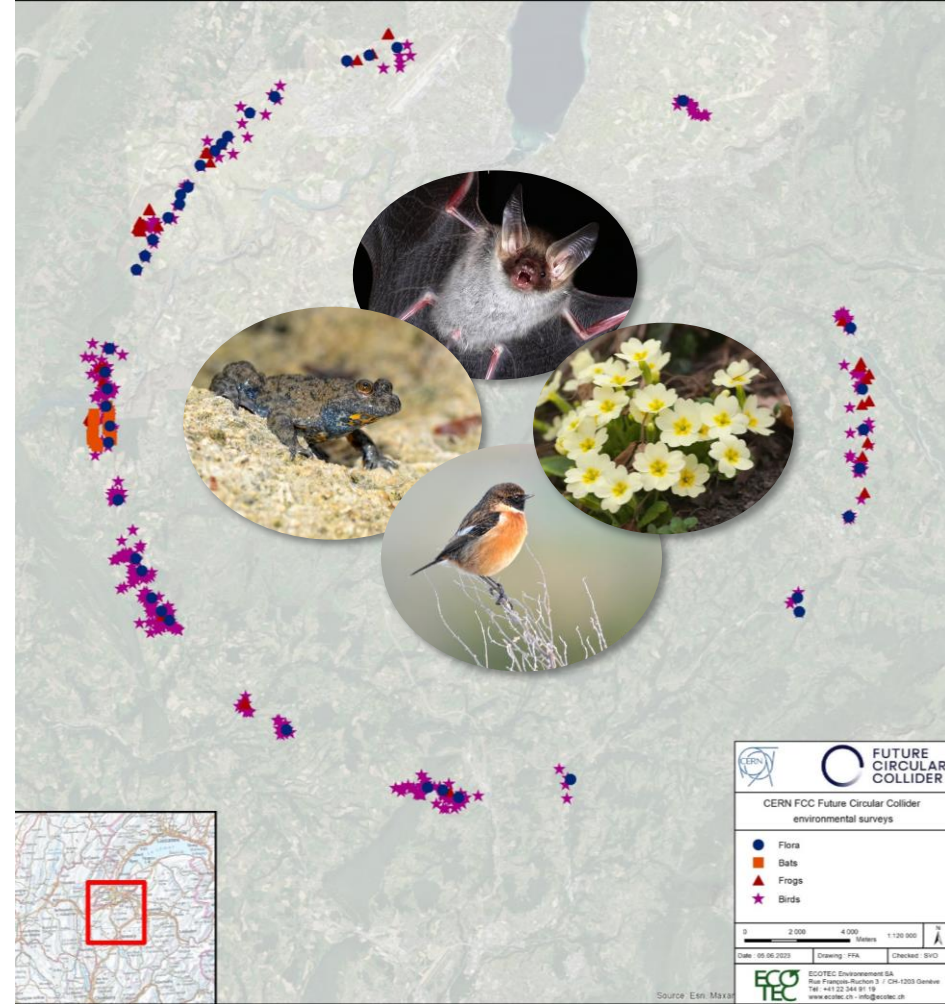
- 8 surface sites
- 47 boreholes
- 96 km of seismic lines



What? Fauna and Flora

- **Birds**
winter species, first breeders
- **Flora**
early species
- **Frogs**
migration, reproduction
- **Bats**
tree nesting sites

Status on 01 June 2023



How ? Methodology

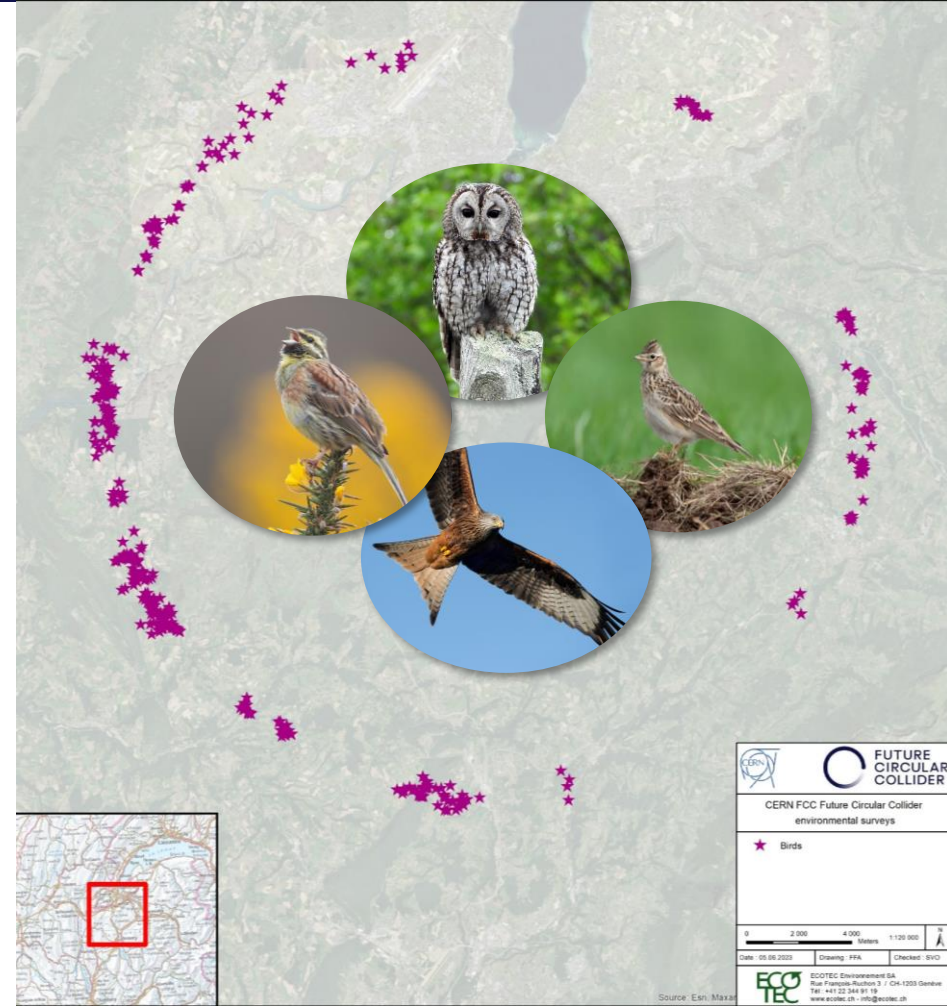


Preliminary results

Bird survey

- ➡ Survey of surface sites in Switzerland and France
- ➡ Survey of boreholes
- ➡ Survey of seismic lines
- ➡ 4 seasons

Number of observed species on total : 69
(2 seasons)



Remarkable species

Red Kite

Milvus milvus

Milan royal

Protection level : National (Fr)

Regional Red List : VU (FR), LC (CH)

Patrimonial status: Moderate to high



Kestrel

Falco tinnunculus

Faucon crécerelle

Protection level : National (Fr, CH)

Regional Red List : LC (FR), NT (CH)

Patrimonial status : Moderate to low



Skylark

Alauda arvensis

Alouette des champs

Protection level : National (Fr, CH)

Regional Red List : VU (FR), VU (CH)

Patrimonial status: Moderate to high



Zizi Sparrow

Emberiza cirius

Bruant zizi

Protection level : National (CH)

Regional Red List : LC (FR), NT (CH)

Patrimonial status: Moderate to low



Remarkable species

Little Owl

Athene noctua

Chevêche d'Athéna

Protection level : National (Fr, CH)

Regional Red List : VU (FR), EN (CH)

Patrimonial status : **High**

Observed near a future borehole.



Eurasian Wryneck

Jynx torquilla

Torcol fourmilier

Protection level : National (Fr, CH)

Regional Red List : VU (FR), NT (CH)

Patrimonial status : **High to moderate**



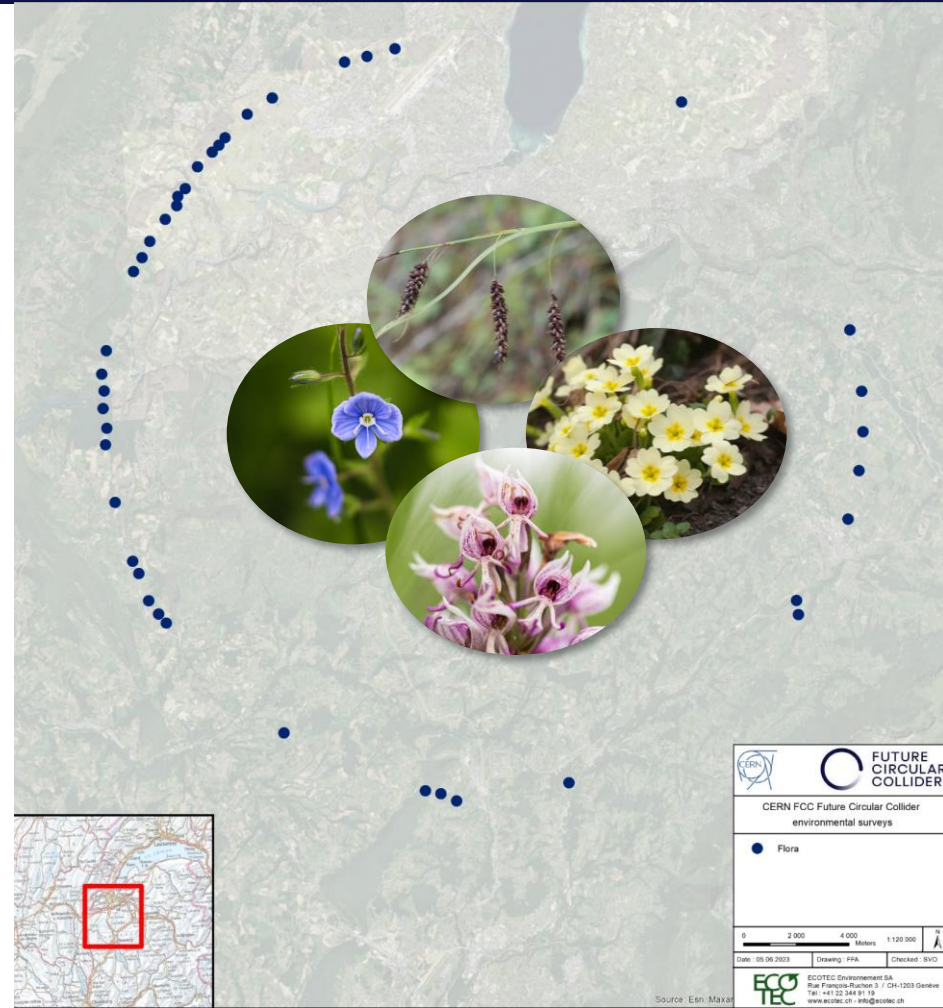
Plant survey

Flora

- ➔ Survey of early species done for boreholes and seismic lines
- ➔ 4 specialists are doing the work

Number of observed species on total: 93

surface sites have not yet been investigated in spring 2023



Plant survey

Only common species
on French territory

Species observed

Monkey orchid

Orchis simia

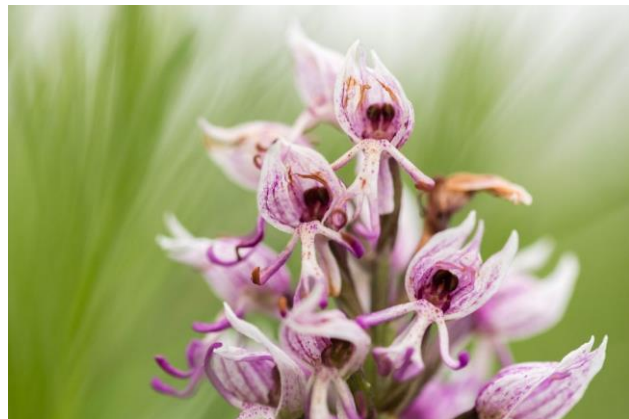
Orchis singe

Protection level : National (CH)

Regional Red List : LC (FR), VU (CH)

Patrimonial status : Moderate

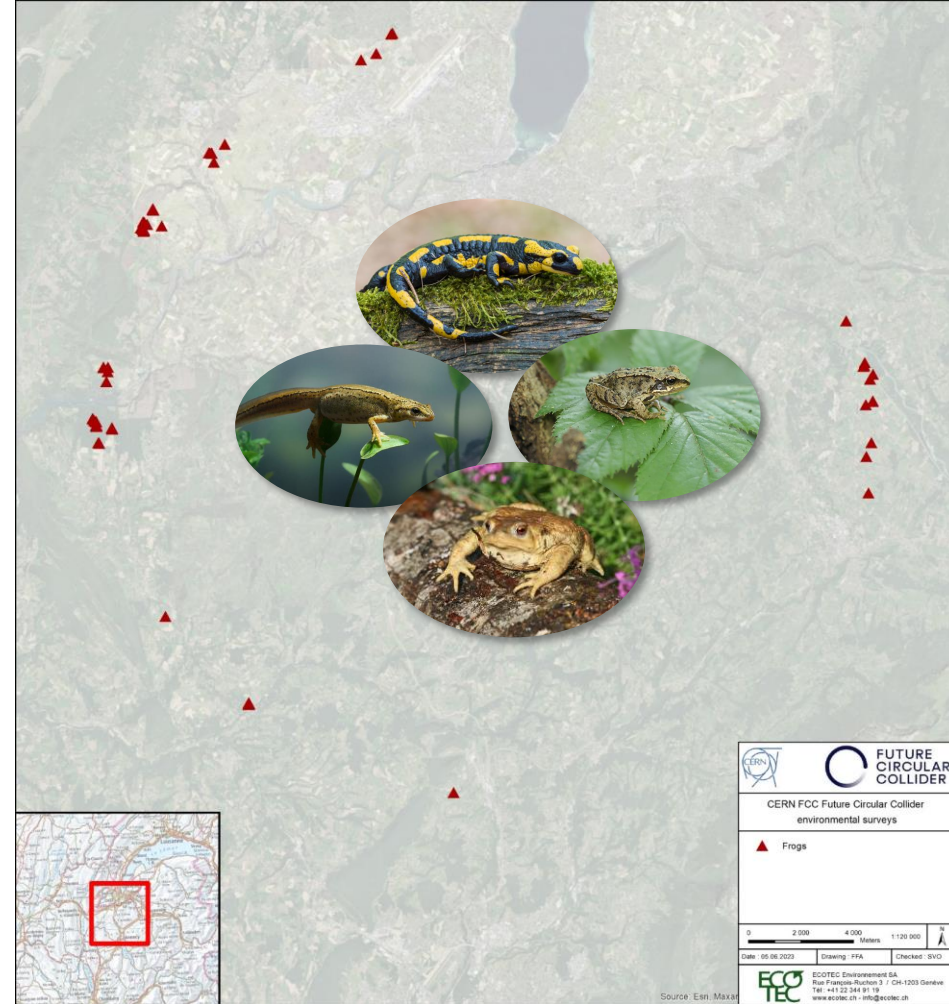
Important ZNIEFF in Rhône-Alpes



Frog survey

➔ Zones with high potential were investigated

Number of observed species on total: 8



Remarkable species

Spotted Salamander

Salamandra salamandra

Salamandre tachetée

Protection level : National (CH)
Regional Red List : LC (FR), NT (CH)
Patrimonial status : Moderate to low



Palmed Newt

Lissotriton helveticus

Triton palmé

Protection level : National (CH)
Regional Red List : LC (FR), VU (CH)
Patrimonial status : Moderate



European common frog

Rana temporaria

Grenouille rousse

Protection level : National (Fr, CH)
Regional Red List : NT (FR), VU (CH)
Patrimonial status : Moderate



Remarkable species

Yellow-bellied Toad

Bombina variegata

Sonneur à ventre jaune

Protection level : National (FR, CH)

Regional Red List : VU (FR), EN (CH)

Patrimonial status : **High**

Observed near future seismic lines.

National plan of action in France and Geneva in favour of this species.



Ongoing : bat surveys

- ➔ Search for tree shelters for bats



- ➔ Done for sensitive sites.

- ➔ Installation of ultrasonic recording devices (echolocation)



Preliminary results

Current situation for all sites

- ➔ 79 faunal species identified in the preliminary studies.
Surveys of insects have not yet started.
- ➔ 93 flora species identified in the preliminary studies.
The surface sites have not yet been surveyed.
- ➔ 10 protected species were observed in the investigation perimeters.
The number is relatively low at this stage.
- ➔ The expected situation in the surface sites could considerably change the challenges in terms of biodiversity.



Some surface sites are close to natural environments with high potential.

To continue in 2023

- **Flora**
- **Reptiles**
- **Entomofauna
(Dragonflies, Beetles, Butterflies)**
- **Wetlands**
- **Forests**
- **Terrestrial mammals**

The presence of Satyrinae (*Lopinga achine*) (very high patrimonial species) in the forests of Challex sector must be precisely verified.



The challenge is equivalent in Etaux sector for Maculinea.



Planning of 2023

Calendar of surveys

Now : 06 June 2023

Groups		Methodology	January	February	March	April	May	June	July	August	September	October	November	December
Terrestrial	Bibliography													
	Forest ruts	visual survey, geolocation												
	Chiroptera	search for cavities and ultrasonic listening												
	Migratory birds	observations												
	Nocturnal birds	listening and observations												
	Cavities arboreal	visual survey, geolocation												
	Amphibians	search for clutches and adults and/or night-time listening												
	Flora "forest"	visual survey												
	Diurnal breeding birds	listening and observations												
	Reptiles	visual survey												
	Mammals	observation of tracks and signs												
	Flora "open environments"	transects												
	Butterflies	Adults: visual survey (direct and binoculars), possible capture												
	Bryophytes	visual survey (presence of LR sp. only)												
	Habitats	plot surveys, habitat mapping (1 pass/site)												
	Coleoptera	visual survey												
Aquatic	Odonata	capture of larvae and survey of exuviae												
	Orthoptera	visual survey with capture												
	Mayflies	capture of larvae and survey of exuviae												
	Aquatic crustaceans	observations												
	Fishes	electrofishing												
	Aquatic vascular flora	visual survey												

Check for new species
in autumn and winter

Take home message

- ➡ At this stage, some species with high patrimonial status have been identified.
- ➡ Investigations on seismic sites show some challenging constraints with fauna and fewer with flora.
- ➡ Protected species with high patrimonial status, are present nearby seismic lines (yellow-bellied Toads in Rhone area) or future boreholes (Little owl in an old orchard of the Arve area).
- ➡ Actions to ensure the preservation of these species shall be taken.
- ➡ Surfaces sites include areas of high natural value. They will be mainly investigated between June and September.



Take home message

- ➔ Investigations are continuing to accurately assess the constraints concerning natural environments, flora and fauna.
- ➔ The next phase will be to **avoid** the impacts, or to **reduce** it, or to **compensate** it.
- ➔ For example, we can avoid the sensitive areas or perform the geotechnical and geophysical investigation at more favorable period of the year.
- ➔ In 2023-2024 : other aspects of environmental state analysis will be prospected such as water quality, agriculture, noise and air pollution.



Thanks

CERN

Co-authors

Cantonal services (Geneva, GESDEC)

Local authorities (Swiss and French)

Swiss authorities (FOEN)

French authorities (DDT/ DREAL)



setec



Coopérative d'entrepreneurs
Métiers de la forêt et de
l'environnement



REPUBLIQUE
ET CANTON
DE GENEVE



La Région
Auvergne-Rhône-Alpes



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Bundesamt für Umwelt BAFU
Office fédéral de l'environnement OFEV
Ufficio federale dell'ambiente UFAM
Uffizi federal d'ambient UFAM



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Thank you for your attention