Dieselstraße 12
72555 Metzingen
GERMANY

sfeeri

BIODIVERSITY IMPACT ASSESSMENT AND ACTION PLAN

H U G O B O S S

19.10.2021

Summary

Biodiversity Impact Assessment - Overview

Methodology

Biodiversity Action Plan - Site specific measures

Biodiversity Action Plan - Species specific measures

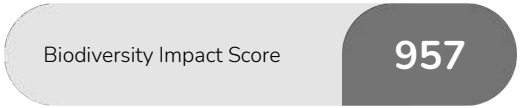
MANAGEMENT SUMMARY

This report documents the results of the sfeeri biodiversity impact assessment and the action plan for the site on

Dieselstraße 12, 72555 Metzingen, GERMANY

A total of **33 species** were identified as being impacted by the activities on the assessed site.

The **biodiversity impact score is 957, which is above average.**
Actions to reduce impact should be prioritized at this site.



The impact on local biodiversity and ecosystems was assessed using the following, site specific parameters:

- The impact of the assessed site is initially assessed on a radius of **50km** around the site, using IUCN red list data and subsequently the direct radius of influence is determined as **500m** based on the industry category
- The activity on site belongs to the industry category **professional, scientific and technical activities** and the sub-industry category **activities of head offices; management consultancy activities.**
- The following impact factors as defined by the German Federal Agency for Nature Conservation in cooperation with the European Union.are attributed to the industry- and sub industry category: **direct area removal, change in habitat structure/use, change in abiotic site factors, barrier or trap effect/ loss of individuals, non-material effects, material effects, targeted manipulation of species and organisms**
- The site climate and habitat categories are **cool temperate moist settlement, grassland and cropland on mountains**

3 ACTIONS TO TAKE IMMEDIATELY

These 3 actions can be implemented with very low effort and require no specific expertise and create no costs.

- **Create local coalitions**
  Engage with local organisations and community leaders to coordinate actions (e.g. NGOs, other businesses, residents' associations, the municipality). There might already be activities happening to engage with or support for your own activities might be available.

- **Implement a policy of avoidance of the use of potentially harmful substances**.
  Even after treatment in a wastewater treatment plant, the water entering the rivers can contain high levels of harmful substances such as phosphates, solvents, surfactants and other chemical products, which potentially damage nature - for details see page 20 of this report.

- **Create an awareness raising campaign.**
  Achieving positive impact and maximizing the outcome of efforts to avoid impacts on local biodiversity can easily be multiplied by engaging all staff members. Not involving everybody and not ensuring everybody's understanding and "buy-in" on the other hand, might hinder the success of any measures taken - for details see page 21 of this report..

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ASSESSMENT OVERVIEW

Dieselstraße 12
72555 Metzingen
GERMANY

Biodiversity Impact Score **957**

Number of impacted species: **33**

LC 28 Least concern	NT 4 Near threatened	VU 0 Vulnerable
EN 0 Endangered	CR 1 Critically endangered	P 29 Protected by law

Protected by law refers to EU legislation, local regulations may vary. It serves the purpose of information and may help in prioritizing actions. The legal obligation to act does not arise directly from this. This can only be derived if the occurrence of these species on the site (or within a radius around the site defined by a nature conservation authority) has been proven by a biologist on site and according to applicable methodological standards.

Example species impacted on site:

Yellow-bellied toad
Bombina variegata

Population: DECREASING

Alpine newt
Ichthyosaura alpestris

Population: DECREASING

European medicinal leech
Hirudo medicinalis

Population: UNKNOWN

Bechstein's bat
Myotis bechsteinii

Population: DECREASING

IDENTIFIED THREATENED SPECIES AFFECTED BY SITE ACTIVITY

#	species name	common name	conservation category	population trend	biome	taxonomic group
1	Oenanthe oenanthe	Northern Wheatear	least concern	Decreasing	Terrestrial/fresh water (=inland waters)/marine	AVES
2	Eptesicus serotinus	Big brown bat	Least Concern	Stable	Terrestrial	MAMMALIA
3	Pelobates fuscus	Spadefoot toad	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
4	Falco vespertinus	Red-footed falcon	Near Threatened	Decreasing	Terrestrial|Freshwater (=Inland waters)	AVES
5	Numenius arquata	Eurasian Curlew	Near Threatened	Decreasing	Terrestrial|Freshwater (=Inland waters)|Marine	AVES
6	Rana arvalis	Moor Frog	Least Concern	Stable	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
7	Arvicola amphibius	European Water Vole	Least Concern	Stable	Terrestrial|Freshwater (=Inland waters)	MAMMALIA
8	Somatochlora metallica	Emerald dragonfly	Least Concern	Unknown	Terrestrial|Freshwater (=Inland waters)	INSECTA
9	Neomys fodiens	Eurasian Water Shrew	Least Concern	Stable	Terrestrial|Freshwater (=Inland waters)	MAMMALIA
10	Plecotus auritus	Brown long-eared bat	Least Concern	Stable	Terrestrial	MAMMALIA
11	Lacerta agilis	Sand Lizard	Least Concern	Decreasing	Terrestrial	REPTILIA
12	Pipistrellus pipistrellus	Common pipistrelle	Least Concern	Stable	Terrestrial	MAMMALIA
13	Myotis brandtii	Brandt's bat	Least Concern	Stable	Terrestrial	MAMMALIA
14	Myotis nattereri	Natterer's bat	Least Concern	Stable	Terrestrial	MAMMALIA
15	Lepus europaeus	European Hare	Least Concern	Decreasing	Terrestrial	MAMMALIA
16	Phragmites australis	Common Reed	Least Concern	Stable	Terrestrial|Freshwater (=Inland waters)	LILIOPSIDA
17	Cervus elaphus	Red Deer	Least Concern	Increasing	Terrestrial	MAMMALIA
18	Zootoca vivipara	Viviparous Lizard	Least Concern	Unknown	Terrestrial	REPTILIA
19	Triturus cristatus	Northern crested newt	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
20	Coronella austriaca	Smooth Snake	Least Concern	Decreasing	Terrestrial	REPTILIA

IDENTIFIED THREATENED SPECIES AFFECTED BY SITE ACTIVITY

#	species name	common name	conservation category	population trend	biome	taxonomic group
21	Hyla arborea	European tree frog	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
22	Pelophylax lessonae	Pool Frog	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
23	Anguilla anguilla	European eel	Critically Endangered	Decreasing	Freshwater (=Inland waters)|Marine	ACTINOPTERYGII
24	Muscardinus avellanarius	Hazel Dormouse	Least Concern	Unknown	Terrestrial	MAMMALIA
25	Dactylorhiza sambucina	Elder-flowered Orchid	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	LILIOPSIDA
26	Salamandra salamandra	Fire salamander	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
27	Rana dalmatina	Agile Frog	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
28	Groenlandia densa	Opposite-leaved Pondweed	Least Concern	Stable	Freshwater (=Inland waters)	LILIOPSIDA
29	Lissotriton helveticus	Palmate Newt	Least Concern	Stable	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
30	Myotis bechsteinii	Bechstein's Myotis	Near Threatened	Decreasing	Terrestrial	MAMMALIA
31	Hirudo medicinalis	European Medicinal Leech	Near Threatened	Unknown	Terrestrial|Freshwater (=Inland waters)	CLITELLATA
32	Ichthyosaura alpestris	Alpine Newt	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
33	Bombina variegata	Yellow-bellied toad	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
34						
35						
36						
37						
38						
39						
40						

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Biodiversity Action Plan - Site specific measures

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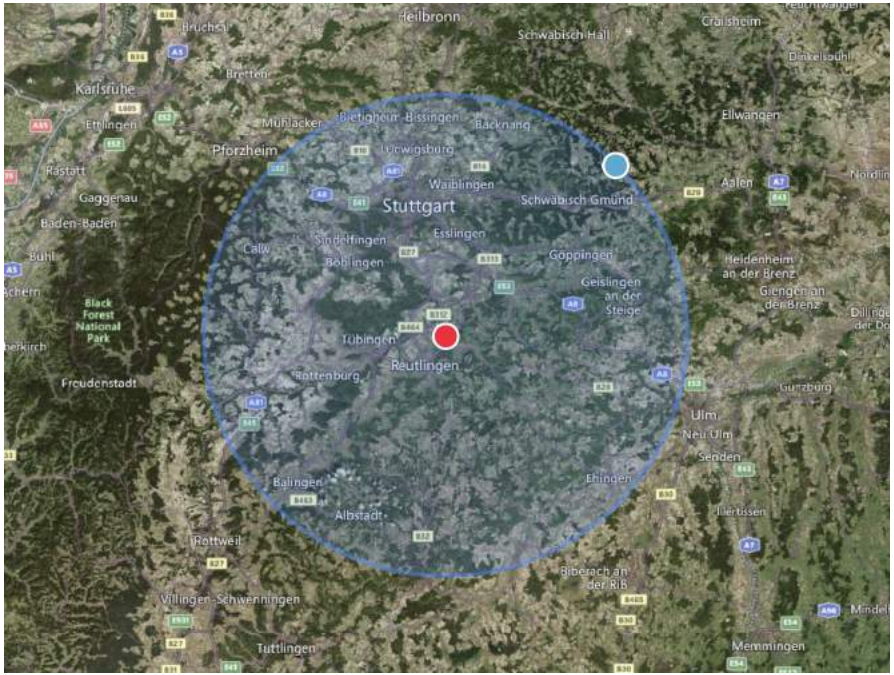
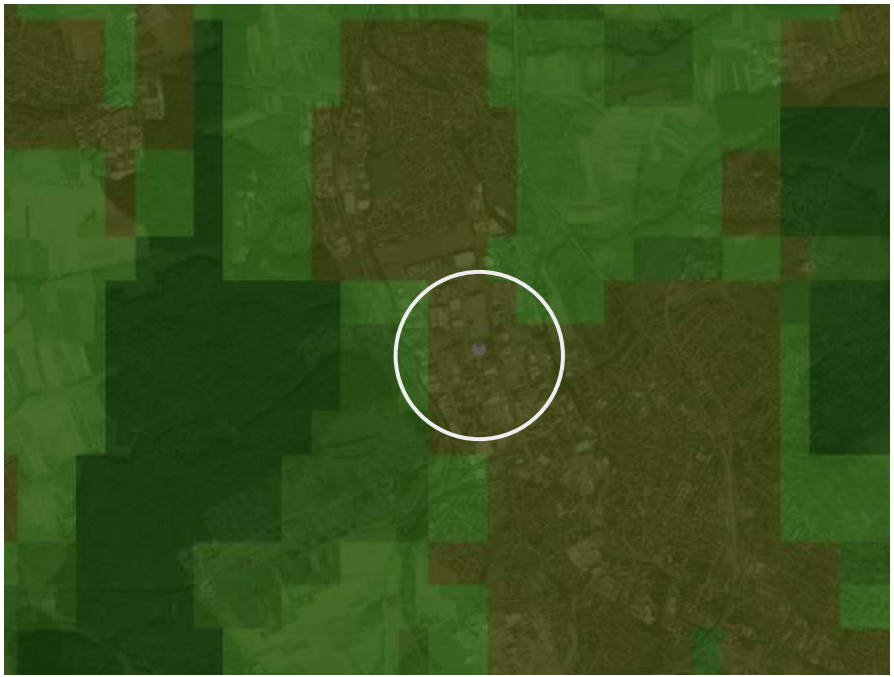
BIODIVERSITY IMPACT ASSESSMENT EXPLAINED 1/5



The assessment starts with the identification of the occurrence of threatened species as per IUCN red list within a 50 km radius around the site.

BIODIVERSITY IMPACT ASSESSMENT EXPLAINED 2/5



The identification of

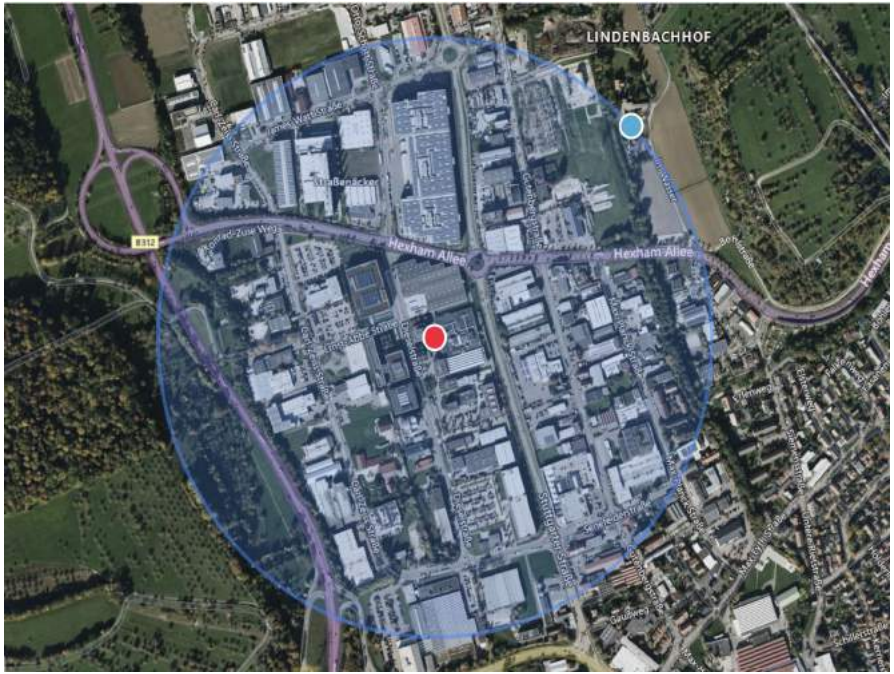
- landforms,
- landcover/ Vegetation and
- climate region

is made via the World Terrestrial Ecosystems classification. This is used to determine existing habitats and to match this with the likeliness of the occurrence of threatened species.

The ecosystems adjacent to the assessed site at
Dieselstraße 12
72555 Metzingen
GERMANY

are classified as
Cool Temperate Moist Settlement, Grassland and Cropland on Mountains

BIODIVERSITY IMPACT ASSESSMENT EXPLAINED 3/5



The identification of ecosystems/ habitats is further enhanced by satellite imagery and using an industry related radius to determine the direct sphere of impact. Industry classification is made according to the Eurostat Economic Framework of 13 categories and 99 sub categories.

The assessed site belongs to the industry type
Professional, scientific and technical activities

sub-industry category
Activities of head offices; management consultancy activities

Radius for the industry type
500m

BIODIVERSITY IMPACT ASSESSMENT EXPLAINED 4/5

In order to identify the local impact on biodiversity, the industry specific activities are taken into account and Impact Factors are attributed. There are **8 Impact Factor categories and 34 sub categories** as defined by the German Federal Agency for Nature Conservation in cooperation with the European Union. These factors can be applied globally.

There are further metrics taken into account, such as the economic output of the industry and the local geographical distribution of threatened species in relation to its global distribution.

These are the 8 Impact factors and their applicability to the assessed site, based on industry/sub-industry category:

#	Impact Factor Categories	Relevant
1	Direct Area Removal	y
2	Change in Habitat Structure / Use	y
3	Change in Abiotic site factors	y
4	Barrier or trap effect / loss of individuals	y
5	Non-material effects	y
6	Material effects	y
7	Radiation	n/a
8	Targeted manipulation of species and organisms	y

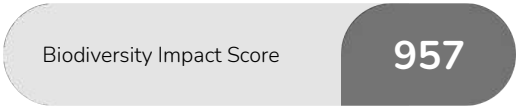
BIODIVERSITY IMPACT ASSESSMENT EXPLAINED 5/5

The Biodiversity Impact Score is a way of quantification and helps to understand local differences in biodiversity impact. It forms the basis of a wider, strategic approach and can be used to prioritize actions on different sites.

For each threatened species that occurs near the site and that is impacted by the industry specific activity and its attributed impact factors, a “range-sized rarity” number is calculated. This forms the basis of the sfeeri Biodiversity Impact Score. The higher the impact on individual species and the higher the total number of threatened species, the higher the Biodiversity Impact Score.

The methodology also allows to determine a percentage of influence on individual species. This is based on the relation of the geographical sphere of influence and the global distribution of species.

Biodiversity Impact Score of the assessed site:



This is an above average score, and actions to reduce impact should be prioritized at this site.
At the assessed site, a number of important species occurs. **Out of the the 33 threatened species occurring near the location, these 5 species make up for ⅓ of the total impact.** If species specific actions are considered, it is recommended to target them first:

1. **Yellow-bellied Toad** (Bombina variegata)
2. **Alpine Newt** (Ichthyosaura alpestris)
3. **European Medicinal Leech** (Hirudo medicinalis)
4. **Bechsteins’s Myotis** (Myotis bechsteinii)
5. **Palmate Newt** (Lissotriton helveticus)

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CONSERVATION BASICS

There are three general rules of biodiversity conservation that are independent from individual site impact and are always recommended:

1. **Maintain, restore or create natural habitats** e.g. by avoiding intensive landscaping
2. **Eliminate pollution of habitats**, e.g. through prohibiting the use of fertilizers and pesticides
3. **Avoid disturbance of species**, e.g. through noise or light pollution

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Example measures for local biotopes

- Implement a protective gardening policy including preserving natural features and avoiding intensive lawn mowing and tree trimming
- Implement a policy of avoidance of the use of potentially harmful substances including a commitment to strictly limit the use of chemical products and a complete ban of salt use for de-icing of outside areas

Example species on site that would profit: Pipistrellus pipistrellus (Common pipistrelle)

- species is highly sensitive to noise and light pollution
- it is under pressure due to loss of natural habitats
- its natural prey is highly affected by widely used toxic chemicals

BIODIVERSITY IMPACT ACTION PLAN - MITIGATION HIERARCHY

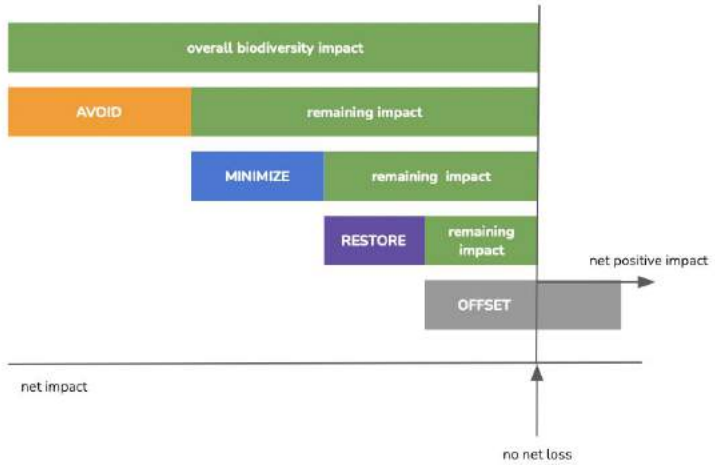
The **mitigation hierarchy** is used to prioritize activities towards reducing and eliminating negative impact on the environment and biodiversity.

1. Avoid
Taking measures to avoid impacts on biodiversity. This is the starting point and best option in biodiversity conservation. If (remaining) impacts are unavoidable, the further steps are taken. It could include measures such as avoiding interference with the surrounding environment or not using harmful substances on site.

2. Minimize
All impacts that can not be avoided should be minimized for as much as possible. This could include taking measures to preserve existing natural features.

3. Restore
This refers to actions on areas where impacts are unavoidable, and measures are taken to return the impacted area to a near-natural state. An example would be to re-plant surfaces that were sealed by concrete.

4. Offset
Actions on the remaining impact after steps 1-3 have been taken. Typically off-site but as close to it as possible. It could include supporting local or global projects or NGOs.



MEASURES TO **AVOID** IMPACT ON SITE

The following slides contain more detailed information on the suggested measures to avoid negative impact on biodiversity on the assessed site.

AVOID

MINIMIZE | RESTORE | OFFSET

Direct nature impact:

- AD1 Implement a protective gardening policy

Adapt behavior:

- AA1 Implement a policy of avoidance of the use of potentially harmful substances
- AA2 Create awareness

Construction:

- n/a

Impact Factor categories that are addressed by proposed actions

#	Impact Factor Categories	Relevant AVOID
1	Direct Area Removal	y
2	Change in Habitat Structure / Use	y
3	Change in Abiotic site factors	y
4	Barrier or trap effect / loss of individuals	y
5	Non-material effects	y
6	Material effects	y
7	Radiation	n/a
8	Targeted manipulation of species and organisms	y

AD1 Implement a protective gardening policy

This measure should include:

A written policy that is developed with and communicated to relevant staff, containing for example:

- a preservation strategy for existing natural features, such as trees, diversified hedges, undeveloped plots, ponds, flower beds, nest boxes
- guidance on gardening best practices, such as
  - to avoid gardening work, such as trimming of trees and bushes or lawn mowing during the breeding season (from March to September)
  - to use mulch and ground cover to limit weeds and reduce the need for irrigation
  - to allow lawns to grow and to only mow lawns in autumn and late in the day

Why:

A protective gardening policy aims to keep existing nature as intact as possible and to avoid disturbance on local animals, particularly insects, but also birds, amphibia and others.

Improvement potential	high
Costs	
Ease of implementation	

#	Impact Factor Categories	Relevant AD1
1	Direct Area Removal	y
2	Change in Habitat Structure / Use	y
3	Change in Abiotic site factors	y
4	Barrier or trap effect / loss of individuals	y
5	Non-material effects	y
6	Material effects	y
7	Radiation	-
8	Targeted manipulation of species and organisms	-

AVOID

MINIMIZE | RESTORE | OFFSET

AA1 Implement a policy of avoidance of the use of potentially harmful substances

This measure should include:

A written policy that is developed with and communicated to relevant staff, containing for example:

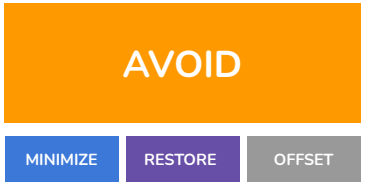
- a commitment to strictly limit the use of chemical products (pesticides, fertilizers, paints, detergents, etc.). to an absolute minimum
- a purchasing policy for necessary chemicals, e.g. cleaning agents with an Ecolabel
- a complete ban of salt use for de-icing of outside areas and to use alternatives, such as sand or sawdust

Why:

Chemical substances are often harmful to ecosystems. Even after treatment in a wastewater treatment plant, the water entering the rivers can contain high levels of phosphates, solvents, surfactants and other chemical products. These compounds are often highly contaminating and can have severe impacts on biodiversity, especially water bodies, and on human health. Other substances, such as salt for de-icing, pose a direct threat to local ecosystems, ground water and even building structures.

Improvement potential	high
Costs	
Ease of implementation	

#	Impact Factor Categories	Relevant AA1
1	Direct Area Removal	-
2	Change in Habitat Structure / Use	-
3	Change in Abiotic site factors	-
4	Barrier or trap effect / loss of individuals	-
5	Non-material effects	-
6	Material effects	y
7	Radiation	-
8	Targeted manipulation of species and organisms	y



AA2 Create an awareness raising campaign

This measure should include:

An awareness-raising campaign is an excellent way to engage with employees and create a long-term impact. This could include:

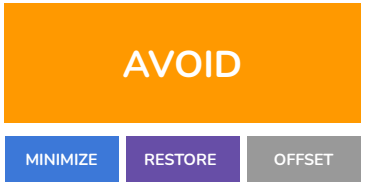
- motivate team building activities such as animal or plant census around the site or planting hedges and plants for bees around the car park
- engage in local, on-site projects such as planting a flower or vegetable garden on-site, to place bird nest boxes on/near the site
- provide opportunities to take part in nature conservation projects, go on walks to explore specific species or biotopes, participate in toad rescues, visit eco-farms, etc.
- motivate and incentivise staff to switch from commuting by car to bike, public transport or carpool

Why:

Achieving positive impact and maximizing the outcome of efforts to avoid impacts on local biodiversity can easily be multiplied by engaging all staff members. Not involving everybody and not ensuring everybody's understanding and "buy-in" on the other hand, might hinder the success of any measures taken. Also, most people enjoy nature, and this might have a positive impact on the overall working culture.

Improvement potential	medium
Costs	
Ease of implementation	

#	Impact Factor Categories	Relevant AA2
1	Direct Area Removal	y
2	Change in Habitat Structure / Use	y
3	Change in Abiotic site factors	y
4	Barrier or trap effect / loss of individuals	y
5	Non-material effects	y
6	Material effects	y
7	Radiation	-
8	Targeted manipulation of species and organisms	y



MEASURES TO **MINIMIZE** IMPACT ON SITE

MINIMIZE

AVOID | RESTORE | OFFSET

The following slides contain more detailed information on the suggested measures to minimize negative impact on biodiversity on the assessed site.

Direct nature impact:

- n/a

Adapt behavior:

- MA1 Clearly label waste disposal facilities
- MA2 Adapt transport to and from site and on-site
- MA3 Organise clean-ups

Construction:

- MC1 Reduce light pollution
- MC2 Provide animal friendly features in existing buildings
- MC3 Install environmentally friendly surfaces

Impact Factor categories that are addressed by proposed actions

#	Impact Factor Categories	Relevant MINIMIZE
1	Direct Area Removal	y
2	Change in Habitat Structure / Use	y
3	Change in Abiotic site factors	-
4	Barrier or trap effect / loss of individuals	y
5	Non-material effects	y
6	Material effects	y
7	Radiation	n/a
8	Targeted manipulation of species and organisms	-

MA1 Clear label waste disposal facilities

This measure should include:

- provide clearly labeled trash bins to allow for a segregation of waste streams
- place signs reminding visitors and staff to dispose of trash with care

Why:

Discarded litter in nature often has dire consequences for the environment: Animals can be poisoned or suffocate on cigarette butts or chewing gum, small mammals or amphibians can get caught in bottles, broken glass can cause injuries to larger animals or start fires due to the burning glass effect. Other trash has longer-term effects: Plastic takes hundreds of years to decompose and releases toxic substances, batteries contain heavy metals that leach into the soil and contaminate groundwater.

Improvement potential	medium
Costs	
Ease of implementation	

#	Impact Factor Categories	Relevant MA1
1	Direct Area Removal	-
2	Change in Habitat Structure / Use	-
3	Change in Abiotic site factors	-
4	Barrier or trap effect / loss of individuals	y
5	Non-material effects	-
6	Material effects	-
7	Radiation	-
8	Targeted manipulation of species and organisms	-

MINIMIZE

AVOID | RESTORE | OFFSET

MA2 Adapt transport to and from site and on-site

This measure should include:

- optimise the use of vehicles (just in time, short ways, combined ways)
- use vehicle fleet that does not rely on fossil fuels

Why:

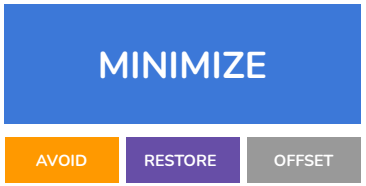
An optimised flow of goods leads to the reduction of transport and minimizes direct acoustical and optical impacts on biodiversity. A fleet that does not rely on fossil fuels and that is not used as often also minimises unnecessary impacts on biodiversity such as air pollution - thereby also lowering impacts on biodiversity related to climate change -, soil and water pollution.

Improvement potential medium

Costs

Ease of implementation

#	Impact Factor Categories	Relevant MA2
1	Direct Area Removal	-
2	Change in Habitat Structure / Use	-
3	Change in Abiotic site factors	y
4	Barrier or trap effect / loss of individuals	-
5	Non-material effects	y
6	Material effects	y
7	Radiation	-
8	Targeted manipulation of species and organisms	-



MA3 Organise clean-ups

This measure should include:

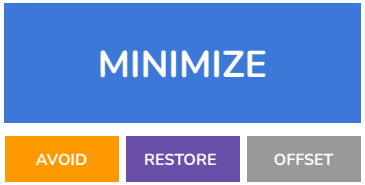
- in winter, remove rubbish from nature, especially near rivers
- sort all this and take it to a landfill

Why:

Through rivers, rubbish reaches the sea and threatens not only terrestrial but also freshwater and marine biodiversity. The organisation of clean-ups, supported by local authorities, helps reduce the contamination of ecosystems and protects animals from many dangers, e.g. from being injured by broken glass or choking on plastic pieces that are mistaken for food.

Improvement potential	high
Costs	
Ease of implementation	

#	Impact Factor Categories	Relevant MA3
1	Direct Area Removal	-
2	Change in Habitat Structure / Use	-
3	Change in Abiotic site factors	-
4	Barrier or trap effect / loss of individuals	y
5	Non-material effects	-
6	Material effects	-
7	Radiation	-
8	Targeted manipulation of species and organisms	-



MC1 Reduce light pollution

This measure should include:

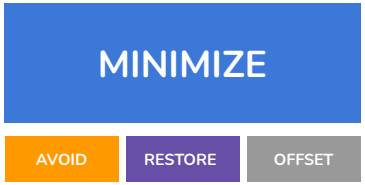
- for all outside lighting, install non-glare lamps which are pointing downwards
- switch off outside lighting when not needed or the site closes, ideally automate outside lights to dim or turn off (particularly between 00:00-04:00). However, compliance with local legislation, i.e. fire safety protocols must be ensured and general safety concerns taken into consideration
- ensure outside light used is in the white light spectrum and avoid blue light spectrum

Why:

Many species rely on a predictable day/night cycle for their existence. This affects a number of various behavior patterns, e.g. finding food, finding the right way or mating.

Improvement potential	medium
Costs	
Ease of implementation	

#	Impact Factor Categories	Relevant MC1
1	Direct Area Removal	-
2	Change in Habitat Structure / Use	-
3	Change in Abiotic site factors	-
4	Barrier or trap effect / loss of individuals	-
5	Non-material effects	y
6	Material effects	-
7	Radiation	-
8	Targeted manipulation of species and organisms	-



MC2 Provide animal friendly features in existing buildings

This measure should include:

- avoid large glass panes, as birds collide with these and often die. If these can not be avoided, attach markings
- consider installing minor structural features, such as drilling holes in thick walls or bricks to allow small species (e.g. hermit bees, bats, birds) to nest there
- install nest boxes for bats and birds

Why:

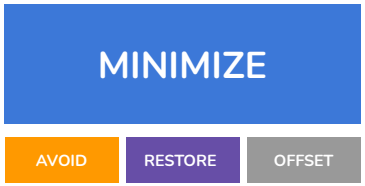
Most habitats are severely affected or even destroyed by buildings and sealed surfaces. Avoiding hazardous building elements and providing retreats in building features can provide existential benefits and ease the pressure on species.

Improvement potential medium

Costs

Ease of implementation

#	Impact Factor Categories	Relevant MC2
1	Direct Area Removal	-
2	Change in Habitat Structure / Use	-
3	Change in Abiotic site factors	-
4	Barrier or trap effect / loss of individuals	y
5	Non-material effects	-
6	Material effects	-
7	Radiation	-
8	Targeted manipulation of species and organisms	-



MC3 Install environmentally friendly surfaces

This measure should include:

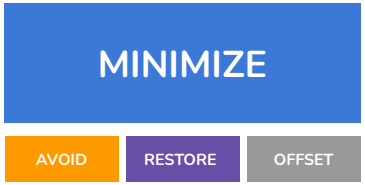
- select/ replace surfaces of roads and parking lots that are permeable to water

Why:

Permeable pavements have the capability to reduce runoff from sealed areas by infiltrating rain water and melting snow. Thus, they can mitigate the impacts on soil water budget and its dynamic processes that can have an impact on the occurrence of habitats and species. They also help filter out pollutants that contribute to water pollution, and phosphorus - which would cause changes in the nutrient supply and can lead to changes in the species composition, or directly harm them. During winter, deeper layers below the pavement remain above freezing. This allows void spaces to remain open and promote infiltration of melted ice and snow, thereby preventing refreezing of pooled water in the “black ice” effect. Therefore, the need for application of deicing agents is reduced, thus further lowering the impact on biodiversity. Additionally, permeable pavements tend to produce less noise when driven on, another impact factor for biodiversity.

Improvement potential	high
Costs	
Ease of implementation	

#	Impact Factor Categories	Relevant MC3
1	Direct Area Removal	y
2	Change in Habitat Structure / Use	y
3	Change in Abiotic site factors	-
4	Barrier or trap effect / loss of individuals	-
5	Non-material effects	y
6	Material effects	y
7	Radiation	-
8	Targeted manipulation of species and organisms	-



MEASURES TO **RESTORE** IMPACT ON SITE

The following slides contain more detailed information on the suggested measures to restore negative impact on biodiversity on the assessed site.

RESTORE

AVOID | MINIMIZE | OFFSET

Direct nature impact:

- RD1 Enhance ecologic features
- RD2 Compost organic waste

Adapt behavior:

- n/a

Construction:

- RC1 Create a site-adapted, natural area on currently sealed land
- RC2 Integrate habitats in building elements
- RC3 Create passage ways for animals
- RC4 Install a catch basin for rainwater collection

Impact Factor categories that are addressed by proposed actions

#	Impact Factor Categories	Relevant RESTORE
1	Direct Area Removal	y
2	Change in Habitat Structure / Use	y
3	Change in Abiotic site factors	y
4	Barrier or trap effect / loss of individuals	y
5	Non-material effects	y
6	Material effects	y
7	Radiation	n/a
8	Targeted manipulation of species and organisms	-

RD1 Enhance ecologic features

This measure should include:

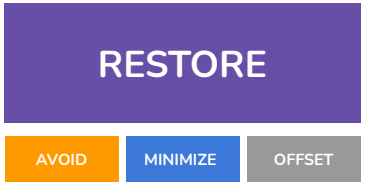
- where vegetation exists but not using all available space, it can be upgraded using native and site-adapted species of trees, shrubs and flowering plants
- mini forests can improve the situation for biodiversity in a small area: a wide variety of species (30 or more) are planted to recreate the layers of a natural forest
- plant dense hedges along the roads

Why:

The greater the diversity of plants, the easier it is for animals to find food there. Flowering plants for example support pollinators and these in turn are food for amphibians, birds, fish and mammals. Mini forests increase the variety in food and shelter for a high diversity of animals. While hedges along roads can guide animals into ecological passages and habitats, they also absorb some of the pollution (like air pollution, noise and light) the actual habitats are impacted by.

Improvement potential	high
Costs	
Ease of implementation	

#	Impact Factor Categories	Relevant RD1
1	Direct Area Removal	y
2	Change in Habitat Structure / Use	y
3	Change in Abiotic site factors	y
4	Barrier or trap effect / loss of individuals	-
5	Non-material effects	y
6	Material effects	y
7	Radiation	-
8	Targeted manipulation of species and organisms	-



RD2 Compost organic waste

This measure should include:

- compost green waste and use it for soil improvement in autumn

Why:

Composting of organic waste encourages the production of beneficial bacteria and fungi that break down organic matter to create humus, a rich nutrient-filled material that is at the basis of all life. This enriched soil helps retaining moisture and suppressing plant diseases and pests while reducing the need for chemical fertilizers. Composting also reduces methane emissions from landfills and therefore lowers impacts on biodiversity related to climate change.

Improvement potential medium

Costs

Ease of implementation

#	Impact Factor Categories	Relevant RD2
1	Direct Area Removal	-
2	Change in Habitat Structure / Use	y
3	Change in Abiotic site factors	y
4	Barrier or trap effect / loss of individuals	-
5	Non-material effects	-
6	Material effects	-
7	Radiation	-
8	Targeted manipulation of species and organisms	-

RESTORE

AVOID MINIMIZE OFFSET

RC1 Create a site-adapted, natural area on currently sealed land

This measure should include:

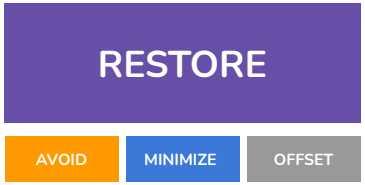
- build an underground car park and create a natural area (park, grassland, etc.) on the former parking lot using native and site-adapted species
- plant trees in parking lot

Why:

The parking lot is, together with the building and roads, the biggest source of negative impact to biodiversity. It takes up a former natural area, thereby eliminating any live and changing natural processes in the soil and its water budget which has an influence on surrounding habitats. The asphalt heats up the site which impacts biodiversity. And the traffic on it may kill migrating animals or disturbing them with noise, pollution, movement and light. At the same time, it has one of the biggest potentials for improvement since it is possible to move the parking space underground and create landscapes on top which come close to natural sites, thus providing habitat and an improved water budget. The green area has the potential to cool the close environment and provide fresh air. The thus reduced traffic leads to the reduction of the threats it poses on fauna. Planting trees in the parking lot can reduce some of the impact factors, to a lesser extent (and not those related to traffic).

Improvement potential	high
Costs	
Ease of implementation	

#	Impact Factor Categories	Relevant RC1
1	Direct Area Removal	y
2	Change in Habitat Structure / Use	y
3	Change in Abiotic site factors	y
4	Barrier or trap effect / loss of individuals	y
5	Non-material effects	y
6	Material effects	y
7	Radiation	-
8	Targeted manipulation of species and organisms	-



RC2 Integrate habitats in building elements

This measure should include:

Green roofs/ walls are of high ecological value and provide a number of benefits to local species but also towards the building itself:

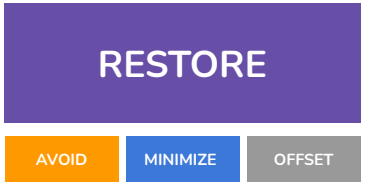
- consider installing a green roof and/ or a green wall: This needs to be checked by a structural engineer. The green roof/ wall shall contain a great variety of plants and include native and side-adapted species with a proportion of flowering plants
- ensure beforehand that the green roof/ wall will receive appropriate care and maintenance. There are low maintenance options available (e.g. sedum or grasses that only need to be maintained once per year, but their improvement potential might be smaller)

Why:

Green roofs/ walls have a high ecological value, they provide shelter, collect rainwater, improve air quality, provide noise insulation, and regulate temperature fluctuation. They can even be used to grow organic fruits and vegetables on site and are an excellent way to engage employees.

Improvement potential	high
Costs	
Ease of implementation	

#	Impact Factor Categories	Relevant RC2
1	Direct Area Removal	-
2	Change in Habitat Structure / Use	y
3	Change in Abiotic site factors	y
4	Barrier or trap effect / loss of individuals	y
5	Non-material effects	y
6	Material effects	y
7	Radiation	-
8	Targeted manipulation of species and organisms	-



RC3 Create passage ways for animals

This measure should include:

- provide small passage ways for animals in those areas where a green space is surrounded by walls. This can for example be created by removing one or two stones from the lower part of walls
- plant hedges or trees along the roads to connect green islands
- provide toad passages, e.g. in speed bumps

Why:

This measure is important for the migration, dispersal and genetic exchange of species. It allows animals like hedgehogs, mice, toads, snakes, lizards, squirrels etc. to move safely between the green spaces.

Improvement potential high

Costs 

Ease of implementation 

#	Impact Factor Categories	Relevant RC3
1	Direct Area Removal	-
2	Change in Habitat Structure / Use	-
3	Change in Abiotic site factors	-
4	Barrier or trap effect / loss of individuals	y
5	Non-material effects	-
6	Material effects	-
7	Radiation	-
8	Targeted manipulation of species and organisms	-

RESTORE

AVOID | MINIMIZE | OFFSET

RC4 Install a catch basin for rainwater collection

This measure should include:
The installation of a rainwater catch basin is a great way to utilize free water from rain.

- consider installing a catch basin for rainwater collection
- animals and plants can use it as habitat
- use the rainwater to irrigate plants on the site (preferably in the evening to avoid evaporation)

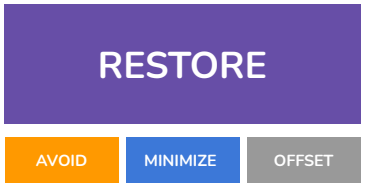
Why:
Water is essential for a healthy planet and the diversity of life. There is enough water for everyone and everything, but it is often poorly distributed or mismanaged.

Improvement potential medium

Costs

Ease of implementation

#	Impact Factor Categories	Relevant RC4
1	Direct Area Removal	y
2	Change in Habitat Structure / Use	-
3	Change in Abiotic site factors	-
4	Barrier or trap effect / loss of individuals	-
5	Non-material effects	-
6	Material effects	-
7	Radiation	-
8	Targeted manipulation of species and organisms	-



MEASURES TO **OFFSET** IMPACT ON SITE

Offsetting impact on biodiversity is considered a last resort and should only be applied once all feasible measures to **avoid**, **minimize** and **restore** impact are taken.

Typical offsetting measures are

- Acquisition of land with the intention to initiate projects to restore biodiversity
- Supporting specifically targeted conservation projects
- Supporting Non Governmental Organisations that address biodiversity loss
- Sponsorship of individual, threatened species

Please contact us at offsetting@sfeeri.com for detailed information on how to offset impact.

Impact Factor categories that are addressed by proposed actions

#	Impact Factor Categories	Relevant OFFSET
1	Direct Area Removal	y
2	Change in Habitat Structure / Use	y
3	Change in Abiotic site factors	y
4	Barrier or trap effect / loss of individuals	y
5	Non-material effects	y
6	Material effects	y
7	Radiation	-
8	Targeted manipulation of species and organisms	y

Summary

Biodiversity Impact Assessment - Overview

Methodology

Biodiversity Action Plan - Site specific measures

Biodiversity Action Plan - Species specific measures

IDENTIFIED THREATENED SPECIES AFFECTED BY SITE ACTIVITY

#	species name	common name	conservation category	population trend	biome	taxonomic group
1	Oenanthe oenanthe	Northern Wheatear	least concern	Decreasing	Terrestrial/fresh water (=inland waters)/marine	AVES
2	Eptesicus serotinus	Big brown bat	Least Concern	Stable	Terrestrial	MAMMALIA
3	Pelobates fuscus	Spadefoot toad	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
4	Falco vespertinus	Red-footed falcon	Near Threatened	Decreasing	Terrestrial|Freshwater (=Inland waters)	AVES
5	Numenius arquata	Eurasian Curlew	Near Threatened	Decreasing	Terrestrial|Freshwater (=Inland waters)|Marine	AVES
6	Rana arvalis	Moor Frog	Least Concern	Stable	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
7	Arvicola amphibius	European Water Vole	Least Concern	Stable	Terrestrial|Freshwater (=Inland waters)	MAMMALIA
8	Somatochlora metallica	Emerald dragonfly	Least Concern	Unknown	Terrestrial|Freshwater (=Inland waters)	INSECTA
9	Neomys fodiens	Eurasian Water Shrew	Least Concern	Stable	Terrestrial|Freshwater (=Inland waters)	MAMMALIA
10	Plecotus auritus	Brown long-eared bat	Least Concern	Stable	Terrestrial	MAMMALIA
11	Lacerta agilis	Sand Lizard	Least Concern	Decreasing	Terrestrial	REPTILIA
12	Pipistrellus pipistrellus	Common pipistrelle	Least Concern	Stable	Terrestrial	MAMMALIA
13	Myotis brandtii	Brandt's bat	Least Concern	Stable	Terrestrial	MAMMALIA
14	Myotis nattereri	Natterer's bat	Least Concern	Stable	Terrestrial	MAMMALIA
15	Lepus europaeus	European Hare	Least Concern	Decreasing	Terrestrial	MAMMALIA
16	Phragmites australis	Common Reed	Least Concern	Stable	Terrestrial|Freshwater (=Inland waters)	LILIOPSIDA
17	Cervus elaphus	Red Deer	Least Concern	Increasing	Terrestrial	MAMMALIA
18	Zootoca vivipara	Viviparous Lizard	Least Concern	Unknown	Terrestrial	REPTILIA
19	Triturus cristatus	Northern crested newt	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
20	Coronella austriaca	Smooth Snake	Least Concern	Decreasing	Terrestrial	REPTILIA

IDENTIFIED THREATENED SPECIES AFFECTED BY SITE ACTIVITY

#	species name	common name	conservation category	population trend	biome	taxonomic group
21	Hyla arborea	European tree frog	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
22	Pelophylax lessonae	Pool Frog	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
23	Anguilla anguilla	European eel	Critically Endangered	Decreasing	Freshwater (=Inland waters)|Marine	ACTINOPTERYGII
24	Muscardinus avellanarius	Hazel Dormouse	Least Concern	Unknown	Terrestrial	MAMMALIA
25	Dactylorhiza sambucina	Elder-flowered Orchid	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	LILIOPSIDA
26	Salamandra salamandra	Fire salamander	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
27	Rana dalmatina	Agile Frog	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
28	Groenlandia densa	Opposite-leaved Pondweed	Least Concern	Stable	Freshwater (=Inland waters)	LILIOPSIDA
29	Lissotriton helveticus	Palmate Newt	Least Concern	Stable	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
30	Myotis bechsteinii	Bechstein's Myotis	Near Threatened	Decreasing	Terrestrial	MAMMALIA
31	Hirudo medicinalis	European Medicinal Leech	Near Threatened	Unknown	Terrestrial|Freshwater (=Inland waters)	CLITELLATA
32	Ichthyosaura alpestris	Alpine Newt	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
33	Bombina variegata	Yellow-bellied toad	Least Concern	Decreasing	Terrestrial|Freshwater (=Inland waters)	AMPHIBIA
34						
35						
36						
37						
38						
39						
40						

01 Oenanthe oenanthe (Northern Wheatear)

Maintain, restore or create suitable landscape features

- optimal habitat for the species is a mixture of short and tall vegetation since this would allow the dispersal of insects (the species' prey)
- avoid the use of pesticides: pesticides would eliminate the species' prey, making its survival difficult
- high-quality stopover sites are important for those regions close to oceanic and desert barriers where stopovers are prolonged in spring and fall
- avoid disturbances such as trimming of trees and bushes or mowing of meadows during the breeding season (March-September)

Guard against the loss of nesting sites

- avoid disturbances at nesting sites
- install loose boulders in favored short-grass habitats where natural nest-sites are lacking

Further

- ensure that trapping is prevented

During the breeding season it occupies open ground including stony estuarine plains with sparse vegetation, sand dunes, shingle stretches, coastal islands, heathland, moors, meadows, submontane shrubland, rocky alpine meadows, streamside bluffs and tundra. Breeding occurs from May-June in central and southern Europe, April-Aug in north-west Europe, May-June in Iceland, May-July in Scandinavia, June-July in Siberia, May-Aug in Mongolia and May-Aug in North America. The nest is a cup of dried stems, moss, feathers etc. set in a rock cavity, rodent burrow or hole in a wall. The species migrates to Africa in winter. It feeds on insects.

LC

Least concern

P

Protected by law

Population: decreasing

02 Eptesicus serotinus (Serotine bat) 1/2

Avoid disturbances

- avoid or minimize noise, light and other forms of pollution from site activities, such as transport, building maintenance or construction - bats are very sensitive to their surroundings

Guard against the loss of roosts:

- maintain broad-leaved trees having potential roost cavities and plant further trees in which potential roost cavities can develop, avoid felling of trees containing roosts
- avoid disturbances, such as construction work, especially during maternity season (May-August) and hibernation period (Oct-April)
- install bat boxes to provide breeding habitats in either buildings or trees
- avoid toxic timber treatments in buildings
- it is especially important to protect the maternal roosting sites in order to ensure the continual survival of bats

Occurs in lowland areas, e.g. in wooded agricultural regions. In the summer, both maternity colonies and males predominantly occupy roosts in buildings, such as attics, voids behind sheathing and shutters etc. It sometimes roosts in ventilation shafts of buildings or joints in bridges. Individuals occasionally use tree caves or nest boxes. They typically remain in the same building to hibernate during winter. Serotines feed on dung beetles, moths and chafer species, often along roads and around street lamps.

LC

Least concern

P

Protected by law

Population: stable

02 **Eptesicus serotinus (Serotine bat)** 2/2

Maintain, restore or create suitable landscape features

- hedgerows, tree lines, and waterways: bats use linear features as commuting pathways from the roost to foraging areas. The vegetation not only acts as cover from potential predators and the weather, but also provides structure for acoustic orientation and navigation and potential for feeding on the insects found there
- foraging areas that attract insects: rivers, ponds, grassland (avoidance of pesticides is important), ancient semi-natural woodland and hedgerows planted with native vegetation
- avoid artificial lights shining on bat roosts, their access points and the flight paths away from the roost: Bats are nocturnal animals and adapted to low-light conditions

Occurs in lowland areas, e.g. in wooded agricultural regions. In the summer, both maternity colonies and males predominantly occupy roosts in buildings, such as attics, voids behind sheathing and shutters etc. It sometimes roosts in ventilation shafts of buildings or joints in bridges. Individuals occasionally use tree caves or nest boxes. They typically remain in the same building to hibernate during winter. Serotines feed on dung beetles, moths and chafer species, often along roads and around street lamps.

Least concern

Protected by law

Population: stable

03 Pelobates fuscus (Spadefoot toad)

Maintain, restore or create suitable landscape features

- the species requires vegetation like meadows and forests, connected to ponds
- several ponds should occur in a network and passageways should connect habitats to enable dispersal and increase breeding success
- avoid construction of roads, mitigate with fencing to prevent toads from entering the road
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)
- avoid restructuring, draining and fish stocking

Protect hibernation sites

- retain piles of stones and branches to provide hibernation sites

This nocturnal toad is mostly present in open areas, generally avoiding moist soils. It inhabits clear spaces in coniferous, deciduous and mixed forests and their edges, groves, steppes, fields, meadows, sand dunes, heath land, gravel pits, parks and gardens. Spawning sites are mostly permanent, small still water bodies including ditches, ponds and lakes covered with dense grass vegetation. Reproduction occurs during early springtime rains (end of March – beginning of April). Hibernation occurs from September/October (November in the south) to March/April.

LC

Least concern

P

Protected by law

Population: decreasing

04 Falco vespertinus (Red-footed Falcon)

If the species' habitat is already taken by the site: Measures focus on avoidance of specific actions. Considering offsetting measures for this species might be required (if the habitat still exists: maintain it).

Maintain, restore or create suitable landscape features

- Red-footed falcons need forest patches of native species for breeding and the connection to extensive grasslands for feeding
- avoid the use of pesticides: pesticides would eliminate the Red-footed Falcon's prey, making its survival difficult

Guard against the loss of nesting sites

- avoid disturbances to rooks: Red-footed Falcons primarily use rookeries for colonial breeding
- avoid disturbances such as trimming of trees and bushes during the breeding season (from March to September)
- install nest boxes to provide breeding habitats in trees

Occurs in open lowlands with trees and plenty of insects, including steppe and forest-steppe, open woodland, cultivation and pastureland with tall hedgerows or fringing trees, agricultural areas with shelterbelts and boggy areas and taiga edge. It prefers the upper part of trees but sometimes nests in cliffs or tree holes, hedgerows or isolated bushes. It breeds in colonies and solitary pairs and does not build a nest but breeds in rook's or magpie nests.

NT

Near threatened

P

Protected by law

Population: decreasing

05 Numenius arquata (Eurasian Curlew)

If the species' habitat is already taken by the site: Measures focus on avoidance of specific actions. Considering offsetting measures for this species might be required (if the habitat still exists: maintain it).

Maintain, restore or create suitable landscape features

- important for the species are the remaining intertidal habitats across its range
- it requires natural hydrosystems
- avoid reclamation of land, water defences, damming, water abstraction, and channelisation
- avoid air, soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)
- work with farmers to promote land management techniques that would benefit the species
- protect and manage key sites

Further

- ensure that hunting is prevented
- conduct research to update population estimates, gain greater insight into the species's life history, its range and movements, and the threats it faces. Further research the impact of certain threats (e.g. wind farms and pollution)

The species breeds on upland moors, peat bogs, heathlands, fens, open grassy or boggy areas in forests, meadows, dune valleys and coastal marshlands. The nest is a depression on the ground or on a mound. It breeds from from April to August and then migrates south for the winter. During winter frequents muddy coasts, bays and estuaries with tidal mud- and sand flats, rocky and sandy beaches with pools, mangroves, salt marshes, coastal meadows and muddy shores of coastal lagoons, inland lakes and rivers. Feeds on worms, insects, crustaceans, molluscs, spiders, berries, seeds, and occasionally small fish, amphibians, lizards, young birds and small rodents.

NT

Near threatened

P

Protected by law

Population: decreasing

06 Rana arvalis (Moor Frog)

Maintain, restore or create suitable landscape features

- the species is fostered by the availability of deciduous or mixed forests and meadows, connected to ponds
- several ponds should occur in a network and passageways should connect habitats to enable dispersal and increase breeding success
- avoid construction of roads, mitigate with fencing to prevent frogs from entering the road
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)
- avoid restructuring, draining and fish stocking

Protect hibernation sites

- retain piles of stones and branches to provide hibernation sites

It occurs in a variety of habitats including tundra, forest tundra, forest, forest steppe, steppe, forest edges and glades, semi-desert, swamps, peatlands, moorlands, meadows, fields, bush lands, gardens. Spawning and larval development takes place in stagnant water bodies of low acidity, including lakes, ponds, swamps, puddles and ditches. Reproduction occurs from March to June, usually some days after the end of hibernation. Hibernation extends from September-November to February-June, in dependence on latitude.

07 Arvicola amphibius (European Water Vole)

If the species' habitat is already taken by the site: Measures focus on avoidance of specific actions. Considering offsetting measures for this species might be required (if the habitat still exists: maintain it).

Maintain, restore or create habitat

- it needs a well connected hydrosystem
- nature-friendly river banks and borders: fence banksides, plant reeds, trees and shrubs
- non-linear habitats such as reed beds and wetland pond systems
- pond creation should include clusters of ponds in various localities, in the vicinity of wild populations to allow natural recolonisation
- ponds with a diverse mosaic of vegetation patches will support higher population densities of water voles
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)

Further

- invest in breeding and reintroduction schemes
- control American mink (Neovison vison) populations where it is invasive since they prey on voles

This species is adaptable and survives in a range of habitats around rivers, streams and marshes in lowlands and mountains. It is a strong swimmer and climber. In Fennoscandia and locally in the Balkans, it lives a fossorial life during winter months. Steep river banks with lush grass and vegetation are preferred. May be active at any time, but is most active at dawn and dusk. Mainly vegetarian, feeding primarily on succulent vegetation, but also consumes some insects, mollusks, and small fish; roots, bulbs and tubers in the winter. Reproduction occurs during the warmer months of the year and may begin as early as February in mild years.

LC

Least concern

Population: stable

08 Somatochlora metallica (Emerald Dragonfly)

If the species' habitat is already taken by the site: Measures focus on avoidance of specific actions. Considering offsetting measures for this species might be required (if the habitat still exists: maintain it).

Maintain, restore or create a hydrosystem

- wet areas should be left open and areas with poor growth of conifers cleared to create runs and clearings that provide foraging habitat
- prevent these hydrosystems from excessive shading, e.g. by refraining from planting around water (over 50 m from the water's edge), grazing
- manage aquatic vegetation from becoming too abundant as this would result in there not being much open water exposed to sunlight
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)

The Emerald Dragonfly inhabits various standing and slow-flowing waters such as ponds, oxbows, rocky lake shores, moorland lakes, canals and sluggish rivers. It often favours some shading by trees and steep banks that suit oviposition; conditions such as these are often found in woodland.

LC

Least concern

Population: unknown

09 Neomys fodiens (Eurasian Water Shrew)

Create uncultivated margins around fields & waterways

- particularly along the edges of arable fields (farmland) this measure helps increase the occurrence of small mammals
- area should not be cultivated or fertilized, but may be mowed
- can be e.g. wild flower fields

Plant trees & small patches of forest

- the added vegetation creates a more hospitable habitat for the species

Plant new or maintain existing hedgerows

- recommendation: unfertilized and unsprayed, with 6-m wide herbaceous strips

This species is semi-aquatic with water repelling fur. It occurs in a wide variety of wetland habitats, both freshwater and coastal, including lakes, rivers, streams, marshes, bogs, damp grasslands, humid woodlands, seashores and intertidal wetlands. It is the most aquatic of all European shrews. It hunts on land and in water for invertebrates, including crustaceans, and occasionally takes small fish and amphibia. It is highly territorial, with males only moving out of territory during the breeding season. They breed between April and September.

LC

Least concern

P

Protected by law

Population: stable

10 **Plecotus auritus (Brown long-eared bat)** 1/2

Avoid disturbances

- avoid or minimize noise, light and other forms of pollution from site activities, such as transport, building maintenance or construction - bats are very sensitive to their surroundings

Guard against the loss of roosts:

- maintain broad-leaved trees having potential roost cavities and plant further trees in which potential roost cavities can develop, avoid felling of trees containing roosts
- avoid disturbances, such as construction work, especially during maternity season (May-August) and hibernation period (Oct-April)
- install bat boxes to provide breeding habitats in either buildings or trees
- avoid toxic timber treatments in buildings
- it is especially important to protect the maternal roosting sites in order to ensure the continual survival of bats

Nursery colonies are mainly in tree cavities, in bird or bat boxes and sometimes behind bark. They are also frequent in buildings, preferably in attics of churches and barns. In attics, maternity roosts are found in the niches of beam fillets and mortises, between roof tiles and behind wooden cladding. It hibernates in underground roosts such as cellars, bunkers, mines and caves, as well as in rock fissures, wood piles and hollow trees. Moths are a major prey.

LC

Least concern

P

Protected by law

Population: stable

10 **Plecotus auritus (Brown long-eared bat)** 2/2

Maintain, restore or create suitable landscape features

- hedgerows, tree lines, and waterways: bats use linear features as commuting pathways from the roost to foraging areas. The vegetation not only acts as cover from potential predators and the weather, but also provides structure for acoustic orientation and navigation and potential for feeding on the insects found there
- foraging areas that attract insects: rivers, ponds, grassland (avoidance of pesticides is important), ancient semi-natural woodland and hedgerows planted with native vegetation
- avoid artificial lights shining on bat roosts, their access points and the flight paths away from the roost: Bats are nocturnal animals and adapted to low-light conditions

Nursery colonies are mainly in tree cavities, in bird or bat boxes and sometimes behind bark. They are also frequent in buildings, preferably in attics of churches and barns. In attics, maternity roosts are found in the niches of beam fillets and mortises, between roof tiles and behind wooden cladding. It hibernates in underground roosts such as cellars, bunkers, mines and caves, as well as in rock fissures, wood piles and hollow trees. Moths are a major prey.

LC

Least concern

P

Protected by law

Population: stable

11 Lacerta agilis (Sand Lizard)

Maintain, restore or create suitable landscape features

- this species requires hedges and fringes as connectivity elements, light forest structures, sandy and sunny egg deposition sites
- avoid reforestation of open land, thin out bushes and trees in abandoned quarries, sand and gravel pits and railway embankments
- avoid developing dry sites with paths or recreational facilities
- avoid paving sandy paths with foreign material
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)

Adapt gardening practices

- avoid moving compost heaps between June and September to avoid destroying egg deposition sites
- avoid spreading cuttings on embankments, bare soil or rock piles
- mow only in winter, alternatively mow alternate sections in midsummer
- use bar mowers and cut at least at 15 cm height during the species' activity phase (March to October)
- generally mow from the inside out or from one side to the other to allow the animals an escape route

This species occurs in heathland, coastal dunes, grassland, steppe, meadows, shrub land, hedgerows, open woodland and sandy semi-desert areas. To regulate its body temperature, it needs both sunny (e.g. stones, rocky areas, dead wood) and shady places (vegetation). Holes in the ground, rock crevices, brushwood piles, bushes, tree hollows, or leaf litter are used as hiding places. It hibernates in rock or soil crevices, rotten tree stumps, burrows of other species or self-dug tubes. It feeds on insects and spiders. Mating season begins in April/May. Between May and August, eggs are buried in sunny soil. It hibernates from September/October to March/April.

LC
Least concern

P
Protected by law

Population: decreasing

12 **Pipistrellus pipistrellus (Common pipistrelle)** 1/2

Avoid disturbances

- avoid or minimize noise, light and other forms of pollution from site activities, such as transport, building maintenance or construction - bats are very sensitive to their surroundings

Guard against the loss of roosts:

- maintain broad-leaved trees having potential roost cavities and plant further trees in which potential roost cavities can develop, avoid felling of trees containing roosts
- avoid disturbances, such as construction work, especially during maternity season (May-August) and hibernation period (Oct-April)
- install bat boxes to provide breeding habitats in either buildings or trees
- avoid toxic timber treatments in buildings
- it is especially important to protect the maternal roosting sites in order to ensure the continual survival of bats

Can be found from urban centres to arable land and woodland, hunts close to woodlands or riparian areas, if available. Summer roosts are mainly found in buildings and trees, and colonies frequently change roost site through the maternity period. Most winter roosts in Europe were found in crevices in buildings, although cracks in cliffs and caves, as well as tree cavities are also utilised. It feeds on small moths and flies and frequently forages around street lamps.

LC

Least concern

P

Protected by law

Population: stable

12 **Pipistrellus pipistrellus (Common pipistrelle)** 2/2

Maintain, restore or create suitable landscape features

- hedgerows, tree lines, and waterways: bats use linear features as commuting pathways from the roost to foraging areas. The vegetation not only acts as cover from potential predators and the weather, but also provides structure for acoustic orientation and navigation and potential for feeding on the insects found there
- foraging areas that attract insects: rivers, ponds, grassland (avoidance of pesticides is important), ancient semi-natural woodland and hedgerows planted with native vegetation
- avoid artificial lights shining on bat roosts, their access points and the flight paths away from the roost: Bats are nocturnal animals and adapted to low-light conditions

Can be found from urban centres to arable land and woodland, hunts close to woodlands or riparian areas, if available. Summer roosts are mainly found in buildings and trees, and colonies frequently change roost site through the maternity period. Most winter roosts in Europe were found in crevices in buildings, although cracks in cliffs and caves, as well as tree cavities are also utilised. It feeds on small moths and flies and frequently forages around street lamps.

Population: stable

13 Myotis brandtii (Brandt's bat) 1/2

Avoid disturbances

- avoid or minimize noise, light and other forms of pollution from site activities, such as transport, building maintenance or construction - bats are very sensitive to their surroundings

Guard against the loss of roosts:

- maintain broad-leaved trees having potential roost cavities and plant further trees in which potential roost cavities can develop, avoid felling of trees containing roosts
- avoid disturbances, such as construction work, especially during maternity season (May-August) and hibernation period (Oct-April)
- install bat boxes to provide breeding habitats in either buildings or trees
- avoid toxic timber treatments in buildings
- it is especially important to protect the maternal roosting sites in order to ensure the continual survival of bats

Brandt's bat feeds in woodlands, also above and along stagnant water, rivers and streams. In northern Europe coniferous forests are favoured. In the south of Europe the species can only be found in mountainous woodlands and rarely in urbanised habitats. It roosts in voids and crevices in buildings (e.g. behind open shatters) or trees, less frequently bat boxes. It may change roosts over the course of the year. The species preys mainly on small insects like moths and flies. Maternity colonies can comprise up to 350 females.

Least concern

Protected by law

Population: stable

13 Myotis brandtii (Brandt's bat) 2/2

Maintain, restore or create suitable landscape features

- hedgerows, tree lines, and waterways: bats use linear features as commuting pathways from the roost to foraging areas. The vegetation not only acts as cover from potential predators and the weather, but also provides structure for acoustic orientation and navigation and potential for feeding on the insects found there
- foraging areas that attract insects: rivers, ponds, grassland (avoidance of pesticides is important), ancient semi-natural woodland and hedgerows planted with native vegetation
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LC

Least concern

P

Protected by law

Population: stable

14 Myotis nattereri (Natterer's bat) 1/2

Avoid disturbances

- avoid or minimize noise, light and other forms of pollution from site activities, such as transport, building maintenance or construction - bats are very sensitive to their surroundings

Guard against the loss of roosts:

- maintain broad-leaved trees having potential roost cavities and plant further trees in which potential roost cavities can develop, avoid felling of trees containing roosts
- avoid disturbances, such as construction work, especially during maternity season (May-August) and hibernation period (Oct-April)
- install bat boxes to provide breeding habitats in either buildings or trees
- avoid toxic timber treatments in buildings
- it is especially important to protect the maternal roosting sites in order to ensure the continual survival of bats

Predominantly found in forests and close to water bodies. During summer it roosts in hollow trees, hollow bricks in buildings and bat boxes. In winter, it can be found hibernating in rock crevices, caves, cellars and other underground sites. Natterer's bats use many and various roosts over the course of a year, typically returning to the same roosts year after year. Its prey is spiders, harvestmen, flies, beetles and aquatic insects. Maternity colonies comprise between 30 and 200 females.

LC

Least concern

P

Protected by law

Population: stable

14 Myotis nattereri (Natterer's bat) 2/2

Maintain, restore or create suitable landscape features

- hedgerows, tree lines, and waterways: bats use linear features as commuting pathways from the roost to foraging areas. The vegetation not only acts as cover from potential predators and the weather, but also provides structure for acoustic orientation and navigation and potential for feeding on the insects found there
- foraging areas that attract insects: rivers, ponds, grassland (avoidance of pesticides is important), ancient semi-natural woodland and hedgerows planted with native vegetation
- avoid artificial lights shining on bat roosts, their access points and the flight paths away from the roost: Bats are nocturnal animals and adapted to low-light conditions

Predominantly found in forests and close to water bodies. During summer it roosts in hollow trees, hollow bricks in buildings and bat boxes. In winter, it can be found hibernating in rock crevices, caves, cellars and other underground sites. Natterer's bats use many and various roosts over the course of a year, typically returning to the same roosts year after year. Its prey is spiders, harvestmen, flies, beetles and aquatic insects. Maternity colonies comprise between 30 and 200 females.

Least concern

Protected by law

Population: stable

15 Lepus europaeus (European Hare)

Create uncultivated margins around fields & waterways

- particularly along the edges of arable fields (farmland) this measure helps increase the occurrence of small mammals
- area should not be cultivated or fertilized, but may be mowed
- can be e.g. wild flower fields

Plant trees & small patches of forest

- the added vegetation creates a more hospitable habitat for the species

Plant new or maintain existing hedgerows

- recommendation: unfertilized and unsprayed, with 6-m wide herbaceous strips

The European Hare is a highly adaptable species that can persist in numerous habitat types from sea level to alpine areas. There is a positive association with hare abundance and habitat diversity. Fallow land is preferred, whereas residential areas are avoided. When available, weeds and wild grasses are selected by the European Hare, however, intensified agro-practices have reduced this food source resulting in the selection of crop species.

LC

Least concern

P

Protected by law

Population: decreasing

16 Phragmites australis (Common Reed)

Maintain, restore or create habitat at landscape level

- the species requires wetlands
- restore ecological functions, starting with the hydrological dynamics: determine if drainage or siltation has caused the problem
    - drainage: close the drainage channels and restore the original conditions
    - siltation: remove the excess of sediments, restore the original depth of the water body and correct the conditions within the basin
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)
- control alien invasive species

Research

- research its distribution, population dynamics and potential threats

This species occurs in most wetland habitats like on margins of small ditches and rivers, ponds, lakes, marsh, in shallow water or growing out over deeper water. It can tolerate brackish conditions and oligotrophic to highly eutrophic. It is capable of persisting for many years in sites which have ceased to be wetlands, e.g. where the source of water has been diverted, but eventually dies out. It is capable of colonising and becoming a weed in some types of irrigated agriculture.

LC

Least concern

Population: stable

17 Cervus elaphus (Red Deer)

Support road overpasses, underpasses & green crossings

- traffic is a significant challenge for large mammals
- overpasses, especially for large motorways and other traffic-dense thoroughfares, should be actively supported
- these help link habitat areas with each other
- overpasses are perhaps not feasible for an individual company to construct, but can be a joint venture with local government and other companies in the vicinity

Support fencing of roads

- this goes hand-in-hand with over- and underpasses
- fences help minimize road accidents with large mammals

It inhabits open woodland, upland moors and mountainous areas (sometimes above the treeline), Mediterranean maquis scrub, natural grasslands, pastures and meadows. It prefers broadleaved woodland interspersed by large meadows. In woodland, its diet consists mainly of shrub and tree shoots, but in other habitats it also consumes grasses, sedges and shrubs. Fruit and seeds are important in autumn.

LC

Least concern

P

Protected by law

Population: increasing

18 Zootoca vivipara (Viviparous Lizard)

Maintain, restore or create suitable landscape features

- this species requires a vegetation rich in cover, bushes and trees as structural elements, fringe structures, and exposed basking sites like deadwood
- avoid removing deadwood from the forest
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)

Protect hibernation sites

- retain piles of stones and branches to provide hibernation sites

This species occurs in grassland, meadows, humid scrubland, hedgerows, open woodland, woodland edges, peat bogs, stream edges and sand dunes. Common characteristics are a closed vegetation rich in cover, individual bushes and trees as structural elements, fringe structures, a certain soil moisture and exposed basking sites in the form of deadwood. It feeds on insects and spiders. Mating season is in April/May, young are born in July. It hibernates from September/October to March beneath rocks and logs.

Least concern

Protected by law

Population: unknown

19 Triturus cristatus (Northern crested newt)

Maintain, restore or create suitable landscape features

- best habitats are deciduous and mixed forests with glades or areas of rank grass, within 500 m of stagnant waters such as ponds, flooded quarries or lakes
- several ponds should occur in a network and passageways should connect habitats to enable dispersal and increase breeding success
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)
- avoid restructuring, draining and fish stocking

Protect hibernation sites

- retain piles of stones and branches to provide hibernation sites

The species occurs in deciduous and mixed forests, their glades and edges, in bushlands, meadows, parks and gardens. It breeds in stagnant waters such as ponds, flooded quarries or lakes. Newts usually come out of hibernation when temperatures reach over 5°C and move towards water to breed. In summer, juveniles leave the water while adults spend their time after breeding on land. In autumn, they move to hibernation sites such as compost heaps, log piles, rockeries or the muddy banks of a pond.

LC

Least concern

P

Protected by law

Population: decreasing

20 Coronella austriaca (Smooth Snake)

Maintain, restore or create suitable landscape features

- this species requires mosaic-like alternation of open, low-vegetation and partly wood-dominated sites and a high density of shelters
- important elements are hedges, shrubberies, rocky outcrops, cairns and dry stone walls
- avoid reforestation of open land, thin out bushes and trees in abandoned quarries, sand and gravel pits and railway embankments
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)

Adapt gardening practices

- mow only in winter, alternatively mow alternate sections in midsummer
- use bar mowers and cut at least at 15 cm height during the species' activity phase (March to October)
- generally mow from the inside out or from one side to the other to allow the animals an escape route

Protect hibernation sites

- retain piles of stones, branches and deadwood to provide hibernation sites

This species is found in moorland, rocky and sandy coastlines, open woodland and its edges, scrubland, hedgerows, heathland, rocky areas, screes, subalpine and open areas with sparse vegetation. On the southern Iberian Peninsula and Greece it is largely restricted to upland or montane areas. It feeds on smaller animals, mostly reptiles. Young are born at the end of August-October. The period of activity lasts from March/April to September/October, varying according to latitude and altitude. It spends winter hibernation in small mammal burrows, cavities between stones and similar frost-proof locations.

LC

Least concern

P

Protected by law

Population: decreasing

21 Hyla arborea (European tree frog)

Maintain, restore or create connected, large, high quality habitats

- the best habitat is a mosaic of forests, shrublands, meadows and wetlands with ponds
- existing ponds can be deepened, de-silted or re-profiled
- several ponds should occur in a network and passageways should connect habitats to enable dispersal and increase breeding success
- avoid construction of roads, mitigate with fencing to prevent frogs from entering the road
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)
- avoid restructuring, draining and fish stocking

Protect hibernation sites

- retain piles of stones and branches to provide hibernation sites

Lives in open, well-illuminated, broad-leaved and mixed forests, bush and shrublands, meadows, gardens, vineyards, orchards, parks, lake shores and low riparian vegetation. Can also be encountered in dry habitats. Spawning and larval development takes place in stagnant waters such as lakes, ponds, swamps and reservoirs, and sometimes in ditches and puddles. Reproduction occurs between March and July, hibernation between September and early May.

LC
Least concern

P
Protected by law

Population: decreasing

22 Pelophylax lessonae (Pool Frog)

Maintain, restore or create suitable landscape features

- the species is fostered by the availability of deciduous or mixed forests and meadows, connected to ponds
- several ponds should occur in a network and passageways should connect habitats to enable dispersal and increase breeding success
- avoid construction of roads, mitigate with fencing to prevent frogs from entering the road
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)
- avoid restructuring, draining and fish stocking

Protect hibernation sites

- retain piles of stones and branches to provide hibernation sites

It is present in deciduous and mixed forests, forest steppe, steppe, bush lands, meadows and fens. It may be found in shallow stagnant water bodies such as lakes, ponds, swamps, puddles, clay and gravel pits, and ditches, often covered with herbaceous vegetation. The presence of permanent water is necessary for its existence. In the forest zone, when the air humidity is high, the frog frequently occurs on land far away from water bodies. Using chains of ponds, it can migrate distances of up to 8 km. Reproduction occurs from March-May to June, hibernation from Sep-Nov to March-May. Frogs hibernate in water, rarely on land (but then in holes and burrows).

LC
Least concern

P
Protected by law

Population: decreasing

23 Anguilla anguilla (European eel)

Measures focus on avoidance of specific actions. Considering offsetting measures for this species might be required.
Protection can be achieved effectively at a national or local level, but an international objective is necessary to orchestrate protection measures. Main threats are fishing in marine, brackish and freshwaters; barriers to up- and downstream migration (including damming of river systems for hydro-electric power) and pollution.

Allow migration

- make it easier for fish to migrate through the rivers, e.g. juvenile (glass eels) migrate upstream to their freshwater habitats (mostly in France on the Atlantic facade, but also in the UK, Spain and Portugal)
- allow 40% of adult eels (silver eels) to escape from inland waters back into the sea, where they spawn

Protect and restore populations

- limit professional and recreational fisheries
- restock suitable inland waters with young eel
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)

The European eel has a complex life cycle: adults spawn in the Sargasso Sea in the Caribbean and the larvae migrate towards European shores following the Gulf Stream current. Eels live on average 5-20 years in freshwaters and brackish waters (rivers, coastal lagoons and lakes) before returning to sea to spawn once and die. The eel's habitat used to span across EU waters but they are now found mostly in the rivers of Atlantic EU countries and in the Mediterranean.

Population: decreasing

24 Muscardinus avellanarius (Hazel Dormouse)

Provide artificial dens or nest boxes on trees

- active woodland management and forestry may decrease the number of mature trees that offer suitable cavities for nesting
- providing artificial cavities such as nest boxes (on trees) offers a solution to this
- nest boxes have proved to be extremely effective at increasing the number of this species (as well as other species that benefit from nest boxes)

Restore or create forest

- the species relies on trees for nesting (see previous action)
- restoring previously existing forest or creating new patches of forest may help reintroduce suitable habitats for the species
- can be effectively combined with the artificial den / nest box action

Protect hibernation sites

- retain piles of leaves and branches to provide hibernation sites

This nocturnal species inhabits deciduous woodland, favouring forest edge, secondary growth, coppices, and other wooded areas with a dense shrubby understorey, and also in hedgerows. During the day, it sleeps in woven nests in trees. It is an arboreal feeder, foraging on flowers, insects and fruit. It hibernates from October to April in nests on the ground: in vegetation, in leaves or brushwood, between roots, on tree stumps or in tree holes.

LC

Least concern

P

Protected by law

Population: unknown

25 Dactylorhiza sambucina (Elder-flowered Orchid)

Maintain, restore or create habitat at landscape level

- protect from ploughing and trampling
- avoid tourism, construction and conversion to agricultural land
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)

Ex situ conservation

- artificial propagation, re-introduction, seed collection

Research

- monitor and survey the existing populations and sites, study their dynamics

Dactylorhiza sambucina is a perennial plant that grows in fresh or dry mountain meadows, pastures, forest borders, open woodland, and poor grassland. It prefers sunny alkaline to slightly acid dry to damp soils. It flowers from May to June. It is pollinated by insects.

26 Salamandra salamandra (Fire salamander)

If the species' habitat is already taken by the site: Measures focus on avoidance of specific actions. Considering offsetting measures for this species might be required (if the habitat still exists: maintain it).

Maintain, restore or create suitable landscape features

- best habitats are deciduous and mixed forests with glades and herbaceous vegetation and well shaded brooks
- avoid forest operations within a buffer of 150 m from reproductive sites
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)
- avoid restructuring, draining and fish stocking

Protect hibernation sites

- retain piles of stones and branches to provide hibernation sites

The Fire salamander can be found in woodlands, glades and forest edges, rocky slopes, dense bush, and herbaceous vegetation. It breeds in well shaded shallow brooks. It usually comes out of hibernation when temperatures reach over 5°C and moves towards water to breed. In summer, juveniles leave the water while adults spend their time after breeding on land. In autumn, they move to hibernation sites such as compost heaps, log piles, rockeries or the muddy banks of a pond. Furthermore, during hot summers (e.g. in the southern range of the species), activity ceases.

LC
Least concern

P
Protected by law

Population: decreasing

27 Rana dalmatina (Agile Frog)

Maintain, restore or create suitable landscape features

- the species requires deciduous forests, preferably with oak, connected to ponds
- several ponds should occur in a network and passageways should connect habitats to enable dispersal and increase breeding success
- avoid construction of roads, mitigate with fencing to prevent frogs from entering the road
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)
- avoid restructuring, draining and fish stocking

Protect hibernation sites

- retain piles of stones and branches to provide hibernation sites

Further

- invest in breeding and reintroduction schemes

The species inhabits leafed forests, consisting largely of oak and/or beech, hornbeam, ash etc. These forests often contain a thick layer of leaf litter. It spawns in small, well-illuminated and warm wetlands (pools, marshes, ditches) within forests and at their edges. Reproduction usually occurs in March to April. High levels of larval mortality have been recorded. Hibernation starts at the end of September/end of October and lasts until late January-March.

Population: decreasing

28 Groenlandia densa (Opposite-leaved Pondweed)

Maintain, restore or create habitat at landscape level

- the species requires wetlands
- restore ecological functions, starting with the hydrological dynamics: determine if drainage or siltation has caused the problem
  - the species requires steady flow of water
  - drainage: close the drainage channels and restore the original conditions
  - siltation: remove the excess of sediments, restore the original depth of the water body and correct the conditions within the basin
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)

Research

- research its distribution, population dynamics and potential threats

A perennial herb of shallow, clear, base-rich water which may grow in lakes and rivers, but is more frequent in smaller waters such as streams, canals, ditches and ponds, particularly the headwaters of calcareous streams. It rarely colonises newly available habitats, although it is sometimes found as an introduction in ponds.

Least concern

Population: stable

29 Lissotriton helveticus (Palmate Newt)

Maintain, restore or create suitable landscape features

- the species requires deciduous or mixed forests with glades, ponds, or ditches
- several ponds should occur in a network and passageways should connect habitats to enable dispersal and increase breeding success
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)
- avoid restructuring, draining and fish stocking

Protect hibernation sites

- retain piles of stones and branches to provide hibernation sites

It is present in a variety of habitats including marshes, heathlands, moorlands, forests, pastures and agricultural land. Breeding and larval development takes place in small stagnant waters such as ponds, ditches and ruts, or rarely slow-moving waters. Newts usually come out of hibernation when temperatures reach over 5°C and move towards water to breed. In summer, juveniles leave the water while adults spend their time after breeding on land. In autumn, they move to hibernation sites such as compost heaps, log piles, rockeries or the muddy banks of a pond.

LC
Least concern

P
Protected by law

Population: stable

30 Myotis bechsteinii (Bechstein's Myotis) 1/2

Avoid disturbances

- avoid or minimize noise, light and other forms of pollution from site activities, such as transport, building maintenance or construction - bats are very sensitive to their surroundings

Guard against the loss of roosts:

- maintain broad-leaved trees having potential roost cavities and plant further trees in which potential roost cavities can develop, avoid felling of trees containing roosts
- avoid disturbances, such as construction work, especially during maternity season (May-August) and hibernation period (Oct-April)
- install bat boxes to provide breeding habitats in either buildings or trees
- avoid toxic timber treatments in buildings
- it is especially important to protect the maternal roosting sites in order to ensure the continual survival of bats

This species has specialized habitat requirements and is largely dependent on mature natural forests. In the south-west Asia region it is found in broadleaf and sometimes mixed forest. In Europe, it prefers mature deciduous woodland with a high proportion of old trees. It is occasionally found in artificial habitats such as pasture, orchards and rural gardens. In summer it roosts in tree-holes, or occasionally in buildings; bat boxes are accepted. In winter it hibernates in underground habitats, and possibly also in hollow trees. It forages in woodland and along woodland edge for moths, flies and non-flying insects. It is considered to be a sedentary species.

NT

Near threatened

P

Protected by law

Population: stable

30 **Myotis bechsteinii (Bechstein's Myotis)** 2/2

Maintain, restore or create suitable landscape features

- hedgerows, tree lines, and waterways: bats use linear features as commuting pathways from the roost to foraging areas. The vegetation not only acts as cover from potential predators and the weather, but also provides structure for acoustic orientation and navigation and potential for feeding on the insects found there
- foraging areas that attract insects: rivers, ponds, grassland (avoidance of pesticides is important), ancient semi-natural woodland and hedgerows planted with native vegetation
- avoid artificial lights shining on bat roosts, their access points and the flight paths away from the roost: Bats are nocturnal animals and adapted to low-light conditions

This species has specialized habitat requirements and is largely dependent on mature natural forests. In the south-west Asia region it is found in broadleaf and sometimes mixed forest. In Europe, it prefers mature deciduous woodland with a high proportion of old trees. It is occasionally found in artificial habitats such as pasture, orchards and rural gardens. In summer it roosts in tree-holes, or occasionally in buildings; bat boxes are accepted. In winter it hibernates in underground habitats, and possibly also in hollow trees. It forages in woodland and along woodland edge for moths, flies and non-flying insects. It is considered to be a sedentary species.

NT

Near threatened

P

Protected by law

Population: decreasing

31 Hirudo medicinalis (European Medicinal Leech)

Restore & protect wetlands

- not only does the species require ponds, small lakes and similar water features for its own habitat, a healthy ecosystem of vertebrae hosts is needed
- by helping grow the number of vertebrae hosts, one can simultaneously help this species
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)
- avoid restructuring and draining

Research

- research its distribution, population dynamics and potential threats

The species occurs in ponds, waters that dry up periodically, floodplain pools and small lakes. Other ecological requirements include abundant hosts (frogs, cattle and horses), silty water bottoms, dense submerged and emergent vegetation and gently sloping banks favourable for laying cocoons.
The species breeds once during an annual season that spans June through August. It also remains fertile over a period of years, unlike most other leech species.

NT
Near threatened

P
Protected by law

Population: unknown

32 Ichthyosaura alpestris (Alpine newt)

Maintain, restore or create suitable landscape features

- best habitats are deciduous and mixed forests with glades, ponds, lakes or ditches
- several ponds should occur in a network and passageways should connect habitats to enable dispersal and increase breeding success
- ensure that sludge buildup in ponds is kept to a minimum (<15 cm)
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)
- avoid restructuring, draining and fish stocking
- avoid construction of roads, mitigate with fencing to prevent newts from entering the road

Protect hibernation sites

- retain piles of stones and branches to provide hibernation sites

Occurs in alpine and lowland habitats including wet, shaded deciduous and mixed forests and meadows. Breeds in stagnant waters and slow-moving streams. Usually comes out of hibernation when temp. reaches over 5°C and moves towards water to breed. In summer, juveniles leave the water while adults spend their time after breeding on land but close to the water. In autumn, they move to hibernation sites such as compost heaps, log piles, rockeries or the muddy banks of a pond.

LC

Least concern

P

Protected by law

Population: decreasing

33 Bombina variegata (Yellow-bellied toad)

Maintain, restore or create ponds

- the best sites are temporary ponds in forest and grasslands that dry out in late summer or during autumn
- ponds should be sunny and with little aquatic vegetation: prevent excessive shading of the pond, e.g. by grazing or mowing
- several ponds should occur in a network to enable dispersal and increase breeding success
- avoid soil and water pollution and eutrophication (e.g. agriculture, forestry, sewage, runoff, fertilizers, pesticides)

Protect hibernation sites

- retain piles of stones and branches to provide hibernation sites

Maintain, restore or create features for free movement and migration

- humid corridors like ditches in meadows, small brooks with surrounding vegetation, small rivers with their banks, hedgerows or rough herbaceous vegetation at field boundaries are important for dispersal between breeding sites and between breeding and hibernation sites
- avoid construction of roads, mitigate with fencing to prevent toads from entering the road

Avoid disturbances during breeding season (May-August)

- avoid forestry work during the breeding season to avoid drainage of breeding sites and crushing of toads

Yellow-bellied toads are small, warty, aquatic toads with a brightly coloured underbelly. They occur in many types of wetland, including lakes, ponds, swamps, rivers, stream pools, springs etc., it is sometimes also found in urban forest parks as well as artificial lakes and ponds. These wetlands can be found in deciduous and mixed or coniferous forests, scrubland, meadows, floodplains and grasslands, and even in urban areas. Breeding season is between May and August, it hibernates from September to March.

Population: decreasing

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