

The Division of Conservation Biology at the Institute of Ecology and Evolution, University of Bern, offers:

## **Up to 9 BSc positions for 2024**

In the following research programmes:

- Grassland restoration, research on invertebrates (1-2 posts)
- Population dynamics and conservation of an environmental sentinel, the peregrine falcon (1 post)
- Amphibian conservation (1 post)
- Invasive species management (1 post)
- Microclimate selection of alpine birds (1 post)
- Post-fledging movements & condition of juvenile Hoopoes (1 post)
- Contribution of grape-protection nets in vineyards to avian mortality (1 post)
- High-alpine alluvial areas conservation (1 post)



## Grassland restoration

Semi-natural grasslands have for long harboured a rich biodiversity but belong now to the most affected and threatened ecosystems worldwide, making them a top conservation priority. Developing efficient restoration methods is thus an urgent scientific and management challenge.



### **Active restoration of lowland grasslands** (1 post)

In this lowland module we actively restored species-poor extensively managed meadows with different pro-active reseeding methods. Two of these methods relied on hay transfer from biodiversity-rich hay meadows which is known to efficiently restore the plant community. However, virtually nothing is known about the following cascading effects like how invertebrates (re-)colonized the restored grasslands.

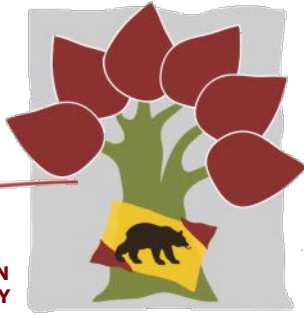
In 2024 a BSc work on the pollinator community and the structure of plant-pollinator interaction network is envisioned. The project is part of an international collaboration with several study sites distributed across Europe. It is led by a team of ecologists in the German Centre for Integrative Biodiversity Research (iDiv) and includes a funded summer school in Leipzig (probably from 22 May to 28 May 2024) to train the student in plant-pollinator interaction sampling techniques and analyses. Field work will then be carried out in our experimentally restored meadows around Bern and last 6–8 days sometimes between 1 June and 15 June.



### **Passive restoration of mountain grasslands** (1 post)

In mountain agro-ecosystems land-use change is relatively recent and is still mostly grassland based. There, contrary to the situation in the lowlands, the seed bank appears fairly intact due to a generally much less degraded landscape matrix, which provides more opportunities for natural, passive grassland restoration. In this research module we experimentally investigate the resilience of mountain grasslands (located in central Valais) to relaxation of intensification. One BSc student can be accommodated in this project. As study models, we envision Auchenorrhyncha, spiders, wild bees and hoverflies as well as plants and potentially orthopterans. Because sampling these taxonomic groups is time and labour intensive, the project will be conducted with the help and in close collaboration with Isabelle Arnold and Silja Eller (PhD and MSc students in the group respectively). Field and lab work will be carried out jointly, while analyses will be conducted independently, investigating different aspects that are still to be discussed with the student. Field work will take place in May–August 2024, but the BSc student will participate mostly after semester end. For field work in Valais free accommodation is provided in Sion.

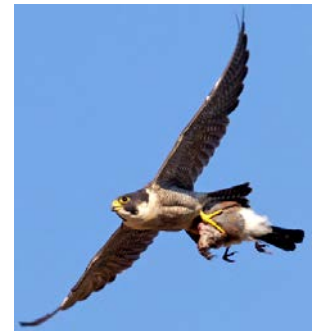
For further information please contact PD Dr [jean-yves.humbert@iee.unibe.ch](mailto:jean-yves.humbert@iee.unibe.ch)



## Population dynamics and conservation of an environmental sentinel, the peregrine falcon

### Project Outline

The peregrine falcon *Falco peregrinus* is an extremely efficient aerial predator that hunts mostly flying birds. As such it is the fastest animal on Earth, with speed in diving flight reaching more than 300 km/h. Not surprisingly, this fascinating bird of prey has been praised by the Egyptians (Horus) and falconers since the Antique. The widespread use of organochlorinated pesticides such as DDT, Dieldrine or Lindane after World War II, notably in agriculture, has decimated most populations in the Western World. However, the peregrine underwent a dramatic come-back after this family of pesticides was banned in the early 1970s. At this title the species is considered as a key environmental sentinel.



While European populations reached again high densities in the 1990s and 2000s, new concerning signs of decline were detected since the mid 2010s. Switzerland is no exception to that general demographic trend. Yet, the causes of this decline have still to be elucidated. The expansion of the eagle owl, which regularly preys on the peregrine, could play a role, but there might be other cryptic issues in the environment that have remained until now undetected (neonicotinoids, decrease in prey supply, etc.). There are currently considerable efforts carried out in Switzerland to monitor peregrine falcon populations. The population of the Upper Rhone Valley (Valais and Vaud), which has also slightly declined in recent years, is tightly monitored since 2013. Before more in-depth scientific investigations about the causes of decline can be envisioned we want to assess the reliability of the currently implemented monitoring scheme.

### Objectives and conservation value

Assess the reliability of the monitoring scheme implemented. Observers have to spend at least 6 h per known breeding site – in at least two sessions of 3 hours but up to 12 sessions of 30 min or combination thereof – during the period preceding egg laying. On that base, population size and structure is estimated over the years. The student will work on datasets collected earlier on (2013-2022) to assess to which extent this effort is sufficient to assess population demographic status. If interested the student can take part to surveys on territory occupancy in January-March and breeding productivity carried in May-June.

**Information and requirements** The student will analyse data extirpated from the platform Ornitho.ch with simple statistics. A continuation with a MSc study is foreseen, but depending on the results. A driving license would be an asset.

**Supervision** This study will be co-supervised by Prof. Dr Raphaël Arlettaz [raphael.arlettaz@bluewin.ch](mailto:raphael.arlettaz@bluewin.ch) and PD Dr Marc Kéry [marc.kery@vogelwarte.ch](mailto:marc.kery@vogelwarte.ch), a world-renown specialist of the peregrine falcon and site-occupancy models.





## European tree frog ecology and conservation



**Project outline**  
The European tree frog *Hyla arborea* is a small climbing

amphibian that has declined steeply throughout Switzerland in recent decades. Ecological research on the species is needed to support planning and assess options for management. This offers multiple opportunities for BSc projects. In particular, a BSc project could focus on 1) determining habitat preferences and phenology of existing populations of *Hyla arborea*, and/or 2) improving monitoring methods by acoustic or visual surveys. All projects would be in close collaboration with a team of two ongoing MSc students.

### Study area

Extant populations for *H. arborea*, and therefore fieldwork locations, are likely in the cantons Vaud, Fribourg or Bern, but other opportunities might arise.

### Supervisors

Dr. Stefano Canessa and Prof. Raphaël Arlettaz, University of Bern

### Information and requirements

For further information please contact [stefano.canessa@unibe.ch](mailto:stefano.canessa@unibe.ch)



## Invasive species ecology and management



### Project outline

We are carrying out multiple studies to assist the evaluation, control and eradication of introduced invasive species in Switzerland, with a particular focus on amphibians and reptiles. Within these projects, there is an option for a BSc study in collaboration with infofauna KARCH <http://www.karch.ch/>.

In particular, we are assessing management options for the invasive American turtle *Trachemys scripta*. Among other things, we want to assess the nesting success of this species in its invasive range, the cost-effectiveness of control methods, and the public reaction to lethal and non-lethal options. All work would be in close collaboration with the current team of one PhD and one MSc student, plus external partners and colleagues in Switzerland and Italy.

### Supervisor

Dr. Stefano Canessa, University of Bern

### Information and requirements

For further information please contact [stefano.canessa@unibe.ch](mailto:stefano.canessa@unibe.ch)





## Microclimate Selection of Alpine Birds

### Project Outline

Mountain ecosystems are among the regions most susceptible to temperature warming, and species adapted to alpine ecosystems are predicted to face local extinctions via physiological and/or behavioral intolerance to rapid increases in temperature. Persistence of alpine avifauna will depend upon the ability of individuals to seek out microhabitats that provide cool refugia while engaging in behaviors that reduce energy expenditure. Identifying such microclimate refugia and understanding how alpine birds use them will help inform management strategies for conserving alpine ecosystems in the face of rapid temperature warming.



### Project Objectives & Location

The objectives of the project are to (1) quantify thermal gradients across alpine landscapes and the thermal properties of microhabitat structures used by birds (e.g., shrubs, isolated trees, rock piles, ledges, topographical depressions, etc.) and (2) quantify the movements of alpine birds in relation to thermal variation and microhabitat structures that provide cool microclimate refugia. The project will focus on two alpine species predicted to respond differently to temperature warming: the cold-adapted Alpine Rock Ptarmigan and the warm-adapted Rock Partridge. Fieldwork will be conducted in alpine landscapes in Valais.

### Information & Requirements

This is a new project, so the exact topic for the BSc project is flexible. However, it will likely focus on the quantification of thermal landscape gradients and/or initial patterns in movement behaviour of ptarmigan and partridge. The study will use state-of-the-art thermal imaging drone technology to create thermal landscape maps and GPS tracking and thermal biologging tags to quantify bird movement behaviour and use of microclimates.

Fieldwork related to bird trapping and application of GPS tags will be led by CB Field Technician, Valentine ("Valou") Debons. We will prioritize the selection of students who can help with the trapping, which requires basic knowledge of backcountry skiing, alpinism, and safely working at high elevations in spring snow.

### Supervisors

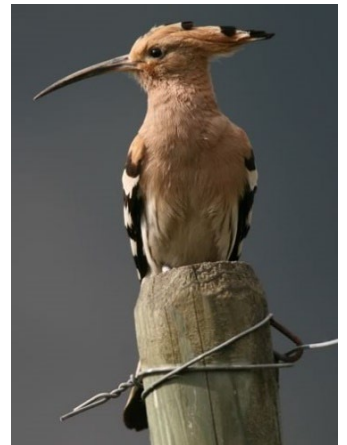
The student will be co-supervised by Prof. Dr Raphaël Arlettaz and Dr Ian Ausprey [ian.ausprey@unibe.ch](mailto:ian.ausprey@unibe.ch), whom you may contact for further information.



# Post-fledgling movements & body condition of juvenile Hoopoes

## Project outline

The Eurasian Hoopoe is a charismatic migratory species that breeds throughout central Eurasia and winters in Africa and southern Asia. In Switzerland the species breeds in low elevation river valleys and is considered vulnerable due to small population sizes. Due to severe population declines in the 1990s, Prof. Arlettaz and colleagues at the Swiss Ornithological Institute initiated an intensive species rehabilitation campaign in Valais by placing hundreds of nest boxes on barns and other farm structures. This intervention proved successful, and the local population rapidly increased, although recently undergoing a new decline. The Hoopoe has since become a central model species for research at the Division of Conservation Biology and monitoring of the nest boxes and the Hoopoe population in Valais continues to this day.



## Project objectives & location

The available project will focus on quantifying movement behaviour in relation to body condition for juvenile Hoopoes as they transition from parental dependence to full behavioural independence. The research will also provide information on the type of habitat structures required to conserve behaviourally dependent Hoopoes within intensified agricultural landscapes. The project will occur during the summer of 2024 in Valais in conjunction with an ongoing project regarding the post-fledging survival and habitat selection of juvenile Hoopoes.

## Field methods

The student will work closely with the MSc student to radio track juvenile Hoopoes after they fledge from the nest. They will also assist in measuring morphological parameters of fledglings that will be used to measure the physiological state of birds upon fledging (e.g., body condition). The student will also have access to data collected during previous field efforts in 2022 and 2023. The student must be available for at least half of the summer field season from mid May to mid August. Housing will be provided at the CB field station in Sion.

## Supervisors

The student will be supervised by Dr Ian Ausprey [ian.ausprey@unibe.ch](mailto:ian.ausprey@unibe.ch) (contact for further information) and Prof. Dr Raphaël Arlettaz.





## Contribution of grape-protection nets in vineyards to avian mortality



### Project outline

Farms across the world often cover their crops with nets in order to prevent birds from eating or destroying their produce. While this may appear an effective solution for improving agricultural yields, the impact on avian biodiversity is potentially problematic given that birds trapped in nets are often seriously injured and ultimately die. Despite widespread use of nets in agricultural landscape, their impact on birds and other biodiversity is poorly understood. This is especially the case in vineyards, where nets are deployed with little understanding of their implications for avian biodiversity.

### Project objectives & location

The project will occur in Vaud and Valais in late July-September 2024, when nets are installed to protect the grapes. The exact dates cannot be exactly known in advance as all depends on grape maturation which is itself governed by local weather circumstances that change from year to year.

### Field methods

The student will work closely with a MSc student to monitor vineyard nets for avian behavioural interactions with protective nets and document associated fatalities. Natural and other environmental structures around the vineyards will be mapped to account for co-factors in statistical modelling. The work will be conducted in close collaboration with the Division's field technician. The student will need to have excellent interpersonal skills given the sensitive nature of this project. Accommodation will be provided for free at the apartment of the Conservation Biology Division in Sion.

### Supervisors

The student will be co-supervised by Prof Dr Raphaël Arlettaz and Dr Ian Ausprey [ian.ausprey@unibe.ch](mailto:ian.ausprey@unibe.ch), whom you may contact for further information.





## High-alpine alluvial areas conservation



### Project outline

Global warming is affecting the biosphere as a whole, with alpine ecosystems and species being particularly threatened by rising temperatures. Melting glaciers are emblematic symbols of this accelerated warming: climate change scenarios forecast their complete disappearance from central Europe by 2100. This dramatic melt will however open new spaces and opportunities for species colonization via secondary succession, ultimately leading to the formation of new alpine habitats. Among them, of special interest and conservation value are high-alpine alluvial zones as they host unique – but not very well known and studied – biodiversity values. However, these alluvial zones are also at risk for new infrastructure development like damming for hydropower production or sediment exploitation. Measures should be taken for the protection of these new alluvial habitats and their biodiversity. In this project we use spatially explicit models to predict where these alluvial habitats will form in the future and what their biodiversity value will be. The final goal is to provide evidence-based recommendations to help decision-making when conflict between biodiversity conservation and exploitation of these area arise. Moreover, we seek to identify the best management practices when exploiting these habitats.

### Project objectives and location

The exact subject of this BSc thesis is to be defined between the applicant and the supervisors as this is a new project. Fieldwork including invertebrates sampling and habitat mapping is however very likely. This fieldwork will occur in selected glacier forefronts, most likely in June-August.

### Supervisors and information

Dr. Alejandra Mórán Ordóñez [alejandra.moran@unibe.ch](mailto:alejandra.moran@unibe.ch) (contact for further information) and Prof. Dr. Raphaël Arlettaz.