UNIVERSITÄT BERN

ECOLOGY & EVOLUTION
CONSERVATION BIOLOGY

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

10-14 MSc positions

in the following research programmes:

- Grassland restoration (2-3 posts)
- Small structures for mustelids (2 posts)
- Amphibian conservation (1-2 posts)
- Invasive species management (2-3 posts)
- Post-fledging survival of Hoopoes (1 post)
- Alpine bird microclimate refugia (1 post)
- Conservation value proglacial alluvial zones (1 post)
- Contribution of vineyard nets to avian mortality (1 post)

Prof. Dr Raphaël Arlettaz
Head of the division of Conservation Biology
Office: Erlachstrasse 9a
Mail: Baltzerstrasse 6
CH–3012 Bern

+41 31 631 31 61
+41 79 637 51 76
+41 31 631 45 35
raphael.arlettaz@unibe.ch
www.conservation.unibe.ch

UNIVERSITÄT BERN
ECOLOGY & EVOLUTION
CONSERVATION BIOLOGY

1. Grassland restoration (2-3 posts)

Farmland biodiversity has been dramatically impacted by the post war agricultural intensification. Most European countries have thus implemented agri-environment schemes (AES) that support farmers financially for modifying their farming practice so as to provide environmental benefits. However, despite the massive financial incentives, the benefits of AES for biodiversity have remained limited until now (Kleijn et al. 2006 *Ecol Lett*; Pe'er et al. 2014 *Science*). In 2019, we launched a research programme whose main objective is to experimentally test novel, active or passive, restoration methods for degraded species-poor grasslands. The project is financially supported by the Swiss National Science Foundation, the Federal Office for the Environment, the Federal Office for Agriculture and the canton of Valais, which emphasizes the strong interest of stakeholders in the thematic.

The research programme comprises two modules, one in the lowlands (Swiss Plateau) and one in the Alps (Valais), with scientific questionings and hypotheses specific to these two different socio-economic and geographical contexts.

1.1 Active restoration of lowland grasslands

In this lowland module we actively restored 48 species-poor extensively managed AES meadows with four different reseeding methods. Two of these methods relied on hay transfer from biodiversity-rich hay meadows which is known to efficiently restore the plant community (Slodowicz et al. 2023 *Ecol Solut Evid*). However, virtually nothing is known about the following cascading effects like how invertebrates (re-)colonized the restored grasslands. The goal of the envisioned MSc project is to evaluate the response of the invertebrate community to the different restoration methods. We shall in particular focus on understanding and disentangling the main local- (typically due to the restoration of the plant community) and landscape-scale ecological mechanisms that influence restoration success. Among invertebrates, we can envision several taxonomic groups (e.g. butterflies, orthopterans, plant- and leafhoppers …). The project will be conducted in close collaboration with Laura Forgione, PhD student on the project.

Prof. Dr Raphaël Arlettaz
Head of the division of Conservation Biology
Office: Erlachstrasse 9a
Mail: Baltzerstrasse 6
CH–3012 Bern

+41 31 631 31 61
+41 79 637 51 76
+41 31 631 45 35
raphael.arlettaz@unibe.ch
www.conservation.unibe.ch

UNIVERSITÄT BERN

ECOLOGY & EVOLUTION
CONSERVATION BIOLOGY

1.2 Passive restoration of mountain grasslands with respect to landscape matrix

In mountain agro-ecosystems land-use change is more recent. There, contrary to lowlands, the seed bank is still probably fairly intact: the matrix is much less degraded and still allows natural dispersal of organisms, which provides more opportunities for natural, passive grassland restoration. In this research module we experimentally investigate the resilience of mountain grasslands to relaxation of intensification, i.e. their progressive return to biodiversity-richer stable states. One master student can be accommodated in this project. As study models, we can envision several taxonomic groups among invertebrates (e.g. wild bees, orthopterans, ground beetles, …), and personal preferences for taxa will be considered. Plants might be sampled too (as co-variable) and the project will be conducted in close collaboration with Isabelle Arnold, PhD student on the project.

Altogether

We offer a stimulating working atmosphere in a very dynamic team, as well as spacious room for developing field expertise and analytical skills at many levels. Field work will be carried out mostly between May and September 2023. Basic knowledge in invertebrate taxa identification would be advantageous, but not prerequisite. We also encourage the student to develop his/her own research ideas, the sampling design and methodology. Note that a driving license is compulsory. Last but not least, this research will let you discover many beautiful areas of Switzerland. For any questions, please contact **jean-yves.humbert@iee.unibe.ch**.

Supervisors: Dr Jean-Yves Humbert and Prof. Raphaël Arlettaz, University of Bern.

Prof. Dr Raphaël Arlettaz
Head of the division of Conservation Biology
Office: Erlachstrasse 9a
Mail: Baltzerstrasse 6
CH–3012 Bern

+41 31 631 31 61
+41 79 637 51 76
+41 31 631 45 35
raphael.arlettaz@unibe.ch
www.conservation.unibe.ch

UNIVERSITÄT BERN
ECOLOGY & EVOLUTION
CONSERVATION BIOLOGY

2. Small structures for mustelids (2 posts)

Farmland biodiversity is still declining in Switzerland and around the world despite all efforts and money invested in its protection. In this context, small structures, such as piles of branches or stones, are more and more popular and recommended by many experts to promote vertebrates. It is quite intuitive that a multitude of organisms benefit from these structures, however, there is very little scientific evidence behind (reviewed in Rossier et al. 2021). It appears that in order to better promote the species that depend on these small structures, in particular stoats (*Mustela erminea*) and least weasels (*Mustela nivalis*), further scientific studies are needed.

Study objectives

There are two potential real-scale MSc projects: one in the lowland farmlands of the Swiss Plateau and one in fruit cultures in Valais. The goal of both projects is the same, i.e. to determine quantitatively the functional role of the small structures for the promotion and conservation of mustelids and/or other small mammals. Ultimately, the project will deliver evidence-based recommendations on when, where and how to place these structures in the landscape to conserve and restore farmland biodiversity. To sample the stoat and weasel populations we will use camera boxes.

Field work will be carried out in in fall 2023 or spring-summer 2024, depending on the project) followed by a couple of months of lab work (genetic analyses). Genetic analyses will be conducted in collaboration with a colleague from the university of Bern. Note that a driving license is compulsory. For further information please contact **jean-yves.humbert@iee.unibe.ch**.

Supervisors: Dr Jean-Yves Humbert and Dr Alain Jacot (for the Valais project, alain.jacot@vogelwarte.ch).

Prof. Dr Raphaël Arlettaz
Head of the division of Conservation Biology
Office: Erlachstrasse 9a
Mail: Baltzerstrasse 6
CH–3012 Bern

+41 31 631 31 61
+41 79 637 51 76
+41 31 631 45 35
raphael.arlettaz@unibe.ch
www.conservation.unibe.ch

UNIVERSITÄT BERN

ECOLOGY & EVOLUTION
CONSERVATION BIOLOGY

3. Amphibian conservation (1-2 posts)

Project outline

Amphibians are the most endangered vertebrate group in the world. Among the main threats are habitat loss and degradation, infectious diseases, climate change. To stop and reverse this decline, we need to understand its patterns and causes, but also to develop and deploy effective actions for restoring and recovering populations. We collaborate with infofauna-KARCH to provide research that directly informs conservation, either by clarifying the impact of human activities, or by testing and improving restoration and recovery actions. We are also involved in planning for reintroduction of several species in Switzerland and abroad. There is a lot of room for a student interested in amphibian conservation and many opportunities to suit different skills and physical abilities.

Information and requirements

Projects can be set up as any mix of field, lab and computer work, to suit different skills and interests. Here are three options based on ongoing or planned projects:

- Assess the feasibility of reintroducing tree frogs *Hyla arborea*. This project is likely to involve a degree of fieldwork to determine possible source populations through count surveys and capture-recapture methods, establish habitat requirements through occupancy and habitat use analysis, and demographic projection of different management strategies using an existing population model.
- Clarify impact of invasive amphibians on Swiss species, particularly invasive crested newts *Triturus carnifex*, by trapping and counting surveys, analysis of dietary preferences and application of removal models to estimate population sizes.
- Estimate demography and dispersal of yellow-bellied toad *Bombina variegata* in Valais, carrying out capture-recapture surveys and fitting demographic and spatial models to estimate survival, reproduction and movement patterns.
- Additional suggestions are very welcome and students are encouraged to develop their own ideas and keep an open mind. Please get in touch to discuss.

Fieldwork depends on the target species and the project chosen, but can range from late winter to mid-summer, day and/or night, and in different weather conditions. A driving license is necessary for fieldwork. Expect also to communicate a lot with managers and other scientists within and outside Switzerland.

Supervisor: Dr. Stefano Canessa, University of Bern; stefano.canessa@unibe.ch.

Prof. Dr Raphaël Arlettaz
Head of the division of Conservation Biology
Office: Erlachstrasse 9a
Mail: Baltzerstrasse 6
CH–3012 Bern

+41 31 631 31 61
+41 79 637 51 76
+41 31 631 45 35
raphael.arlettaz@unibe.ch
www.conservation.unibe.ch

UNIVERSITÄT BERN
ECOLOGY & EVOLUTION
CONSERVATION BIOLOGY

4. Invasive species management (2-3 posts)

Project outline

Invasive species cause biodiversity loss worldwide, impacting native species and ecosystems by predation, competition, disease and other mechanisms. Active management of invasive species is necessary but challenging, because of uncertainty, limited budgets, and possible controversies about lethal methods of control. Funded by SNSF, we are carrying out a study to assist the control and eradication of the invasive pond slider turtle *Trachemys scripta* in Switzerland and Europe. Our project focuses on comparing different control methods, from trapping to nest removal, against different criteria of cost-effectiveness.

Information and requirements

There are multiple potential topics for MSc projects, to work in a team with postdocs, PhD students and partners in Switzerland, Italy and possibly Spain (depending on projects).

- Carry out a detailed assessment of the welfare implications of different control methods. This will involve working with experts, carrying out formal elicitations, and collecting field data in wild and captive settings, using camera traps and data loggers.
- Evaluate shooting as a management option for *Trachemys scripta*. This method, potentially controversial, should be evaluated empirically before deciding whether to implement it or not. This project will focus on collecting dead turtles, shooting the carcasses on a range under experimental conditions, working with Vetsuisse experts at the University of Bern to assess effectiveness and welfare implications.
- Developing a protocol to search for nests at sites where *T. scripta* occurs, using a combination of data loggers and GPS-VHF tracking to determine the climatic conditions which nests experience. This information can then be used to project the expected sex ratio and population dynamics, for example under different climate change scenarios.
- Additional ideas are welcome and can be discussed with the team to explore their feasibility. Multiple skills and interests can be helpful to the project, ranging from fieldwork to captive care to quantitative (desk-based) analyses and programming. So don't hesitate to get in touch!

Field work will be carried out in spring to summer 2024, with the possibility of extending to another season in 2025 depending on progress. Travel to Italy and/or Spain is highly likely depending on the project chosen. A valid driving license is highly recommended.

Supervisor: Dr. Stefano Canessa, University of Bern; stefano.canessa@unibe.ch.

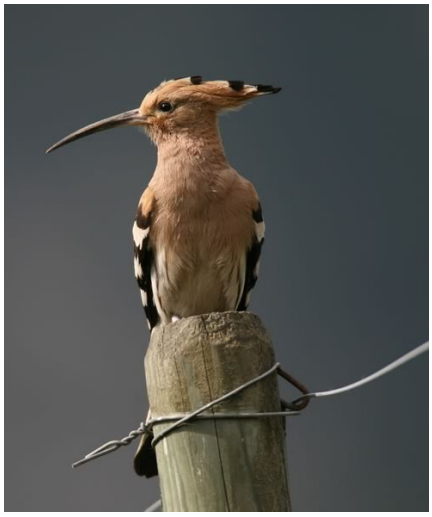
Prof. Dr Raphaël Arlettaz
Head of the division of Conservation Biology
Office: Erlachstrasse 9a
Mail: Baltzerstrasse 6
CH–3012 Bern

+41 31 631 31 61
+41 79 637 51 76
+41 31 631 45 35
raphael.arlettaz@unibe.ch
www.conservation.unibe.ch

UNIVERSITÄT BERN
ECOLOGY & EVOLUTION
CONSERVATION BIOLOGY

5. Post-fledging survival and habitat use of juvenile Hoopoes (1 post)

Project Outline



The Common 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. 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 builds upon two years of intensive fieldwork conducted by past MSc and BSc students, with the goal of building a multi-year time series of survival, movement, and behavioural development metrics. Specifically, we have developed an intensive field protocol in which we track birds on a daily basis for the length of the fledgling period in order to determine how long they survive, the major sources of mortality, how far they move, the types of habitats that they select, and the extent of parental investment in the development of foraging behaviour. The project is done in close collaboration with Vogelwarte, which has been monitoring Hoopoe reproductive rates in Valais for over 20 years. Data from this project will be used to improve the demographic model for the Valais Hoopoe population, as well as providing recommendations for mitigating fledgling mortality via the conservation of important habitat structures.

The student will spend the winter of 2024 (1) organizing data from previous field efforts and (2) learning how to conduct state-of-the-art mark-recapture models in Program MARK and R. The student will then transition to fieldwork in Valais from May-August 2024, and it is essential that the student be available for that entire period. The fieldwork is challenging, requiring 6 days of fieldwork each week in extremely hot conditions across the intensified agricultural landscapes of Valais between Martigny and Sion. While the exact topic of the final MSc thesis is flexible, it will likely focus on analysing inter-annual variation in survival, movements, and/or behavioural development.

Supervisors

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

Prof. Dr Raphaël Arlettaz
Head of the division of Conservation Biology
Office: Erlachstrasse 9a
Mail: Baltzerstrasse 6
CH–3012 Bern

+41 31 631 31 61
+41 79 637 51 76
+41 31 631 45 35
raphael.arlettaz@unibe.ch
www.conservation.unibe.ch

UNIVERSITÄT BERN
ECOLOGY & EVOLUTION
CONSERVATION BIOLOGY

6. Behavioural plasticity and microclimate selection of alpine birds (1 post)

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.

Exact project sites have yet to be identified but will most likely be located across alpine landscapes of Valais.

Information & Requirements

This is a new project, so the exact topic for the MSc thesis 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 prefer to have a student who can help Valou 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**, whom you may contact for further information.

Prof. Dr Raphaël Arlettaz
Head of the division of Conservation Biology
Office: Erlachstrasse 9a
Mail: Baltzerstrasse 6
CH–3012 Bern

+41 31 631 31 61
+41 79 637 51 76
+41 31 631 45 35
raphael.arlettaz@unibe.ch
www.conservation.unibe.ch

UNIVERSITÄT BERN
ECOLOGY & EVOLUTION
CONSERVATION BIOLOGY

7. Conservation value proglacial alluvial zones (1 post)

Project outline

The extremely rapid melting of glaciers in response to accelerating climate change will lead to the formation of new lakes and proglacial alluvial habitats in the Alps; these ice-free areas will gradually be colonised by pioneer species, followed by whole alpine communities of high conservation value, inducing changes in the composition and configuration of alpine landscapes in the long-term.

This project (starting in Fall 2023) will identify, via predictive spatial models, where proglacial alluvial habitats will appear in the landscape, what their biodiversity values will be and whether the latter could be at risk because of the potential of these new formed landscapes for infrastructure development (e.g., damming for hydropower production or water reserve retention, or flooding for the same reasons, and/or management via heavy machinery - sediment removal). The main outcome of the project will be a hierarchical ranking of Swiss proglacial landscapes based on their conservation value and vulnerability to potential infrastructure development that will serve as a basis for deciding on the future use and management of these alluvial areas. The results of this research will provide political leaders, government agencies, operators, and non-governmental organisations with a scientific basis for action and decision-making.

Information and requirements

In this project, the student will contribute to the identification of the key biodiversity indicators of the proglaciar alluvial zones. The aim is to understand the relationship between the occurrence/abundance of these indicator species and the different microhabitats present in these alluvial landscapes. The project is open to interests in different taxonomic groups and can accommodate bibliographical review and field work but also computer work (spatial modelling of species distributions). A driving license is necessary for fieldwork.

The project will be co-supervised by Prof. Dr Raphaël Arlettaz and Dr. Alejandra Morán-Ordóñez, University of Bern; alejandra.moran@unibe.ch. In this project we also collaborate with the Biodiversity Change group of UNIL.

Prof. Dr Raphaël Arlettaz
Head of the division of Conservation Biology
Office: Erlachstrasse 9a
Mail: Baltzerstrasse 6
CH–3012 Bern

+41 31 631 31 61
+41 79 637 51 76
+41 31 631 45 35
raphael.arlettaz@unibe.ch
www.conservation.unibe.ch

UNIVERSITÄT BERN
ECOLOGY & EVOLUTION
CONSERVATION BIOLOGY

8. 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 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 monitor vineyard nets for avian behavioral 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, whom you may contact for further information.

Prof. Dr Raphaël Arlettaz
Head of the division of Conservation Biology
Office: Erlachstrasse 9a
Mail: Baltzerstrasse 6
CH–3012 Bern

+41 31 631 31 61
+41 79 637 51 76
+41 31 631 45 35
raphael.arlettaz@unibe.ch
www.conservation.unibe.ch