



D.1.3.1 Preliminary map of “urgent- need-to-act” areas (UTAAs)

Technical summary

Elena Tello-García, Johannes Rüdiger and Georg Leitinger
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1 “Urgent-need-to-act” areas (UTAAs) planning

As a reminder, the following is stated in the project proposal:

Activity 1.3 Mapping of potential “urgent-need-to-act” areas (UTAAs): Based on D1.2.1 and D1.3.2 (Table 1), UTAAs are identified, i.e. areas requiring urgent action for protection or restoration. Initially, very soon after the start of AlpsLife, preliminary maps based on KBA and N2000 areas are produced for assessment by observers/stakeholders in WP4. Finally, results from all WPs are processed and the final UTAAs mapped.

Table 1 Details of deliverables from AlpsLife Project Proposal

Running number	Deliverable title	Description	Delivery period
D.1.3.1	Preliminary map of UTAAs	The preliminary map of UTAAs based on KBA and Natura 2000 areas is provided to WP4 to be assessed by stakeholders and observers.	Period 1, 1 - 6
D.1.3.2	Report and maps of potential UTAAs	Detailed reporting on the UTAA assessment approach as well as geodata (maps) of UTAAs are provided. Synthesis of the spatial information and identification of priority conservation areas.	Period 6, 31 - 36

The preliminary UTAAs map is the first step (first circle) towards the final deliverable of the project (Fig. 1). The UTAAs map will evolve as a 'living' document, incorporating feedback from the different stakeholders and partners and data from all the WPs, especially the reality check by WP2 and WP3.

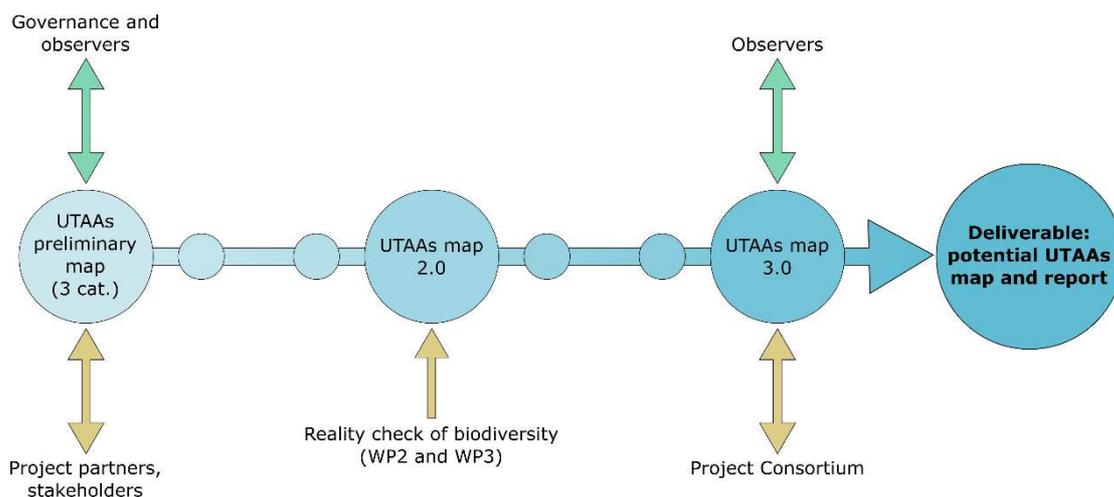


Figure 1 "Urgent-need-to-act" areas (UTAAs) timeline.

The current plan, as discussed in the AlpsLife Task Force meeting on 23.01.2025, is to follow a three-layer approach for reviewing feedback on the first preliminary UTAA's map:

- Scientific Criteria: Evaluation of the criteria of the map by scientists.
- Map content: Project partners assess the map's accuracy and relevance.
- Target group understanding: Engage key decision-makers to discuss potential UTAA's.

2 Concept of the UTAA's preliminary map.

The UTAA's preliminary map is conceived as a tool to motivate discussion at the Core group meetings for identifying the final UTAA's. The main objectives of the UTAA's preliminary map are to:

- Gather feedback from both local perspectives (bottom-up) and strategic insights (top-down) – the specific stakeholders will be defined together with WP4.
- Explore the knowledge available among stakeholders.
- Learn and identify ongoing biodiversity initiatives to ensure none are overlooked.
- Assess whether stakeholders think we are on the right track, e.g. whether Key Biodiversity Areas (KBAs) accurately represent real biodiversity.
- Engage stakeholders, so that they have a sense of ownership over the outcome.

What kind of feedback do we expect?

- Data sources or initiatives we need to include.
- Synergies and connections between the three categories we are developing.
- Learning about their expectations, what kind of information do they need in our final map of potential UTAA's to plan actions?

How are we going to get this feedback? This is still uncertain and will be developed in the next steps in close cooperation with CIPRA, i.e. WP4 and the AlpsLifeTask Force.

3 AlpsLife perimeter

The perimeter defined for the AlpsLife project is based on the Alpine Convention perimeter, extended by a 50 km buffer, and further adjusted to align with regional borders to facilitate data accessibility. This adjusted perimeter is designed to better serve the project's goal of monitoring biodiversity. By including areas surrounding the Alpine Convention region, it captures relevant ecological contexts while excluding regions too distant to influence Alpine biodiversity.

4 Key Biodiversity Areas (KBAs)

The UTAA's preliminary map is mainly based on Key Biodiversity Areas (KBAs). The KBA Programme supports the identification, mapping, monitoring and conservation of KBAs to help safeguard the most critical sites for nature worldwide. For more information, refer to <https://www.keybiodiversityareas.org>

KBAs can be identified by a KBA National Coordination Group (KBA NCG) if this has been established in a country or by an individual or small group of proposers. KBA monitoring assessments should be undertaken every 8-12 years to ensure they still meet the KBA criteria, with monitoring data managed in the World Database of KBAs. The KBA criteria (<https://www.keybiodiversityareas.org/working-with-kbas/proposing-updating/criteria>) do not just consider populations of species but also their habitats or ecosystems, so their conservation helps to ensure the simultaneous survival of many species. In our area of interest, i.e. the AlpsLife perimeter, almost all KBAs are triggered by bird species and established by BirdLife International. Most of them were last updated in 2000 and 2002. Only 36 KBAs (13% of the total) have been updated in the last 15 years.

5 UTAs categories

The preliminary map is organized into three categories, representing relevant topics related to biodiversity in the Alps. For each category, we propose a hypothesized issue, formulate questions to assess and illustrate the reality of that issue for stakeholders, and outline potential actions to consider if our hypothesis is correct. We also include some information on previous approaches and a short description of the maps.

The maps for each category are included in the same folder as this technical summary.

5.1 Category 1. Hotspots of biodiversity

Issue: some biodiversity hotspots do not overlap with Alpine Protected Areas (APAs) surface and are therefore not protected, and conservation is not guaranteed.

Questions:

- Which KBAs are outside of APAs? In a first look, we see that almost all KBAs (or at least a part of their territory) are located inside APAs of some kind of protection.
- Under what type of protection are the KBAs located in the APAs? Not all APAs have the same level of protection. While National Parks have regular monitoring and strong protection measures, other APAs are typically grouped into broad categories, making it challenging to assess their specific protection levels due to differences among nations (see Table 2). In the ALPBIONET2030 project (<https://www.alpine-space.eu/project/alpbionet2030>), the IUCN classification system was considered unsuitable due to its global scope and emphasis on North American conservation concepts. Instead, they developed a classification adapted to the Alps that considered national differences. There, Laner et al. (2024) introduced an Environmental Protection Factor, ranging from 0 to 10, which quantifies the legal protection status of various protected areas. This factor was derived from the World Database on Protected Areas (WDPA) and refined with national and regional datasets to address cross-country variations. For further details, refer to table 2 from Laner et al. (2024). The final classification categories for the Alps and some examples to illustrate them are summarized in Table 3.

Table 2 Alpine protected area (PA) types and their IUCN category. Source: Alpine Parks 2030 (Plassman & Coronado-Cortes, 2023).

PA type	IUCN Category
National Parks	II/V
Nature reserves	IV
Regional nature parks	II/IV/V
Other areas with particular protections	
Wilderness areas/strictly protected reserves	I (Ia/Ib)
Landscape protection areas	IV/V
Protected parts of a landscape	III
Special conservation areas/Natura 2000 sites or Emerald sites	IV or other
Natural monuments/ natural areas	III/IV/V
Natural forest reserves/ strict protection forests	I/IV
Quiet zones/ extraordinary protected area	I, II, III, V
Area of relevant environmental interest (only in Italy)	-
Gardens and parks, municipal or intermunicipal parks (Italy)	-
Natural recreation areas (only in Italy)	-
Ensembles (new in 2020, Bolzano Province)	-
International designations	
UNESCO Biosphere reserves	various
UNESCO Global Geopark reserves	various
UNESCO World Natural Heritage sites	various
Ramsar sites	various

Table 3 Environmental protection factor categories created by Laner et al. (2024) and some examples of protected area (PA) types of each factor value.

Legal protection status	Examples of PA types	Factor value (0-10)
Strict conservation status, no economic use	Wilderness areas in Austria, Swiss National Park, Italy Nature reserve cat. Ia	10
Protected areas with strictly regulated economic use	National parks	9
Protected areas with legal restraints I	IUCN cat. IV, national nature reserves in France	7
Protected areas with legal restraints II	Natura2000	6
Protected areas without legal restraints AND / OR Protected areas where the management serves the sustainable development of natural ecosystems	Austria protected landscape areas, France National Park buffer zones, ecological important areas in Slovenia	5
No protection		0

We calculated the area of KBAs in each environmental protection factor at the AlpsLife perimeter (Fig. 2 and Fig. 3). The analysis shows that 25% of the total KBA area remains unprotected, while only 1% falls within areas with the highest protection level, i.e., value 10. A significant portion of the KBA area is in areas classified as value 6, which corresponds to protected areas with legal constraints such as Natura 2000 sites.

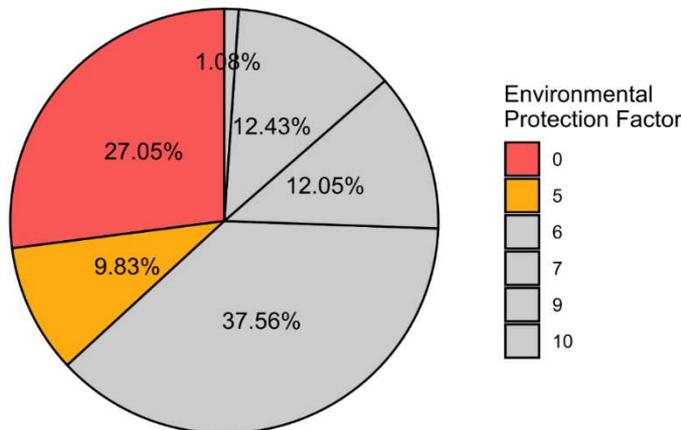


Figure 2 Proportion of KBA area within each category of the Environmental Protection Factor in the AlpsLife perimeter. Refer to Table 3 for the description of each factor value.

- Are these KBAs completely within the APAs? In most cases, KBAs are intersecting with APAs, but they are not totally protected.

Action: (stronger) protection of KBAs. This would mean to protect KBAs that are unprotected or extend protected areas that only cover a share of a specific KBA, or to increase the level of protection of those that fall into lower protection levels.

Alpine Space

Previous approaches/tests: We tried to categorize the levels of protection based on the ALPARC APA layer (<https://alparc.org/discover-the-apa>), showing the APAs, but the ALPBIONET environmental protection layer was suggested, as it gives a better idea on the level of protection, although it is more difficult to identify specific APAs.

KBAs and Natura 2000 sites were compared, and we saw that there is a significant overlapping with 58.85 % of the KBAs total area located in Natura 2000 sites.

We mapped the overlap between KBAs and APAs, and we determined that most KBAs were partially protected, with only 17 KBAs fully inside APAs and 9 KBAs entirely outside APAs, out of a total of 288 KBAs within the AlpsLife perimeter.

Layers for the final map:

The map is shown in Fig. 3 and includes the following layers:

1. AlpsLife perimeter created by Universität Innsbruck (UIBK).
2. KBAs inside the AlpsLife perimeter, provided by the KBA Programme.
3. Environmental protection factor provided by Laner et al. (2024). Here, we want to focus the attention on the non-protected areas (factor 0) and the ones with lower environmental protection (factor 5).

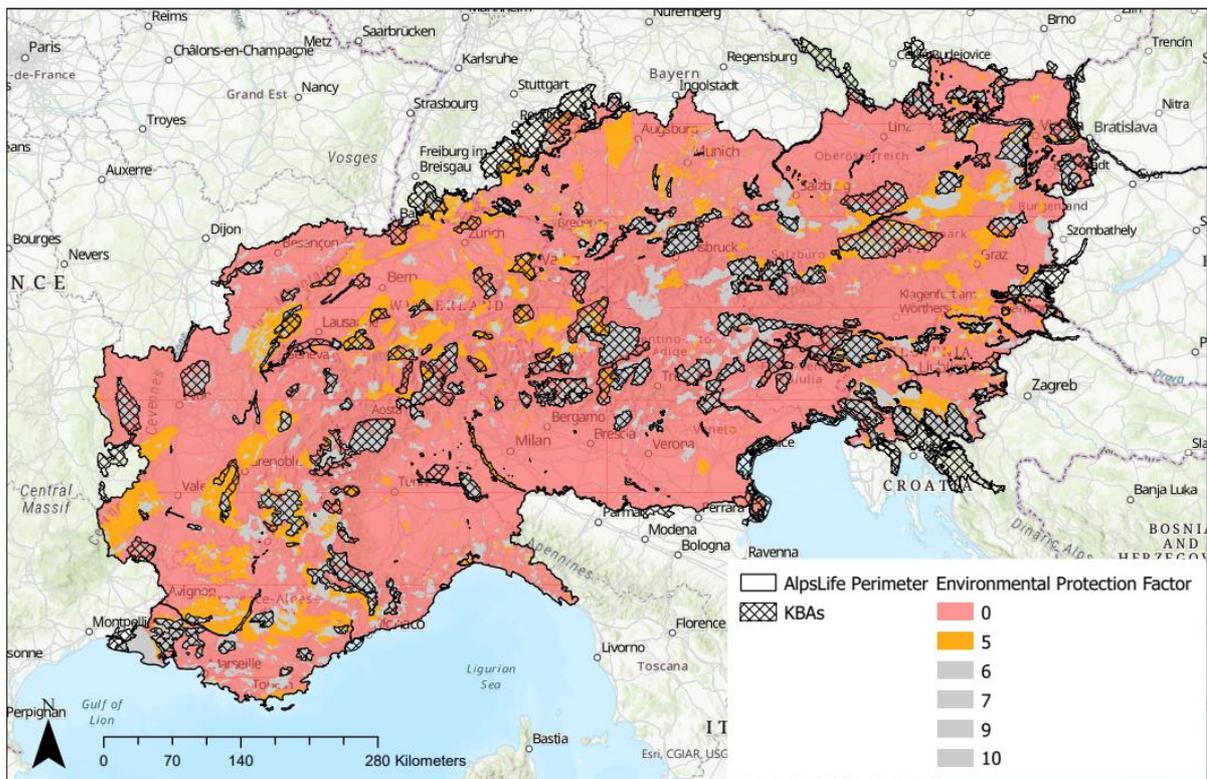


Figure 3 UTAs category 1 – Hotspots for biodiversity, based on Key Biodiversity Areas (KBAs) and the Environmental Protection Factor from Laner et al. (2024).

Goal of the map: The goal of this map is to enable stakeholders to identify KBAs as hotspots for biodiversity and assess the level of protection of KBAs or areas they might consider relevant for action.

5.2 Category 2. Ecological connectivity

Issue: some ecologically important areas are isolated. To maintain ecological connectivity and prevent further fragmentation, it is essential to connect areas that are relevant for ecological conservation. At Alpine level, large corridors are especially missing and are essential to support large mammals (such as deer, wolves and bears) and long-distance species (e.g. migratory birds).

Questions:

- Which KBAs are within strongly protected areas (i.e. National Parks)? We can identify in our category 1 map that there is some overlapping between KBAs and National Parks.
- Can these KBAs in National Parks be connected to other KBAs nearby? KBAs in National Parks are close or even touching boundaries with other KBAs which protection is uncertain.

Schoville et al. (2018) measured the genetic diversity of 893 plant species and concluded that the APA network protects all of them. Nevertheless, they also observed not significant declines in mean alpine plant species richness and intraspecific genetic diversity. They assessed the least-cost paths among protected areas indicating habitat connectivity and identified key regions in Switzerland, Austria and France to keep genetic connectivity in the Alps. This dataset will be explored in future steps, as it may provide valuable insights into ecological connectivity.

- Where are potential corridors to connect areas of interest, i.e. National Parks, KBAs or areas of high ecological value?

The PlanToConnect project (<https://www.alpine-space.eu/project/plantoconnect/>) provided a map of the regional potential ecological network in EUSALP areas. This map builds on previous work done in ALPBIONET2030 (Laner et al., 2024), where they used indicators with relevance for ecological connectivity and summarized them in the Continuum Suitability Index (CSI). The indicators were environmental protection, fragmentation by transportation infrastructure, land use, population pressure, and altitude and topography. All ranged from 0 = poor suitability as an ecological continuum to 10 = high suitability as an ecological continuum.

According to the CSI, they divided the area in three categories:

- SACA1 or Ecological Conservation Area (ECA): still have considerable space for connectivity with non-fragmented surfaces and where connectivity should be conserved.
- SACA2 or Ecological Intervention Area: areas with a high potential for connectivity (of SACA 1 areas) in which larger, more or less natural non-fragmented zones could be created. Ecological connectivity is currently working but would benefit from enhancements.
- SACA3 or Connectivity Restoration Areas: fragmentation has already progressed so far that interlinked habitats and a transparent landscape matrix are no longer a realistic option.

For more information on this categorization, refer to Laner et al. (2024) or the ALPBIONET2030 recommendations to enhance and promote ecological connectivity in the EUSALP area (<https://www.alpine-space.eu/project/alpbionet2030/>).

PlanToConnect created a layer (available here: <https://www.jecami.eu/ptc/>), with regional potential linkages between ECAs bigger than 300 ha. In the map, the different ranges of the linkages represent the width of the corridor; ECAs are differentiated between protected and not protected and Steppingstones are defined as ECAs smaller than 300 ha; and Restoration areas are linkages going through SACA3 or Connectivity Restoration Areas. We plan to provide this map for stakeholders to assess the potential linkages and comment on their feasibility. However, as highlighted by Javornik et al. (2022), we must carefully evaluate the applicability of general connectivity indicators (e.g. fragmentation, environmental protection, population pressure) to large carnivores and large ungulates distribution in future steps of the UTAA's map.

Action: identification of potential ecological corridors.

Previous approaches/tests: first, we checked the SACA categories surrounding National Parks, however, the map provided by PlanToConnect is more informative for our goal of finding potential linkages for connectivity. We should, however, keep in mind the comments done in one WP1 meeting: Although the SACA classification is a good representation of landscape permeability and fragmentation, the analysis done with species distribution models did not show a high correlation between biodiversity and the SACA1 category. Therefore, expert knowledge and other datasets based on specific species can improve this map.

Layers for the final map:

The map is shown in Fig. 4 and includes the following layers:

1. AlpsLife perimeter created by UIBK.
2. PlanToConnect: potential ecological network EUSALP provided by Laner & Favilli (2024).

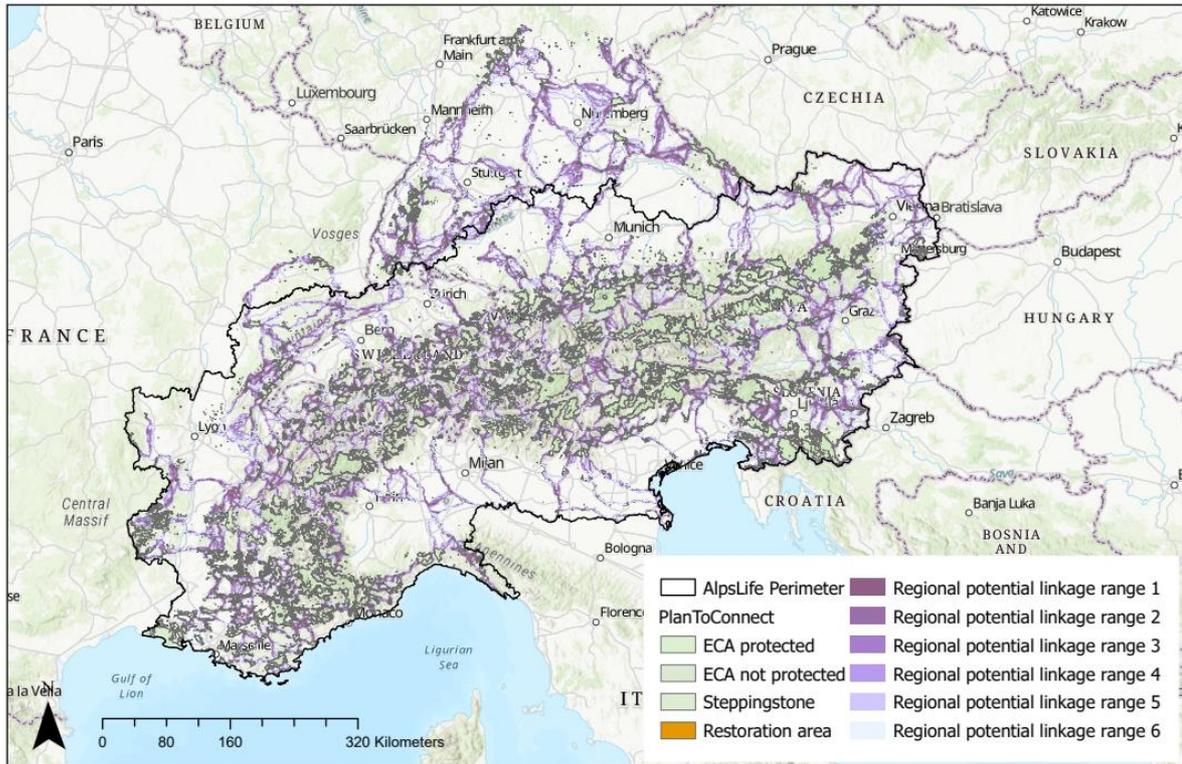


Figure 4 UTAA category 2 – Ecological connectivity, from Laner & Favilli (2024).

Goal of the map: The goal of this map is to enable stakeholders to identify potential corridors between KBAs, National Parks or areas of ecological value that they might consider relevant.

Next steps: In the next phase, we aim to compare these potential corridors with those created by Schoville et al. (2018) for plants, to identify overlaps. We may also incorporate other potential corridors identified in the literature or by partners and stakeholders.

Additionally, connectivity is also vital for medium-small species such as the mountain hare (*Lepus timidus*), whose populations are becoming increasingly fragmented due to climate change and its cascading effects on species interactions. In the next steps, overlaying UTAA with functional connectivity maps for indicator species such as large carnivores or lagomorphs could help evaluate whether they align and identify gaps.

5.3 Category 3. Restoration

Issue: most protected areas are at high altitudes, and areas at lower altitudes with high biodiversity potential are degraded and fragmented. Consequently, these areas may require not only conservation efforts but also restoration initiatives.

Species richness is known to change with elevation. As reported in a review by Rahbek (2005), a hump-shaped altitudinal species-richness pattern is common. However, scale plays an important role and can change the picture, especially because of the effects of human activities at lower altitudes (Nogués-Bravo et al., 2008). However, according to the ALPARC Alpine Parks 2030 Final Report by Plassman & Coronado-Cortes (2023), only areas with low protection have a significant percentage of their area below 1500 m, while National Parks are mainly between 2000 and 3000 m and Nature reserves between 1000 and 2000 m (Table 4). As stated in the report, the most obvious reason behind the lower distribution of strongly protected areas at lower altitudes is the conflict with human activities, e.g. agriculture, industry and transportation. Therefore, even if all KBAs were protected, we expect to find that areas at lower altitudes would need restoration initiatives. The representation of different altitudes as protected areas is important to cover the habitat range of many species, especially regarding seasonal movements.

Table 4 Elevation segments by category of protection of different protected area types from Plassman & Coronado-Cortes (2023).

Elevation segments	% over total category surface					
	National Parks – core	Nature reserves	Regional parks	Particular protection	World heritage UNESCO	Biosphere reserve UNESCO
Under 1,000	5%	19%	47%	35%	3%	61%
1,000 and 1,500	11%	27%	20%	19%	8%	15%
1,500 and 2,000	18%	33%	13%	15%	25%	11%
2,000 and 2,500	30%	14%	11%	15%	36%	8%
2,500 and 3,000	28%	5%	8%	12%	18%	4%
Over 3,000	7%	2%	1%	5%	9%	0%

At the same altitude, mesoclimatic conditions and consequently floristic and faunistic habitats vary significantly throughout the Alps. Overall, there are six levels of vegetation: colline, montane, sub-alpine, alpine, sub-nival, and nival. This differentiation may be more relevant than simply considering altitude for understanding habitat specifications. However, in this preliminary map, we focus on elevation segments as a straightforward and easily interpretable guide.

Questions:

- At which altitude are APAs located? This section adds detail to Table 4. Using the Environmental Protection Factor from Laner et al. (2024), we analyzed the elevations associated with different environmental protection levels (Table 5). Most protection categories range from 0 to above 4000 m, but the median values reveal distinctions between the categories. Unprotected areas are primarily found at elevations around 500 m, and the altitude increases with the level of protection until category 9 at 2200 m. Category 10 represents a very small area centered around 1500 m. These findings align with the patterns shown in Table 4.

Table 5 Median altitude at which each value of environmental protection is located inside the AlpsLife perimeter.

Value Environmental protection	Median altitude (m)
0	553.3
5	847.0
6	694.7
7	1605.2
9	2230.7
10	1481.4

- Are Natura 2000 sites distributed along the altitudinal gradient? This information is missing in Table 4, so we calculated it in Fig. 5. More than 50 % of the Natura 2000 area is located under 1000m.

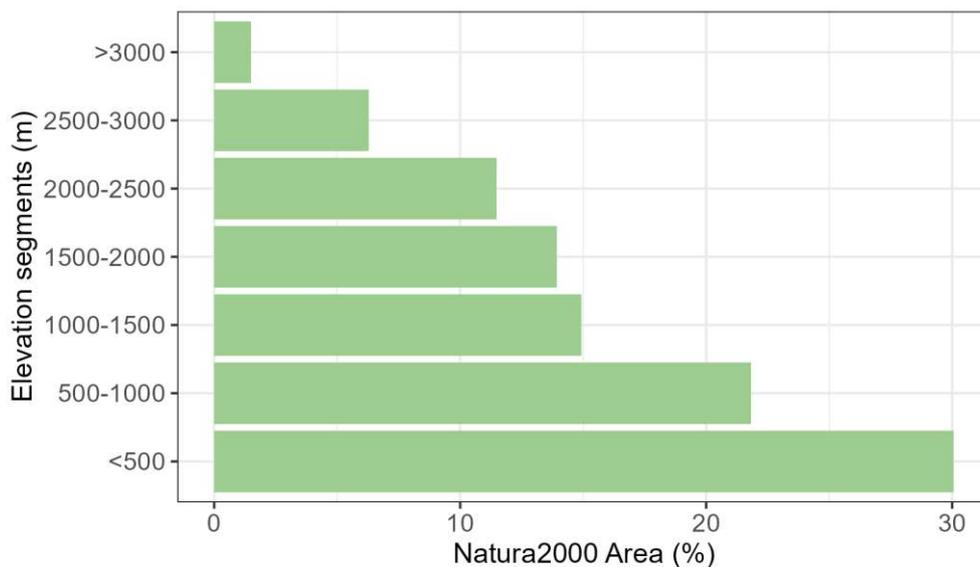


Figure 5 Natura 2000 area distribution along elevation segments inside the AlpsLife perimeter.

- At which altitude are KBAs located? Similar to Natura 2000 sites, almost 50 % of the KBAs area is located under 1000 m and only 18.1 % is between 2000 and 3000 m (Fig. 6), where most of the National Parks are (Table 4).

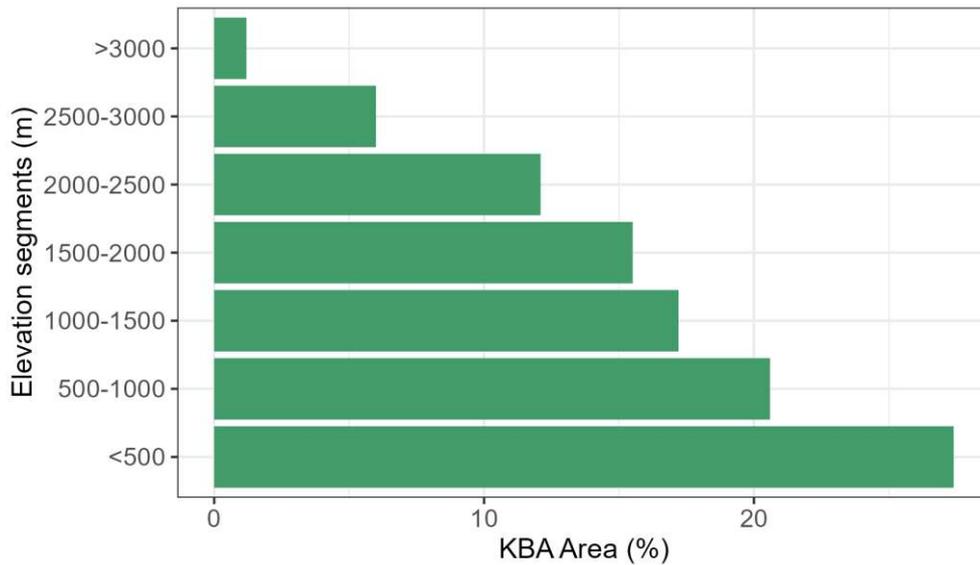


Figure 6 Key Biodiversity Areas (KBAs) area distribution along elevation segments inside the AlpsLife perimeter.

For a clearer comparison, we observed that the distribution of the most strongly protected areas differs from that of the KBAs. Here, we highlight protection factor 7 and 9 (Fig. 7), as factor 10 accounts for only 1% of the total area. The largest proportion of areas with factor 7 protection is found at elevations of 1500–2000 m, while for factor 9, it is even higher, at 2000–2500 m. These findings align with the data presented in Table 4.

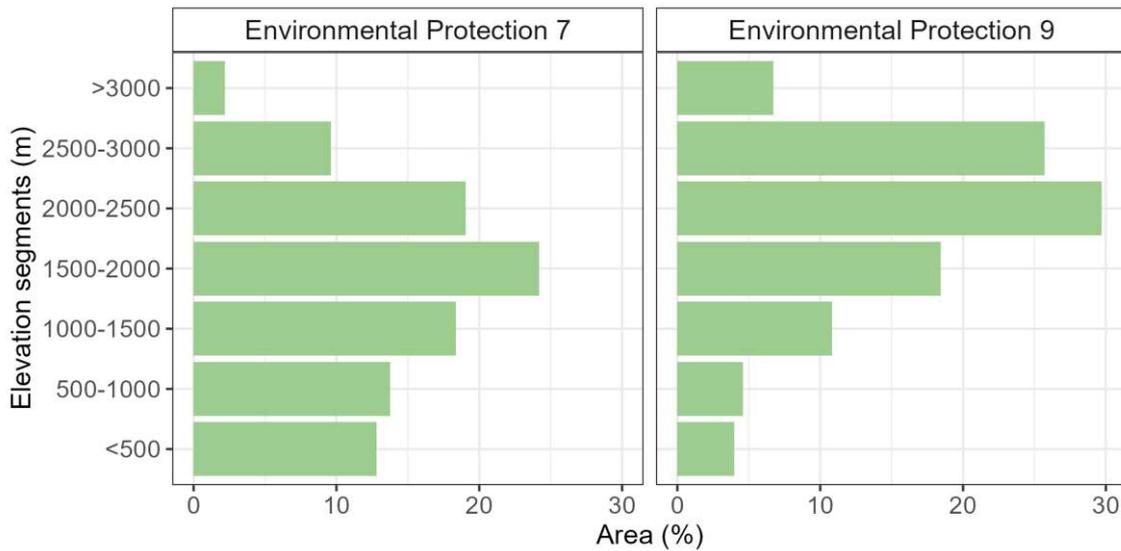


Figure 7 Distribution of areas with environmental protection factor 7 and 9 across elevation segments within the AlpsLife perimeter.

- Which KBAs are below 1500 m? The 1500 m threshold was set based on the information provided by Plassman & Coronado-Cortes (2023) in Table 4 and the results shown in the previous figures (Fig. 5, 6 and 7). At a first look, most KBAs in the Alpine Convention are above 1500 m except for some lower parts. Most of the KBAs below 1500 m are located on the East side of the Alps, i.e. Austria, east of Italy and Slovenia.
- Are KBAs in lower altitudes also in Natura 2000 sites? According to discussion in AlpsLife meetings, there is a strong interest of the EU Nature Restoration Law implementation on Natura 2000 sites. Therefore, we consider it important to include these sites in the restoration category.

Action: restore KBAs at low altitudes and avoid further fragmentation.

Previous approaches/tests: In a previous version, instead of focusing on KBAs, we checked the ecological connectivity potential (ECA) below 1500 m. However, we found that most of the ECA was above 1500 m, probably because the parameters protection status and altitude are used to create the CSI index. Therefore, we discarded this option.

Maps and layers created:

The map is shown in Fig. 8 and includes the following layers:

1. AlpsLife perimeter created by UIBK.
2. KBAs area provided by the KBA Programme below 1500 m in the AlpsLife perimeter.
3. KBAs area provided by the KBA Programme above 1500 m in the AlpsLife perimeter.

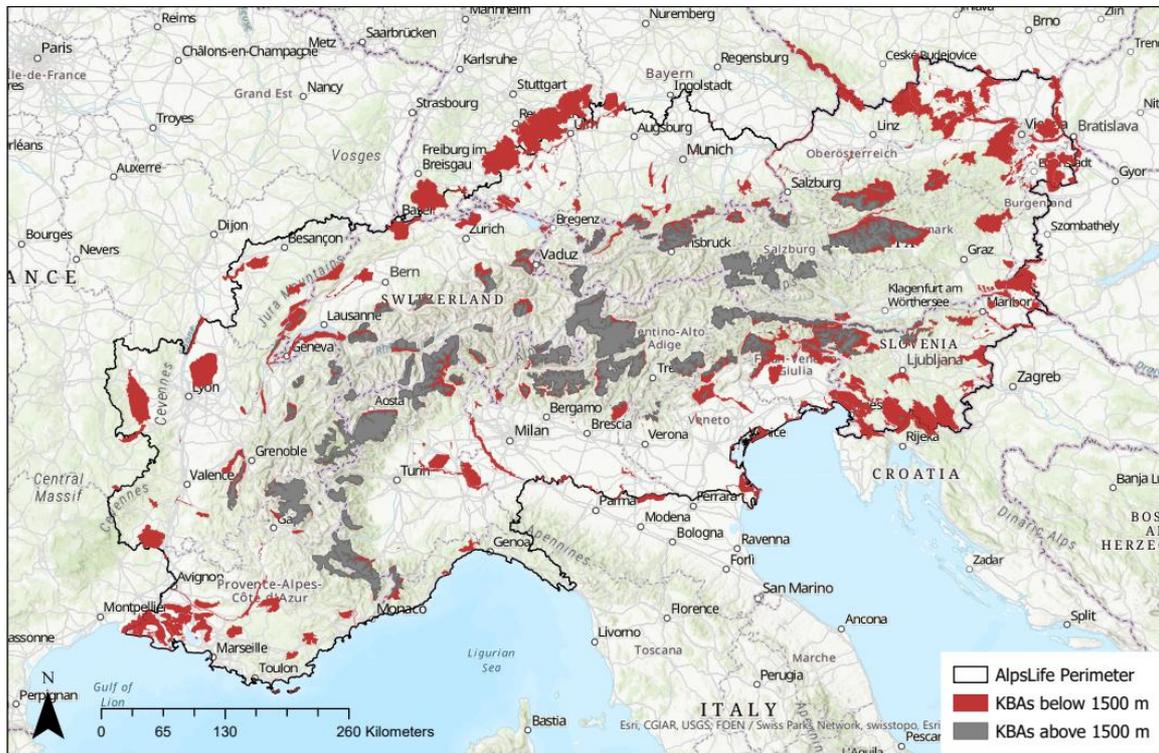


Figure 8 UTAA category 3 – Restoration, based on Key Biodiversity Areas (KBAs).

Goal of the map: The goal of this map is to enable stakeholders to identify KBAs at low elevation that might need restoration.

Next steps: We plan to use the species distribution model (SDM) from Si-moussi & Thuiller (2024), which predicts habitat suitability for 1207 terrestrial vertebrate species across Europe at a 1km resolution under current conditions (1990-2020). We aim to extract indices, such as species richness, and combine this information with the data provided by the KBAs to identify areas with high species richness below 1500m that may be unprotected. This dataset could also be used to gather information for other categories and other datasets can be considered, e.g. Karger et al. (2022) and Lumbrieres et al. (2022).

The use of altitudinal zonation, rather than just a simple altitude threshold, has been discussed and will be considered further for category 3. Besides the altitudinal criterion, the identification of areas for restoration will be coupled with an evaluation of pressures and threats to biodiversity, e.g. the dataset SPECTRE: standardized global spatial data on terrestrial SPECies ThREats from Branco et al. (2025).

6 General next possible steps

Below is a list of options currently under discussion for potential inclusion in the next phases of the map:

- Use species distribution models, e.g. <https://portal.geobon.org/ebv-detail?id=84#summary-view>
- Literature research on hotspots for biodiversity in the Alps to combine with KBA information.
- Ecoregional approach, see Zoderer et al. (2024).
- Use BON in a Box to calculate potentially interesting indicators.

- The results obtained in WP1, WP2 and WP3 will be applied to the UTAA's map.
- Include Ramsar sites.

7 Feedback summary

These maps and the technical summary were distributed within the AlpsLife consortium and each partner had the opportunity to provide feedback and comments on the work done. Some of the most relevant and recurring feedback, i.e. issues and approaches, received by the AlpsLife Partnership is summarized in Table 6. These approaches will be carefully studied and implemented in the next steps of the UTAA's preliminary map.

Table 6 Summary of the feedback received by the AlpsLife Partnership in February 2025.

Topic	Issue	Proposed approach
Key Biodiversity Areas (KBAs)	KBAs have been critically evaluated for not being updated and for focusing only on birds, which reduces their reliability. Also for birds, the KBAs might not fully reflect the presence of threatened species.	Integrate additional datasets that capture other taxonomic groups and ecological functions, e.g. species distribution models.
		Generate our own map of biodiversity hotspots using the species on the global and European red lists, cross-referencing them with known ‘recent’ locations (GBIF, national databases, etc.), and data from WP2 and WP3 → joined effort with WP2 and WP3 needed to have a realistic view on biodiversity.
		Complementary hotspot analyses incorporating, for example, mammals, invertebrates, and plant diversity (reality check from WP2 and WP3).
Protected areas	Some protected areas are missing or incomplete.	Include the areas mentioned and cross-reference protected areas from UTAAAs category 1 map with updated data provided by ALPARC.
AlpsLife perimeter	Including some political boundaries can result in unintended consequences.	Refine the perimeter following expert advice in areas of conflict.
UTAAAs cat. 2	Corridors missing.	Include the suggested corridors, e.g. Traisental/Gölsental and Bad Buchau, or others identified by regional administrations. Detailed feedback on corridors from ISPRA.
	Concerns about the applicability of general connectivity indicators (e.g., fragmentation, environmental protection, population pressure) to large carnivores and large ungulates, based on the WISO mandate.	In-depth analysis: overlaying UTAAAs with functional connectivity maps for indicator species such as large carnivores or lagomorphs could help evaluate whether they align and identify gaps. Use SDMs to derive least-resistance surfaces and gain further insight into functional connectivity.
	Connectivity is mainly focus on large mammals, but it is also vital for medium-small species such as the mountain hare (<i>Lepus timidus</i>), whose populations are becoming increasingly fragmented due to climate change.	Include data on medium-small species based on literature.
UTAAAs cat. 3	Besides the altitudinal criterion, identify other areas in need of restoration.	Couple the identification of areas in need of restoration with an evaluation of pressures and threats (as defined for the Habitats Directive).
		Check the high elevation problematic areas, e.g. ski resorts.

8 References

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