



Endangered Species Living in Protected Areas

From a species conservation point of view, nature reserves do the most good harboring large numbers of threatened plants and wildlife.

Based on up-to-date information, the M3 indicator gives a rough picture of the importance of protected areas for conserving certain species groups. 17% of all threatened species mostly occur in national protected areas, which emphasizes the essential role such areas play in habitat preservation. However, the indicator also reveals that for many species groups, there are no or only undersized national protected areas. In order to ensure long-term survival of threatened species, Switzerland needs additional, well-interlaced priority biodiversity areas as well as targeted species recovery projects.

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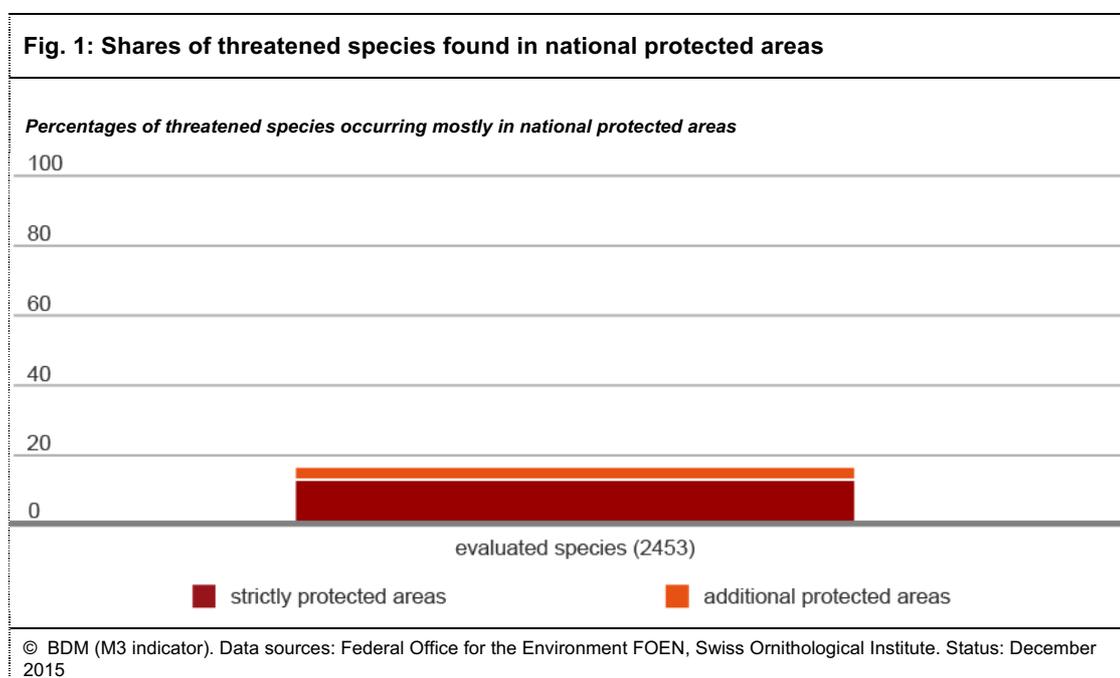
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Based on data gathered for indicators Z5: “Change in the Endangerment Status of Species” and M1: “Size of Protected Areas”, the M3 indicator reflects the extent to which threatened species benefit from national protected areas.

Development overall

Data used by the indicator represent the status as captured in 2012. There are no change data available so far for surveyed species groups.

Figure 1 below shows the shares of threatened species known to occur mostly—meaning at no less than 50%—in national protected areas or strictly protected national areas. Strictly protected areas account for 2.3% of the country’s expanse.



Interpretation examples

- 17% of threatened species mostly occur in national protected areas.
- 13% of threatened species mostly occur in strictly protected national areas, with another 4% mostly occurring in additional protected national areas.

Comments

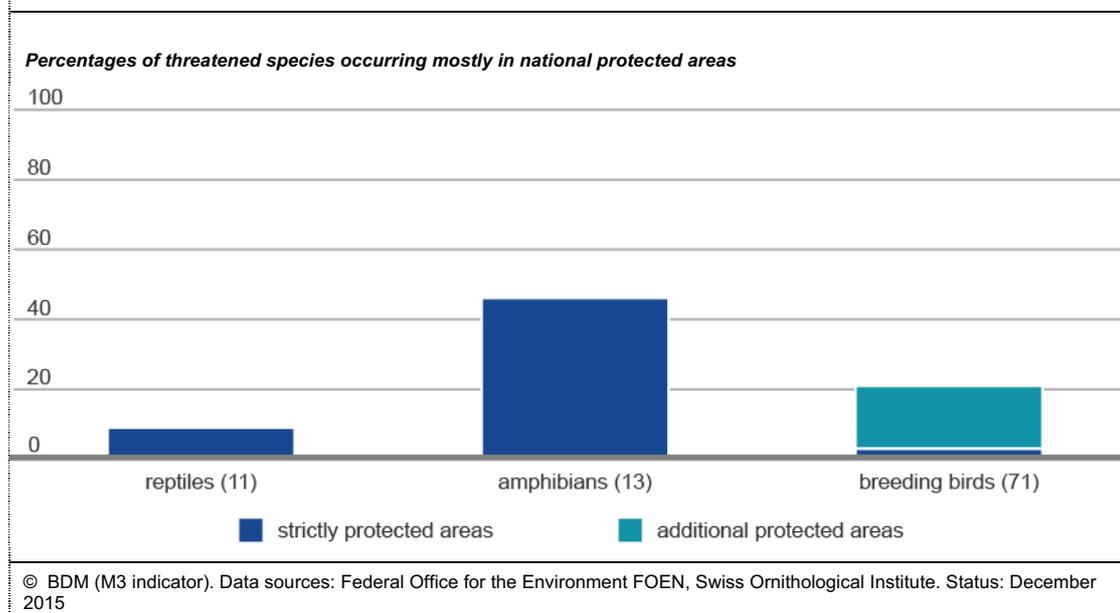
- Figure 1 refers to reptiles, amphibians, breeding birds, mollusks, dragonflies, grasshoppers, butterflies, ferns and flowering plants, mosses, lichen and macrofungi.
- Breeding birds are localized down to the square kilometer, whereas other species groups are localized down to the hectare.
- The M3 indicator only covers areas legally protected at the national level and aimed at conserving species diversity, i.e. alluvial plains, raised bogs including transition bogs, fenlands, amphibian spawning areas, dry grassland, the Swiss National Park, federal game reserves, and reserves for

water birds and migratory birds. The latter two categories are not considered to be strictly protected areas, as conservation regulations are less comprehensive.

- Underlying data for most species groups are heterogeneous due to the lack of systematic surveys conducted inside and/or outside of national protected areas. As regards lichen, macrofungi and mosses, more than two thirds of threatened species in Switzerland were identified in an area of less than 16 hectares.
- The indicator summarizes species records gathered from 1992 to 2012. In this period of time, national protected areas as a whole increased greatly in size. However, an increase in the size of national protected areas does not necessarily result in new habitats being created. It only means that additional areas have been placed under the legal protection of the federal government.
- Purely cantonal or communal protected areas are not included in computing the indicator. In 2003, the total size of the approximately 9,500 cantonal and communal protected areas in Switzerland amounted to roughly 43,000 hectares, which corresponds to around 1% of the country's expanse. Still, a part of these 43,000 hectares is included in federal inventories and, hence, being considered by the indicator.
- The indicator value (no less than 50% or a majority of occurrences are confined to national protected areas) does not suggest that the survival of any individual species in Switzerland is guaranteed. For this to be inferable, factors such as population size, gender ratio, genetic diversity, isolation of (sub-) populations and quality of protected areas would need to be taken into account as well.
- The indicator differentiates whether more or less than 50% of the occurrences of a species are confined to national protected areas. This limit has been chosen arbitrarily. An expert committee of the Council of Europe proposed 20% and 60% as limits for determining Areas of Special Conservation Interest (ASCI). For information on these values please refer to the Appendix.
- For data tables and complementary information please refer to the Appendix.

Development of vertebrates

Fig. 2: Shares of vertebrate species found in national protected areas



Interpretation example

- 21% of the 71 breeding bird species threatened in Switzerland mostly occur in national protected areas, with 4% occurring mostly in strictly protected areas.

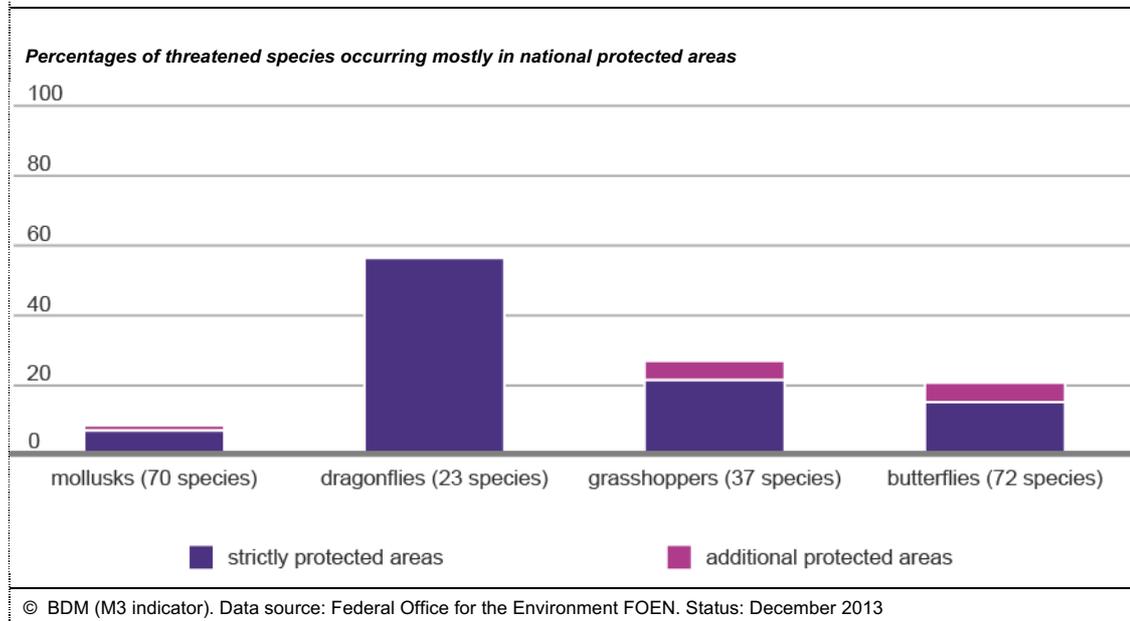
Comments

- 8% of threatened reptile species mostly occur in strictly protected national areas. This corresponds to one species, namely the European Pond Turtle (*Emys orbicularis*). Occurrences frequently consist of specimens illegally released into the wild (Cordillot & Klaus, 2010).
- 46% of 13 threatened amphibian species mostly occur in strictly protected national areas. Not one threatened amphibian species is primarily found in any additional national protected area.
- 17% of threatened breeding bird species that occur in “additional protected areas” contribute to the share of occurrences found in national protected areas increasing to no less than 50%. Neither amphibian nor reptile species comprise any occurrences in “additional protected areas” that would contribute to the share of occurrences found in national protected areas increasing to no less than 50%.
- Breeding birds are localized down to the square kilometer, whereas reptiles and amphibians are localized down to the hectare.
- The share of threatened amphibian species mostly occurring in national protected areas is much larger than that of reptiles for reasons of nature conservation politics: amphibian habitats of national importance are strictly protected, which is not the case for reptile habitats.
- The share of amphibians mostly occurring in national protected areas is certain to be underestimated, since migratory sites are not taken into account here. The Federal Inventory of Amphibian Spawning Areas of National Importance IANB differentiates between permanent sites and temporary sites the location of which keeps changing.

- There is no reptile or amphibian species that exclusively occurs either inside or outside of national protected areas.
- As regards amphibian species, the Fire Salamander (*Salamandra salamandra*) is rarest to occur in national protected areas (5%). For the Smooth Newt (*Lissotriton vulgaris*), however, the share of occurrences found in national protected areas reaches 64%.
- Nine amphibian species are “endangered”. Of those, 5 species (56%) mostly occur in national protected areas, while that applies to only one species (25%) of the four classified to be “vulnerable”.
- Among breeding birds, the Northern Shoveler (*Anas clypeata*) is exclusively found in national protected areas, while Montagu’s Harrier (*Circus pygargus*) and the Pallid Swift (*Apus pallidus*) only occur outside of national protected areas.
- Nine of Switzerland’s breeding bird species are “critically endangered”. Three of those (33%) have no less than 50% of their occurrences recorded in national protected areas. Of the 21 species listed as “endangered”, five species (24%) mostly occur in national protected areas, whereas this applies to merely seven species (17%) of the 41 breeding bird species listed as “vulnerable”.
- Breeding bird species mostly occurring in national protected areas solely consist in inhabitants of wetlands/waterbodies and alpine habitats. As regards the 34 water bird and wetland species, 41% mostly occur in national protected areas, while that share among the three alpine species is 33%. Threatened breeding bird species living in forests (9), cultivated land (16), settlements (1) and dryland sites (4) comprise not a single species mostly occurring in national protected areas.

Development of invertebrates

Fig. 3: Shares of invertebrate species found in national protected areas



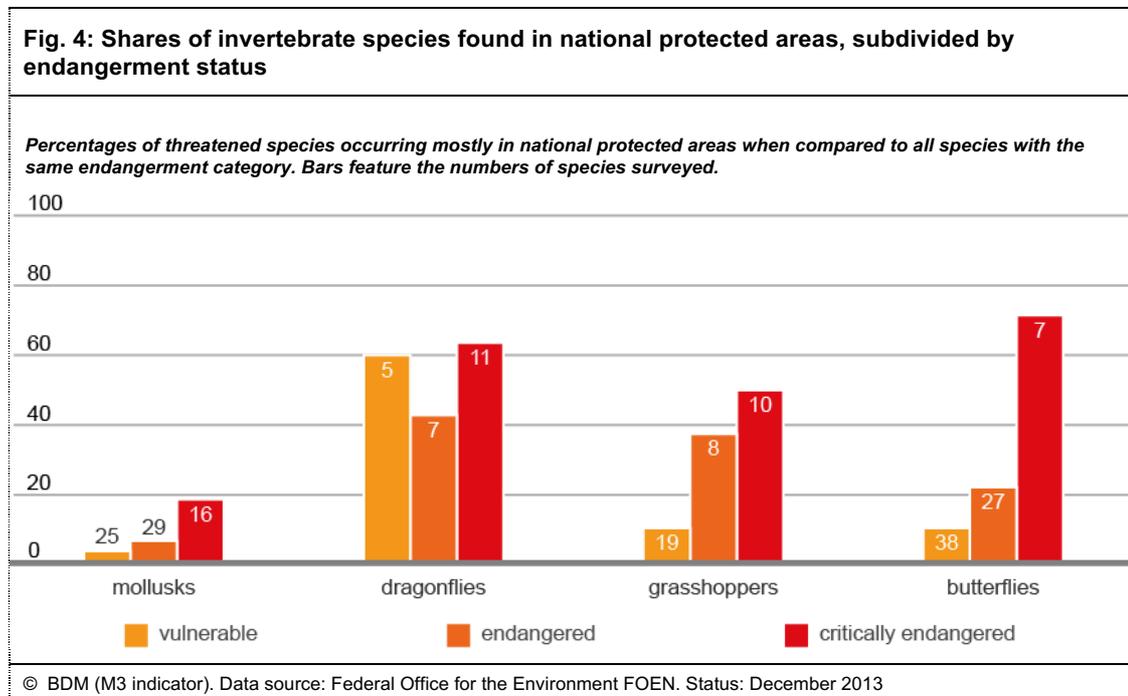
Interpretation example

27% of the 37 threatened grasshopper species mostly occur in national protected areas, while 22% mostly occur in strictly protected national areas.

Comments

- At 57%, the share of threatened dragonfly species mostly occurring in national protected areas is particularly high. Conversely, a mere 9% of threatened mollusks mostly live in such habitats.
- Compared to other invertebrate species groups, the share of threatened mollusk species mostly occurring in national protected areas is small. Aside from the fact that available data are limited because only few people study mollusks, this might also be caused by biological or political factors: For example, many threatened mollusk species in Switzerland have very tightly confined occurrences, with some species – such as the endemic spring snail species *Bythiospeum alpinum* – even only occurring in isolated springs or cave waterbodies. No national protected areas have been established for these habitats yet.

Figure 4 below further subdivides species groups by IUCN endangerment categories. It shows that the higher the risk of extinction faced by mollusk, grasshopper and butterfly species, the more likely they are to occur mostly in national protected areas.



Interpretation example

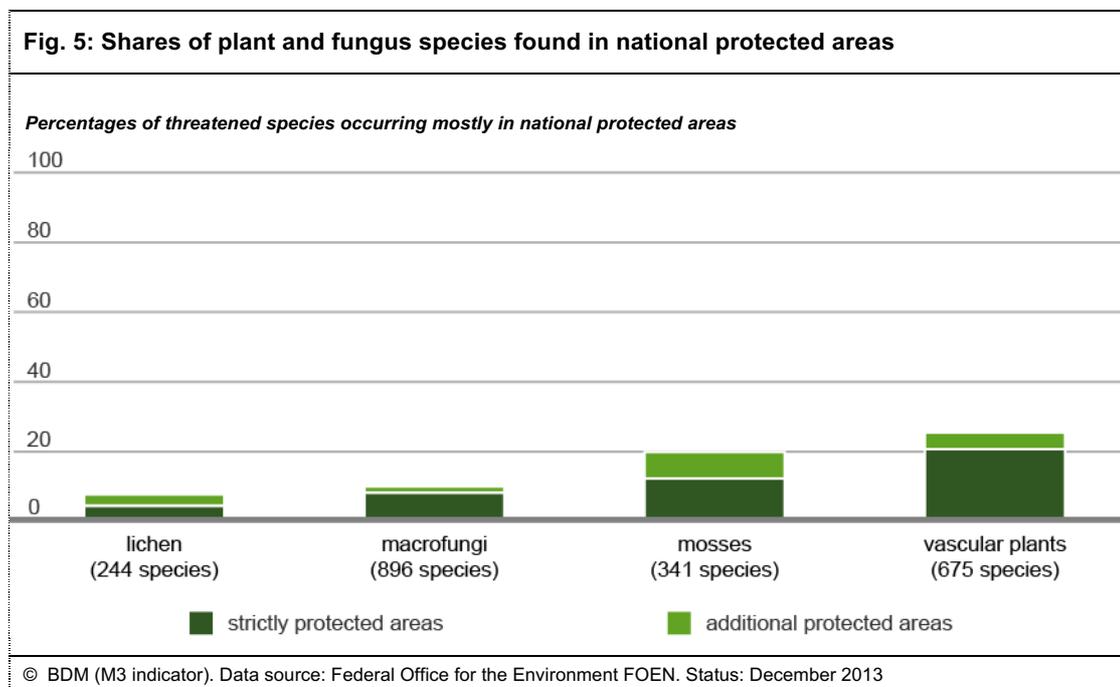
Seven butterfly species are “critically endangered”, with 71% (5 species) mostly occurring in national protected areas. Looking at the 27 “endangered” and the 38 “vulnerable” species, that share drops to 22% and 11% respectively.

Comments

- Throughout all invertebrate species groups, the shares of species mostly occurring in national protected areas are higher in the “critically endangered” category than in the other endangerment categories. This difference is most marked for butterflies.
- Strongly depending on waterbodies and wetlands, dragonflies have relatively high shares of species mostly occurring in national protected areas in all three endangerment categories.
- Of all threatened species, 16 mollusks, one grasshopper and one butterfly have only been observed outside of national protected areas to date.
- Of all threatened species, two grasshoppers, one mollusk, one dragonfly and one butterfly have only been evidenced inside national protected areas to date.

Development of plants, fungi and lichen

Only a small share of plant and fungus species has been found to occur in national protected areas at no less than 50%.



Interpretation example

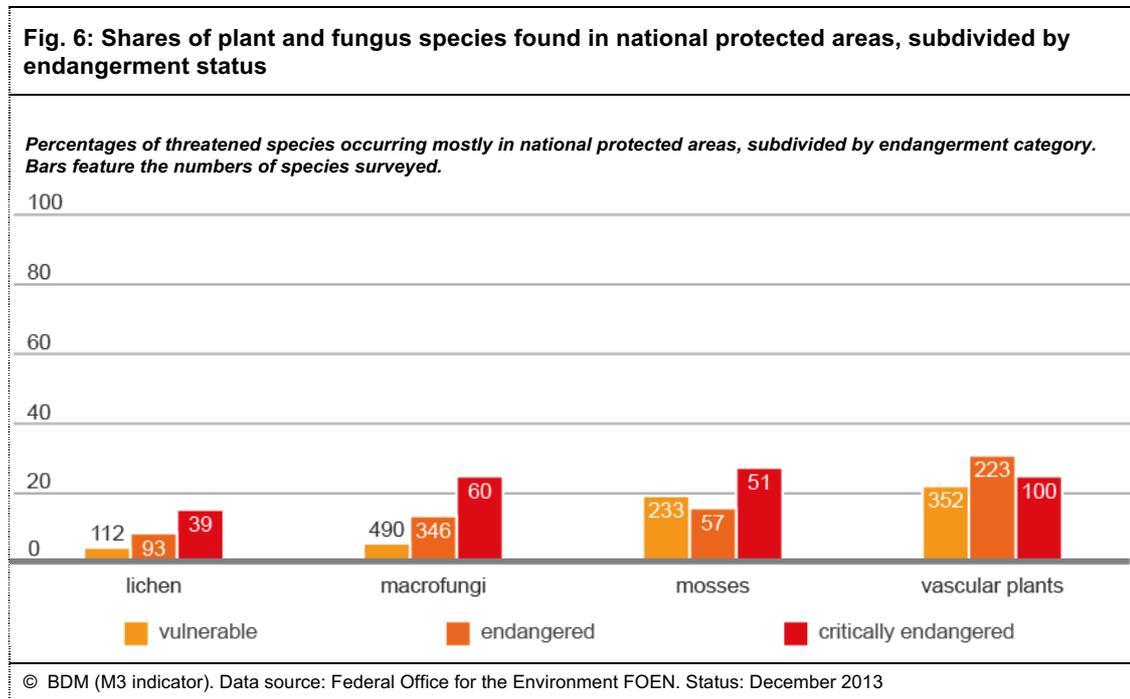
25% of the 675 threatened vascular plant species in Switzerland mostly occur in national protected areas, with 21% mostly occurring in strictly protected areas.

Comments

- At 25% and 20% respectively, there are more vascular plant and moss species mostly occurring in national protected areas than macrofungi (10%) and lichen (8%).
- As regards vascular plants and macrofungi, occurrences are more distinctly confined to strictly protected areas than in the case of mosses and lichen.
- In implementing the Global Strategy for Plant Conservation (GSPC), 75% of all threatened species are intended to be protected on site by 2020. However, reaching this objective requires additional protected areas. Furthermore, existing protected areas frequently lack management concepts and binding plant/land use agreements.
- When establishing the Red List of mosses, several raised-bog specialists were categorized as “near threatened” (NT) based on the reasoning that these species were less intensely threatened with extinction because of bog conservation measures. As a result, these species that mostly occur in strictly protected areas are not taken into account by the M3 indicator.
- The share of macrofungus species mostly occurring in strictly protected national areas is certain to be underestimated. More than 80% of data have been gathered by volunteers who abide by prohibitions of picking and entry in force for nature reserves. Targeted surveys would surely make it easier to determine the importance of national protected areas for fungus conservation.

- Of all threatened species, 123 vascular plants, 149 mosses, 335 fungi and 94 lichen have only been observed outside of national protected areas to date.
- Of all threatened species, 17 vascular plants, 8 mosses, 22 fungi and 6 lichen have only been evidenced inside national protected areas to date.

Figure 6 below further subdivides species groups by IUCN endangerment categories.



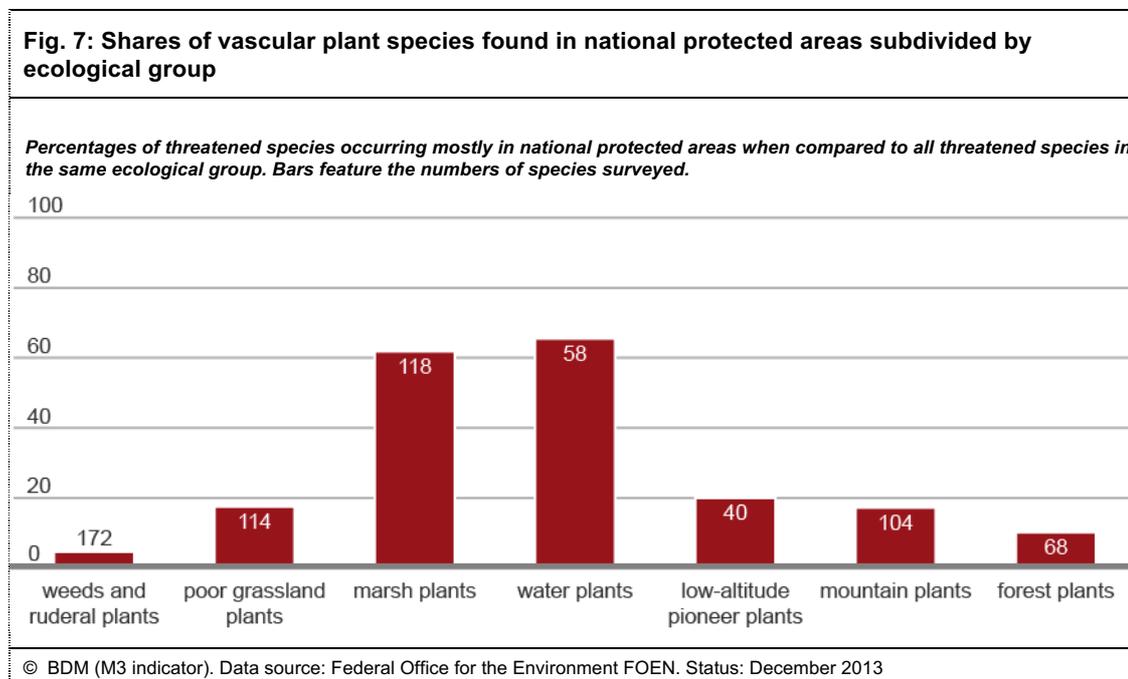
Interpretation example

100 vascular plant species are “critically endangered”, with 25% (25 species) mostly occurring in national protected areas. Among the 223 “endangered” and the 352 “vulnerable” species, that share amounts to 31% and 22% respectively.

Comment

- For “critically endangered” lichen, macrofungi and mosses, shares of species mostly occurring in national protected areas are higher than for other endangerment categories.

Figure 7 below illustrates that the share of vascular plant species mostly occurring in national protected areas varies widely depending on habitat.



Interpretation example

There are 68 threatened forest plant species in Switzerland, 7 (10%) of which mostly occur in national protected areas.

Comments

- At over 60%, the shares of marsh plant and water plant species mostly occurring in national protected areas are much higher than those of e.g. weeds and ruderal plants (5%) or forest plants (10%).
- The subdivision into ecological groups is based on the Red List of Ferns and Flowering Plants in Switzerland.

Significance for biodiversity

From a species conservation point of view, nature reserves do the most good harboring large numbers of threatened species and individuals per species. Furthermore, Switzerland's Federal Act on the Protection of Nature and Cultural Heritage stipulates that habitats required for the survival of threatened species must be protected. Accordingly, the M3 indicator associates species and habitat conservation, outlining the extent to which threatened species benefit from protected areas.

Protection of rare and threatened habitats at the national level contributes to preserving the subsistence of numerous plant and animal species.

The indicator records the shares of threatened species whose occurrences are confined to protected areas at no less than 50%, with this limit having been arbitrarily determined by experts.

However, a high share of occurrences inside protected areas is no guarantee for the survival of any species. If the population is very small, a species may eventually go extinct just the same. Likewise, legal protection must not be treated as equivalent to actual protection. The effects of legal protection depend on

species management really being based on species-specific requirements (cf. indicators M2, Z10 and Z11). What is more, influences such as airborne nutrient entry or climate warming may affect conditions facing threatened species inside protected areas as well.

The indicator monitors national protected areas that have conservation objectives tightly connected to preserving biodiversity and provide survey data usable for analysis. Habitat conservation is meant to secure the habitats of certain special species.

In Switzerland, forest areas—which cover 31% of the country's expanse—are protected in general. Furthermore, forestry activities are restricted for the sake of sustainability. Other habitats such as lake shore and river bank vegetation or waterbodies are legally protected as well. However, there are no federal inventories recording these habitats, and there are no consistent data available. Regional and local protected areas are not taken into account, either, since they have been established applying different methods. In addition, their locations and conservation objectives are not always primarily aimed at preserving biodiversity. Hence, the total area dedicated to nature conservation in Switzerland is larger than the area monitored by the M3 indicator, so it must be assumed that the share of threatened species mostly occurring in protected areas is also larger in total.

Definition

Total number of threatened species whose current occurrences are confined to national protected areas at no less than 50% proportionate to the total number of threatened species belonging to the same taxonomic groups in Switzerland.

Species are considered to be threatened if they have been assigned to any of the following Red List endangerment categories by international IUCN standards: “critically endangered (CR)”, “endangered (EN)”, or “vulnerable (VU)”.

The M3 indicator only covers protected areas legally protected at the national level, with their objectives aimed at preserving species diversity. Regional and local protected areas or landscape conservation areas are not considered for data analysis.

Surveying methods

Definition of endangerment categories

Red Lists show extinction risks faced by taxa classified according to IUCN criteria. In order to appeal to a wider readership, we use the term “species” rather than “taxon”. While Red Lists differentiate between eight endangerment categories, using the term “redlisted species” usually refers to a species assigned to any of the five following endangerment categories: “extinct”, “extinct in Switzerland”, “critically endangered”, “endangered”, or “vulnerable”. The M3 indicator considers a taxon to be a “threatened species” if it belongs to any of the three categories below:

- critically endangered (CR),
- endangered (EN) and
- vulnerable (VU)

Selection of species groups

The M3 indicator covers the following species groups: reptiles, amphibians, breeding birds, grasshoppers, dragonflies, butterflies, mollusks, ferns and flowering plants (combined under vascular plants), mosses, tree-dwelling and ground-dwelling lichen (combined), and macrofungi. It excludes species primarily occurring in watercourses or waterbodies, i.e. fishes, caddisflies, stoneflies and mayflies, decapods, bivalves, and charales. Breeding birds and bats are not taken into account, either, since their habitats normally exceed one hectare, which often makes assignment impossible given Switzerland's small-scale protected areas. Furthermore, alien species are excluded as well.

Definition of protected areas

Legally protected areas of national importance refer to alluvial plains, raised bogs including transition bogs, fenlands, amphibian spawning areas, dry grassland, the Swiss National Park, reserves for water birds and migratory birds, and federal game reserves (cf. indicator “M1: Size of Protected Areas”). The analyzed data status is January 10, 2012 for amphibian spawning areas, June 5, 2013 for dry grassland, and August 2, 2010 for all other protected areas. At this time, protected areas totaled 271,945 hectares, which corresponds to 6.6% of the country’s expanse. Strictly protected areas totaled 92,910 hectares harboring alluvial plains, raised bogs, fenlands, amphibian spawning areas (excluding temporary sites), dry grassland and the Swiss National Park. Strictly protected areas cover 2.3% of the country’s expanse.

Analysis is based on records of threatened species evidenced from 1992 to 2012 and—for all species groups except breeding birds—localized down to at least the hectare in national data centers. All records of any one species gathered inside a grid cell of 1 hectare (100 x 100 meters) are compiled. There are no data fulfilling these criteria available for a number of threatened species (or taxa), among them 4 reptiles, 1 dragonfly, 18 mollusks, 76 vascular plants, 60 mosses, 13 lichen and 40 macrofungi. As regards breeding birds, analysis is based on evidenced threatened species localized down to 1 square kilometer. All records of any one species gathered inside a 1-km² grid cell (1000 x 1000 meters) are compiled.

Species records found in sampling areas the center of which is located inside a protected area are considered to have been found “inside”, while all others are considered to have been found “outside”. The indicator reports the share of species evidenced to occur inside national protected areas at no less than 50%.

Except for breeding bird data, which were processed by the Swiss Ornithological Institute, analyses for all species groups were conducted by Info Fauna, with indicator data prepared by the BDM Coordination Office.

Further information

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Mosses: NISM, Norbert Schnyder, norbert.schnyder@systbot.uzh.ch

Additional sources of information

www.bafu.admin.ch/index.html?lang=en (Federal Office for the Environment FOEN)

www.redlist.org (IUCN database)

www.karch.ch (Swiss Amphibian and Reptile Conservation Program; no information in English)

www.nism.uzh.ch/index.php?content=einleitung&lang=en (National Inventory of Swiss Bryophytes)

www.wsl.ch/dienstleistungen/inventare/pilze_flechten/swissfungi/index_EN (distribution maps of Swiss fungi)

www.swisslichens.ch (national data and information center of Swiss lichen; no information in English)

Bibliography

Cordillot, F.; Klaus, G., 2011: Gefährdete Arten in der Schweiz. Synthese Rote Listen, Stand 2010. Bundesamt für Umwelt, Bern. Umwelt-Zustand Nr. 1120. 111 S.

Gonseth, Y.; Monnerat, C., 2002: Rote Liste der gefährdeten Libellen der Schweiz. Hrsg. Bundesamt für Umwelt, Wald und Landschaft, Bern und Schweizer Zentrum für die Kartographie der Fauna, Neuenburg. BUWAL-Reihe «Vollzug Umwelt». 46 S.

IUCN, 2001: IUCN Red List Categories and Criteria: Version 3.1. IUCN Species Survival Commission. IUCN Gland, Switzerland and Cambridge, UK. ii + 30 pp.

Keller, V.; Gerber, A.; Schmid, H.; Volet, B.; Zbinden, N., 2010: Rote Liste Brutvögel. Gefährdete Arten der Schweiz, Stand 2010. Hrsg. Bundesamt für Umwelt, Bern, und Schweizerische Vogelwarte, Sempach. Umwelt-Vollzug Nr.1019. 53 S.

Monnerat, C.; Thorens, P.; Walter, T.; Gonseth, Y., 2007: Rote Liste der Heuschrecken der Schweiz. Hrsg. Bundesamt für Umwelt, Bern, und Schweizer Zentrum für die Kartographie der Fauna, Neuenburg. Umwelt-Vollzug Nr. 0719. 62 S.

Monney, J.-C.; Meyer, A., 2005: Rote Liste der gefährdeten Reptilien der Schweiz. Hrsg. Bundesamt für Umwelt, Wald und Landschaft BUWAL, Bern und Koordinationsstelle für Amphibien- und Reptilienschutz der Schweiz, Bern. BUWAL-Reihe «Vollzug Umwelt». 50 S.

Moser, D.; Gygax, A.; Bäuml, B.; Wyler, N.; Palese, R., 2002: Rote Liste der gefährdeten Farn- und Blütenpflanzen in der Schweiz. Hrsg. Bundesamt für Umwelt, Wald und Landschaft, Bern; Zentrum des Datenverbundnetzes der Schweizer Flora, Chambésy, Conservatoire et Jardin botanique de la Ville de Genève, Chambésy. BUWAL-Reihe «Vollzug Umwelt». 118 S.

Reid, W.V.; McNeely, J.A.; Tunstall, D.B.; Bryant, D.A.; Winograd, M., 1993: Biodiversity Indicators for Policy-Makers. World Resource Institute (WRI) / International Union for the Conservation of Nature and Natural Resources (IUCN) / World Conservation Monitoring Centre (WCMC).

Roekaerts, M., 2006: Proposal for setting up criteria for assessing the National Lists of proposed Areas of Special Conservation Interest (ASCI). T-PVS/Emerald03e_07. 11S.

Rüetschi, J.; Stucki, P.; Vicentini, H.; Müller, P., 2012: Rote Listen der gefährdeten Muscheln- und Schneckenarten der Schweiz, Stand 2010. Hrsg. Bundesamt für Umwelt, Bern, und Schweizer Zentrum für die Kartographie der Fauna, Neuenburg. Umwelt-Vollzug Nr. 1216. 148 S.

Scheidegger, C.; Clerc, P., 2002: Rote Liste der gefährdeten Arten der Schweiz: Baum- und erdbewohnende Flechten. Hrsg. Bundesamt für Umwelt, Wald und Landschaft BUWAL, Bern und Eidgenössische Forschungsanstalt WSL, Birmensdorf, und Conservatoire et Jardin botanique de la Ville de Genève CJBG. BUWAL-Reihe «Vollzug Umwelt». 124 S.

Schmidt, B.; Zumbach, S., 2005: Rote Liste der gefährdeten Amphibien der Schweiz. Hrsg. Bundesamt für Umwelt, Wald und Landschaft BUWAL, Bern und Koordinationsstelle für Amphibien- und Reptilienschutz der Schweiz, Bern. BUWAL-Reihe «Vollzug Umwelt». 48 S.

Schnyder, N.; Bergamini, A.; Hofmann, H.; Müller, N.; Schubiger-Bossard, C.; Urmi, E., 2004: Rote Liste der gefährdeten Moose in der Schweiz. Hrsg. BUWAL, FUB & NISM. BUWAL-Reihe «Vollzug Umwelt». 99 S.

Senn-Irlet, B.; Bieri, G.; Egli, S., 2007: Rote Liste der gefährdeten Grosspilze der Schweiz. Hrsg. Bundesamt für Umwelt, Bern, WSL, Birmensdorf. Umwelt-Vollzug Nr. 0718. 92 S.

Wermeille, E.; Chittaro, Y.; Gonseth, Y., 2014: Rote Liste Tagfalter und Widderchen. Gefährdete Arten der Schweiz, Stand 2012. Hrsg. Bundesamt für Umwelt, Bern und Schweizer Zentrum für die Kartographie der Fauna, Neuenburg. Umwelt-Vollzug Nr. 1403. 97 S.

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