



Species Diversity at National and Regional Level

Covering the period of 1900 to the present, the Z3 indicator monitors select taxonomic groups comprising a total of currently 708 animal species living in the wild in Switzerland. In doing so, BDM only determines whether or not a species occurs in this country at a certain point in time, disregarding its frequency. Information on the frequency of species is provided by other indicators, most importantly Z8.

For this purpose, BDM selected nine well-documented and generally known taxonomic groups, surveying all butterfly, grasshopper and dragonfly species as well as more than 90% of all vertebrates. This sample corresponds to approximately 2% of all animal species living in the wild in Switzerland.

Species numbers within these groups have changed little since 1900. While they have been slightly growing during this period of time, changes were characterized by distinct regional differences.

Rising numbers primarily involve mammal and breeding bird species. Presumably, these increases have mainly been caused by species expanding their areas of occupancy or reimmigrating into formerly occupied areas and by intentional or accidental releases of animals into the wild, among them some alien species.

Decreases above all affect the number of fish species occurring in Switzerland. Generally, species declines are the result of fluctuations in the populations of species that have been rare in this country to begin with, reaching their utmost geographical or ecological boundaries in Switzerland. Fish species numbers have chiefly been reduced by the construction of insurmountable obstacles in watercourses (retaining dams, sills, etc.) and by the temporarily severe eutrophication of many Swiss lakes in the 1970s.

Status: July 2014

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Development in Switzerland from 1900 to 2013

Tab. 1: Changes in species numbers of select taxonomic groups in Switzerland 1900–2013

Taxonomic groups	Species numbers in 1900	Numbers of species permanently occurring from 1900 to 2013	New arrivals (gains)	Alien new arrivals among them	Dis-appearances (losses)	Species undergoing several status changes	Net species numbers in 2013
Mammals excl. bats	51	49	10	5	2	0	59
Breeding birds	163	152	25	2	10	6	178
Reptiles	14	14	1	1	0	0	15
Amphibians	18	16	1	0	1	1	18
Fishes	92	80	6	4	12	0	86
Cyclostomes	3	2	0	0	1	0	2
Butterflies	192	189	3	1	4	0	191
Grasshoppers	105	102	3	1	4	0	104
Dragonflies	66	63	7	0	3	0	70
Total	704	667	56	14	37	7	723

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Comments

Between 1900 and 2013, the overall number of species in the taxonomic groups monitored by BDM increased. The net increase has been particularly conspicuous as regards breeding birds (+15 species; see table 1 above) and mammals (+8 species). Fish species numbers, however, decreased by six. The number of reptile species increased by one, the number of dragonfly species by four. Grasshoppers, cyclostomes and butterflies lost one species each. While some status changes took place among amphibians, they were mutually offsetting.

Mammals

Compared to 1900, Switzerland held ten more mammal species by 2013, almost all of them owing the expansion of their ranges to man. These species were either reintroduced, like the Alpine Ibex (*Capra ibex*), the Eurasian Lynx (*Lynx lynx*) and the European Beaver (*Castor fiber*), or they were released, escaped into the wild, or immigrated, such as the Nutria (*Myocastor coypus*), the Muskrat (*Ondatra zibethicus*), the European Mouflon (*Ovis musimon*), the Raccoon (*Procyon lotor*), the Siberian Chipmunk (*Tamias sibiricus*) and the Sika Deer (*Cervus nippon*). After immigrating on its own as well, the Wolf (*Canis lupus*) benefitted from conservation measures and has been fulfilling BDM criteria since 2010. Most of the newly arrived species settled in Switzerland after 1950. Hunted to extinction in the 20th century, the European River Otter (*Lutra lutra*) and the Brown Bear (*Ursus arctos*) have not been observed again in this country until the recent past and do not yet fulfill BDM criteria.

Breeding birds

In 2013, 25 new breeding bird species were recorded in Switzerland against 1900, many among them dependent on bodies of water. Except for the Fieldfare (*Turdus pilaris*), all these new species did not settle in Switzerland until after 1950. The avifauna's high dynamics also become apparent in the number of species that have disappeared: Compared to 1900, ten species, with three waders among them, were no longer observed to be breeding in Switzerland by 2013. While the Osprey (*Pandion haliaetus*) and the Common Redshank (*Tringia totanus*) disappeared even before 1920, the others followed after 1970.

Six breeding bird species were found to have the same status both in 2013 and in the initial survey year of 1900, yet it had changed in between. Despite the White Stork (*Ciconia ciconia*) occurring in Switzerland in 1900 as well as in 2013, it had temporarily disappeared in the meantime. While Cetti's Warbler (*Cettia cetti*), the European Penduline Tit (*Remiz pendulinus*) and the Tawny Pipit (*Anthus campestris*) did occur in Switzerland for short amounts of time, neither was spotted to breed regularly either in 1900 or in 2013. This also applies to the Common Teal (*Anas crecca*) and the Mew Gull (*Larus canus*), even though both species were found in Switzerland for extended periods of time between 1900 and 2013.

Reptiles

Switzerland's 14 regular reptile species were joined by only one new arrival, the Italian Wall Lizard (*Podarcis sicula*), in the 1980s.

Amphibians

In the period under review, one amphibian species was gained, and another one lost. At least the first individuals of the newly arrived Marsh Frog (*Pelophylax ridibundus*) have been released in Switzerland. The European Green Toad (*Bufo viridis*) went extinct in the early 20th century, even though a small, fluctuating population was reobserved in the 1990s in the Tessin, only to disappear again after only a few years. No longer recorded in Switzerland at the onset of the 20th century, the Italian Agile Frog (*Rana latastei*) was rediscovered in the Tessin in 1982 (cf. also Z6 indicator "Population Size of Endangered Species"). The species was most likely never gone at all.

Fishes and cyclostomes

Of the roughly 80 fish species permanently occurring in Switzerland (see note on taxonomy in "Surveying methods" on page 23), a few newcomers were released into the country's waters in the late 19th century, among them salmonidae such as the Brook Trout (*Salvelinus fontinalis*), the Lake Trout (*Salvelinus namaycush*) and the Rainbow Trout (*Oncorhynchus mykiss*), as well as the Goldfish (*Carassius auratus*) and the Pikeperch (*Sander lucioperca*). After 1900, six new species appeared, paralleled by the disappearance of 13, among them the Allis Shad (*Alosa alosa*), the Twaite Shad (*Alosa fallax*), the Atlantic Salmon (*Salmo salar*) and the European River Lamprey (*Lampetra fluviatilis*), all four anadromous species that need to be able to ascend rivers to spawn. Furthermore, Switzerland lost four species of the genus *Coregonus* to the eutrophication of its lakes and partly to intense hybridization with introduced *Coregonus* species. Finally, the Weatherfish (*Misgurnus fossilis*) disappeared from these waters in the decade of 1941 to 1950. Still, as confirmed by BDM criteria, the Large-scale Loach (*Paramisgurnus dabryanus*) has been a part of Switzerland's ichthyofauna since 1999. The East Asian Topmouth Gudgeon (*Pseudorasbora parva*) only started fulfilling BDM occurrence criteria in 2006, a target the Asp (*Aspius aspius*) has reached in 2008.

Butterflies

Among this large taxonomic group, only three species are considered to be new arrivals in Switzerland: the Large Copper Butterfly (*Lycaena dispar*, since 1988), the Long-Tailed Blue (*Lampides boeticus*, since 2009) and since 2012, the Geranium Bronze (*Cacyreus marshalli*) which originates in Southern Africa. However, four species have disappeared since 1900. Such low dynamics can partially be explained by the fact that BDM does not cover irregularly appearing migratory butterflies. Permanent occurrence has been established for 189 species.

For monitoring purposes, Darwin's Heath (*Coenonympha gardetta darwiniana*) and the Alpine Heath (*C. gardetta gardetta*) are considered one and the same species.

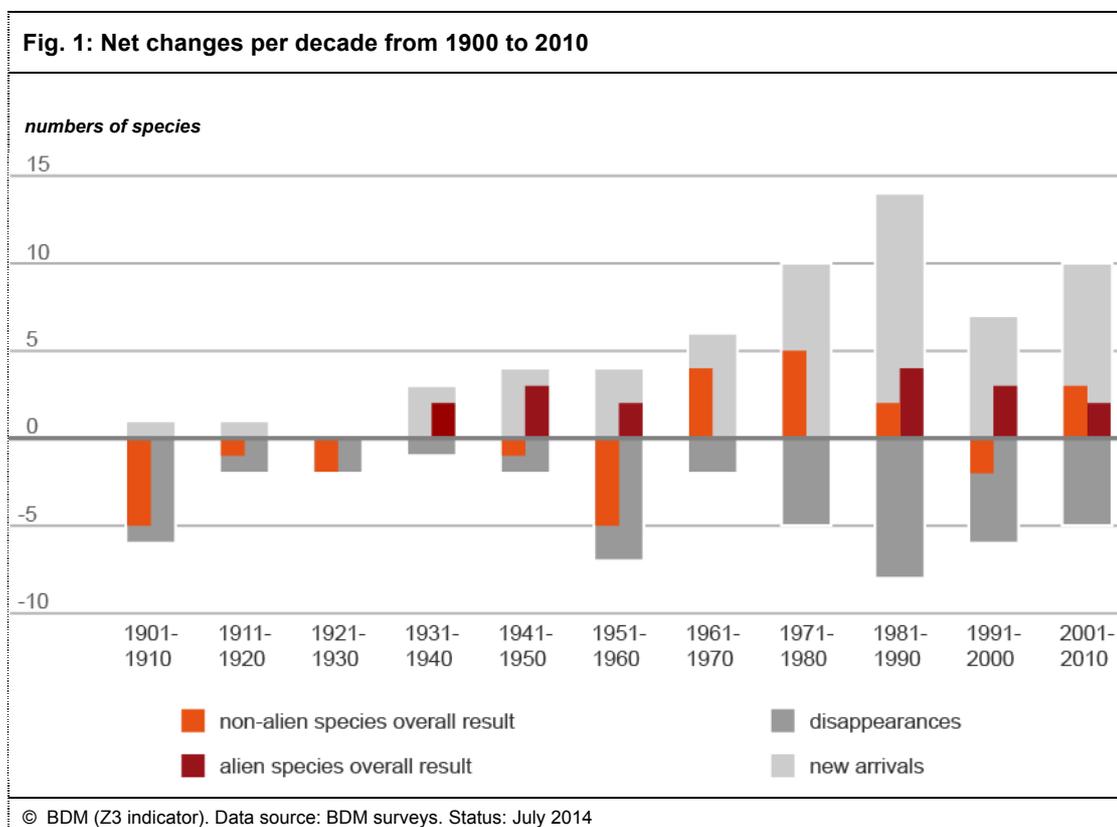
Grasshoppers

After 1900, researchers newly recorded occurrences of three grasshopper species in Switzerland: the Egyptian Locust (*Anacridium aegyptium*, since 2012), the Slender Burrowing Grasshopper (*Acrotylus patruelis*, since 2011), and the Greenhouse Camel Cricket (*Tachycines asynamoros*, since approx. 1940), with the latter restricted to buildings within zoos, nurseries and the like in this country. In contrast, four

species have disappeared since 1900, two of which—*Bryodemella tuberculata*, a band-winged grasshopper species, and the Eastern Long-Winged Grasshopper (*Epacromius tergestinus*)—used to live in natural floodplains. While the Eastern Long-Winged Grasshopper has again been identified on a regular basis in the Western Central Alps since 2006, it does not yet fulfill BDM criteria for permanent occurrence. The third lost species, the Desert Cricket (*Melanogryllus desertus*), had reached the utmost Northern boundary of its range in Switzerland. Occurring in meadows, steppes and ruderal sites, it was last identified in 1960 in the South of the Tessin. Likewise, the circummediterranean Brown-Spotted Bush Cricket (*Platycleis tessellata*) is classified as “no longer occurring” since 2010; it had only ever been observed in a Geneva nature preserve. Permanent occurrence has been established for 101 grasshopper species.

Dragonflies

Switzerland's nature databases have been complemented by seven additional dragonfly species since 1900: the Blue Eye (*Erythromma lindenii*) settled in this country as early as 1910, whereas the Scarlet Dragonfly (*Crocothemis erythraea*) and the White-Tailed Skimmer (*Orthetrum albistylum*) made the list in the 1980s. The recent past has witnessed the arrival of four new migratory species, i.e. the Dainty Damselfly (*Coenagrion scitulum*), the Southern Migrant Hawker (*Aeshna affinis*), the Red-veined Darter (*Sympetrum fonscolombii*) and the Southern Darter (*Sympetrum meridionale*). Even though these species had been evidenced before in this country, particularly in warmer years, they have not regularly reproduced here until recent years. As a result, BDM considers them to be permanently occurring since 2013 (2011 in the case of the Dainty Damselfly). On the other hand, three species disappeared in the last century, namely the Ornate Bluet (*Coenagrion ornatum*), the Large Pincertail (*Onychogomphus uncatus*) and the Irish Damselfly (*Coenagrion lunulatum*). Permanent occurrence has been established for 63 species.



Interpretation example

Between 1981 and 1990, Switzerland lost eight animal species, but gained 14, increasing its total number of species by six. Of these six, four were alien species.

Dynamics

Among all taxonomic groups surveyed, a total of 704 species fulfilled BDM criteria for permanent occurrence in Switzerland in 1900. In 2013, this figure had increased by 19 species. In other words, the number of species in the taxonomic groups monitored by BDM increased by roughly 3% between 1900 and 2013.

In the first half of the 20th century, only fishes were affected by a manifest decline, while species numbers in all other taxonomic groups remained more or less stable. Since around 1960, however, dynamics have been picking up distinctly, with changes mainly concerning species that either disappear completely or are new to colonize large parts of the country. Short-term fluctuations contribute little to changes recorded overall, so it may be assumed that such changes are not primarily based on improved species knowledge.

Sources

Data and comments:

Martinez, N., 2008: *Artenvielfalt in der Schweiz von 1900 - 2000*. 19 S. + Anhang. unpubl.

Martinez, N.; Küttel, M.; Weber, D., 2009: *Deutliche Zunahme wildlebender Tierarten in der Schweiz seit 1900*. Naturschutz und Landschaftsplanung 41, 375-381.

Status

Data: July 2014.

Alien species

By BDM definition, any species that was introduced into this country after 1500 by man and whose population lacks any contact with its area of origin is deemed alien to Switzerland. Wild forms of domesticated and farm animals living in this country are not considered alien. In computing species diversity, BDM differentiates between the total number of species and the number of alien species, with the difference being understood to be the number of non-alien species (in the sense of a working term).

Species only alien to certain biogeographical regions (biogeographical allochthones)—for example native to the Northern Alps but alien to the Southern Alps—are not set apart.

In most cases, species must obviously be classified as alien; this applies e.g. to the North American salmonidae. In other cases, however, such a classification may be questioned. All species alien to Switzerland are listed in appendix 1, table 3.

Table 2 below displays the total number of species found in Switzerland as well as alien species occurring nationwide and in biogeographical regions in 2013.

Taxonomic groups	total number of species	Thereof alien species Switzerland	Jura	Central Plateau	Northern Alps	Western Central Alps	Eastern Central Alps	Southern Alps
Mammals*	59	5	4	5	2	0	0	1
Breeding birds	178	2	0	2	0	0	0	0
Reptiles	15	1	0	1	0	0	0	0
Amphibians	18	0	0	0	0	0	0	0
Fishes	86	10	3	7	4	6	3	8
Cyclostomes	2	0	0	0	0	0	0	0
Butterflies	191	1	0	0	0	0	0	1
Grasshoppers	104	1	0	1	0	0	0	0
Dragonflies	70	0	0	0	0	0	0	0
Total	723	20	7	16	6	6	3	10

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* excluding bats

Interpretation example

In 2013, Switzerland was found to harbor 723 species that fulfill BDM criteria for permanent occurrence, including 20 alien species.

Comments

Most alien species classified as such in 2013 are mammals and fishes. In the Western and Eastern Central Alps, all alien species are fishes.

Development in Switzerland in the past 10 years (2004-2013)

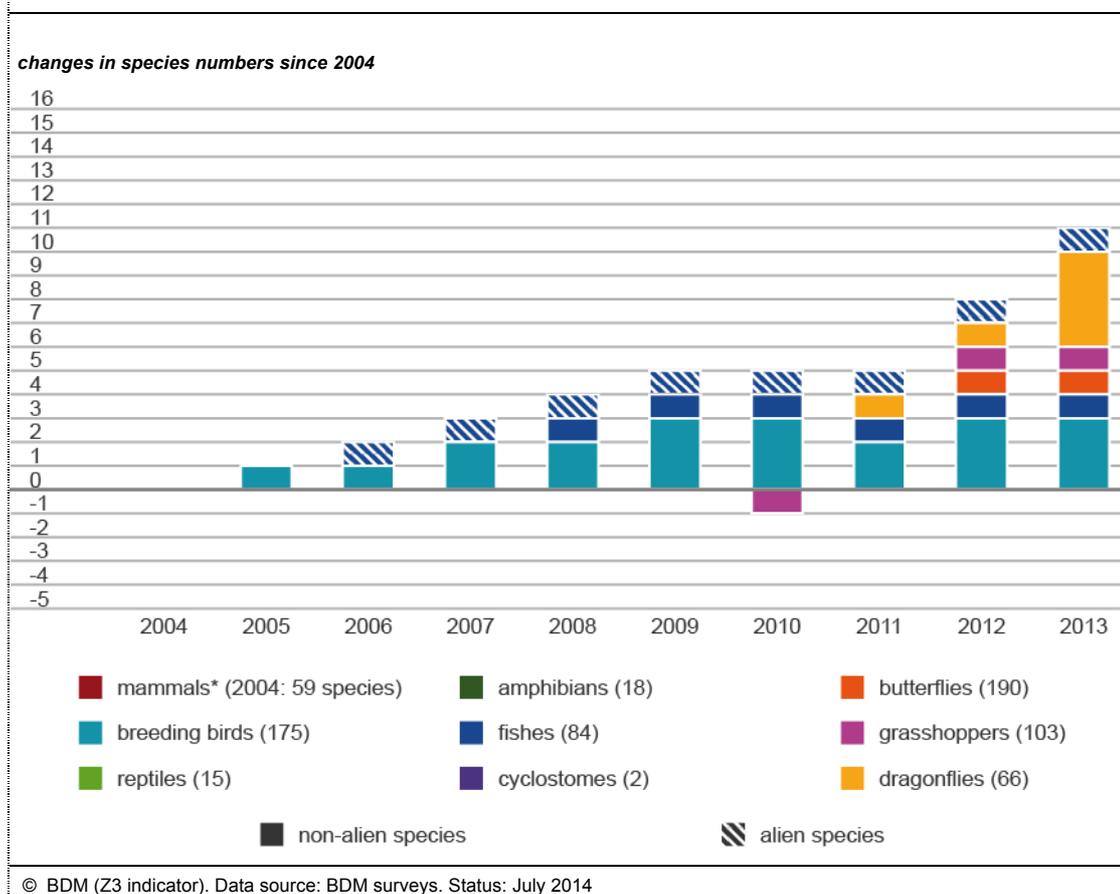
This chapter deals with the development observed in the current last decade. In other words, the period under observation is not the same as the one used for the legislature indicator “Species Diversity of Select Groups”, which monitors the development since 1997 (Swiss Federal Statistical Office, 2014). As monitoring starting points differ, so do overall results.

Definition of “occurrence”

In order to prevent indicator information from being distorted by irregular appearances of mobile species, any species needs to have been present in 9 of 10 consecutive past years to be classified as occurring in Switzerland. Individuals of e.g. the originally eastern Asian Raccoon Dog (*Nyctereutes procyonides*) may have been spotted time and again for several years, but because they have not been recorded every year, the Raccoon Dog does not (yet) fulfill BDM criteria for permanent occurrence in this country.

Overview

Generally speaking, species numbers of vertebrates, butterflies, dragonflies and grasshoppers living wild in Switzerland have only marginally changed since 2004. For example, certain bird species were impossible to be found breeding on an annual basis. The Tawny Pipit (*Anthus campestris*) was only spotted in 2009 and 2010, and the Little Crake (*Porzana parva*) could not be found except for isolated years. There has been no breeding evidence of the Curlew (*Numenius arquata*) since 2007. The Mew Gull (*Larus canus*) has not been observed to be breeding until 2006. New to occur in Switzerland are one bird species and two fish species: the Mediterranean Gull (*Larus melanocephalus*) as well as the Topmouth Gudgeon (*Pseudorasbora parva*) and the Asp (*Aspius aspius*). Because the Southern Migrant Hawker (*Aeshna affinis*), the Red-veined Darter (*Sympetrum fonscolombii*) and the Southern Darter (*Sympetrum meridionale*), all three of them migratory dragonfly species, now reproduce in this country on a regular basis, they have been newly classified as permanently occurring in Switzerland. Formerly migratory dragonfly species settling in Central Europe of late is being associated with climate change (Ott, 2001).

Fig. 2: Development of select taxonomic groups in Switzerland 2004–2013

*) excluding bats

Interpretation example

In 2004, Switzerland held 712 wildlife species belonging to the taxonomic groups monitored by BDM. Figure 2 above illustrates changes observed against this initial value. In 2005, one “non-alien” breeding bird species was added to the list, to be followed by another in 2007. Until 2013, Switzerland’s “non-alien” species numbers were increased by four dragonflies, three breeding birds and one fish, butterfly and grasshopper each, with an alien fish species joining the newcomers in 2006. Overall, 2013 species numbers have grown by ten compared to 2004. Of these ten species, one is alien.

Disappearances

2007: In the past decades, the breeding population of the Curlew (*Numenius arquata*) has gradually declined from more than 60 pairs to zero. While isolated pairs may still be observed in suitable habitats at the beginning of each breeding period, they do not make regular breeding attempts anymore.

2010: The Woodchat Shrike (*Lanius senator*) does not meet BDM occurrence requirements anymore. Formerly restricted to a Geneva nature preserve, the circummediterranean Brown-spotted Bush Cricket (*Platycleis tessellata*) has also been reclassified as “no longer occurring”.

Newcomers

2006: BDM criteria for permanent occurrence are newly fulfilled by the Topmouth Gudgeon (*Pseudorasbora parva*), a fish species.

2007: The White-backed Woodpecker (*Dendrocopos leucotos*) fulfills BDM criteria for permanent occurrence. Except for 2011, the Mediterranean Gull (*Larus melanocephalus*) has been meeting BDM

requirements since 2007. In this period of time, the population invariably consisted of only a very small number of breeding pairs on the Central Plateau.

2008: Indigenous to Central and Eastern Europe and for the first time fulfilling BDM criteria for permanent occurrence, the Asp (*Aspius aspius*) has immigrated into this country by way of the River Rhine.

2009: The Long-tailed Blue (*Lampides boeticus*) newly joins Switzerland's butterfly species, while the Great Cormorant (*Phalacrocorax carbo*) officially becomes a Swiss breeding bird.

2010: Switzerland's breeding bird species are complemented by the Common Eider (*Somateria mollissima*) and the Purple Heron (*Ardea purpurea*). The latter had disappeared as a breeding bird in 1986 after regularly breeding in this country for decades, primarily by Lake Neuchâtel.

2011: BDM criteria are newly fulfilled by the Slender Burrowing Grasshopper (*Acrotylus patruelis*) and the Dainty Damselfly (*Coenagrion scitulum*).

2012: Both the Geranium Bronze (*Cacyreus marshalli*) from Southern Africa and the Egyptian Locust (*Anacridium aegyptium*) are considered to occur in Switzerland by BDM criteria.

2013: The Southern Migrant Hawker (*Aeshna affinis*), the Red-veined Darter (*Sympetrum fonscolombii*) and the Southern Darter (*Sympetrum meridionale*), three former migratory dragonfly species, have settled in Switzerland.

Unstable species

For a species to be considered unstable, it needs to have changed its status (occurrence/nonoccurrence) more than once during the period under review.

1998 to 2008: After its population size had been dwindling for a long time, the Common Snipe (*Gallinago gallinago*) no longer fulfilled BDM criteria as of 1998. From 2005 to 2009, it had again been considered to be a breeding bird in Switzerland, only to be reclassified as nonoccurring in 2010 for lack of regular breeding evidence.

Impossible to classify

The Italian Loach (*Sabanejewia larvata*), a fish species, has been impossible to classify.

Overview

For an overview of the number of occurring species by taxonomic group and year please refer to table 4 in appendix 1.

Sources

Swiss Ornithological Institute, Sempach

Coordination Office for the Protection of Amphibians and Reptiles in Switzerland KARCH

Swiss Biological Records Center CSCF

Surveys conducted by Faune Concept and Aquarius on behalf of BDM

BDM surveys

Status

July 10, 2014 (2013 data). The Z3 indicator is updated on annual basis, with the next update scheduled for the fall of 2015.

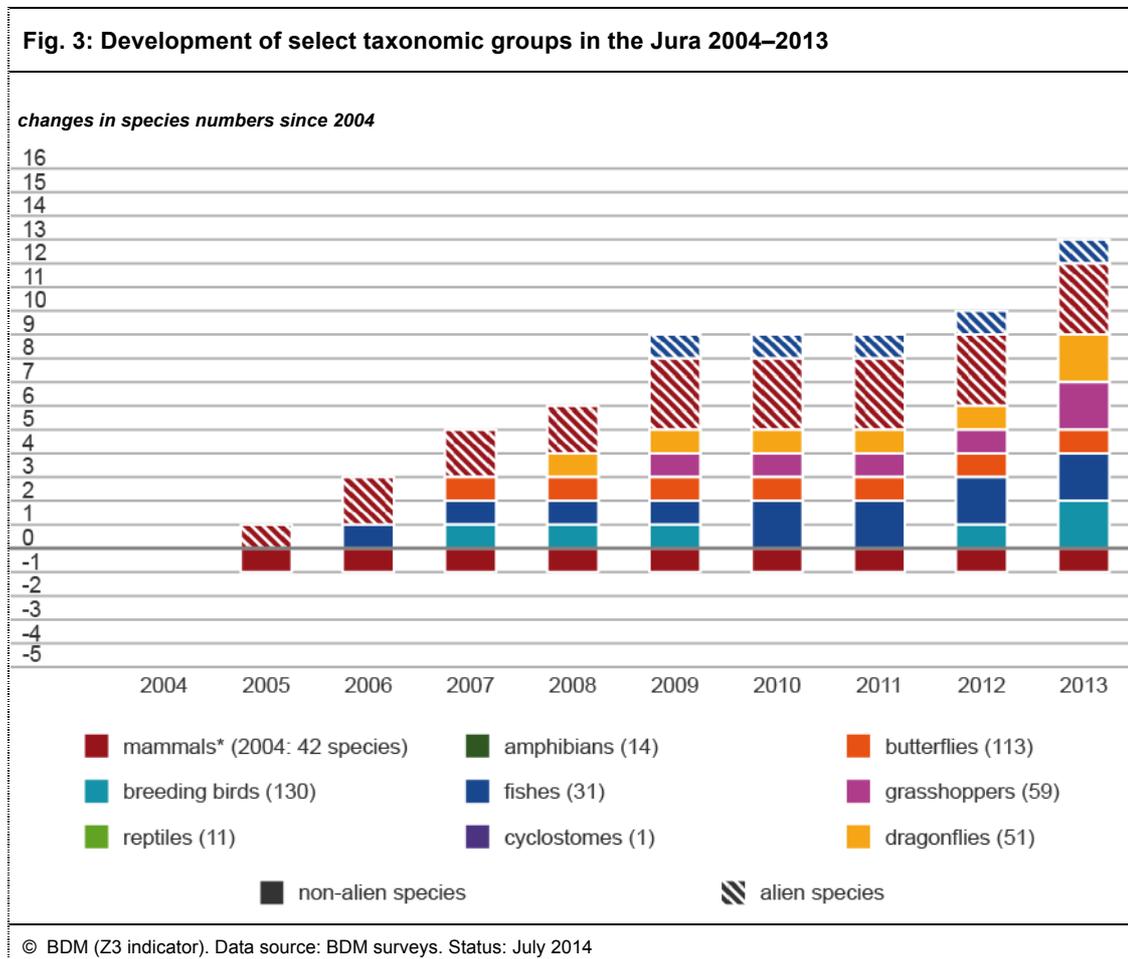
Development in the regions

Comment regarding all regions

Species numbers for Switzerland's individual regions vary due to biogeographical differences. Net changes in species numbers differ as well, ranging between +6 on the Central Plateau and +16 in the Eastern Central Alps. The large increase found in the Eastern Central Alps relates to various taxonomic groups.

For complete species lists please refer to the appendix.

Jura



*) excluding bats

Disappearances

Species lost in the Jura after 2004: Ring-Necked Pheasant (*Phasianus colchicus*) (2005) and Woodchat Shrike (*Lanius senator*) (2010).

Newcomers

Species gained in the Jura after 2004: Rock Bunting (*Emberiza cia*) (2005), Spirlin (*Alburnoides bipunctatus*) (2006; however, this fish species might not be a true newcomer, as it is possible that it was simply overlooked so far), Raccoon (*Procyon lotor*) (2006), Tufted Duck (*Aythya fuligula*) (2007), Short-tailed Blue (*Cupido alcetas*) (2007), Large Conehead (*Ruspolia nitidula*) (2009), Topmouth Gudgeon (*Pseudorasbora parva*) (2009), Zander (*Sander lucioperca*) (2010), Dainty Damselfly (*Coenagrion scitulum*) (2011), Melodious Warbler (*Hippolais polyglotta*) (2013), Mediterranean Katydid (*Phaneroptera nana*) (2013) and Red-veined Darter (*Sympetrum fonscolombii*) (2013).

The Grasshopper Warbler (*Locustella naevia*) has been fulfilling BDM criteria since 2012. While this species occurred in the Jura even before 2003, its status was unclear from 2004 to 2011.

An alien species originating in Eastern Asia, the Sika Deer (*Cervus nippon*) is deemed to be permanently occurring since 2009. It had been evidenced on a regular basis before, but not in consecutive years.

Unstable species

The Banded Darter (*Sympetrum pedemontanum*) met BDM criteria from 2008 to 2010.

Impossible to classify

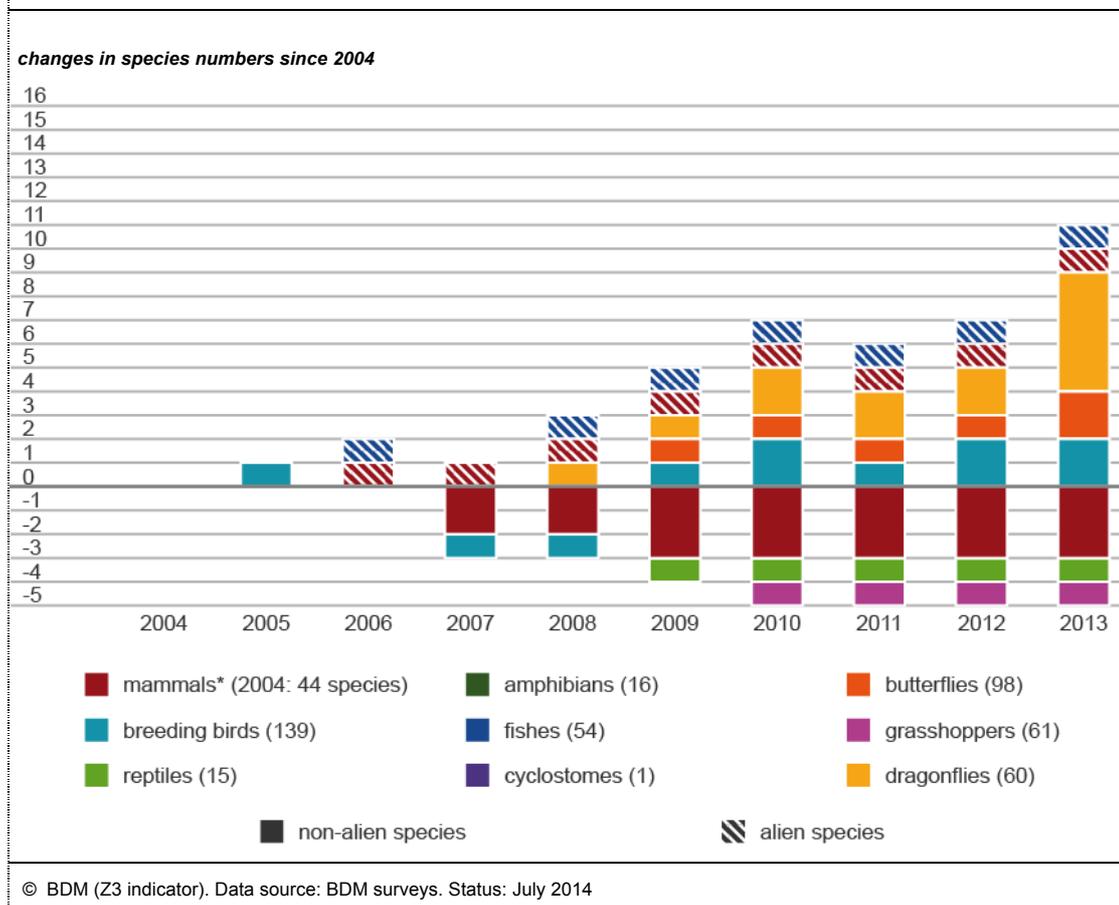
The occurrence of the Crucian Carp (*Carassius carassius*) (since 2006) and the Southern Darter (*Sympetrum meridionale*) has been found uncertain.

Overview

For an overview of the number of occurring species by taxonomic group and year please refer to table 4 in appendix 1.

Central Plateau

Fig. 4: Development of select taxonomic groups on the Central Plateau 2004–2013



*) excluding bats

Disappearances

Species lost on the Central Plateau after 2004: Bi-colored White-toothed Shrew (*Crocidura leucodon*) (2006), Black-necked Grebe (*Podiceps nigricollis*) (2006), Miller's Water Shrew (*Neomys anomalus*) (2006), Northern Brown Argus (*Aricia artaxerxes*) (2007, uncertain before), Meadow Pipit (*Anthus pratensis*) (2010), Brown-spotted Bush Cricket (*Platycleis tessellata*) (2010), and European Wildcat (*Felis silvestris*) (2010, uncertain in 2009). The Largemouth Bass (*Micropterus salmoides*), an alien species, had been meeting BDM requirements until 2006. However, after being considered uncertain from 2007 to 2010, the species disappeared in 2011. After having been considered to occur in Switzerland until 2006, the Eurasian Woodcock (*Scolopax rusticola*) was classified as uncertain from 2007 to 2011. It is now deemed to have disappeared from this region as of 2011 (no breeding evidence in 2007 and 2012).

Newcomers

Species gained on the Central Plateau after 2004: Topmouth Gudgeon (*Pseudorasbora parva*) (2006), Nutria (*Myocastor coypus*) (2006, uncertain before), Asp (*Aspius aspius*) (2008), Western Spectre (*Boyeria irene*) (2008), Corncrake (*Crex crex*) (2009), Great Cormorant (*Phalacrocorax carbo*) (2009), Long-tailed Blue (*Lampides boeticus*) (2009), Purple Heron (*Ardea purpurea*) (2010), Common Eider (*Somateria mollissima*) (2010), Banded Darter (*Sympetrum pedemontanum*) (2010), and Southern Small White (*Pieris mannii*) (2013).

Classified as uncertain on the Central Plateau until 2012, the Southern Migrant Hawker (*Aeshna affinis*), the Red-veined Darter (*Sympetrum fonscolombii*) and the Southern Darter (*Sympetrum meridionale*) made the BDM's permanent occurrence list in 2013.

The Mediterranean Gull (*Larus melanocephalus*) has been fulfilling BDM criteria since 2007, albeit with a gap in 2011.

Unstable species

Even though the Common Snipe (*Gallinago gallinago*) met BDM requirements from 2005 until 2009, it has been failing to do so since 2010. The Scarlet Grosbeak (*Carpodacus erythrinus*) has been fulfilling BDM until 2005, and again as of 2010.

Impossible to classify

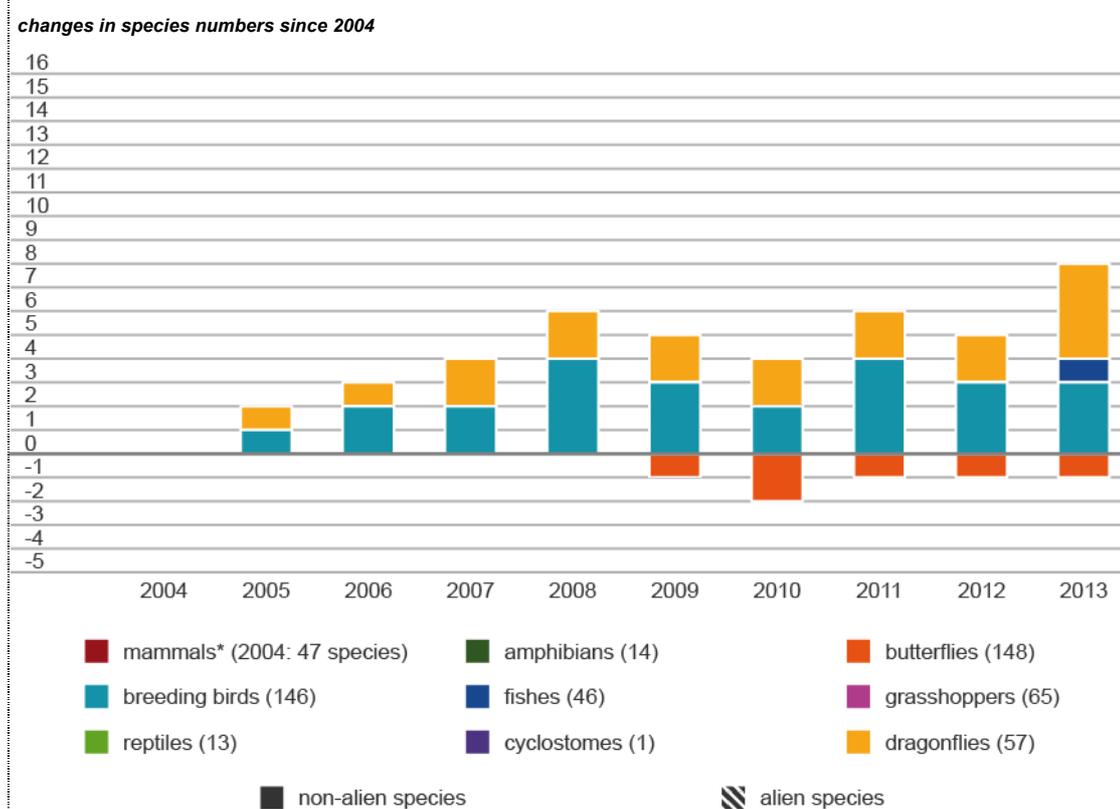
It still cannot be confirmed whether the Common Adder (*Vipera berus*) continues to be present in its last stronghold on the Central Plateau (uncertain as of 2009). While the Vagrant Emperor (*Anax ephippiger*) has been regularly evidenced on the Central Plateau for several years, it does not yet fulfill BDM criteria.

Overview

For an overview of the number of occurring species by taxonomic group and year please refer to table 4 in appendix 1.

Northern Alps

Fig. 5: Development of select taxonomic groups in the Northern Alps 2004–2013



© BDM (Z3 indicator). Data source: BDM surveys. Status: July 2014

*) excluding bats

Disappearances

Species lost in the Northern Alps after 2004: Black-headed Gull (*Larus ridibundus*) (2008), Black-necked Grebe (*Podiceps nigricollis*) (2009), Gatekeeper (*Pyronia tithonus*) (2010), and Common Tern (*Sterna hirundo*) (2010).

Newcomers

Species gained in the Northern Alps after 2004: Norfolk Hawker (*Aeshna isoceles*) (2005), Rook (*Corvus frugilegus*) (2006), White-backed Woodpecker (*Dendrocopos leucotos*) (2007), White-tailed Skimmer (*Orthetrum albistylum*) (2007), Woodlark (*Lullula arborea*) (2008), Yellow-legged Gull (*Larus michahellis*) (2008), Brown Argus (*Aricia agestis*) (2010, uncertain before), Bluethroat (*Luscinia svecica*) (2011), Hoopoe (*Upupa epops*) (2011), Provençal Short-tailed Blue (*Cupido alcetas*) (2011), and Crucian Carp (*Carassius carassius*) (2013).

Unstable species

Fulfilling BDM criteria in 2005, 2006 and from 2008 till 2011, but not in 2007, 2012 and 2013, the Corncrake (*Crex crex*) has been classified as an unstable species.

Impossible to classify

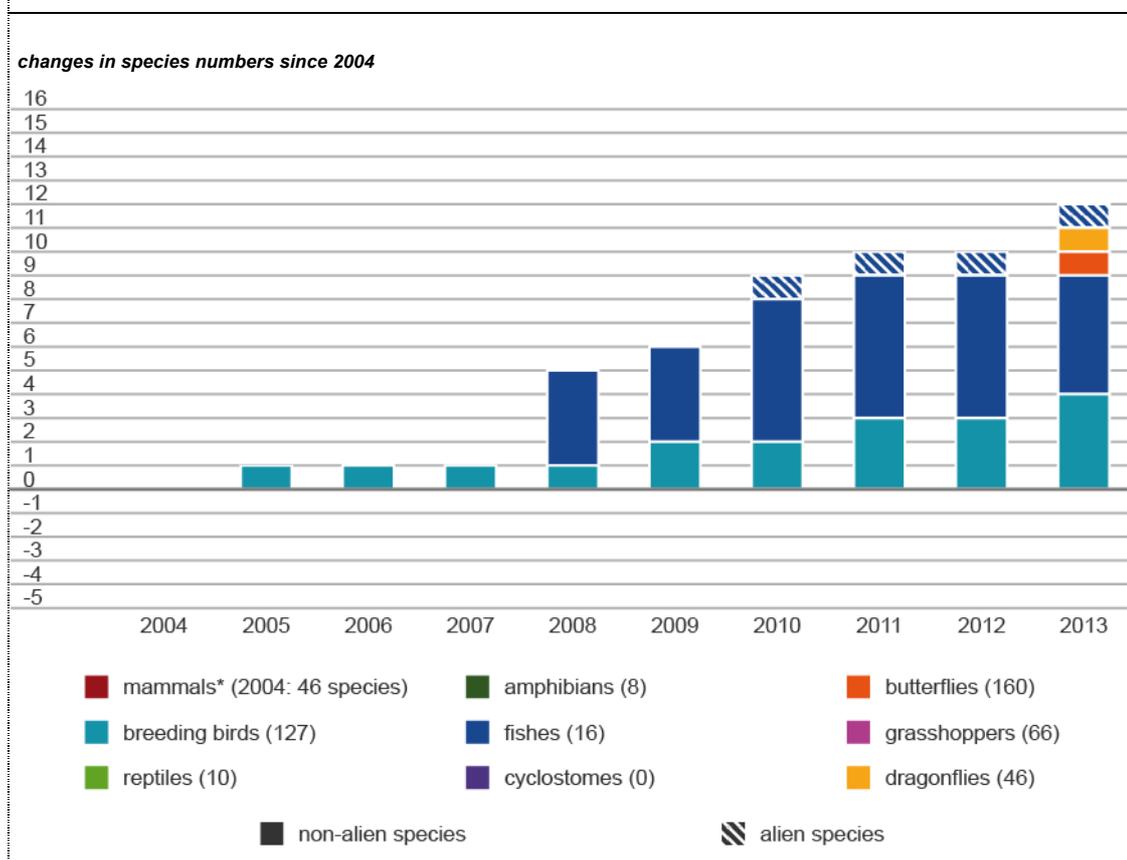
It cannot be confirmed whether the False Ringlet (*Coenonympha oedippus*) continues to occur in the Northern Alps.

Overview

For an overview of the number of occurring species by taxonomic group and year please refer to table 4 in appendix 1.

Western Central Alps

Fig. 6: Development of select taxonomic groups in the Western Central Alps 2004–2013



© BDM (Z3 indicator). Data source: BDM surveys. Status: July 2014

*) excluding bats

Disappearances

There were no species lost in the Western Central Alps in the past ten years.

Newcomers

Species gained in the Western Central Alps after 2004: Tufted Duck (*Aythya fuligula*) (2007), Northern Pike (*Esox lucius*) (2008), Common Carp (*Cyprinus carpio*) (2008), Gudgeon (*Gobio gobio*) (2008), Lake Charr (*Salvelinus umbla*) (2008), Blue Rock Thrush (*Monticola solitarius*) (2009), Goldfish (*Carassius auratus*) (2010), Pumpkinseed Sunfish (*Lepomis gibbosus*) (2010), Great Reed Warbler (*Acrocephalus arundinaceus*) (2011), and Great Banded Grayling (*Brintesia circe*) (2013). However, it is quite feasible that not all fish species registered as such are actually true newcomers; they might just have gone unnoticed before.

Classified as uncertain until 2012, the Red-veined Darter (*Sympetrum fonscolombii*) has been fulfilling BDM criteria since 2013.

Unstable species

Meeting BDM requirements in 2005 and 2006, but not anymore as of 2007, the Scarlet Grosbeak (*Carpodacus erythrinus*) must be classified as an unstable species.

Impossible to classify

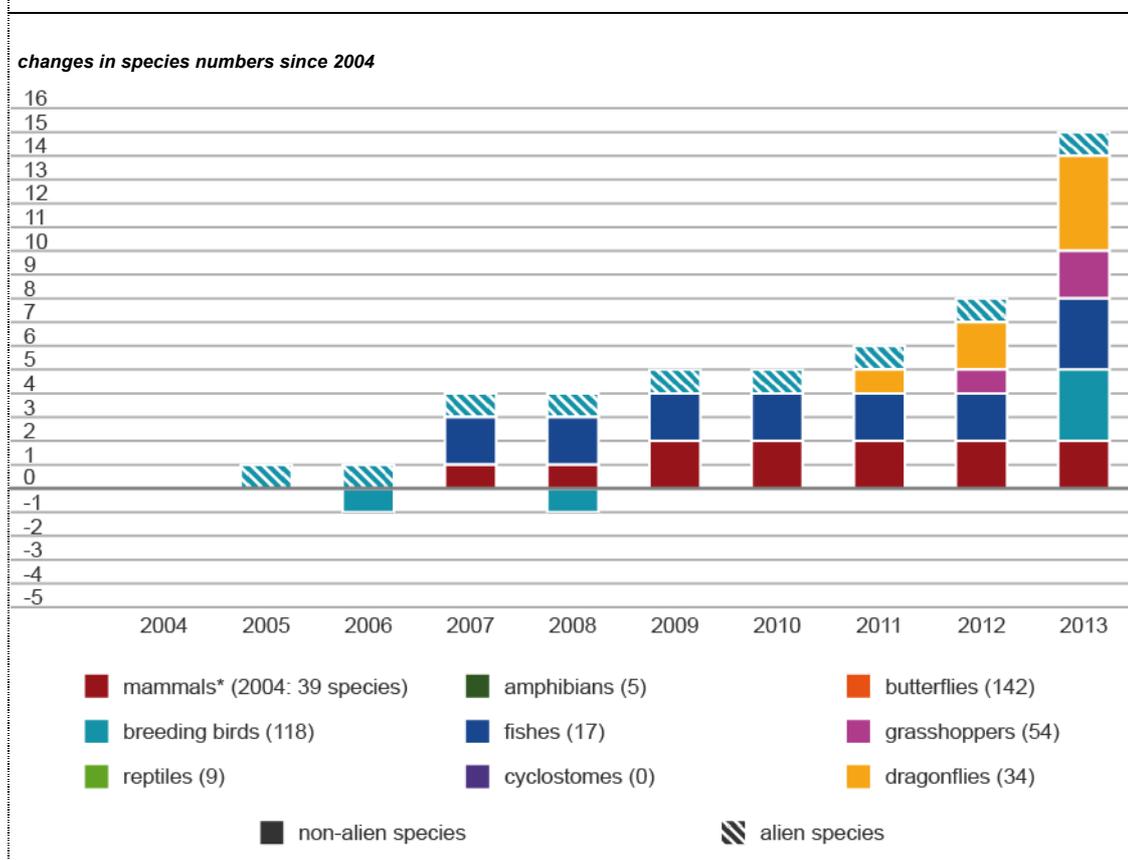
The Crucian Carp (*Carassius carassius*) occurred in the Western Central Alps from 2010 to 2012. Its status for 2013 is unclear.

Overview

For an overview of the number of occurring species by taxonomic group and year please refer to table 4 in appendix 1.

Eastern Central Alps

Fig. 7: Development of select taxonomic groups in the Eastern Central Alps 2004–2013



© BDM (Z3 indicator). Data source: BDM surveys. Status: July 2014

*) excluding bats

Disappearances

Species lost in the Eastern Central Alps after 2004: Mute Swan (*Cygnus olor*) (2006), Scarlet Grosbeak (*Carpodacus erythrinus*) (2008), Lesser White-toothed Shrew (*Crocidura suaveolens*) (2009, uncertain since 2004) and Barred Warbler (*Sylvia nisoria*) (2011).

Newcomers

Species gained in the Eastern Central Alps after 2004: Willow Warbler (*Phylloscopus trochilus*) (2005), Eurasian Lynx (*Lynx lynx*) (2007), Cirl Bunting (*Emberiza cirlus*) (2007), Common Bream (*Abramis brama*) (2007), Common Carp (*Cyprinus carpio*) (2007), Wolf (*Canis lupus*) (2009), Grey-headed Woodpecker (*Picus canus*) (2009), Common Heron (*Ardea cinerea*) (2011), Migrant Hawker (*Aeshna mixta*) (2011), Banded Demoiselle (*Calopteryx splendens*) (2012), Oak Bush Cricket (*Meconema thalassinum*) (2012), Great Crested Grebe (*Podiceps cristatus*) (2013), Common Nightingale (*Luscinia megarhynchos*) (2013), Bluethroat (*Luscinia svecica*) (2013), Western Vairone (*Telestes souffia*) (2013), Blue-winged Grasshopper (*Sphingonotus caeruleus*) (2013), and Blue Eye (*Erythronia lindenii*) (2013).

Classified as uncertain until 2012, the Red-veined Darter (*Sympetrum fonscolombii*) has been fulfilling BDM criteria since 2013.

Unstable species

None.

Impossible to classify

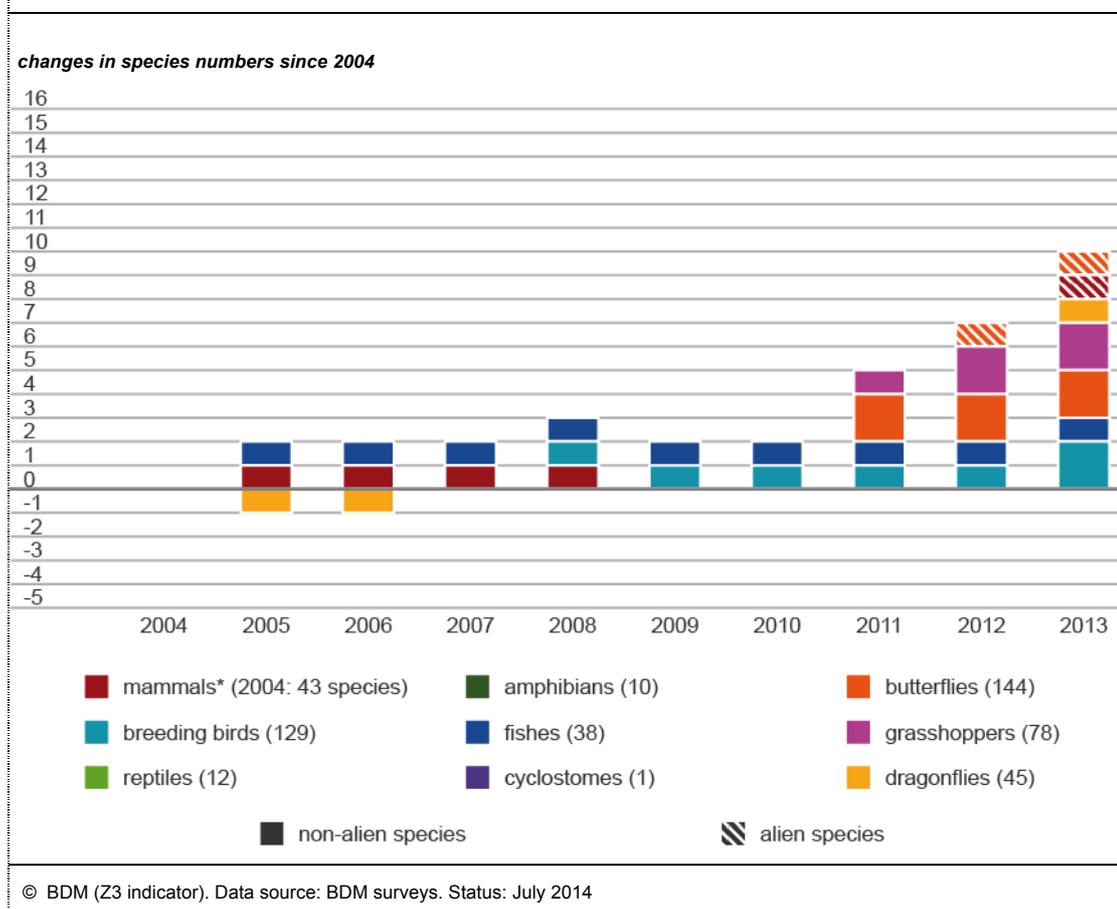
The occurrence of De Prunner's Ringlet (*Erebia triaria*) (since 1998) needs confirming.

Overview

For an overview of the number of occurring species by taxonomic group and year please refer to table 4 in appendix 1.

Southern Alps

Fig. 8: Development of select taxonomic groups in the Southern Alps 2004–2013



*) excluding bats

Disappearances

Species lost in the Southern Alps after 2004: Small Spreadwing (*Lestes virens*) (2006), European Rabbit (*Oryctolagus cuniculus*) (2009), and Harvest Mouse (*Micromys minutus*) (2009). Only evidenced from 2004 to 2006, the Scarlet Grosbeak (*Carpodacus erythrinus*) disappeared in 2007.

Newcomers

Species gained in the Southern Alps after 2004: Eurasian Lynx (*Lynx lynx*) (2005, uncertain before), Crucian Carp (*Carassius carassius*) (2005), Black-billed Magpie (*Pica pica*) (2007), White-tailed Skimmer (*Orthetrum albistylum*) (2008), Yellow-legged Gull (*Larus michahellis*) (2009), Wolf (*Canis lupus*) (2009), Long-Tailed Blue (*Lampides boeticus*) (2011), Asian Fritillary (*Euphydryas intermedia*) (2011), Slender Burrowing Grasshopper (*Acrotylus patruelis*) (2011), Eurasian Scops Owl (*Otus scops*) (2012), Geranium Bronze (*Cacyreus marshalli*) (2012), Egyptian Locust (*Anacridium aegyptium*) (2012), Great Cormorant (*Phalacrocorax carbo*) (2013), and Nutria (*Myocastor coypus*) (2013).

The Crucian Carp (*Carassius carassius*) is allochthonous to the Southern Alps, i.e. an alien fish species that has been accidentally introduced into the region.

Classified as uncertain until 2012, the Southern Migrant Hawker (*Aeshna affinis*) has been fulfilling BDM criteria since 2013.

Unstable species

The Tufted Duck (*Aythya fuligula*) only met BDM requirements in 2008.

Impossible to classify

The Piedmont Ringlet (*Erebia meolans*) and Warren's Skipper (*Pyrgus warrenensis*) continue to be impossible to classify. The same goes for the Common Minnow (*Phoxinus phoxinus*) and the Italian Loach (*Sabanejewia larvata*). Even though the Red-veined Darter (*Sympetrum fonscolombii*) has been evidenced for several years, it does not fulfill BDM criteria yet.

Overview

For an overview of the number of occurring species by taxonomic group and year please refer to table 4 in appendix 1.

Sources

Swiss Ornithological Institute, Sempach

Coordination Office for the Protection of Amphibians and Reptiles in Switzerland KARCH

Swiss Biological Records Center CSCF

Surveys conducted by Faune Concept and Aquarius on behalf of BDM

BDM surveys

Status

July 10, 2014 (2013 data). The Z3 indicator is updated on annual basis, with the next update scheduled for the fall of 2015.

Significance for biodiversity

In the past years, both vertebrate species numbers and monitored insect species numbers have remained comparatively stable in Switzerland. Species numbers may change, for example, whenever isolated patch habitats change, affecting or benefiting rare species. But they are also impacted by large-scale developments such as area dislocations (natural changes in range) and accidental introductions. It is generally beneficial for any region to accommodate a large number of species, as long as rare endemic species are not crowded out by new arrivals that are very common to begin with. While many newcomers are quite unlikely to pose this kind of threat, several immigrated/introduced species have turned out to be causing problems for native wildlife in the past. Besides, as it is often difficult to recognize problem species early, there is always a risk. Experts currently suspect the Topmouth Gudgeon to fall into that category. Originating in Eastern Asia, this small fish may—in case of mass propagation—become a food competitor for indigenous fry.

Various regions are being recolonized by species that had once been actively exterminated in those same regions. Examples for this development include the Eurasian Lynx, the Common Heron, and the Wolf.

Other species, such as the Scarlet Grosbeak, the Tufted Duck and several migratory dragonflies, have extended their natural ranges into new regions.

At a regional level, species numbers have been tending to increase in many European areas during the past decades. In addition to reasons already mentioned, this trend is also the result of well-targeted nature and species conservation efforts as well as successful reintroduction projects. However, it would be wrong to consider such success stories to be an indication of biodiversity improving by and large. What is more, species numbers in many areas have been increasing due to the accidental introduction of new species.

Unfortunately, it is still not possible to completely prevent endangered species from disappearing in Switzerland. Losing typical bogland species that used to be rather widespread is a painful failure of Swiss nature conservation. For several species, such as the Curlew and the Common Snipe, bogland protection measures were initiated too late.

Definition

Changes in the numbers of free-living species of certain taxonomic units whose presence can be evidenced or demonstrated to be probable for at least nine out of ten consecutive years using standardized methods.

This definition is characterized by three intentional restrictions:

1. The indicator is limited to certain taxonomic groups. Individual species within these groups are observed readily enough to gather very reliable data on their presence or absence in a given region each year.
2. The indicator only covers animals living in the wild. For a species to be considered free-living, it must reproduce independently of human care.
3. The “nine out of the ten years” criterion is meant to disqualify mobile species occurring only at irregular intervals without building stable populations (“vagrants”, “irregular breeders”).

Results are presented differentiating between non-alien and alien species. By BDM definition, any species that was introduced into this country after 1500 by man and whose population lacks any contact with its area of origin is deemed alien to Switzerland. For a list of all alien species please refer to table 3 in appendix 1.

Surveying methods

Verifying whether or not a species fulfills the criterion of “living in the wild in nine out of ten consecutive years” requires a whole series of methodological definitions answering questions like: What is an acceptable indication of successful reproduction? Which features are used to identify a species? Which assumptions regarding the presence of a species are applied in years in which no successful reproduction is observed? Which conditions have to be met for a species to be considered absent from a region? For this purpose, exact minimum requirements have been defined for each species.

Starting with the 2011 revision of the Z3 indicator (2010 data), cyclostomes and fishes are classified according to the taxonomy used by Kottelat & Freyhof (2007). Furthermore, whitefish species (*Coregonus* sp.) are no longer treated as a species group, but broken down by individual species according to the taxonomy used by Hudson et al. (2011) and Vonlanthen (2009). As a result, species numbers of cyclostomes and fishes and, hence, total species numbers changed for the whole period under review. New taxonomic insights are mainly based on genetic species identification methods.

BDM makes an effort to provide evidence in accordance with these definitions, updated annually for each of Switzerland’s regions. Surveys monitor all species of select taxonomic units which have been evidenced at least once since 1998. In doing so, BDM largely relies on existing reporting networks maintained by amateur faunists such as members of the Swiss Ornithological Institute, the KARCH, or the CSCF. In addition, specialists are called in from time to time in order to close specific information gaps, for example by dealing with “tricky” groups such as small mammals or by looking for missing species.

From time to time, new findings make scientists realize that certain species have been misclassified at a regional level. This results in total species numbers being changed versus Z3 information published in previous years without any species newly arriving or disappearing. Likewise, new taxonomic insights may bring about a change in total species numbers, but they usually do not impact developments.

Gathering data for the 1900–2013 monitoring period required a special method. Due to data deficiency at a regional level, species numbers in this period are only presented for Switzerland as a whole.

First of all, a list of all species possibly fulfilling required BDM occurrence criteria at least once between 1900 and 2013 was established for each taxonomic group. Next, each of those species was investigated regarding the number of years it fulfilled species-specific and group-specific Z3 criteria. Species which were present in Switzerland in isolated years only, never meeting species-specific BDM requirements in at least 9 of 10 consecutive years, were dropped.

The remaining species were subdivided into different categories (permanently occurring, disappeared, newly arrived, changed status more than once). If possible, the status of rare species was determined on an annual basis between 1900 and 2013 in order to pinpoint any status changes with yearly precision.

Regarding certain species, it was not possible to find conclusive evidence of their status or the time of any status changes in literature and available databases (Swiss Ornithological Institute, CSCF, BDM). In these cases, we had expert opinions prepared, accepting the conclusions they reached. Due to lack of data, four bird species (Little Crake, Collared Flycatcher, Pallid Swift, Red-Crested Pochard) have not been classified yet, even though they certainly fulfilled BDM criteria in certain periods of time.

With the quality of available data varying widely from one taxonomic group to the next, particularly in the first half of the 20th century, it usually proved impossible to pinpoint status changes with yearly precision. For this reason, we have chosen to indicate a qualifying year based on ten-year steps, proceeding as follows:

Whenever a species newly fulfills BDM criteria, it is classified as present in Switzerland as of the start of the following decade. For example: The Bee-Eater has been breeding in Switzerland on an annual basis since 1991. In other words, the bird had been present in this country for 9 out of 10 consecutive years by 1999, meeting Z3 requirements for permanent occurrence. Consequently, the Bee-Eater is classified as permanently occurring as of 2000.

Likewise, if a species disappears from Switzerland, it is classified as disappeared as of the start of the following decade.

However, when proceeding this way, species only meeting BDM requirements for a short amount of time would end up being classified as newly arriving and disappearing in one and the same decade. Such new arrivals will be classified as permanently occurring as of the start of the preceding decade and as disappeared again as of the start of the following decade. This rule was applied to the European Green Toad, Cetti's Warbler and the European Penduline Tit.

While alien species are taken into account, but earmarked as such, migratory species not breeding in this country or only by exception are disregarded. This concerns winter guests and passage migrants among birds, the European Eel among fishes, and various butterfly species.

Further information

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Related indicators

- > Z4 Number of Species in Switzerland Facing Global Extinction
- > Z6 Population Size of Endangered Species
- > Z7 Species Diversity in Landscapes
- > Z9 Species Diversity in Habitats

Additional sources of information

- > <http://www.bafu.admin.ch/index.html?lang=en> website of the Federal Office for the Environment FOEN
- > <http://www.vogelwarte.ch/startseite-english.html> website of the Swiss Ornithological Institute, providing comprehensive information on bird life in Switzerland
- > http://www.cscf.ch/page9835_en.html website of the Swiss Biological Records Center CSCF
- > www.karch.ch Coordination Office for the Protection of Amphibians and Reptiles KARCH (no information in English)

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- > Vonlanthen, P., 2009: On speciation and its reversal in adaptive radiations. The central European whitefish system. Dissertation Universität Bern. 147 S.

For detailed species information please refer to the pdf documents attached to this data file:

- > Table 3: List of alien species
- > Table 4: Development of species numbers in Switzerland and its regions within the past 10 years
- > Table 5: Species lists of all monitored taxonomic groups detailing regional distribution statuses for the past 10 years

This information is based on the German-language document 1180_Z3_Basisdaten_2013_v1.docx dated October 1st, 2014.