

How many bird species are there? (2018)

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Introduction

In an article titled: "How many bird species are there?" the author (FISHER 2014) writes: "A short answer is that there are more than last week." The meaning of this statement is that the number of existing bird species can currently not be precisely quantified. On the one hand, new bird species are still being discovered – though less and less frequently – but on the other hand, bird populations that were previously classified within the same species are increasingly recognized as new species. Therefore, for the number of bird species only a snapshot can be provided by describing the situation at the beginning of 2018.

Bird classifications of the last 50 years

The first list of species in which birds are classified according to criteria that are still valid today comes from CARL VON LINNÉ (1758), but he made no distinction between species and subspecies. The last classification without subspecies appeared in 1909 with 18,939 species (SHARPE). The author was curator of the British Museum's bird collection.

As of 1931, JAMES L. PETERS published a new classification where species and subspecies were strictly distinguished. After the publication of the first seven volumes,

PETERS passed away in 1952 and the subsequent volumes were edited by various authors and editors. A total of 33 ornithologists were involved. As a consequence, the appearance of this broad-based work dragged on for decades, and when the last volume was published in 1986, the first volumes were already outdated. However, only Volume 1 was published in a revised edition. In total, this *Checklist of the Birds of the World* described 8,897 species and 22,217 subspecies.

Even before PETERS's checklist was completed, it became clear that the time had come for a further reclassification of birds, preferentially in a single volume and in a relatively short period of time. With the aim to present a checklist with German bird names, HANS EDMUND WOLTERS started 1975 a classification entitled *Die Vogelarten der Erde* (The Bird Species of the Earth), which was initially published in seven parts, and 1982 as hard-back volume.

At almost the same time (1974), JAMES F. CLEMENTS finished a PhD thesis on the classification of birds which became the first edition of his *Birds of the World, a Check List*. He was editor and main author of six editions before he died in 2005. The responsibility for further updates was taken up by the Cornell Laboratory of Ornithology. Compared to the first edition with 8,600 bird species, the number of species in the 6th edition is already 9,930, and since the publication of the 6th edition additions to this checklist have been published on the Internet, lastly in 2017 the Update No. 12.

Another widely recognized classification was first published in 1980 under the title *A Complete Checklist of the Birds of the World*, written by RICHARD HOWARD and ALICK MOORE. After the death of the two authors, a team of five

ornithologists led by E. C. DICKINSON was in charge of publishing the third and fourth editions. The fourth edition appeared in two volumes in 2014 and 2016. Supplements have not yet been published.

In 1984, a group of ornithologists at Yale University began using DNA analysis to differentiate between bird species, families and orders. At that time, however, the quality of these data was not sufficient to be able to differentiate between closely related species. With the book *Distribution and Taxonomy of Birds of the World* they created the basis for their own classification, known as SIBLEY & MONROE checklist. In 1993 this list was published under the title *A World Checklist of Birds*. An unchanged edition followed in 1997.

At the end of the 1980s, JOSEP DEL HOYO, originally a country doctor and hobby ornithologist, decided to publish a comprehensive work on all birds of the world. The primary goal was to provide a description of birds, but necessarily accompanied by a classification. Although experts were initially sceptical, the volumes published from 1992 onwards attracted wide interest, especially because the bird names are not only listed in English and Latin, but also in German, Spanish and French. The work, entitled *Handbook of the Birds of the World*, was published in 16 volumes and completed in 2011. With regard to the classification, the authors were free to incorporate the ongoing changes to bird taxonomy, as far as this was possible at the time of publication. In 2013 a supplementary volume was published describing 84 bird species not included in the 16-volume edition.

Bird checklists also originate from international ornithological organisations, two of which are mentioned here:

The *International Ornithological Congress (IOC)* has been publishing the *IOC World Bird List* on the Internet since 2006. The first edition (version 1.0) was based on the book *Birds of the World: Recommended English Names (2006)*. At the beginning of 2018 the *IOC World Bird List* was released as version 8.1.

The organisation *BirdLife International* has been publishing the *BirdLife Checklist of the Birds of the World* on the Internet since 2007. This list of species has been updated annually. With Version 9 of 2016, *BirdLife International* decided to collaborate with the publishers of the *Handbook of the Birds of the World*. As a result, the two-volume work *HBW and BirdLife International Illustrated Checklist of the Birds of the World* was published in book form in 2016 and the species list based on it was published on the Internet under the name *HBW and BirdLife International Handbook of the Birds of the World and BirdLife International Digital Checklist*. The Internet checklist was updated in 2017 and published under the name Version 2.

As can be seen in table 1, the number of bird species today (2018) is more than 11,100, but it also includes about 150 extinct species. The differences between the individual species lists result from the fact that they are based on different concepts of how species and subspecies are defined.

Table 1: The most important checklists

Checklists denoted as versions or updates are open-access lists published on the Internet. To simplify the list, not all versions or updates are shown.

Year	Author/Checklist	Edition/ version	Number of species
1758	Linné, Systema Naturae, Bd 1, 78-193	10 th edition	446
1986	Peters: Checklist of the Birds of the World	16 volumes	8897
1993	Sibley & Monroe: A World Checklist of Birds		9702
1994	Howard & Moore: Complete Checklist of the Birds of the World	2 nd revised edition	9359
2000	Clements: Birds of the World: a Checklist	5 th edition	9718
2003	Howard & Moore: Complete Checklist of the Birds of the World	3 rd edition	9721
2006	IOC World Bird List	Version 1.0	10'066
2007	BirdLife Checklist of the Birds of the World	Version 0.0	9956
2007	Clements: Birds of the World: a Checklist	6 th edition	9930
2008	BirdLife Checklist of the Birds of the World	Version 1.0	9990
2009	BirdLife Checklist of the Birds of the World	Version 2.0	9998
2009	IOC World Bird List	Version 2.0	10'331
2010	BirdLife Checklist of the Birds of the World	Version 3.0	10'027

Year	Author/Checklist	Edition/ version	Number of species
2011	Del Hoyo: Handbook of the Birds of the World	16 volumes	9972
2011	IOC World Bird List	Version 2.10	10'466
2012	IOC World Bird List	Version 3.1	10'596
2013	BirdLife Checklist of the Birds of the World	Version 6	10'052
2013	IOC World Bird List	Version 3.5	10'657
2014	Howard & Moore: Complete Checklist of the Birds of the World	4 th edition 2 volumes	10'135
2014	IOC World Bird List	Version 4.3	10'684
2015	BirdLife Checklist of the Birds of the World	Version 8	10'424
2015	Clements: Birds of the World: a Checklist	Update No. 10	10'473
2015	IOC World Bird List	Version 5.4	10'612
2016	BirdLife Checklist of the Birds of the World	Version 9	11'121
2016	Clements: Birds of the World: a Checklist	Update No. 11	10'514
2016	HBW and BirdLife International Illustrated Checklist of the Birds of the World	2 volumes	11'121
2017	Clements: Birds of the World: a Checklist	Update No. 12	10'550
2017	IOC World Bird List	Version 7.1	10'828
2017	HBW and BirdLife International Handbook of the Birds of the World and BirdLife International Digital Checklist	Version 2	11'122
2018	IOC World Bird List	Version 8.1	10'857

Important regional species lists

Since none of the classifications listed in Table 1 can claim to have a generally accepted status, many ornithologists prefer a classification – depending on the geographical focus of their work – which refers only to a specific geographical area of distribution.

Table 2: Important regional checklists

Editor	Title	Geo-graphic coverage	Number of species	Last update
American Ornithological Society	<i>Check-list of North and Middle American Birds</i> 7 th edition (1998)	North America, Central America, Caribbean,	2143	2017 ¹
American Birding Association (ABA)	<i>ABA Check-list</i> Version 8.0.1	North America, North of Mexico	1103	2017
Deutsche Ornithologische Gesellschaft	<i>Artenliste der Vögel Deutschlands</i>	Germany	509	2005
British Ornithologists' Union	<i>The British List: A Checklist of the Birds of Britain</i> , 9 th edition (2017)	Great Britain	616	2018 ²

¹ 58th Supplement to the 7th edition

² Update of January 8, 2018

Table 2 shows four such lists, which have a high level of acceptance in their geographical area. Two species lists deal with the birds of North America: *The American Birding Association (ABA)* publishes a species list on the Internet, which was last published in 2017 as version 8.0.1. The second species list comes from the *American Ornithological Society*. The last complete edition was published 1998 in book form in the 7th edition. Since then, additions have been published regularly on the Internet, most recently in 2017 as 58th Supplement.

From a European perspective, the regional species lists of Great Britain and Germany are worth mentioning. The list of birds of Great Britain is published by the *British Ornithologist's Union*. The last issue appeared as the 9th edition in 2017. A list of German birds was last published in 2005, and since then regular reports appeared in *Die Vogelwarte* (MARTENS 2016). The last Report 10 was published in 2016, but an updated number of species has not been released since 2005.

Described bird species since 1920

As has already been mentioned, there was no distinction between species and subspecies until 1930. Therefore, only bird checklists published since 1930 are directly comparable. As the first list of this kind, written by JAMES I. PETERS, was not completed until 1986, it was impossible to answer the question of how many bird species there are for decades. In 1946, ERNST MAYR provided the first reliable number of bird species existing at that time. He came up with a total number of 8,616 species. The same author as well as other authors (ZIMMER 1943) tried, in addition, to differentiate the bird species described since 1920 by species and subspecies. For the period from 1920 to 1945 they state a number of 201 newly described species. If this figure is subtracted from the number of

8,616 species published by ERNST MAYER in 1946, the number of known bird species (excluding subspecies) for the year 1920 is 8,415. This figure can be regarded as the starting point for a reliable description of existing bird species.

After PETERS' checklist of birds was completed in 1986, the next reliable figure for the number of bird species was 8,897 – 281 more than ERNST MAYER had reported 40 years earlier. The SIBLEY & MONROE species list published seven years later listed 799 additional species. However, this difference to the list of SIBLEY & MONROE is only partly based on newly discovered bird species. Rather, former subspecies were listed as new species in this list.

In 2006, the first edition of the *IOC World Bird List* was published with a list of over 10,000 species. This list was the beginning of a new development by publishing species lists in an open-access database on the internet. In contrast to printed lists, such lists can be updated more quickly, so that usually several updates appear per year (see table 3). The *IOC World Bird List* has been updated 40 times since its first publication in 2006 to date (2018).

It can be noticed that, with each update of these lists, former species are being split (one species is divided into two or more), while only in a few cases species are being lumped (two or more species are merged into one). Isaac et al. (2004) recently applied the term "taxonomic inflation" to cases in which subspecies are increasingly raised to the species level.

Table 3: Frequency with which species lists were updated

Checklist	First version or edition	Current version or edition	Number of updates or editions
Clements: Birds of the World: a Checklist	1974	2017	6 editions 12 updates
Howard & Moore: Complete Checklist of the Birds of the World	1994	2014	4 editions no updates
IOC World Bird List	2006 Version 1.0	2018 Version 8.1	40 updates
BirdLife BirdLife Checklist of the Birds of the World	2007 Version 0.0	2016 Version 9*	12 updates

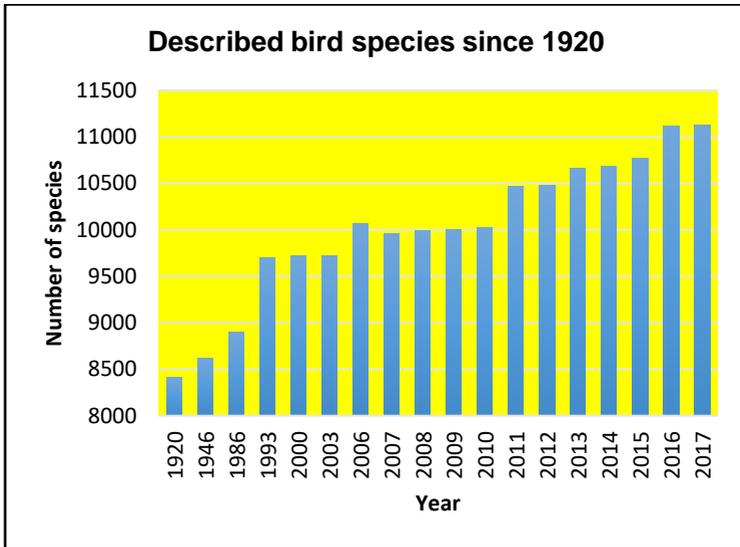
*Since 2017 published under *HBW and BirdLife International Handbook of the Birds of the World and BirdLife International Digital Checklist*

In 2012 the first species list with more than 10,500 species (*IOC World Bird List Version 3.1*) was published. Four years later (2016) the first list with more than 11,000 bird species (*BirdLife Checklist of the Birds of the World Version 9*) was released. All these lists also contain extinct bird species which, however, are recorded back to different dates. In the two lists of *BirdLife* and *IOC*, 156 extinct species are counted (see next chapter).

As in 1920, 8,415 bird species were known and, in 2017, 11,122 species are described in the *HBW/BirdLife* list, the number of newly described bird species has increased in this period by 2,707 (see figure 1). But newly described bird species are not newly discovered bird species. From 1920 to 2016, only 442 species were newly discovered. This means that within almost 100 years, 2,265 new bird

species have been defined through reclassification of species and subspecies.

Figure 1: Number of bird species described since 1920



Extinct species

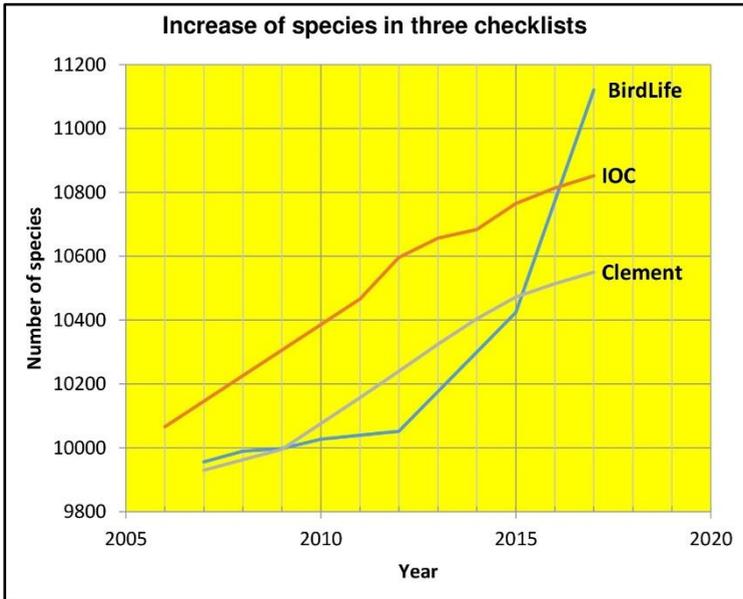
In addition to the newly discovered bird species, the extinct bird species must also be mentioned. The *Red List* published annually by the *IUCN (World Conservation Union)* shows which bird species are considered extinct today. In the current list, 156 bird species are listed as extinct, counted from 1500. In addition, five species are mentioned as extinct in the wild. Fortunately, this number of extinct species can be regarded as relatively small in relation to the total number of bird species. Unfortunately, however, it must be assumed that a considerable number of species have become extinct before they have even been discovered.

The problem of the increasing number of species

The increase in the number of species due to classification, as well as the different number of species in the various lists, is a disturbing development for ornithologists and bird lovers. Species lists that were created at a time when molecular methods were not yet known clearly show fewer species than more recent lists in which the species were defined with molecular data. However, molecular methods of species identification require tissue samples that are not always available.

In order to identify species without molecular methods, a taxonomic scoring system has been developed (TOBIAS 2010). Differences between populations that have so far been considered as one species are evaluated by points in terms of their phenotypic characteristics such as size, weight, colouring, pattern and voice. As soon as the differences reach a certain number of points, the population in question is treated as species. In this way, the *HBW and BirdLife International Illustrated Checklist of the Birds of the World* has significantly increased the species numbers for some bird groups (see figure 2). These additions include amongst others 46 pigeon species, 36 hummingbird species, 26 owl species, 29 kingfisher species, 39 woodpecker species and 45 parrot species. For example, one kingfisher species (*Ceyx lepidus*) has been split into twelve species.

Figure 2: Increase of species in three current checklists



It is worth asking where this classification-related increase in the number of species leads to. In a recent publication (BARROWCLOUGH 2016) it is argued that the total number of bird species could eventually amount to approximately 18,000. This means that the number of bird species seems not to be quantifiable for a longer period of time. The only advantage of this increase of species is that new species can benefit from species protection legislation, while bird populations within the same species are not equally protected.

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