Vertebrate Fauna of Lesotho

Vertebrate Fauna of Lesotho:

An Ecological Monograph

By
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Dedicated to Roman & Franciszka,
my beloved Parents
—The Author

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INTRODUCTION

Each country has three types of wealth: material, cultural and biological. Material wealth is well-understand and measured, cultural wealth less so. But, of the three, biological wealth is both the most important and the least appreciated or valued (Wilson 1992). Biological diversity and species richness are high in Africa, but not distributed equally. While in some countries, such as Madagascar, the Democratic Republic of the Congo (DRC), Cameroon, or Kenya, the level of biodiversity is very high, in others it is much lower. The gradient is clear: the closer to the Equator, the higher the biodiversity and species richness. This also depends on a country's size: at the same latitude, the bigger the country, the higher the diversity of life. However, it also remains true that the higher the level of nature conservation in a country, the higher the level of biodiversity, which is especially evident in relation to the larger components of fauna (vertebrates).

From a global point of view, individual countries will attach particular importance to their endemic species, as these occur only in that country, nowhere else in the world. The preservation of these endemic species for future generations is therefore a special responsibility for the government and the nation as a whole. In fact, this should be the highest priority in development strategies for countries with endemic species.

Lesotho is a small African country, landlocked and almost entirely mountainous. Its whole surface is covered by a single biome, grassland. With one of the highest human population densities in Africa, the environment is under heavy pressure from humans. This is especially evident in the Highveld, already highly degraded by agriculture and human settlements. The Afromontane Grassland in the Maloti is, however, still relatively well preserved. The highest part of this grassland, the Alpine Mountain Grassland, is still in an almost pristine state. The montane grasslands of the Maloti is recognized as a region with high number of endemic species, and is one of six such regions in southern Africa. This is the most extensive grassland in Africa south of the Equator. An estimated 30% of species are endemic to this region (Ambrose et al. 2000, Kopij 2001).

For this reason, Lesotho's flora and fauna deserve special attention from botanists, zoologists, ecologists and conservationists worldwide. The state of its biodiversity was well summarized by Ambrose et al. (2000). There are 2,600 flowering plant species in Lesotho, but the flora has not so far been catalogued (Ambrose et al. 2000). A checklist of all species is available only for the Sahlabathebe National Park (Kopij & Hoener, 2019). Among lower plants, only the Bryophyts has been subject to a country-wide survey (Hodgetts et al. 1999). The invertebrate fauna was catalogued by Kopij (2001). Since then, only Lepidoptera and Orthopteroidea have received further attention (Kopij 2006, 2023). On the other hand, the vertebrate fauna is relatively well known in Lesotho and is documented in this work. The knowledge is, however, highly dispersed in scientific journals, the so called 'grey literature', and in various other unpublished theses and reports. There is an urgent need to bring this 'dispersed' knowledge together, to evaluate and publish it in a readily available single volume.

In this book, an attempt is made to determine the status, distribution and abundance of each vertebrate species ever recorded in Lesotho. For most species, statistics given in this book for the status refer to the years 1996 to 2025.

Status

When describing the status of mammal, reptile, amphibian and fish species, the terms used and their definitions are as follows:

Very rare: 1 to 4 records in the last 30 years
Rare: 5 to 20 records in the last 30 years
Uncommon/Fairly common: 20 to 50 records in the last 30 years
Common: recorded in most atlas grids
Very common: encountered in all atlas grids and habitats
Rare and localized: 5 to 10 records in 1 to 3 localities
Introduced: originated from other parts of the world, released in the country and established a viable population.

The status of bird species was determined using the following terms and criteria:

Vagrant: 1 to 5 records in the last 30 years
Occasional visitor: 6 to 15 records in the last 30 years
Irregular visitor: 16 to 40 records in the last 30 years
Regular visitor: recorded annually

Palearctic visitor: visitor from the Palearctic Region
Breeding resident: breeding in Lesotho

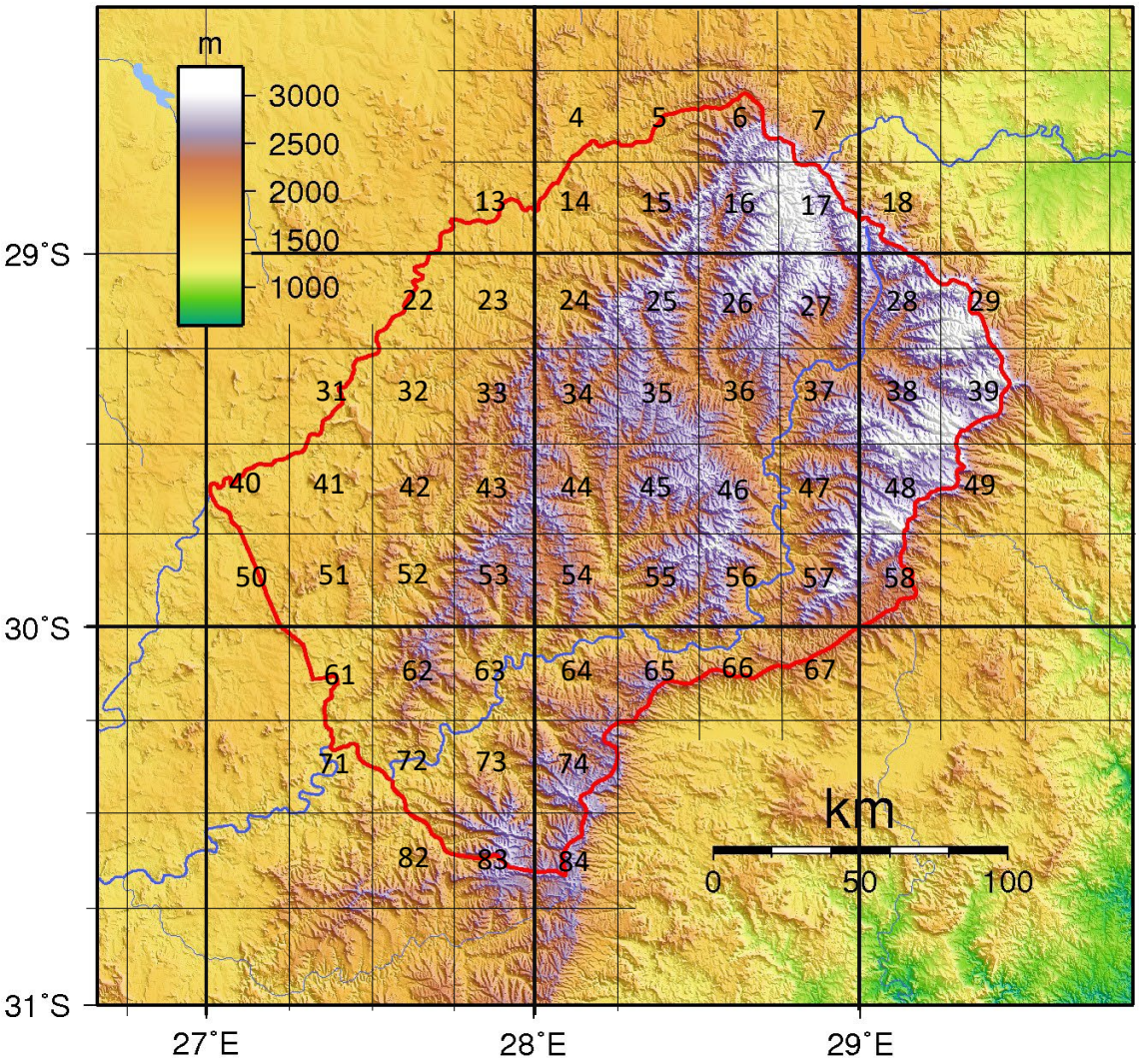
Distribution

Most records and information on the distribution and abundance of birds refer to the years 1996 to 2025. Older data are given only for species with well-documented changes in distribution and/or abundance in Lesotho. For other vertebrates, most records refer to the years 1970 to 2025. Species recorded only before 1950 are regarded as locally extinct.

Atas data refer to two periods: 1) SABAP1: 1987–1991, 2) SABAP2: 01.07.2007–31.12.2024.

In SABAP1, Lesotho was covered with a net of 15' x 15' (c. 25 x c. 27 km) grids, while in SABAP2, the country was covered with a net of 5' x 5' (c. 9 x c. 9 km) grids.

In this book the map numbering system used by Osborne and Tigar (1990b) and subsequently by Ambrose (2005) was adopted. In this system, Lesotho is covered with a net of grids, each 15' latitude x 15' longitude, that is, comprising about 660 km^2. The numbering system runs from south to north along the longitude and from west to east along the latitude. So, the country is covered with 64 such grids. In cases where more detailed distribution information was available, each grid was further divided into four sub-grids, e.g. 33A, 33B, 33C, 33D, which refer respectively to the NW, NE, SW and SE quarters of the given grid.



Map 1. Map of Lesotho showing 1: 50,000 map numbering system.

Based on SABAP1 (1987–1991) and SABAP2 (2007–2024) distribution maps for some bird species in Lesotho were generated. The following symbols were used on these maps:


Large black circle: breeding in the atlas grid confirmed from 2007 to 2024


Large black dotted circle: possible breeding in the atlas grid from 2007 to 2024

Large white circle: breeding in the past (before 1996)

Large white dotted circle: possible breeding in the past in the atlas grid (before 1996)

Based on SABAP1, SABAP2, literature records and the author's own observations, exact breeding localities were plotted for selected rare bird species:

Small black circle: breeding locality from 2007 to 2024


Small grey circle: possibly breeding locality from 2007 to 2024


Small white circle: breeding in the past (before 1996).

For all other vertebrates:


Solid black circle denotes confirmed records from 1990 to 2024,


Dotted black circle denotes uncertain records from 1990 to 2024.

Abundance

In the case of breeding resident birds, the abundance of particular species was estimated using the following scale:

Very rare: 1 to 10 pairs
Rare: 11 to 50 pairs
Uncommon: 51 to 200 pairs
Fairly common: 201 to 1,000 pairs
Common: 1,001 to 5,000 pairs
Very common: 5,001 to 50,000 pairs
Abundant: >50,000 pairs.

The abundance of breeding bird species (population densities) has been estimated using the following methods:

1) total counts of particular species in the whole country (e.g. Black Stork, Cattle Egret, Cape Vulture, Black Eagle, Bearded Vulture; all very rare species)
2) total counts of selected species in larger areas
3) territory mapping methods to estimate population densities of all breeding species (e.g. on the campus of the National University of Lesotho (NUL) at Roma)
4) line transect method to estimate linear densities of all breeding species
5) point count method to estimate frequency of occurrence and dominance of all breeding species (e.g. in Maseru, Sehlabathebe National Park).

The abundance of non-breeding birds was estimated in Lesotho for only a few large and conspicuous regular visitors, such as the Lesser Kestrel, Amur Falcon, Yellow-billed Kite, Steppe Buzard, White Stork, Common Sandpiper.

The abundance was determined for fish species, in two ways: 1) the number of individuals of a given species as a percentage of the total number of all fish sampled; 2) as a mean number of individuals of a given species to all fish sampled in a site.

To estimate the population density of small mammals, snap traps were used. Traps were placed on trap-lines (transects), spaced 5 m apart and left open for c. 90 hours. They were checked and rebaited at sunrise and just before sunset. The term ‘trap night’ refers to one trap, which was set for a 24-hour period. Trap success is the number of small mammals captured per 100 trap nights.

Changes in distribution and abundance

Based on literature records, especially on SABAP1 and SABAP2, it was possible to provide evidence of long-term trends in the distribution and abundance (population dynamics) of some bird species (e.g. House Sparrow, European Starling, Red-eyed Dove, Acacia Pied Barbet, Bearded Vulture). It should be pointed out that these changes probably occurred in more species, but were not evidenced.

Phenological data

First date of arrival and last day of departure of migratory bird species in Lesotho are given whenever such data are available.

Conservation status

For each threatened species in Lesotho, well-known RDB categories were applied:

Globally extinct: no longer extant in the world
Extinct: not recorded in Lesotho since 1951
Critically endangered: extremely critical state
Endangered: very high risk of extinction in the wild
Vulnerable: high risk of human-caused extinction
Near threatened: close to being endangered in the future

Endemicity

Three categories of endemicity were distinguished:

Endemic: the entire range of the species is in Lesotho
Near Endemic: most of the species range is in Lesotho
Maloti/Drakensberg endemic: endemic to the Maloti in Lesotho and Drakensberg in South Africa.

GEOGRAPHY OF LESOTHO

Lesotho is a country in southern Africa (28° to 31°S, 27° to 30°E), with an area of 30,355 km^2. It is an independent kingdom (total land borders 909 km).

Topography

Eastern Lesotho is formed of high mountain ranges and tablelands known as Maloti or Highlands. The region extends further to the east in KwaZulu-Natal and the Eastern Cape of South Africa and is known there as the Drakensberg. The Maloti can be further divided into three regions: Upper Mountain Valleys (1,750 to 2,500 m a.s.l. [above sea level]; 15.8%), Mountain Region (2,500 to 3,000 m; 12.9%) and the High Mountain Region (higher than 3,000 m; 16.6%). The western part of Lesotho (21.3% of the country), known as Lowlands, is an extension of the South African Highveld. Most of the Lowlands are situated between 1,500 and 1,800 m and are interrupted by isolated inselbergs (plateaus) and hills bounded by sandstone cliffs. The Foothills (11.8% of the country) are situated between the Lowlands and Highlands, that is, at 1,800 to 2,500 m, and are separated from the Lowlands by a wall of sandstone cliffs. The lower part of Senqu, with its tributaries, (below 1,750 m; 21.8% of the country) forms another physiographical unit called the Senqu Valley. The lowest point of Lesotho is at 1,388 m, where the Mahaleng River joins the Senqu on the Lesotho/South African border. It is the highest low point of any country in the world. Lesotho is the only state in the world that lies entirely above 1,000 m. The highest point of Lesotho, which is also the highest point in all of southern Africa, is at 3,482 m and is called Thabana Ntlenyana (Lynch 1994; Ambrose et al. 2000, Bates & Haacke 2003).

The Maloti/Drakensberg mountains (also known as the Eastern Mountains) are regarded as a 'hot-spot' area (c. 40,000 km^2) characterized with a high level of species richness and endemism (e.g. 30% of c. 1,800 vascular plant species recorded in this region are endemic). More than half of this area is situated in Lesotho.

Drainage system

The whole territory of Lesotho is drained by the upper Senqu (Orange) River System. The major tributaries of the Senqu are the Senqunyane (with the Mantsunyane as its main tributary), Tsedike, Malibamatšo (with Bekong and Matsoku as its major tributaries), Khubelu, Moremoholo, Mokhotlong, Sehonghong, Linak, Makhaleng and Mohokare (main tributaries: Hlotse, Phuthiatsana and Tswaing) rivers. The Senqu and Mohokare originate from the Mount-aux-Sources in northeast Lesotho, along the border. The Makhaleng River originates in central Maloti. The total length of Senqu and Makhaleng and their tributaries is 1,600 km, while that of Mohokare and its tributaries is 560 km. Senqunyane alone is 120 km, long and Makhaleng 190 km.

In October 1986, a treaty was signed by Lesotho and South Africa regarding the Lesotho Highland Water Project (LHWP). This involves the construction of an intricate network of tunnels and dams to divert water from the mountains of Lesotho to South Africa. In Lesotho, it involves the rivers Malibamatšo, Matsoku, Senqunyane Senqu and, in South Africa, the Vaal River. The project had two phases. In Phase IA, the Katse Dam was constructed in Central Maloti and the transfer of water began in 2007. In Phase IB, the Mohales Dam on the Senqunyane River was completed and water transfer to the Vaal River in South Africa began in 2020. In 2023, construction of the Mashai Dam as part of Phase II began, with its opening planned for 2028.

Climate

Lesotho has a temperate climate with alpine characteristics. The summers (October to April) are hot, while winters (May to September) are relatively very cold. Mean annual temperature in highlands is below 12°C, 12°C to 14°C in the Sequ Valley, and 14°C to 16°C in the Lowlands. In Maseru, the monthly mean temperature is at its lowest, 8°C, in the coldest months (June/July), and at its highest, 24°C, in the hottest month (January). Altitude has an effect on temperature. It drops by 1°C for every 125 m increase in altitude. In the highlands above 3,000 m the mean temperature in mid-winter (June/July) is often below 0°C, and may drop to −10°C at night. Lesotho experiences clear skies for most of the year. There is 82% of sunshine in August, the clearest month, while in January it is 67%. In the Lowlands the annual rainfall averages from 600 to 800 mm, increasing from west to east. In the Maloti, it ranges from 800 to 1,200 mm. With frequent thunderstorms, 85% of the rainfall falls in the summer (October to April). In the highlands, snow is common between May and September; the higher peaks may experience snowfall all year round. Rainfall can be erratic, resulting in droughts in the dry season and flooding in the rainy season.
(https://en.wikipedia.org/wiki/Geography_of_Lesotho#Climate)

Photo. 1. Katse Dam.

Photo. 2. Mohales Dam.

Vegetation

There are a few ways of presenting vegetation maps for Lesotho.

Acocks (1970): *Themeda-Festuca* Alpine Veld covers most of the Maloti, while the Lowlands, Foothills and Senqu Valley are covered with *Cymbopogon-Themeda* Veld.

Low & Rebelo (1996): Highveld Grassland (= Moist Cold Highveld Grassland) extending to 1,800 m, therefore covering most of the Lowlands and Senqu Valley (23.3% of the country); Afromontane Grassland between 1,800 and 2,500 m) covering most of the Maloti and Foothills (53.3% of the country); Afroalpine Grassland (= Alti Mountain Grassland) above 2,500 m, i.e. the extreme northeastern part of the Maloti (23.4% of the country), receiving more than 1,000 mm of rainfall per year. All these ecoregions fall within the montane grasslands and shrublands biome.

Lesotho flora is represented by 2,600 flowering (angiosperms and gymnosperms) plant species, 219 bryophytes and 85 pteridophytes (Ambrose et al. 2000). The flora of the Maloti has alpine characteristics, with a large proportion of endemic species.

Photo 3. A) Thabana Ntlenyana – the highest peak of Lesotho, B) Maletsunyane river canyon below the Semonkong Fall, C) Sehlabathebe National park with a rock pool on the foreground, D) borderline of mountains and foothills, E) Senqu River Valley, F) Molimontuse at the foothills, G) Morija village in the lowland bordering the foothills, H) farmland in the lowlands near Maseru with the sandstone cliff in the background.

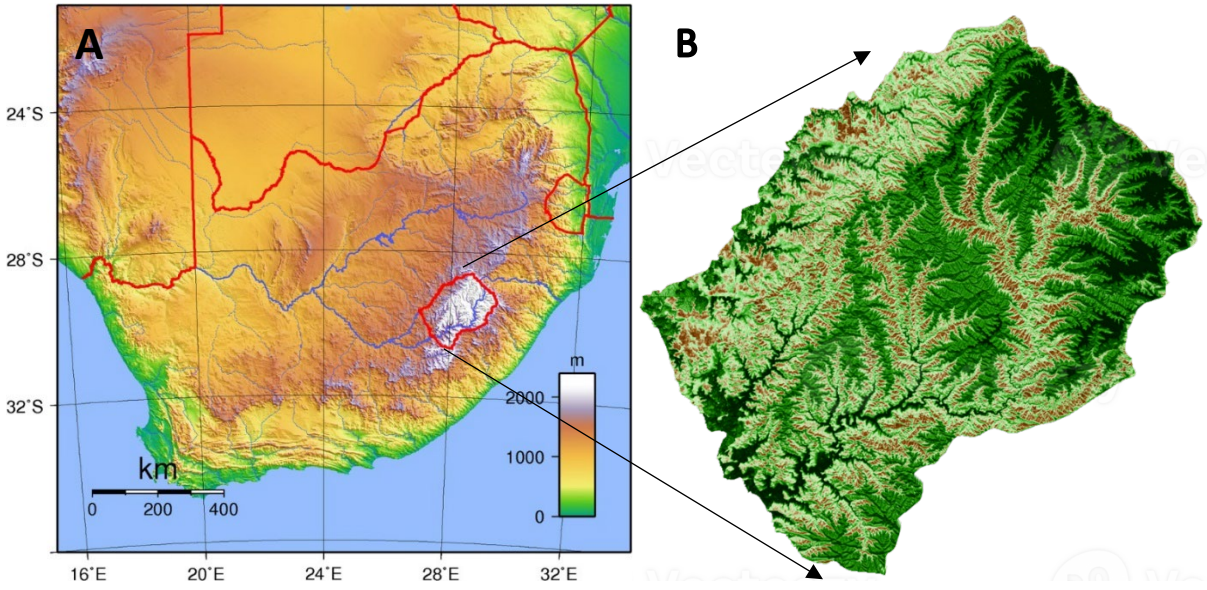
Land use

Two-thirds of the country still comprises natural vegetation, the remainder has been converted into cultivated fields, human settlements, roads and other land uses. Within the Highveld, cultivated land covers 3,700 km^2 (12.2% of the country), natural grasslands 1,230 km^2 (4.1%), and villages, towns and roads cover 1,200 km^2 (4.0%), gully eroded areas cover 600 km^2 (2.0%), shrublands and thickets 220 ha (0.7%) (Ambrose et al. 2000). Within the Afromontane Grassland, shrublands and thickets comprise 4,800 km^2 (15.8%), natural grasslands 7,020 km^2 (23.2%), cultivated land 3,800 km^2 (12.6%) and settlements and roads 400 km^2 (1.3%). The Afroalpine Grassland constitutes mostly natural grasslands (6,720 km^2; 22.1%), the remaining are shrublands (400 ha; 1.3%). Therefore, natural grasslands cover 49.4% of the country, shrublands and thickets 17.8%, cultivated land 24.5%, settlements and roads 5.3%; and the remaining land uses (forest plantations, dams, eroded areas) 3.0% (Ambrose et al. 2000). Forests cover 49,585 ha (1.5%) and are under severe threat of deforestation and degradation. The main cultivated crop plants are the maize (62% of the croplands), sorghum (11%), beans (10%), wheat (7%), potatoes (4%) and peas (3%). Sheep, goats, cattle, horses and pigs are the main livestock.

Population

In 2022 the population was 2,281,454; about 34% urban and 64% rural. The population density is 66.1 people per 1 km^2, but it is much higher in the Lowlands where about 75% of the population live. People of the Basotho ethnic group comprise 99.7% of the country's population, making it the most homogenous nation in the world.

The largest city, Maseru, with a population of 330,760 (2016), is the country's capital. Nine other towns (district capitals known as 'camp towns') range in population from 6 to 75 thousand. These are Teyateyaneng (75,000 in 2022), Mafeteng (57,000), Hlotse/Leribe (47,000), Butha Buthe (36,000), Mohale's Hoek (25,000), Quthing (14,000), Qacha's Nek (10,000), Mokhotlong (10,000) and Thaba Tseka (6,000). Administratively, the country is divided into 10 districts which are further divided into 80 constituencies (https://en.wikipedia.org/wiki/Lesotho).



Map 2. Location of Lesotho in southern Africa (A) and Lesotho topography (B).

AN OUTLINE HISTORY OF LESOTHO VERTEBRATE ZOOLOGY

Vertebrate Zoology before 1901

As in many African countries, the first literature records of Lesotho vertebrates can be found in reports made by early missionaries. In Lesotho, they came from the Paris Evangelical Missionary Society: Eugene Casalis (1812–1891) and Thomas Arbousset (1810–1877). In 1833, Casalis arrived in the kingdom and remained at his base at Morija till 1856. Establishing missions throughout the country, he also founded hospitals, schools, churches and a printing press. Their reports (e.g. in Casalis 1834, 1841, 1859, 1888, 1889; Arbousset 1936; Arbousset & Daumas 1846) tell of wildlife species which were abundant in their time and are now are extinct.

In 1820, the famous Scottish zoologist and explorer, Andrew Smith (1797–1872), one of the fathers of southern African zoology was posted to the Cape Colony, caring for the health of British soldiers stationed there (he had studied medicine at the University of Edinburgh, graduating in 1819). In 1825 he was appointed the first Superintendent of the South African Museum of Natural History in Cape Town. In 1833-1834, he led an 18-month expedition into the little-known areas of Basutoland, Kuruman, and Magaliesberg. He was accompanied by about 40 people, including J. Burrow (a surveyor), G. H. Ford (a painter) and C. D. Bell. On August 12, 1834 they left Graaf Reinet and proceeded to Philippolis, and from there to east Lesotho, visiting Mosheshwe on the way. After returning to Philippolis, they went to Kuruman and, together with a local missionary, R. Moffat, visited the Matable king Mzilikazi at Mosega (Zeerust today). From Mosega the expedition went eastwards along the southern slopes of Magalisberg to Hartebeestpoort, and further northwards to the tropic of Capricorn. The expedition returned to Cape Town in February 1836 with a huge collection of specimens and drawings.

In January 1837, Smith returned to Britain and began work on his five-volume *Illustrations of the Zoology of South Africa,* which appeared between 1838 and 1850. This is Smith's opus magnum and can be regarded as the starting point of Lesotho vertebrate zoology. Andrew Smith is the author of 142 publications, in which he described many new species. He coined 76 generic names and 558 specific names (48 valid mammal species vs. 59 synonyms or homonyms; birds: 108 vs. 59; reptiles: 68 vs. 47; amphibians: 14 vs. 5; fish: 19 vs. 15; total: 257 vs. 185 (Rookmaaker 2017)).

Photo. 4. Thomas Arbousset (1810–1877) (on left), Eugene Casalis (1812–1891) (in the middle), Andrew Smith (1798-1872) (on right).

Mammalogy

The first records of mammal species in Lesotho were made by Andrew Smith (1836). During his expedition to Lesotho in November 1834, he recorded large mammal species such as the Eland, Oribi, Grey Rhebok, Mountain Rhebok, Red Hartebeest, Wild Hunting Dog and Chacma Baboon. More importantly he collected somewhere in Lesotho ("the summit of hills in the country north of the Orange River towards its sources") a rodent which proved to be a species new to science, the Highveld Gerbil.

For the remaining part of the 19th and most of the 20th century mammals in Lesotho were not objects of any study. Only at the end of the 20th century (from 1988 to 1992) did some studies take place. A major atlas study was conducted for the whole country by C. D. Lynch from the National Museum in Bloemfontein. Extensive collections of small mammals, field observations and examinations of museum specimens deposited in various South African museums resulted in a first comprehensive atlas of mammals of Lesotho (Lynch 1994). Some additional records of mammals were later also provided by Ambrose (2006).

Photo. 5. Callie Lynch (on left), Nico Avenant (the middle) and Petr Benda (on left).

In recent years, particular mammal species in Lesotho have attracted special attention from mammalogists:

Plelea capreolus (population density estimation by line transect method: Kopij 2006a)

Otomys sloggeti (reproductive biology: Willan 1990; morphological adaptation to low temperature (Richter 1997); special dichotomy and social behaviour: Hinze et al. 2013; behavioural strategies: Swaibold & Pillay 2006; distribution: Lynch & Watson 1992); population density estimation by means of scan sampling method: Mokotjomela et al. 2010; subspecies *Otomys sloggeti basuticus* (Roberts 1929)

Cryptomys hottentous mahali (ecophysiology, thermoregulation: Richter et al. 1997; Broekman et al. 2006; circadian rhythms of locomotory activity: Schöttner et al. 2006)

Rhinolophus cervenyi (Benda et al. 2024). This is a species new to science described from Lesotho (type locality: Sehlabathebe National Park).

More intense studies on local mammal fauna have led mammal research along a new path in recent years in Lesotho. So far, mammal fauna has been investigated in three selected areas of the Maloti (Table 1).

Ornithology

Before 1901

The first ornithological survey in Lesotho was carried out by Andrew Smith in 1834 (see sub-chapter entitled ‘Vertebrate Zoology before 1901’). No bird species from Lesotho was described as new to science, either by Smith or any other zoologist. However, a dozen or so subspecies do have their type localities in the country. Many of these were described by P. A. Clancey (1917–2001), the director of the Durban Museum from 1952 to 1982, although many of them are no longer valid.

1930 to 1965

During the years 1894 to 1926, J. P. Murray, a member of colonial service in Lesotho based in Mafeteng and Maseru, collected many birds for scientific study from different parts of Lesotho (Murray 1909a, 1909b, 1912, 1914). Since his species identifications are sound, his records of rarities are of special interest, as some of them are extinct today in Lesotho. J. Winterbottom from the Fitzpatric Institute of African Ornithology published some of his records (e.g. Winterbottom 1964, 1975) mainly to supplement the Jacot-Guillarmod’s checklist.

From 1920 to 1958 Charles Frédéric Jacot-Guillarmod (1912–1979) observed birds in the Mamathe area in the northern part of the Lesotho lowlands. Based on his observations (Jacot-Guillarmod 1932) and those made by W. P. Stanford in other parts of the lowlands and the Qacha's Nek area, and by G. Maclean (1937–2008) from the Maloti, he compiled the first checklist of 258 bird species (Jacot-Guillarmod 1963), supplemented by Goodfellow (1966a). For many years, this checklist remained a standard work on the birds of Lesotho. Charles was born on a farm near Clocolan, eastern Free State. His father, François Frédéric, was a trader at Mamathe, his grandfather a Swiss missionary who had come to Lesotho in the 1870s. In 1924, he started school at Grey College in Bloemfontein. In 1936, he graduated with a B.Sc. in Zoology from the University of Pretoria. From 1936 to 1939, he worked as an entomologist in the Department of Agriculture & Forestry in South Africa. From 1939 to 1958, he managed the trading store at Mamathes, and from 1958 to 1979 he was employed as a Curator and Director of the Albany Natural History Museum in Grahamstown, South Africa.

Three short collecting expeditions to the Maloti were undertaken by Colonel Jack Vincent in the 1940s (material unpublished). Phillip A. Clancey ventured about 50 km east of Maseru in the 1950s (Clancey 1957), as did Quickelberge in the 1960s (Quickelberge 1972).

Photo. 6. Jack Winterbottom (on left), Phillip Clancey (in the middle) and Charles F. Jacot-Juillarmod (on right).

1966 to 1995

Regular observations of birds on the Roma NUL campus were carried out by two expatriates, K. N. G. Macleay (1969) and Angela M. Aspinwall (1973). Both left unpublished reports of their observations. Aspinwall listed 115 bird species (Ambrose & Maphisa 1999, Kopij 2001, Ambrose 2005). Between 1975 and 1980, Janissa Belcomb made similar observations on birds in the Sehlabathebe National Park, recording 111 species (Kopij 2006).

Between 1978 and 1981, birdwatching observations were conducted by Kurt Bonde, a Danish volunteer and librarian in Maseru. He has gathered his observations and those of all other contemporaries and earlier birdwatchers and produced a second checklist of Lesotho birds. It is a unique source of unpublished records and rarities from the earliest times to the 1990s, though with very few data on birds in Maloti or on species abundance.

In the 1980s, a thorough ecological study of the Bearded Vulture was undertaken by Chris Brown in both Lesotho and Natal Drakensberg (Brown 1977, 1988, 1989, 1990 a–f, 1992ab). This was a part of his PhD project in the Zoology Department of the University of Natal in Pietermaritzburg. It was the first time in the history of Lesotho ornithology that a single species had received so much research attention.

Photo. 7. David Ambrose (on left), Chris Brown (in the middle) and Patrick Osborne (on right).

From 1986 to 1989, the Lesotho Bird Atlas Project was undertaken by a team led by Patrick Osborne. He obtained his D.Ph. at the Edward Grey Institute of Field Ornithology, University of Oxford. He was a Freelance Consultant from 1989 to 1992 in Maseru, specializing in environmental monitoring and data analysis in Lesotho. The atlas, containing distribution maps and commentaries of the status and distribution of 222 bird species, was, however, never published. It has overtaken, to a large extent, by the much wider bird atlas project (SABAP1) conducted across the whole of southern Africa, south of the Cunene and Zambezi rivers (Harrison et al. 1997).

The Golden Age of Lesotho ornithology

The second half of the last decade of the 20th century saw rapid advances in Lesotho ornithology. The development was induced and facilitated by the construction of huge dams in Maloti as part of the LHWP. One of the requirements for the project implementation was environmental impact assessments of areas directly affected. Since birds are important components of this environment, a series of surveys were undertaken in these areas. David Allan, from the Avian Demographic Unit of the University of Cape Town and later the Durban Museum of Natural History, coordinated these surveys in the Katse Dam (1996–2000) and Mohales Dam (1995–1996) catchment areas and in river valleys below these dams. The following people participated in these surveys: K. Barnes, C. Cohen, A. R. Jankins, G. Kopij, D. H. Maphisa, R. Nuttall, C. Spottiswoode, W. R. Tarborton, C. J. Vernon, P. Wittington and others.

At that time, extensive quantitative studies on avian assemblages in various parts of the country were undertaken by Prof. G. Kopij from the Free State University at Bloemfontein and later from NUL at Roma. The research was aimed at assessing the relative abundance of birds breeding in all major habitats in Lesotho, such as mountain and Alpine grasslands, river valleys, bushy vegetation on slopes along the Clarens formation sandstone cliffs, farmlands, rural and urban habitats, and others. He also pioneered in Lesotho studies on breeding (e.g. Fiscal Shrike, Red-winged Starling, European Starling) and feeding ecology (e.g. Lesser Kestrel, Amur Falcon, Barn Owl, Cattle Egret, Black-headed Egret) of selected bird species.

In meantime, Prof. D. Ambrose from the Education Department of NUL initiated a very thorough review of the literature dealing with birds and other vertebrates in Lesotho. He has meticulously retrieved all interesting records regarding vertebrate species ever recorded in Lesotho. Especially valuable is the information from old and hard-to-access books, journals, obscure local magazines and the so-called grey literature. Ambrose, accompanied later by D. H. Maphisa, made long-term (1965–2005) observations on the birds of the NUL campus (82 ha), recording ardently all rare and new species, and the disappearance of others. Also G. Kopij did some research on birds of the Roma campus at NUL, including studies on the avian assemblage of the whole area (Kopij 2001). The campus was declared by the Lesotho Government to be a bird sanctuary, hence the special ornithological interest in this area. All of this has made the campus one of the most intensively studied sites in Africa.

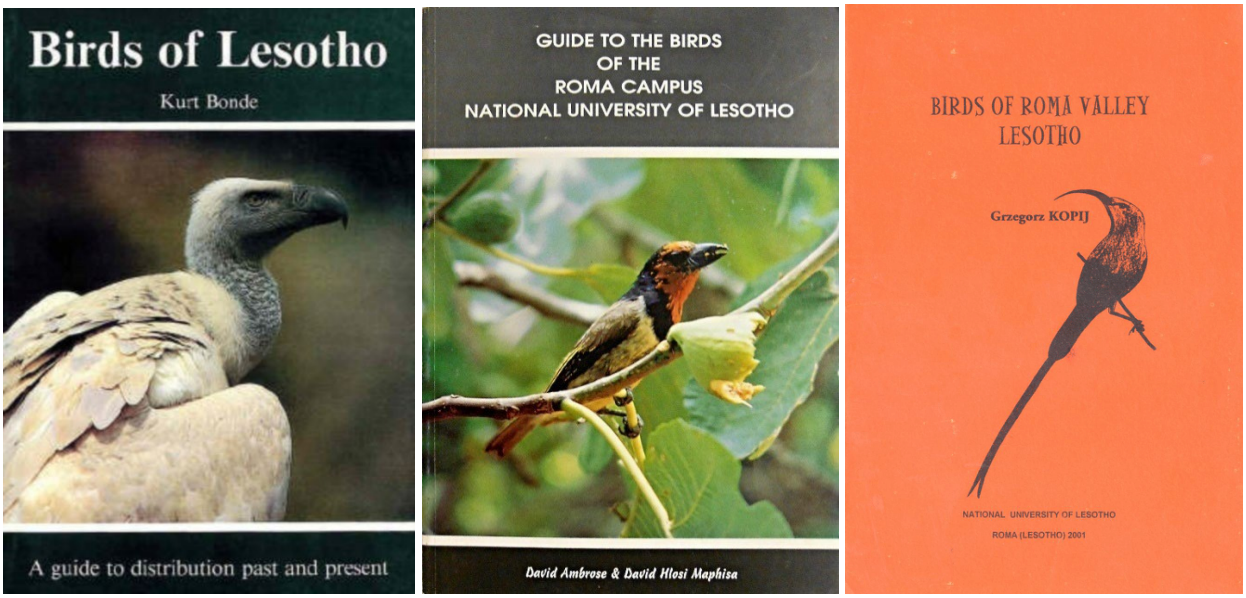


Photo. 8. Monographs on Lesotho vertebrates

Over those years, Dr. David H. Maphisa, the first Basotho ornithologist, has obtained an M.Sc. under Prof. Peter Ryna supervising in the Fitzpatrick Institute of African Ornithology at Cape Town University. The title of his thesis was: 'Breeding biology and habitat selection of the critically endangered Rudd's Lark *Heteromirafra ruddi*: Implications for conservation'. In 2015, David also obtained a doctorate at the same university. His thesis was on how to manage grasslands for bird conservation ('Towards adaptive management of high-altitude grasslands: Ingula as a case study'). David found that grass height and cover are two key habitat variables. His results suggest that a combination of burning and grazing could be used to create a habitat mosaic that should allow for high species diversity. Since August 2013 he has been employed as a scientist at the South African National Biodiversity Institute.

Photo. 9. Mr. David Allan at Durban Museum (on left) and Dr. David Maphisa with his supervisor Ass. Prof. Res Altwegg (on right)

With the Southern African Bird Atlas Project II

Since 2007, the FitzPatrick Institute of African Ornithology of the University of Cape Town and the South African National Biodiversity Institute have led the way, taking southern African ornithology on a new path. A bird atlas and a citizen science project, encompassing all southern African countries, was started. It is the second bird atlas project in southern Africa, the follow-up project to the (SABAP1) conducted between 1987 and 1991 (Harrison et al. 1997). Since 2007, more than 17 million records have been collected with about 2 million more being added each year. Lesotho is part of this great project. From 2007 to 2024, 168 pentads (5' x 5' grid) out of 420 were covered in Lesotho. The total number of cards submitted was 868 (from 1 January 2023 to 18 June 2024, 93 cards were submitted from 59 pentads). So far, a total of 306 species have been recorded in Lesotho by SABAP2. At least four cards are required in each grid to have satisfactory coverage. Therefore, Lesotho is still a long way from completing this atlas project, which is still ongoing.

During those years, Dara Sands from the University of Cape Town did her M.Sc. degree by mapping the collision sensitivity of Lesotho's avifauna (especially the Bearded Vulture, Cape Vulture and Black Stork) to wind farm development in northeast Lesotho (Sands 2015).

Herpetology

The history of Lesotho herpetology began in 1834 with the description of a species new to science: the Yellow-throated Plated Lizard *Gerrhosaurus bibroni* (=*Gerrhosaurus flavigularis*) collected in the Mokhokare headwaters (Smith 1834).

The first survey of Lesotho herpetofauna, and de facto also the first literature record of amphibian species from the country was published in 1927. Hewitt (1925, 1927) from the Albany Museum at Grahamstown provided a list of 10 amphibian species collected at Qeme Plateau, Thaba Phutsoa Range and Mont-aux-Sources between 1925 and 1926 by J. A. Cottrell and R. Essex; and around Masite by E. Ford. From the reptile collection (five species) made in these areas, Hewitt (1927) described two lizard species new to science: Essex's Mountain Lizard *Tropidosaura essexi* from Mont-aux-Sources and Cotrell's Mountain Lizard *Basutosaura cottrelli* (=*Tropidosaura cottrelli*) from the Namahali Pass. Summing up these studies, FitzSimon (1943) listed nine lizard species known in Lesotho by 1940.

In 1950 to 1951, frogs and reptiles (seven species) were collected in various sites in Lesotho by the Lund University Expedition. Based on collections made by this expedition, Inger (1959) published several species records, new to Lesotho. In that time, a frog species (*Amieta vertebralis=Amieta umbraculata*), new to science has also been described, based on specimens collected in the Lekhalabalaeti (=Langa-le-balele) River, eastern Lesotho (Hewitt 1927). The taxonomic status of this species was an enigma (Poynton 1964), solved finally by Channing (2015). *Amieta umraculata* appeared however as a species complex of the Maloti River Frog *Amieta vertebralis* (Hewitt 1927) and the Phofung River Frog *Amieta hymenopus* (Boulenger 1920).

Thelejane (1966) compiled a checklist of Lesotho snakes based on literature records, unpublished data and his own records (13 species). This checklist remains the only source of information on the occurrence of some species. Bourquin (1989) provided records of several anuran species from various parts of Lesotho, based mainly on museum specimens, collected mostly by W. D. Haacke in the 1960s and 1970s.

Ambrose (2001a) provided some records of frogs (mostly from the 1990s) from several locations in Lesotho, but mostly from the Maseru and Roma areas. Kopij (2017) published a first checklist of amphibians and reptiles of the Sehlabathebe National Park, based on his own sightings made in January 2001 and all literature records (12 species). Therefore, to date, herpetofauna has been more thoroughly investigated in four places in Lesotho (Table 1).

Between 1996 and 2000, G. Kopij, E. P. Mohapi and M. F. Bates made a small but intense collection of frogs in various part of Lesotho as a part of Southern African Frog Atlas Project (Bates & Haacke 2003). In subsequent years, this initiative resulted in more extensive collections and studies conducted for this project by M. F. Bates, M. Cunningham, E. Swarts, R. I. Bills and others. A total of 781 frogs and 504 tadpoles from South African and various overseas institutions were examined. All these resulted in a first comprehensive atlas of amphibians of Lesotho, where 23 species were listed (Bates & Haacke 2003).

Photo. 10. John Hewitt (on left) Alan Channing (in the middle) and Michael Bates (on right).

In the 1990s Mouton (1996ab) and van Dijk (1996) reported on amphibian fauna in the Katse Dam catchment area (10 species) and neighbouring areas. Mouton & van Wyk (1993) conducted a reptile survey in 1991 and 1992 in the same area. At 18 sampling sites they recorded six lizard and two snake species. They studied the frequency of occurrence (but not estimated population density), habitat selection, diet and reproduction. In the Mohale dam's catchment area, reptile fauna was surveyed by Johann Van As from the Free State University at Bloemfontein (for the first time in Lesotho zoology, he also studied blood parasites of five lizard species collected in this area, as a part of his M.Sc. studies) and in the Senqunayane and Senqu Rivers downstream from Marakabei by P. le F. N. Mouton. These studies constituted part of the biological survey of the LHWP.

Ichthiology

A. Smith was the first zoologist to deal with fish in Lesotho. He described three fish species new to science, which occur today in Lesotho, although Lesotho was not type locality for any of them.

One of the most important events in Lesotho ichthyology was the rediscovery of the Maloti Minnow in the Tsoelikane River by Pike & Tedder in 1970. It has also been subsequently recorded in headwaters of several rivers, including those in the Mohale's Dam catchment area (Cambray & Meyer 1987). At that time the species, which also occurs in the Natal Drakensberg, was considered to be on the brink of extinction. As a result, it has attracted a wide attention from ichthyologists and conservations (Jubb 1971, Rondorf 1976, Skelton 1988, Rall et al. 1992, Rall 1993, 2014, McCafferti et al. 2018). Jubb & Farquharson (1965), Pike (1971) and Jubb (1972) listed for the first time species occurring in the Senqu (n=5) and Mohokare rivers (n=3).

In 1968, the Fishery Department was created within the Ministry of Agriculture of the Lesotho Government. Since then, studies on Lesotho fish have accelerated. At the beginning the Department was headed by J. Tedder and supported by a British-funded Fisheries Development Project. The Department played an important role in the introduction of the trout into Lesotho rivers. The rivers of Maloti have been stocked with the brown trout, *Salmo trutta*, and the rainbow trout, *Salmo gairdneri*. The first successful stocking was made in 1935 and by 1966 trouts were well established in most Maloti rivers (Jubb 1972).

Further development of Lesotho ichthyology was boosted by the LHWP at the end of the 1980s and beginning of the 1990s (Skelton & Mashapha 1989, Rall et al. 1995, Steyn et al. 1996, Rall & Steyn 1996;). During the pre-impoundment survey of the Malibamatšo River and its tributaries, five species were recorded (Skelton 1996). These were *B. aeneus*, *B. kimberleyensis*, *L. capensis*, *O. mykiss* and *A. sclateri*.

Later, studies on fish communities were conducted at the Katse Dam by Rall & Rall (1997), and at the Mohale Dam by M. Nthimo (2000), an M.Sc. student from the Rhodes University. He caught 11,612 fish between November 1998 and July 1999. Samples of *B. aeneus*, *O. mykiss* and *L. capensis* were collected monthly from Katse dam between November 1998 and July 1999.

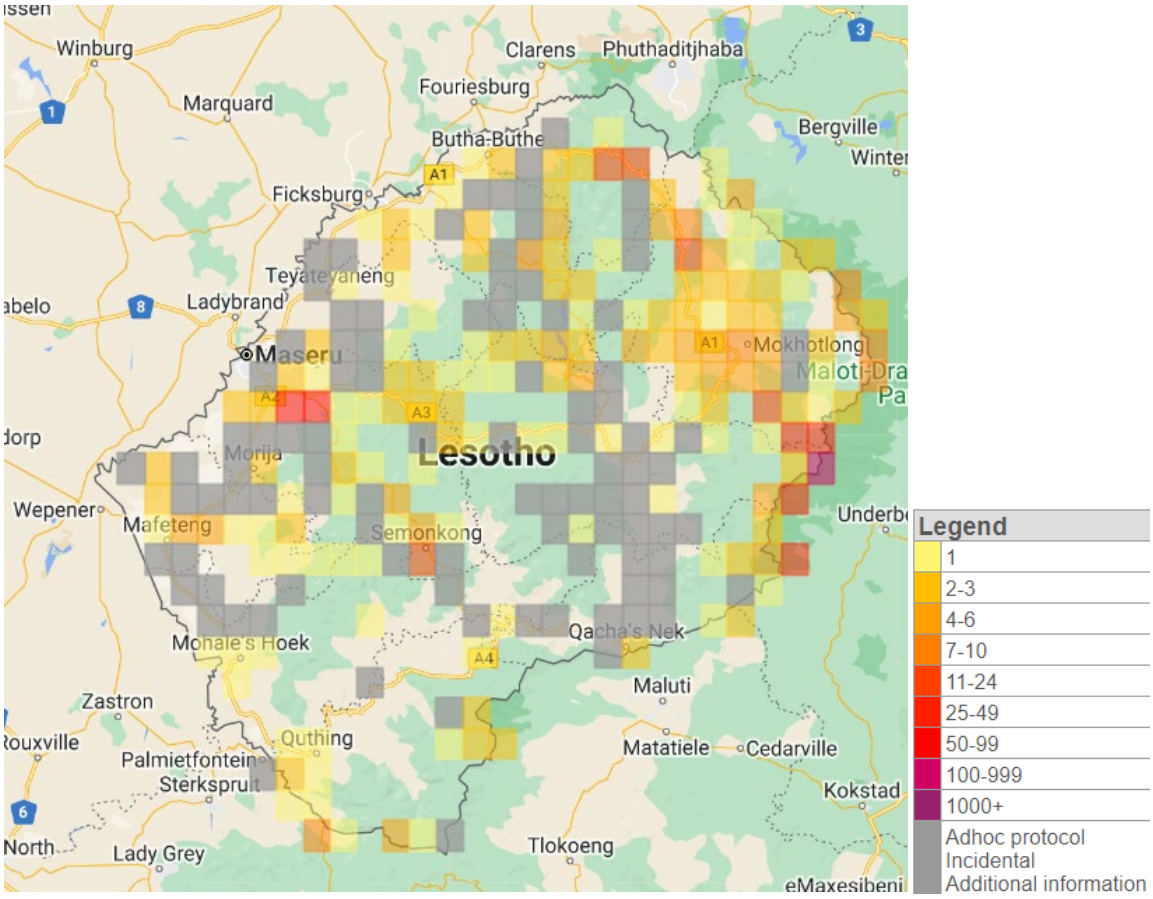
Photo. 11. Paul H. Skelton

At the beginning of the 21st century, ichthyological studies focused on the impact of dams created by the LHWP on the local ichthyofauna, especially on the endangered Maloti Minnow and the Yellowfish competing with it (Rall 1993). From 1994 to 1996, Brenton Henry Niehaus from the Rand Afrikaans University did his M.Sc. on the ecology of the

Rock Catfish *Aaustroglanis sclateri* and other fish species in Senqunyane below the Mohale Dam (Niehaus 1996). In 2013 and 2014, J. Schrijvershoff from the North-West University at Pochefstroom did his M.Sc. on the biology and ecology of fish at four sites on the Senqu River and one site in the Linakeng River (Senqu tributary) (Schrijvershoff 2015).

Table 1. Studies on distribution and abundance of vertebrates conducted in larger areas in Lesotho.

Study area	Studied groups	No. spp. recorded	Study period	Source
Katse Dam catchment area	Fish	5	1991–1992	Skelton 1996
Katse Dam catchment area	Fish	5	1996–1997	Rall & Rall 1997
Katse Dam catchment area	Amphibians	7	1991–1992	van Dijk 1996
Katse Dam catchment area	Reptiles	8	1991–1992	Mount & van Dijk 1993
Katse Dam catchment area	Birds	119	1997–1998	LHDP 1997–2000
Katse Dam catchment area	Mammals	15	2001–2002	Avenant 2002
Katse Dam catchment area	Mammals	15	2014	Du Plessis et al. 2014
Mohale Dam catchment area	Fish	5	1998–1999	Nthimo 2000
Mohale Dam catchment area	Amphibians	4	2001–02	van As 2002
Mohale Dam catchment area	Reptiles	11	2001–02	van As 2002
Mohales Dam catchment area	Birds	106	1991–92	Allan et al. 1996a
Mohale Dam catchment area	Mammals	15	2014	Avenant et al. 2014
Sehlabathebe National Park	Fish	3	1970–2015	Kopij 2017
Sehlabathebe National Park	Amphibians	9	1970–2015	Kopij 2017
Sehlabathebe National Park	Reptiles	9	1970–2015	Kopij 2017
Sehlabathebe National Park	Birds	89	1977	Howard & Howard 1977
Sehlabathebe National Park	Birds	105	1978	Passineau 1978
Sehlabathebe National Park	Birds	111	1973	Belcomb 1980
Sehlabathebe National Park	Birds	117	2001	Kopij 2002
Sehlabathebe National Park	Mammals	43	1978	Belcomb, Sienethalaer 1978
Sehlabathebe National Park	Mammals	32	Nov. 1988	Lynch & Watson 1990
Semonkong area	Birds	78	1996–1999	Kopij 2014
Roma Valley	Birds	159	1964–1969	MacLeay 1969
Roma Valley	Birds	119	1975–1980	Aspinwall 1974
Roma Valley	Birds	185	1960–1999	Kopij 2001
Roma	Mammals	8	1996–2002	Ambrose 2002c
Roma	Birds	119	1973	Aspinwall 1973
Roma	Birds	156	1965–1999	Ambrose, Maphisa 1999
Roma	Birds	200	1998–2000	Kopij 2001
Roma	Amphibians	c.10	1996–2002	Ambrose 2002d, 2004
Maseru	Birds	213	1996–2000	Kopij 2000
Morija	Birds	66	1994	Maphisa 1995
Morija	Birds	29	1999–2001	Kopij 2006
Thaba-Khupa	Birds	72	1975–1977	Steele 1976
Thabana Ntlenyana	Birds	30	2001	Kopij 2010



Map 3. Lesotho bird atlas, coverage as for 18 June 2024 (for each atlas grid, the number of submitted reports is given).

PISCES

Order Anguilliformes

Family Anguillidae

Longfin Eel *Anguilla mossambica* (Peters 1852)

Recorded in Senqu as a rare species (Kleynhans 2007; Schrijvershof 2015).

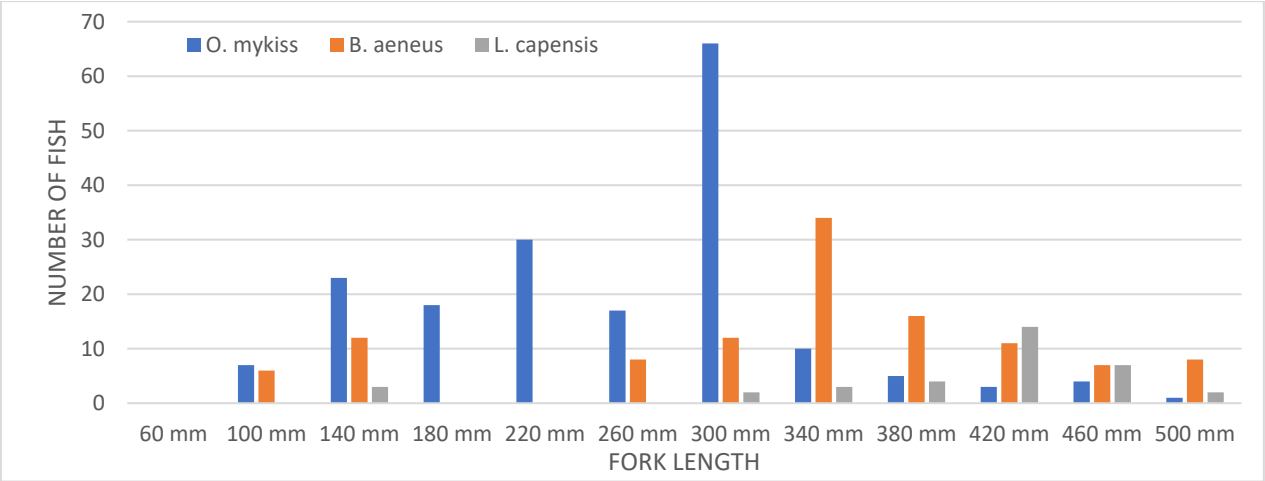
Order Salmoniformes

Family Salmonidae

Rainbow Trout (Khoalinyane-mookoli) *Oncorhynchus mykiss* (Walbaum 1792)

Status: Introduced to Lesotho (in upper Senqu and its tributaries) in 1935 (Shortt-Smith 1963; Jubb 1972; Schrijvershof 2015) and probably in the 1940s at Sehlabathebe (Shortt-Smith 1965) for angling purposes. By 1966, it was already well established in Lesotho (Jubb 1972; Welcome 1988). Currently, it occurs commonly in most rivers in Maloti; also in Makhaleng and southern Phuthiatsana. Introduced to the Katse Dam for fishing and aquaculture, but probably does not reproduce there (Tweddle & Davies 1997). Its natural range includes rivers of the Pacific coast from Alaska to Mexico.

Ecology: It exerts heavy pressure on the indigenous species in the rivers draining into the Katse Dam (Rall & Rall 1997; Arthington et al. 1999; Lintermans 2007). In Lesotho, it matures at 2–3 years of age and spawns from July to October (Schrijvershof 2015). Population structure at Senqu: dominant size class in summer: 50–99 mm, in winter: 100–250 mm; all fish are less than 250 mm, n=27 (Schrijvershof 2015). Lesotho records: 4.22 kg, Tsoalikane at Sehlabathebe, early 1960s, J. Beattie; 4.15 kg, Leqooat, Sehlabathebe, F. Basson (Ortlepp 1972). Age of specimens sampled in the Katse Dam catchment area varied from 0+ to 3+ years; age of 0+ year age group varied from 63 to 78 mm (Rall & Rall 1998). Sex ratio (males : females) in Malibamatšo River: 5.2 : 1.0 (n=88 specimens examined) (Davies 1996).



Graph 1. Fork length of three fish species in Lesotho.

Densities: In Senqu near Sehonghong, it comprised 3.5% of all fish sampled (n=431) in 1998/99 (Arthington et al. 1999).

Brown Trout (Khoalinyane-sootho) *Salmo trutta* L. 1758

Introduced to Lesotho in the Sanqebethu in March 1935 (Farson 1954) and by 1966 it was well established in Maloti (Welcome 1988). It occurs fairly commonly in cold mountain rivers: upper Senqu, Malibamatšo, Mokhotlong, Tele, Maletsunyane, Moremoholo and Toelikane (Jubb 1972; Gephard 1977; Arthington et al. 1999).

American Brook Trout (Khoalinyane-ea-linokana) *Salvelinus fontinalis* (Mitchill 1815)

Introduced in Mokhotlong and Makhaleng in 1956 (Ambrose 2006), but failed to establish viable population.

Order Cypriniformes

Family Cyprinidae

Common Carp (Kapa) *Cyprinus carpio* L. 1758

Introduced to Lesotho at the Relating Dam at Mafeteng in 1915. Today it occurs in many lowland dams, Mohokare and lower Senqu. Both Mirror and King carp races were recorded in the former river (Marshall 1972). Lesotho record: 14 kg, Mohokare (Jubb 1972).

Silver Carp (Kapa) *Hypophthalmichthyes molitrix* (Valenciennes 1844)

Introduced from Israeli stock into a few dams in the lowlands in mid-1970s (G. bar David). Most introductions failed. In 2006, it occurred only in Maseru hatchery and at Ha Lenyakoane, Leribe District (Ambrose 2006).

Grass Carp (Kapa) *Ctenopharyngodon idella* (Valenciennes 1844)

From Israeli stock, it was introduced into a few dams in lowlands in the 1970s (G. bar David), but it failed to establish a viable population (Ambrose 2006).

Orange River Mudfish (Motorofisi) *Labeo capensis* (Smith 1841)

Status: Very common in both Mohokare and the Senque drainage system, reaching as high as the Katse Dam (Loxton et al. 1993).

Densities: In the lower Senqunyane it comprised 22% of all fish sampled in March 1996 (Rall & Steyn 1996); in the Mohokare river system, 33% (Marshall 1972), being the most abundant fish species (Baird 1976; Nthimo 2000); in Senqu near Sehonghong it constituted 4.6% of 431 fish sampled in 1998/99 (Arthington et al. 1999). In the Katse Dam, it is segregated by sex in the breeding season: while males remain in the spawning grounds at the river mouths, females only visit such places to lay their eggs (Tweddle & Davies 1997). Recorded in the Mohale Dam catchment area after filling the dam in 2003, posing a threat to the Maloti Minnow (Skelton et al. 2016); it was not recorded in this catchment area before the dam had been constructed.

It constituted 90.8% of all fish remnants (n=61,241) extracted in a Holocene (1700BC–900AD) shelter at Likoaneng on Senque near Sehonghong; the fish were 330–449 mm in body length, with >90% being 330–449 mm; one specimen was 540–569 mm long (Plug et al. 2010). It also strongly dominated other fish in the Pitsaneng shelter (Plug & Mitchell 2008).

Ecology: Spawing occurs in November–January in the Katse Dam catchment area upstream of Likoaneng (Nthimo 2000). Breeding in Senqu occurs from spring to mid-summer (Arthington et al. 1999). Population structure at Senqu (n=97 exx.): dominant size class in summer: 50–99 mm, in winter: 0–49 mm; most fish (>95%) were shorter than 150 mm, only a few were up to 500 mm long (Schrijvershof 2015). Age of specimens sampled in the Katse Dam catchment area varied from 1 to 6+ years; age of first year age group varied from 110 to 137 mm; for the 6+ years specimen lengths ranged between 473 and 490 mm (Rall & Rall 1998). Sex ratio (males : females) in Malibamatso River: 1.0 : 1.0 (n=6 exx.) (Davies 1996).

Moggel (’Mamahetlana) *Labeo umbratus* (Smith 1841)

Rare in Senqu where before 2006 recorded only once (Rall & Steyn 1996, Ambrose 2006). Common in Mohokare, where it constituted 22% of all fish caught (Marshall 1972), but probably downstream from Lesotho (Ambrose 2006). Rare or absent in other rivers, e.g. not recorded in Senqunyane and Matsoku (Arthington et al. 1999). In Senqu, seven individuals captured were 20–50 cm in length (Schrijvershof 2015).

Maloti Minnow (Thoboshana) *Pseudobarbus quathlambae* (Barnard 1938)

Status: Rare and localized. Ecological specialist confined to the uppermost streams of the Senqu river system. Endemic to Maloti. RDB: *Endangered* (Skelton 1987) and IUCN Red List: *Critically endangered* (2013). Originally described as *Labeo quathlambae* from the headwaters of the Mkhomazana in Drakensberg Natal (Barnard 1938). Believed extinct until rediscovered in Tsoelikane in Lesotho in 1970 (Jubb 1971; Randorf 1976). First renamed as *Oreodaimon quathlambae* (Greenwood & Jubb 1967); renamed again as *Pseudobarbus quathlambae* (Skelton 1988). In Lesotho it occurs in the upper Senque, upper Moremoholo, Senqunyane and its major tributaries upstream of the Semonkoaneng Waterfall (this river stretch can be regarded as the main sanctuary of this species; it is the only fish species there), Matsoku and Sani (Rondorf 1976; Gephard 1978; Rall 1993, 1996, 2014).

Photo. 12. The Maloti Minnow (https://www.inaturalist.org/taxa/110939-Pseudobarbus-quathlambae).

Densities: The population size in Jordane and Bokong rivers (6.9 km) was estimated at 3,300 exx. in 1991/92, with range: 1,200–5,400; i.e. 0.48 ex. / m^2 of suitable habitat (Rall 1993). There were on average 15.7 exx. per sampling site evenly distributed on these rivers (Rall 1993).

Ecology: In some places, it coexists with the introduced Rainbow Trout, although the Maloti Minnow may be preyed by it (Cambray & Meyer 1988). The population from Senqunyane drainage system is genetically distinct from the rest (Rall 2005). In Tsoelikane River, body length ranged from 79 to 115 mm (x=100 mm) (Randorf 1975 cited by Rall 1993); in Senqunyane/Jordane/Bokaneng: body length ranged from 0.5 to 13.0 cm (x=4.0–6.5 cm); mass ranged from 0.5 to 21.5 g; max. length: a female 13.7 cm (Rall 1993). Sex ratio (males : females): 1 : 1.70 (n=292 exx.) in Senqunyane/Jordane/Bokaneng rivers (Rall 1993); in Tsoelikane: 1:0.58; Senqu: 1 : 2.44; Moremohalu: 1 : 1.33 (Gephard 1978). Low recruit survival (8% at the end of the first year) and low life span (3–4 years) recorded in

Senqunyane/Jordane/Bokaneng rivers (Rall 1993). A genetically distinct population of the Maloti Minnow is known only from the Mohale catchment area, and was formerly abundant in the Senqunyane, Bokong and Jorodane rivers which flow into the Mohale Reservoir. The Semongkoaneng waterfall (situated c. 4 km downstream of the Mohale Reservoir) has prevented larger fish species from moving upstream into areas inhabited by the Maloti Minnow. After the filling of the Mohale Reservoir in 2003, an inter-basin transfer connecting it to the Katse Reservoir was opened, and in 2006 the Smallmouth Yellowfish, a larger and more aggressive species, was recorded in the reservoir. A dozen or so years after the filling of the Mohale Dam in 2003, only five individuals were recorded in the Joratane and Bokong rivers, and none in Senqunyane, regarded as the main stronghold of the species in Lesotho. Transclocated Smallmouth Yellowfish, which appeared in these rivers in 2006 after the filling of the Mohale Dam, are suspected to have caused this population crash (Shelton 2016, 2017). In the Toelikane River (7 km) the population was estimated at 308 ex. (range: 90–526 exx.) in 1974/75 (Randorf 1975 in Rall 1993), and a larger adult population at the same stretch was estimated at 618 exx. in 1987 (Skelton 1987 in Rall 1993).

Gentics: Allelic frequencies were similar between the populations and generations studied in the Senqunyane, Jordane and Bokong Rivers in the highlands. Average heterozygosity values range from 4.2% to 6.2% and the average genetic distance between the populations was 0.008. Gene flow between populations and between generations is good, so these can be regarded as a single large population (van der Bank et al. 2001).

Smallmouth Yellowfish (Chelefisi-nyane, Mookhane, Tšehla-hohle) *Lebeobarbus aeneus* (Burchell 1822)

Status: Very common in Senque up to the Semokonoaneng Waterfall (Steyn et al. 1996), Matsoku, Malibamatšo and Bokong (Loxton et al. 1993; Rall et al. 1995), Tsoelikane (Pike & Tedder 1973). Opportunistic, omnivorous feeder, better adapted to higher altitudes (above 2,200 m) in the Senqu river system than any other fish species (Schrijvershof 2015). Distribution in Lesotho is presented by de Villiers & Ellender (2008a).

Densities: It constituted 63% of all fish sampled in the lower Senqunyane in March 1996 (Rall & Steyn 1996). Also in upper Malibamatšo and Bokong it was the most common fish species (Rall & Rall 1999). It is also abundant in the Katse Dam, where it can support subsistence fishery (Tweddle & Davies 1997). It constituted 6.4% of all fish remnants (n=61,241) extracted in a Holocene (1700BC–900AD) shelter at Likoaneng on Senque near Sehonghong; they were 150–689 mm in body length, with most being 348–374 mm; six specimens were >500 mm in length, one specimen was 660–689 mm long (Plug et al. 2010). Modern record: <800 mm (Skelton 2001). The smaller sizes of modern specimens most likely reflect deteriorating Senqu conditions caused by soil erosion initiated c. 160 years ago with the agricultural settlements in the highlands (Showers 1989; Plug et al. 2010). Breeding in Senqu occurs from spring to mid-summer (Arthington et al. 1999), while in the Katse Dam catchment area upstream Likoaneng in November–February (Nthimo 2000).

Ecology: Composition of gut contents of 30 individuals from the Senqu river system (volumetric percentage): algae (diatoms, *Nitzschia*, *Diadesmis*, *Cymbella*, *Aulacoseira* and *Euglena*) – 63%, macroinvertebrates – 37% (numerical percentage of prey items: Hydropsychidae – 59%, Simulidae larvae – 26%, Oligocheata – 8%, Baetidae larvae – 3%, Chironomidae larvae – 3%, Culicidae larvae – 1%) (Schrijvershof 2015). Population structure at Senqu: dominant size class in summer: 0–49 mm, in winter: 50–99 mm; almost all fish <200 mm, n=312 (Schrijvershof 2015). Age of specimens sampled in the Katse Dam catchment area varied from 1 to 7+ years; length of first year age group varied from 50 to 89 mm; for the age 7+ years specimens the length was 500 mm (Rall & Rall 1998). Sex ration (males : females) in Malibamatso River: 1.0 : 1.5 (n=5 exx.) (Davies 1996).

Largemouth Yellowfish (Chelefisi-kholo) *Lebeobarbus kimberleyensis* (Gilchrist & Thompson, 1913)

Status: Uncommon in lowland rivers. Threatened by the construction of dams in the Lesotho highlands. Defined as *endangered* in the IUCN Red List 2013. Beside the Sharptooth Catfish, it is the largest Lesotho fish. It occurs in Senqu and lower Malibamatšu downstream of the Katse Dam (Skelton 1986; Arthington et al. 1999). One specimen was caught in Malibamatšu a short distance down from the Katse Dam (Ambrose 2006). Not recorded in Mohokare (de Villiers & Ellender 2008b).

Densities: In Senqu at Seaka Bridge, out of 1,680 fish caught only 19 (1.1%) were Large-mouth Yellowfish in 1998/1999. In a Holocene (1700BC–900AD) shelter at Likoaneng on Senque near Sehonghong it constituted 1.6% of all fish remnants (n=61,241) extracted; they were 254–977 mm in body length, with most being 360–749 mm (Plug et al. 2010).

Ecology: All fish caught in Senqu were <200 mm (Schrijvershof 2015).

Chubbyhead Barb (Sebataolana) *Entermius anoplus* (Weber 1897)

Common in all lowland rivers. The highest recorded altitude (1,775 m) is the Nqoe River in the Katse Dam catchment area (Loxton et al. 1993). Apparently very common in lower Senqu, at least at Whitehill (Ambrose 2006), but not recorded in Senqu near Sehonghong (Steyn et al. 1994; Arthington et al. 1999).

Goldie Barb *Enteromius pallidus* (Smith 1841)

Recorded in Senqu as a rare species (Kleynhans 2007; Schrijvershof 2015).

Straightfin Barb *Enteromius paludinosus* (Peters 1852)

Recorded in Senqu as a rare species (Kleynhans 2007; Schrijvershof 2015).

Threespot Barb *Enteromius trimaculatus* (Peters 1852)

Recorded in Senqu as a rare species (Kleynhans 2007; Schrijvershof 2015).

Ordo Siluriformes

Family Bagridae

Rock Catfish (Letšoala-la-Maloti) *Austroglanis sclateri* Boulenger 1841

Status: Uncommon in mountain rivers. SARDB: *Rare* (Swartz et al. 2007).

Photo. 13. The Rock Catfish (https://www.inaturalist.org/taxa/86778-Austroglanis).

Densities: Out of 473 fish caught in the lower Senqunyane in March 1996, 71 (15%) were Rock Catfish (Steyn et al. 1996; Rall & Steyn 1996). In Senqu near Sehonghong, it comprised 0.9% of all fish sampled (n=431) in 1998/99 (Arthington et al. 1999). In the distant past, in a Holocene (1700BC–900AD) shelter at Likoaneng on Senque near Sehonghong, the Rock Catfish constituted less than 0.1% of all fish remnants (n=61,241) extracted (Plug et al. 2010).

Ecology: In Senqunyane, recruits (smallest group) prefer backwater pools with cobbles on the bottom (current velocity <0.1 m/s), while larger fish prefer stickles and runs (current velocity 0.4 m/s) with rubble (Niehaus et al. 2007). The mean preferred water depth for all ranged between 19 and 59 cm; no specimens were collected at depths