List of Mammals which have become Extinct or are Possibly Extinct since 1600

compiled by

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Prepared for the Survival Service Commission of
IUCN as an extension and up-dating of the list
drawn up by the late James Fisher in 1968

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PREFACE

This listing is an effort to go beyond a necrology of the mammals which have disappeared since 1600. It attempts to cover also some of the uncertain ones, to call their plight to the attention of the world, to encourage their rediscovery and their preservation. In compiling the material, the authors have aimed to extend and bring up to date a listing of extinct mammals commenced by James Fisher for IUCN in 1968.

The date of disappearance given is that of the last known record, either from a collection date, a recorded death of a wild animal or of one held in captivity, or an accepted sighting of an animal in the wild. The prefix "c." indicates an approximate date; "a." is to designate after the mid-century, and "b." to designate before the mid-century.

The compilation is not intended as an authoritative revision of the systematics of species and subspecies included, although there are a few differences in arrangement and detail from those used in the Mammalia volume of IUCN's Red Data Book. The scientific or common names used are only for the proper identification of the animal according to some standard reference, the data having been gleaned from many sources, including the files of IUCN. No original work is claimed by the authors except the research required to trace and check all the available information, and the debt owed to the many authors whose works have been consulted is gratefully acknowledged. It is hoped that others will in turn perfect and complete the record.

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MARSUPIALIA

MACROPODIDAE

**Macropus greyi** Waterhouse Toolache Wallaby 1924
A large wallaby of southeastern South Australia and Victoria.

**Macropus bernardus** Rothschild Bernard's Wallaroo 1922
Known from the interior of Arnhem Land, Northern Territory of Australia.

**Onychogalea fraenata** Gould Bridle Nail-tailed Wallaby 1937
Once common in New South Wales, south-central, south western Australia and Victoria.

**Lagorchestes leporides** Gould Brown Hare-Wallaby 1890
Once found in the interior of New South Wales, Victoria and the Murray River region of South Australia.

**Lagorchestes asomatus** Finlayson Centralian Hare-Wallaby 1943
This hare-wallaby is known only from a skull collected in Western Australia.

**Caloprymnus campestris** Gould Desert Rat-Kangaroo 1931
After a lapse of 38 years, this species was rediscovered in 1931 in north-eastern South Australia but there have been no reliable records since.

**Bettongia gaimardi** Desmarest Gaimard's Rat-kangaroo 1911
The typical form that occurred between the Dividing Range and the coast from south-eastern Queensland to western Victoria is extinct. A sub-species *B. g. cuniculus* Ogilby is extant in Tasmania.
Bettongia tropica  Wakefield  Northern Rat-kangaroo  1932
Only six specimens are known of this species; the first was collected in 1884, the last nearly a half-century later.

Potorous platyops  Gould  Broad-faced Rat-kangaroo  1875
The last known specimens of this rat-kangaroo were collected by the National Museum of Victoria.

VOMBATIDAE

Lasiorhinus gillespiei  De Vis  Monnie River Wombat  1900
Collected from a single restricted locality near St. George in southern Queensland.

PERAMELIDAE

Peramiares eremiana  Spencer, Desert or Orange-backed Bandicoot  1935
Once abundant in the southern part of Northern Territory, Australia, none have been recorded for forty years.

Chaeropus ecaudatus  Ogilby  Pig-footed Bandicoot  1907
A former inhabitant of New South Wales, Northern Territory, northern South Australia.

Macrotus leucura  Thomas  Yallara or Rabbit Bandicoot  1931
This small rabbit-eared bandicoot was once found in South Australia.

DASYURIDAE

Planigale subtilissima  Lonnberg  Kimberley Planigale  1949
First described from a single specimen collected in Western Australia, the last record is of six specimens taken at the Kimberley Research Station.

Sminthopsis longicaudata  Spencer  Long-tailed Dunnart  1940
Last recorded at Marble Bar, the long-tailed dunnart of Western Australia is poorly represented in museum collections.
**Sminthopsis psammophila**  Spencer  Sandhill Dunnart  1894

The largest of the *Sminthopsis*, only a single specimen recorded from near Lake Amadeus in Central Australia.

**THYLACINIDAE**

**Thylacinus cynocephalus**  Harris  Thylacine  1933

Once common in the central plateau of Tasmania, the last certain records are of a wild one killed in 1930 and a captive animal which died three years later in Hobart Zoo.

**INSECTIVORA**

**TENRECIDAE**

**Dasogale fontoyonti**  Grandidier  Fontoyont's Tenrec  1928

This member of the Tenrecidae is known to scientists from one specimen collected in the forests of eastern Madagascar.

**NESOPHONTIDAE**

The members of this family were common in the West Indian Antilles until relatively recent times. All have been described from skeletal remains found in cave deposits and the following species may have become extinct since European occupation.

- **Nesophontes edithae**  Anthony
- **Nesophontes micrus**  G.M. Allen
- **Nesophontes longirostris**  Anthony
- **Nesophontes paramicrus**  Miller
- **Nesophontes hypomicrus**  Miller
- **Nesophontes zamicrus**  Miller

Puerto Rican *Nesophontes* a.18 Cent.
Western Cuban *Nesophontes* a.18 Cent.
Eastern Cuban *Nesophontes* a.18 Cent.
St. Michel *Nesophontes* a.19 Cent.
Atalaye *Nesophontes* a.19 Cent.
Haitian *Nesophontes* a.18 Cent.
SORICIDAE

Crocidura fuliginosa Blyth. The common shrew of southern Asia and Borneo was represented on Christmas Island by:

C.f. trichura Dobson Christmas Island Shrew c.1908
Last collected soon after the turn of the century.

Praesorex goliath Thomas African Forest Shrew 1910
The largest of the true shrews. It is represented in museums by only three specimens which were collected in Cameroon early in the present century.

TALPIDAE

Scaptonyx fusicaudus Milne-Edwards Long-tailed Mole a.19 Cent.
This mole of northern Burma and the adjacent provinces of China is represented by less than a dozen specimens in museums.

Scapanulus oweni Thomas Kansu Mole c.1930
Recorded from Kansu, Szechwan and Yunnan in China, it is represented by less than a dozen specimens in museums.

CHIROPTERA

PHYLLOSTOMATIDAE

Monophyllus frater Anthony Leaf-nosed Bat a.18 Cent.
Known only from skeletal material found in the Cathedral Cave near Morovis, Puerto Rico.

NATALIDAE

Natalus major Miller. Of three races of large funnel-eared bats:

N.m. primus Anthony Cuban Funnel-eared Bat a.18 Cent.
Known only from skeletal material found in Eastern Cuba.
VESPERTILIONIDAE

Lasiurus brachyotis J.A. Allen Galapagos Red or Hairy-tailed Bat 1892
Known from a single specimen taken at an elevation of 500 meters on Chatham Island.

LAGOMORPHA

OCHOTONIDAE

Prolagus sardus Wagner Sardinian Pika a.18 Cent.
Known from remains found in Corsica and Sardinia. They were last noted on Tavolara off Sardinia where F. Cetti in 1774 recorded seeing "giant rats whose burrows are so abundant that one might think the surface of the soil had been recently turned over by pigs".

RODENTIA

CRICETIDAE

Oryzomys antillarum Thomas Jamaican Rice Rat 1877
Last collected in 1877, no record since then.

Oryzomys victus Thomas St. Vincent Rice Rat 1897
Known from a single specimen.

Oryzomys desmaresti J.B. Fischer Martinique Rice Rat 1902
Probably wiped out by the eruption of Mont Pelée.

Oryzomys audreyae Hopwood Barbuda Rice Rat a.18 Cent.
Known only from skeletal material from Barbuda, Lesser Antilles.

Oryzomys luciae Forsyth Major St. Lucia Rice Rat c.1900
Last collected some time before the beginning of the present century.

Oryzomys swarthi Orr James Island Rice Rat 1906
This Galapagos Islands rice rat has not been seen alive since early in the present century.
Oryzomys galapagoensis  Waterhouse. Chatham Island Rice Rat 1835
Has not been seen since collected on Chatham Island of the
Galapagos group by Charles Darwin.

Oryzomys indefessus  Thomas  Indefatigable Rice Rat c.1945
From Indefatigable and South Seymour of the Galapagos
Islands.

Microtus nesophilus  V. Bailey  Gull Island Vole c.1900
From Gull Island, off the eastern extremity of Long Island,
New York, USA, now considered a race of M. pennsylvanicus.

Microtus californicus  Peale. Of sixteen races:
M.c. scirpensis  V. Bailey  Amargosa Meadow Vole 1917
Known only from Shoshone in eastern Inyo County,
California, USA.

MURIDAE

Leporillus apicalis  Gould  White-tipped Stick-nest Rat 1933
Formerly known from inland parts of northwestern Victoria,
western New South Wales, and South Australia.

Conilurus albipes  Lichtenstein  White-footed Tree or
Rabbit Rat a.19 Cent.
Once found from southern Queensland to Victoria in
Australia, it has not been recorded in this century.

Notomys megalotis  Thomas  Big-eared Hopping Mouse 1843
Collected at the Moore River, in the vicinity of New Norcia,
Western Australia.

Notomys longicaudatus  Gould  Long-tailed Hopping Mouse 1901
Once found in Western Australia, central Australia and
South Australia, it appears to have become extinct during
the present century.

Notomys amplus  Brazenor  Large-Desert Hopping Mouse 1896
This species is known from two specimens collected in 1896
from the vicinity of Charlotte Waters in the Northern
Territory of Australia.
Rattus macleari  Thomas  
Indigenous to Christmas Island in the Indian Ocean, south of Java. It was collected in 1886 and 1887, was abundant in 1897; but became extinct soon afterward.

Rattus nativitatis  Thomas  
Also indigenous to Christmas Island but now vanished.

Mus musculus  Linnaeus. The house mouse has well over 100 named forms of which not more than a score may represent valid races.

M.m. muralis  Barrett-Hamilton  St. Kilda Mouse  1931
This mouse of the Outer Hebrides, Scotland, was last seen more than forty years ago.

CAPROMYIDAE

Of eight genera in this family, three are extinct.
Several genera contain both living and recently extinct species.

Geocapromys ingrahami  J.A. Allen. Of three races of the Bahaman hutia, one race barely survives on a single small cay and the two following races are extinct.

G.i. abaconia  Lawrence  Abaco Island Hutia  a.18 Cent.
G.i. irrectus  Lawrence  Crooked Island Hutia  a.18 Cent.

Plagiodontia ipnaeum  Miller. Hispaniolan Hutia or Zagouti  a.17 Cent.
Described from skeletal material found in kitchen-middens in the Dominican Republic and Haiti.

Plagiodontia spelaeum  Miller  Least Hispaniolan Hutia or Zagouti  a.17 Cent.
Described from skeletal material found in cave near St. Michel, in Central Haiti.

Hexolobodon phenax  Miller  Haitian Hexolobodon  a.17 Cent.
Described from skeletal material found in caves in Central Haiti.
Aphaetrenus montanus  Miller  Narrow-toothed Hutia  c.16 Cent.
Described from numerous skeletal finds in caves in Haiti, the Dominican Republic and San Gabriel Island.

Isolobodon portoricensis  J.A. Allen  Puerto Rican  c.16 Cent.
Isolobodon
Described from skeletal material abundant in kitchen-middens of Puerto Rico, the Dominican Republic and the Virgin Islands.

Isolobodon levir  J.A. Allen  Haitian Isolobodon  c.16 Cent.
Described from skeletal material abundant in kitchen-middens of Haiti and the Dominican Republic.

ECHIMYIDAE

Boromys offella  Miller  Greater Cuban Spiny Rat  a.19 Cent.
Known only from skeletal material found in digs of native villages. It probably became extinct during the second half of the 1800s.

CETACEA

ESCHRICHTIDAE

Eschrichtius gibbosus  Erxleben  Atlantic Grey Whale  1864
The grey whale of the Atlantic was a victim of 18th Century whaling. The last record is of one found dead in a bay in Devon, England.

CARNIVORA

CANIDAE

Canis lupus  Linnaeus  1758. The wolf is represented by twenty-four generally accepted races in North America (Nearctic Region) and eight in Eurasia (Palearctic Region). It disappeared from England by the year 1500, from Scotland by 1743 and from Ireland by 1776. Many races are barely surviving and several are quite certainly extinct.
C. l. beothucus  G.M. Allen and Barbour. Newfoundland Wolf  1911
Only four skulls and one skin remain to represent this animal which once inhabited Newfoundland.

C. l. alces  Goldman  Kenai Peninsula Wolf  1955
Perhaps the largest of the wolves, this race has disappeared from its Alaskan haunts south of Anchorage.

C. l. mogollonensis  Goldman  Mogollon Mountain Wolf  1935
Survived in central Arizona and New Mexico until well into the present century.

C. l. monstabilis  Goldman  Texas Grey Wolf  1942
Survived in western Texas and northeastern Mexico until nearly half way through the present century.

C. l. nubilus  Say  Buffalo Wolf  1926
Once spread from southern Manitoba and Saskatchewan southward to northern Texas. Intergrades are suspected in the Minnesota population of the eastern timber wolf.

C. l. youngi  Goldman  Southern Rocky Mountain Wolf  1936
Survived in the Rocky Mountain region of Nevada, Utah, and Colorado until well into the present century.

C. l. hattai  Kishida  Hokkaido Wolf  c.1889
This animal was exterminated in Japan's northernmost large island some years before the end of the 19th century.

C. l. deitanus  Cabrera  Spanish Wolf  c.1950
One of the two races originally found in Spain, this smaller, reddish form, of southern Spain, appears to have become extinct sometime since 1930.

C. l. hodophilax  Temminck  Honshu Island Wolf  1904
A smaller animal than the typical subspecies, with shorter legs and short, smooth coat, which was indigenous to the main Island of Japan.
**Canis rufus** Audubon and Bachman. The red wolf once ranged from the Atlantic coast of Florida and Georgia westward to central Illinois and Indiana. Two of three accepted races still survive in limited numbers in a seriously restricted range. Loss of habitat, persecution and hybridization with other canids pose serious threats to its continued survival.

*Vulpes macrotis* and *Vulpes velox*. The "Kit" and "Swift" foxes, of which some ten races can be recognized, are often regarded as conspecific, but are treated here as full species.

** Ursidae **

*Ursus arctos* Linnaeus. The brown bear as listed here includes the large brown bears of Eurasia (Palaearctic Region) and the brown and grizzly bears of North America (Nearctic Region). The earliest name available for the Nearctic group is *Ursus horribilis* Ord, 1815, and nearly a hundred forms have been named. About 17 races would be acceptable to European (but not all American) systematists. Of these 17 races, five are probably extinct:
**U.a. californicus** Merriam  
California Grizzly  
1933  
Formerly occurring in most of the State, it was last reported in 1933, but generally believed extinct by 1908.

**U.a. horriaeus** Baird  
New Mexico Grizzly  
c.1950  
Formerly in Arizona, New Mexico and western Texas, was last recorded in Texas in 1910 but still survived in Arizona and New Mexico until quite recently.

**U.a. nelsoni** Merriam  
Mexican Grizzly  
1962  
Formerly found in northern Baja California, northeaster Sonora, most of Chihuahua and Coahuila, and northern Durango; last in northern Chihuahua.

**U.a. pervagor** Merriam  
Lilloet Grizzly  
b.20 Cent.  
Originally found in southern interior British Columbia, was never abundant.

**U.a. crowtheri** Schinz  
Atlas Brown Bear  
1841  
Formerly of western North Africa, was last recorded in the mountains near Tetuan, Morocco.

**MUSTELIDAE**

**Mustela macrodon** Prentis  
Sea Mink  
c.1890  
This large mink of the New England coast is considered by some authorities to be a race of the American mink *M. vison*.

**FELIDAE**

**Felis pardina** Temminck. Two forms of the pardin lynx (itself often regarded as a race of the northern lynx) are generally recognized, one of them now believed to be extinct:

**F.p. sardiniae** Mola  
Sardinian Lynx  
c.1950  
The endemic subspecies of the Island of Sardinia.
Felis concolor Linnaeus. The cougar or puma was formerly transcontinental in America from Canada to the South American mainland. Many races have been described, including:

- **F.c. cougar** Kerr  
  Believed extinct since the late 19th century but sporadic reports and two fairly recent specimens, one from New Brunswick, Canada, in 1952 and one from Maine, USA, in 1938, give hope for its survival.

Panthera pardus Linnaeus. The leopard is widely distributed in the Ethiopian and Palaearctic Regions. Of 14 recognized races, four are endangered and another believed extinct:

- **P.p. jarvisi** Pocock  
  Sinai Leopard 1934
  The last record is of a female killed in 1934.

Panthera tigris Linnaeus. The tiger was once distributed widely in Eurasia but is now extinct throughout most of its former range and is everywhere declining in numbers. Of the eight presently accepted races two are possibly extinct:

- **P.t. virgata** Illiger  
  Considered extinct in Russia, there are no certain reports of its existence in Iran or Afghanistan in recent years, although spoor was identified in north-eastern Iran in 1971.

- **P.t. balica** Schwarz  
  Bali Tiger
  The Indonesian Wildlife Service considers this tiger extinct, but recent reports from west Bali give hope that it may still survive.

Panthera leo Linnaeus. The lion deserves mention here because whether several races are extinct depends entirely on whose classification is used. Agreement with those who recognize only two races leads to the conclusion that the African race survives in a restricted range; but that the Asian race clings to a very precarious existence. Agreement with those who recognize several races among the populations of lions formerly inhabiting both Africa and Asia leads to the conclusion that as a minimum the following races have become extinct since 1600:
P. l. melanochaitus Hamilton Smith Cape Lion 1865
P. l. leo Linnaeus Barbary Lion 1922
P. l. persicus Meyer Persian Lion 1923

PINNIPEDIA

OTARIIDAE

Zalophus californianus Lesson. The California sea lion is a widely spread species containing three races of which -
Z. c. japonicus Peters Japanese Sea Lion c.1960
formerly found on islets off Kyushu and Shikoku, and
also in the Sea of Japan off western Honshu, was last
recorded in the 1950s.

PHOCIDAE

Monachus tropicalis Gray Caribbean Monk Seal 1962
Formerly found on shores and islands in the Caribbean Sea
and Gulf of Mexico. A few remained in the western Caribbean
until 1952 and, in 1962, a solitary animal seen on Isla
Mujeres, off the Yucatan Peninsula, was the last reported.

SIRENIA

DUGONGIDAE

Hydrodamalis stelleri Retzius Steller's Sea Cow 1768
Indigenous to the Bering Straits region; though reported
from near Cape Navarin in 1962, it is commonly believed
to be extinct.
PERISSODACTYLA

EQUIDAE

Equus gmelini Antonius Tarpon 1851
The tarpon, usually conceded to be the direct ancestor of
the European and West Asian domestic horses, survived last
in Russia where the last one died in the Ukraine.

Equus hemionus Pallas. Five races of the Asiatic wild ass
have been recognized, of which the Indian E.h. khur is
seriously near extinction and -

E.h. hemippus L. Geoffroy Syrian Wild Ass 1928
Is believed to have become extinct when the last one
died in the Schönbrunn Zoo, Vienna.

Equus quagga J.F. Gmelin Quagga 1883
Formerly found in Cape Province, it became extinct when the
last one died in the Amsterdam Zoo.

Equus burchelli Gray. The common zebra of the African
plains includes four races of which -

E.b. burchelli Gray Southern Burchell's Zebra 1909
The last survivor of the nominate race of southern
Botswana and Orange Free State, died in the London Zoo.

ARTIODACTYLA

SUIDAE

Sus scrofa Linnaeus. The wild boar includes about 30
races of which -

S.s. sennaarensis Gray Egyptian Wild Boar 1902
Formerly found in Egypt and the northern Sudan, was
last recorded in Wadi Natron.

CERVIDAE

Cervus schomburgki Blyth Schomburgk's Deer 1932
Formerly found in Thailand, the last record is of one taken
near Sayok along the Qwe-Noi River.
**Cervus nippon** Temminck. The Sika deer is widely distributed in eastern China, Korea, Manchuria, Japan and Formosa. It includes thirteen races of which two are possibly extinct:

- **C.n. grassianus** Heude
  - Shansi Sika  c.1940
- **C.n. kopschi** Swinhoe
  - South China Sika  c.1940

**Cervus elaphus** Linnaeus. The red deer of Europe and southwestern Asia consists of twelve races of which two Asian races are possibly extinct:

- **C.e. wallichi** Cuvier
  - Shou  1946
- **C.e. yarkandensis** Blanford
  - Yarkand Deer  c.1930

**Cervus canadensis** Erxleben. The wapiti of North America, Manchuria and China consists of thirteen races of which two North American races are extinct:

- **C.c. canadensis** Erxleben
  - American Wapiti  1880
- **C.c. merriami** Nelson
  - Merriam's Elk  1906

**Cervus unicolor** Kerr. The Sambar deer of the Oriental Region contains some sixteen races of which:

- **C.u. boninensis** Lydekker
  - Bonin Islands Sambar  c.1940
  - Is reported to be extinct. (It is possible that it may have been introduced to the Bonin Islands as recently as 1850).
- **C.u. mariannus** Desmarest
  - Marianne Islands Sambar  c.1940
  - Also extinct. (May have been introduced from Luzon).

**Rangifer tarandus** Linnaeus. The reindeer of the northern hemisphere is divided into nine races of which:

- **R.t. dawsoni** Thompson Seton. Queen Charlotte Reindeer
  - Queen Charlotte Island, British Columbia, Canada  c.1935
- **R.t. eogroenlandicus** Degerbøl.
  - East Greenland Reindeer  1900
  - Was restricted to the central eastern coast of Greenland.
BOVIDAE

*Bos primigenius* Bojanus  Aurochs  1627
Regarded as the ancestor of the European domestic cattle, the last survivor died in the game preserve of Jaktorowka in Masovia, Poland.

*Bison bonasus* Linnaeus. The European bison contained two races of which one is extinct:

- **B.b. caucasicus** Grevé  Caucasian Wisent  1925

*Bison bison* Linnaeus. The American bison is sometimes divided into four races of which, if they are valid, the following are extinct:

- **B.b. pennsylvanicus** Shoemaker  Eastern Bison  1825
- **B.b. oregonus** V. Bailey  Oregon Bison  1850

*Hippotragus leucophaeus* Pallas  Blue Antelope  1800
The bluaubok was formerly found in the region of Swellendam, Cape Province, South Africa.

*Alcelaphus buselaphus* Pallas. The hartebeest contains about fifteen races of which -

- **A.b. buselaphus** Pallas  Bubal Hartebeest  1923
  Was the typical race of northern Africa, of which the last known survivor died in the Jardin des Plantes, Paris.
- **A.b. caama** G. Cuvier  Red Hartebeest  1938
  The Cape race of southernmost Africa is extinct.

*Gazella rufina* Thomas  Rufous Gazelle  1936
The red gazelle of interior Algeria.

*Capra pyrenaica* Schinz. Of four recognized races of the Spanish ibex, one is certainly extinct and the existence of a pure strain of a second is questionable:

- **C.p. lusitanica** Schlegel  Portuguese Ibex  1892
- **C.p. pyrenaica** Schinz  Pyrenean Ibex  ?

*Ovis canadensis* Shaw. The bighorn sheep of North America is represented by seven subspecies of which one race is extinct:

- **O.c. auduboni** Merriam  Badlands Bighorn  1910
  The bighorn of the Missouri River badlands.
The International Union for Conservation of Nature and Natural Resources (IUCN) is an independent international body, formed in 1948, which has its headquarters in Morges, Switzerland. It is a Union of sovereign states, government agencies and non-governmental organizations concerned with the initiation and promotion of scientifically-based action that will ensure perpetuation of the living world - man's natural environment - and the natural resources on which all living things depend, not only for their intrinsic cultural or scientific values but also for the long-term economic and social welfare of mankind.

This objective can be achieved through active conservation programmes for the wise use of natural resources in areas where the flora and fauna are of particular importance and where the landscape is especially beautiful or striking, or of historical, cultural or scientific significance. IUCN believes that its aims can be achieved most effectively by international effort in co-operation with other international agencies, such as Unesco and FAO.

The World Wildlife Fund (WWF) is an international charitable organization dedicated to saving the world's wildlife and wild places, carrying out the wide variety of programmes and actions that this entails. WWF was established in 1961 under Swiss law, with headquarters also in Morges.

Since 1961, IUCN has enjoyed a symbiotic relationship with its sister organization, the World Wildlife Fund, with which it works closely throughout the world on projects of mutual interest. IUCN and WWF now jointly operate the various projects originated by, or submitted to them.

The projects cover a very wide range, from education, ecological studies and surveys, to the establishment and management of areas as national parks and reserves and emergency programmes for the safeguarding of animal and plant species threatened with extinction as well as support for certain key international conservation bodies.

WWF fund-raising and publicity activities are mainly carried out by National Appeals in a number of countries, and its international governing body is made up of prominent personalities in many fields.