Ecological Database of Wildlife and Plants Species in Canada's National Parks

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1. Introduction

The ecological database of Parks Canada is a computerized inventory of all wildlife and plant species in Canada's national parks. The current version of the database contains data on mammals, birds, amphibians, reptiles, fish and vascular plants. Eventually, it will cover all aquatic plants and marine wildlife. The objectives of the ecological database are to create a national inventory of wildlife and plants species, to facilitate research, to allow longterm monitoring and to establish responsibility for protection and conservation at the national, regional and parks level. At the national level, the inventory facilitates research by managers and scientists on the distribution and status of wildlife species, and in some cases, on the designation of species that have been identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as being at risk. As a result, specialists and managers will be able to accelerate conservation efforts and identify regions in which conservation efforts are already under way, specifically in the case of reintroduced species.

2. Ecological Database Conception

This project was launched by the Natural Resources Branch of Parks Canada headquarters in Hull. The database was designed on the basis of a review of literature on the status of the wildlife and plants resources in Canada's national parks, resource descriptions and analyses, ecological inventories and computerized databases provided by some regional offices and many individual parks. The preliminary version of the wildlife database was verified in 1995 by ecological inventory specialists from the majority of parks and regions of Parks Canada. In 1997, the plants species have been added to the national list. The review process by staff members and researchers is planed for the summer 1997.

The database is not yet complete. It is lacking data on many species (abundance, reproduction, etc.). As a result, it is critical that the inventory be maintained uptodate in order to acquire more information on the protected ecosystems in Canada.

3. Database Composition and structure

The database was structured in such a way as to allow rapid identification of the species in the different parks and to present a summary of the information available on the species. It contains the species name (English, French and scientific), taxonomic classification, classification codes and ecological data on abundance, reproduction, etc.

3.1. Structure

The ecological Database of Wildlife and Plants Species in Canada's National Parks was created to serve as a master or template in the creation of a national parks species database. The database is a powerful force for national standardization because information in databases is structure from one set of fields. The database is organized into records consisting of data fields. Through dbase format, users can easily enter, store, and retrieve information. The structure of the Ecological Database of Wildlife and Plants species in Canada's National Parks is presented below. It should be noted that mammals, birds, and fish contain additional fields that are specific to these three groups.

FIELD NAME	TYPE	NUMBER OF CHARACTERS	DECIMAL
LONGITUDE	NUMERIC	8	4
LATITUDE	NUMERIC	7	4
REGION	CHARACTER	4	-
PARKS	CHARACTER	4	-
CODE	CHARACTER	4	-
ENGLISH NAME	CHARACTER	35	-
SCIENTIFIC NAME	CHARACTER	60	-
FRENCH NAME	CHARACTER	30	-
ORDER	CHARACTER	30	-
FAMILY	CHARACTER	30	-
GENUS	CHARACTER	30	-
CLASS	CHARACTER	10	-
COSEWIC	CHARACTER	3	-
COSEWIC STATUS	CHARACTER	5	-
REPRODUCTION	CHARACTER	2	-
ABUNDANCE	CHARACTER	5	-

NATIVE	CHARACTER	4	-
EXOTIC STATUS	CHARACTER	5	-
EXOTIC SPECIES ASSOCIATION	CHARACTER	3	-
SOURCE	CHARACTER	8	-

Addition of specific fields for certain databases

Mammals

NAME OF FIELD	TYPE	NUMBER OF CHARACTERS	DECIMAL
TERRESTRIAL-MARINE	CHARACTER	3	-

Terrestrial (T), marine (M) or terrestrial and marine (T-M).

Birds

NAME OF FIELD	TYPE	NUMBER OF CHARACTERS	DECIMAL
AOU	NUMERIC	6	2

Code from the American Ornithologists' Union

Fish

NAME OF FIELD	TYPE	NUMBER OF CHARACTERS	DECIMAL
WATER	CHARACTER	3	-

Type of fish habitat

3.1.1. Field mnemonic

Field mnemonic is the abbreviation assigned to each data field.

abundance ABUNDANCE

aou	AOU
c_name	ENGLISH NAME
class	CLASS
code	CODE
cos_status	COSEWIC STATUS
cosewic	COSEWIC
exo_asso	EXOTIC ASSOCIATION
exo_status	EXOTIC STATUS
family	FAMILY
french_n	FRENCH NAME
genus	GENUS
lat	LATITUDE
long	LONGITUDE
native	NATIVE
order	ORDER
parks	PARKS
region	REGION
reproduct	REPRODUCTION
sc_name	SCIENTIFIC NAME
source	SOURCE
ter_mar	TERRESTRIAL-MARINE
water	WATER

3.2. Definition of each field and the different codes used

The following sections explain the specification used to define each data field in the database.

3.2.1. Parks/Region

Each of the national parks is designated by a four-letter code to simplify consultation and reduce the possibility of typographical errors. A four-letter code was also developed for each region to facilitate the classification of parks by region. The codes are as follows:

ATLANTIC REGION (ATRO)

CBHI	**Cape Breton Highlands National Park, (N.S.)**
FUND	**Fundy National Park, (N.B.)**
GROS	**Gros Morne National Park, (Nfld.)**
KEJI	**Kejimkujik National Park, (N.S.)**
KEJA	**Kejimkujik (Seaside Adjunct) National Park, (N.S.)**
KOUC	**Kouchibouguac National Park, (N.B.)**
NOVA	**Terra Nova National Park, (Nfld.)**
PEIS	**Prince Edward Island National Park, (P.E.I.)**

QUEBEC REGION (BRQC)

FORI	**Forillon National Park, (Que.)**
MING	**Mingan Archipelago National Park Reserve, (Que.)**
MAUR	**La Mauricie National Park, (Que.)**
SAGU	**Saguenay-St. Lawrence Marine Park, (Que.)**

ONTARIO REGION (ONRO)

GBIS	**Georgian Bay Islands National Park, (Ont.)**
SLIS	**St. Lawrence Islands National Park, (Ont.)**
PELE	**Point Pelee National Park, (Ont.)**
BRUC	**Bruce Peninsula National Park, (Ont.)**
FIVE	**Fathom Five National Marine Park, (Ont.)**
PUKA	**Pukaskwa National Park, (Ont.)**

PRAIRIES AND NORTHERN REGION (PNRO)

IVVA	**Ivvavik National Park, (Y.T.)**
AULA	**Aulavik National Park, (N.W.T.)**
AUYU	**Auyuittuq National Park Reserve, (N.W.T.)**
ELLE	**Ellesmere Island National Park Reserve, (N.W.T.)**
RIDM	**Riding Mountain National Park, (Man.)**
PALB	**Prince Albert National Park, (Sask.)**
NAHA	**Nahanni National Park Reserve, (N.W.T.)**
WOOD	**Wood Buffalo National Park, (N.W.T.)**
GRAS	**Grasslands National Park, (Sask.)**
KLUA	**Kluane National Park Reserve, (Y.T.)**
VUNT	**Vuntut National Park (Y.T.)**

ALBERTA REGION (ABRO)

BANF	**Banff National Park, (Alta.)**
JASP	**Jasper National Park, (Alta.)**
ELKI	**Elk Island National Park, (Alta.)**
YOHO	**Yoho National Park, (B.C.)**
KOOT	**Kootenay National Park, (B.C.)**
WATE	**Waterton Lakes National Park, (Alta.)**

PACIFIC AND YUKON REGION (PYRO)

PRIM	**Pacific Rim National Park Reserve, (B.C.)**
GWAA	**Gwaii Haanas National Park Reserve, (B.C.)**
REVE	**Mount Revelstoke National Park, (B.C.)**
GLAC	**Glacier National Park, (B.C.)**

3.2.2. CODE

This field contains a four-letter code for each species. The use of this code accelerates queries on the identification of species.

CODE source:

For the database on birds, the fourletter codes correspond to the codes used in the North American Bird Banding Manual.

3.2.3. AOU

The field "AOU" is used only in the birds database. It is a four-digit numerical code (including the decimal) used by the American Ornithologists' Union (Check-list of North American Birds, 6th Edition). The use of the code makes it possible to select species more quickly.

3.2.4. Species names for the fields "ENGLISH NAME", "SCIENTIFIC NAME" and "FRENCH NAME".

For purposes of consistency, we used the following reference works for identifying each of the species.

Mammals:
Banfield, A.W.F., 1977, The Mammals of Canada, Second edition, National Museum of Natural Sciences, University of Toronto Press, 438 pages.

Birds:
Godfrey, W. Earl, 1986, The Birds of Canada, Revised edition, National Museum of Natural Sciences, National Museums of Canada, Ottawa, 595 pages.
Amphibians and Reptiles:
Cook, Francis R., 1984, Introduction to Canadian Amphibians and Reptiles, National Museum of Natural Sciences, National Museum of Canada, 200 pages.

Fish:
McAllister, Don E., 1990, A List of the Fishes of Canada, Syllogeus No. 64, National Museum of Natural Sciences, Ottawa, 310 pages.

Plants:
Brouillet, Luc, Frederic Coursol, Geoffrey Hall, Andree Blais and Stuart Hay, 1997 Computerization of the floristic inventories of the National Parks of Canada, Institut de recherche en biologie végétale, Herbier Marie-Victorin, Université de Montréal, Faculté des arts et sciences, Département de sciences biologiques.

It should be noted that the names of several species have been changed in recent years. The scientific name is the key to the identification of the species and subspecies. The use of vernacular names for identification purposes can pose problems because they can differ from one author to another. As a result, it is extremely important to adopt a standard for all species. It is sometimes difficult to distinguish between species and subspecies. If we do not know the exact name, the symbol (S) is placed after the name to indicate that it is a subspecies.

3.2.4.1. ENGLISH NAME

This field contains the English vernacular name according to the authors listed above. The symbol (S) following a name indicates that it is a subspecies. See the scientific name for details.

3.2.4.2. SCIENTIFIC NAME

The scientific name of the species is derived from the taxonomic classification of living organisms. It is a universal identification of the name of species and subspecies. The scientific name is composed of Latin words and words derived from Latin and Greek. The scientific name comprises two or three words (excluding the name of the author). The first word designates the genus. The second word designates the species and the third word designates the subspecies. The third or fourth word of the scientific name, depending on the

species or subspecies, is the name of the author. The author is the person who described the species or subspecies. If the author's name is placed in parentheses, this designates a species or subspecies that has been transferred to another genus. In some cases, the name of the author who made the transfer is cited following the name in parentheses.

3.2.4.3. FRENCH NAME

This field contains the French vernacular name according to the authors listed above. The symbol (S) following a name indicates that it is a subspecies. See the scientific name for details.

3.2.5. Taxonomic classification of species

All living organisms are systematically classified in accordance with a universal hierarchical system. Taxonomy is the classification of living organisms according to their natural relationships based on the degree of similarity between the organisms.

The following is an example of the taxonomic classification of the Arctic wolf, *Canis lupus arctos* Pocock.

Taxon	**Relationship**
Kingdom - ***Animalia***	All animals
Phylum - ***Chordata***	Animals with notochords
Subphylum - ***Vertebrata***	Animals with skeletons of bone or cartilage
Class - ***Mammalia***	All mammals
Order - ***Carnivora***	Carnivores
Family - ***Canidae***	Dogs, foxes, wolves, etc.
Genus - ***Canis***	Dogs
Species - ***lupus***	Wolves
Subspecies - ***arctos***	Wolf found on the Queen Elizabeth Islands of the Arctic Archipelago

For the Ecological Database, three categories were used; including the Order, the Family and the Genus.

3.2.5.1. ORDER

Designates the taxonomic order of the species according to the system of classification used by the authors listed above. *Canis lupus arctos* Pocock is a member of the order **Carnivora**.

3.2.5.2. FAMILY

Designates the taxonomic family of the species in accordance with the system of classification used by the authors listed above. The family name is indicated in Latin to avoid French and English translations. *Canis lupus arctos* Pocock is a member of the family **Canidae**.

3.2.5.3. GENUS

Taxonomic designation of the genus of the species in accordance with the classification used by the authors listed above. *Canis lupus arctos* Pocock is a member of the genus **Canis**.

3.2.6. COSEWIC

This field is defined on the basis of the Canadian classification of species at risk in Canada. COSEWIC is the acronym for the Committee on the Status of Endangered Wildlife in Canada. COSEWIC determines the national status of wild species, subspecies and separate populations in Canada. This field must be adjusted regularly on the basis of the results of the latest studies.

Code	Categories
X	**Extinct**
XT	**Extirpated**
E	**Endangered**
T	**Threatened**
V	**Vulnerable**
NAR	**Not at Risk**
I	**Indeterminate**

Extinct: Any animal or plant species formerly indigenous to Canada that no longer exists anywhere.

Extirpated: Any indigenous animal or plant species no longer existing in the wild in Canada but occurring elsewhere.

Endangered: Any indigenous animal or plant species threatened with imminent extinction or extirpation throughout all or a significant portion of its Canadian range.

Threatened: Any indigenous animal or plant species likely to become endangered in Canada if the factors affecting its vulnerability are not eliminated.

Vulnerable: Any indigenous animal or plant species particularly at risk because of low or declining numbers, small range or for some other reason.

Not at Risk: A species that has been evaluated and found to be not at risk.

Indeterminate: A species for which there is insufficient scientific information to support status designation.

3.2.6.1. Categories of candidates on CANDLST (Plants Species only)

These code are categories of candidates used for vascular plants species under investigation for status report preparation. Five categories of rare plants are recognized.

Code	Categories
1	**Rare Canadian endemics**
2	**Rare Canadian peripheral species that are Endangered, Threatened or Vulnerable through their total range**
3	**Rare Canadian peripheral species that are Endangered, Threatened or vulnerable in 2 or more American border states**
4	**Rare Canadian peripheral species that are Endangered, Threatened or Vulnerable in one American border state**
5	**Rare Canadian peripheral species that occur at few localities, but for which no official status is known from American border states**

3.2.7. COSEWIC STATUS

This field indicates the distribution of the species at risk in the park.

Code	Categories
C-W	**Common and widespread**
C-L	**Common and limited spatial distribution**
U-R-W	**Uncommon or rare but widespread**
U-R-L	**Uncommon or rare and limited spatial distribution**

Common and widespread: Indicates species that are common and widespread in the park. These species are generally easily and regularly observed and they are present in larger numbers throughout the park.

Common and limited spatial distribution: Indicates species that are common but limited in some area in the park. These species are generally easily and regularly observed in their limited habitat and they are present in larger numbers.

Uncommon or rare but widespread: Indicates species that are uncommon or rare but widespread in the park. The presence of such species is characterized by infrequent observations, small population densities and located in fragmented area of habitat in the park.

Uncommon or rare and limited spatial distribution: Indicates species that are uncommon or rare and present in limited areas in the park. It includes species that are observed in their limited habitat and infrequently observed

3.2.8. REPRODUCTION

This field indicates whether or not the species breeds in the park.

Code	Categories
B	**Breeding**
N	**Non-Breeding**
?	**Indeterminate**

Breeding: Indicates species that breed in the park.

Non-Breeding: Indicates "transient" birds only.

Indeterminate: The breeding status for the species is not available (research in progress).

3.2.9. ABUNDANCE

The concept of species abundance enables a quantitative assessment of the state of the population in a given area. In this database, the abundance is determined only for the territory occupied by the park. The concept of abundance does not provide regional, provincial or national data. The national status of species is indicated only for Canadian species at risk (see the field COSEWIC).

Code	Categories
C	**Common**
U	**Uncommon**
R	**Rare**
E	**Exceptional**
EXTIR	**Extirpated**
?	**Indeterminate**

Common: Indicates species that are abundant or common in the park. These species are generally easily and regularly observed in their preferred habitat and they are present in larger numbers than other species of the same genus. Populations are large and the habitat required for the survival of the species is found over large areas of the park territory.

Uncommon: Indicates species that are not common in the park. The presence of such species is characterized by infrequent to frequent observations, average population densities and average area of habitat in the park. It should be noted that these species are not rare in the park.

Rare: Indicates species that are present in small numbers in the park and which are the focus of special attention due to their fragility. It includes species that are not present in large numbers in the park and rarely observed in their preferred habitat. In most cases, it is a question of the presence of a species in a habitat that is unusual for the region under study.

Exceptional: Indicates species that are exceptional in the park. This category includes species that have wandered from their home range and/or occasional species, unlikely to be observed outside their usual habitat. In general, observations of these species are exceptional since in most cases the species are outside their usual range.

Extirpated: Indicates species that no longer occur in the park. This category includes species that were once present in the park, but that are no longer observed there today (habitat loss, contamination of the population, etc.) In this field, extirpated does not necessarily have the same meaning as when used by COSEWIC. It refers only to the park and its region and is designed to identify species that occurred in the park at one time but that have moved to other habitats and/or were exterminated.

Indeterminate: The question mark indicates that data on species abundance is unavailable.

3.2.10. NATIVE

This field indicates whether the species is indigenous to the region of the park. It distinguishes between: native species; species that are native to and peculiar to the park; introduced species; and species that have been reintroduced for the purpose of restocking the population in the park. This field applies to the status of the species at the regional level and is restricted to the park, since a species may be native to Canada but introduced to a given region.

Code	Categories
EN	**Endemic**
N	**Native**
NAIN	**North American introduced**
NOAM	**North American incidental**
EXOT	**Exotic**
R-I	**Reintroduced**
?	**Indeterminate**

Endemic: restricted to a specific region.
Native: originating in a given region, habitat.

North American introduced: a Canadian species deliberately introduced to a park, (region).

North American incidental: having reached a park (region) independently.

Exotic: introduced species.

Reintroduced: reintroduced species.

Indeterminate: Status to be determined.

3.2.11. Exotic Status

This field is used as an indicator of the indicator monitoring recording the distribution of exotic species that may threat the ecosystem integrity. Three categories of invasive exotic species are identified for the purposes of this database: those that are native to North America but that have extended their ranges due to human activities, those that are North American native species that were deliberately introduced, and those that originate from other parts of the world. These species may have dramatics implications of the ecosystem integrity. Non-native species may pose problems in natural habitat because such organisms disturbed or even replace native species.

Code	Categories
C-W	**Common and widespread**
C-L	**Common and limited spatial distribution**
U-R-W	**Uncommon or rare but widespread**
U-R-L	**Uncommon or rare and limited spatial distribution**

Common and widespread: Indicates species that are common and widespread in the park. These species are generally easily and regularly observed and they are present in larger numbers throughout the park.

Common and limited spatial distribution: Indicates species that are common but limited in some area in the park. These species are generally

easily and regularly observed in their limited habitat and they are present in larger numbers.

Uncommon or rare but widespread: Indicates species that are uncommon or rare but widespread in the park. The presence of such species is characterized by infrequent observations, small population densities and located in fragmented area of habitat in the park.

Uncommon or rare and limited spatial distribution: Indicates species that are uncommon or rare and present in limited areas in the park. It includes species that are observed in their limited habitat and infrequently observed.

3.2.12. Exotic Species Association

Many exotic species in Canada's national parks, particularly exotic plants, can reproduce and survive only in disturbed sites such as highway right of ways, lawns, townsites, campground, gravel pits, and other disturbed areas created or maintained by humans. These species may not represent a major threat for parks ecosystem conservation. However, some other species may spread in many ecosystem threatening the ecological integrity of natural ecosystems of the parks. This field contain the estimate species distribution used as an indicator of the potential impact of some exotic species.

Code	Categories
D	**Just associated with humans disturbed areas**
D-N	**Associated with disturbed and natural areas**

Just associated with humans disturbed areas: their presence is recorded in recovering ecosystems and/or in human dominated areas such as townsites, campground, disturbed roadsides etc.

Associated with disturbed and natural areas: presence in natural habitat, recovering ecosystems and in human dominated areas.

3.2.13. TERRESTRIAL-MARINE

This field indicates whether a species is terrestrial, marine or both. This field is used only for the mammals. It enables the user to quickly distinguish between the various types of mammals for the purpose of classification.

Code	Categories
T	**Terrestrial**
M	**Marine**
T-M	**Terrestrial and marine**

Terrestrial: species that live on land environment.

Marine: species that live in the water environment.

Terrestrial and marine: species that live in both environment (land and water) such as the polar bear.

3.2.14. WATER

This field appears for the fish only. It is used to distinguish between the various habitats of a species. It is important to bear in mind that the data on fish habitat are specific to a given park. A species may be anadromous in Canada but may occur only in freshwater in the park.

Code	Categories
M	**Marine**
F	**Freshwater**
A	**Anadromous**
AF	**Anadromous and freshwater**
C	**Catadromous**
E	**Euryhaline**
FS	**Freshwater and marine**

Marine: species that live in the sea, in salt water.

Freshwater: species that live exclusively in fresh water.

Anadromous: said of fish that ascend rivers from the sea for breeding.

Catadromous: said of fish that live in fresh or briny water and go to the sea to spawn.

Euryhaline: an aquatic species that tolerates a wide range of salinity.

Freshwater and marine: species that live in both fresh water and salt water.

Anadromous and freshwater: said of fish that ascend rivers from the sea for breeding and that can also live exclusively in fresh water.

3.2.15. SOURCE

This field specify author or primary reference work providing the information of the species record in parks.

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