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OUTLINE OF THE  
CANADIAN LAND CAPABILITY CLASSIFICATION  
FOR WILDLIFE

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CANADA LAND INVENTORY  
A R D A

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## OUTLINE OF THE CANADIAN LAND CAPABILITY CLASSIFICATION FOR WILDLIFE

### BACKGROUND

The objectives, scope and organization of the Canada Land Inventory have been published in Report No. 1.<sup>(1)</sup> It is important to reiterate, however, that the Inventory is designed primarily for planning rather than for management. It does not provide the detailed information required for management of individual parcels of land but is a reconnaissance type of inventory which provides information essential for the planning of land resource development by all levels of government.

It is also essential to understand that this inventory is a first attempt to classify on a national basis the capabilities of land for agriculture, forestry, recreation and wildlife. For this reason, the classification systems used are of an interpretive nature, largely relying upon the collation, revision and interpolation of existing information. In addition to reconnaissance for inventory purposes, surveys are used to up-date information, fill in gaps and to spot-check assigned ratings. When completed, the Inventory will publish the results on maps containing the most reliable information available. It is clearly

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(1)

The Canada Land Inventory, Objectives, Scope and Organization, Report No. 1, Department of Forestry Publication No. 1088 Queen's Printer, Ottawa.

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recognized that future modifications will be required as research and more objective assessments fill the current gaps in knowledge.

The Wildlife Sector of the Canada Land Inventory has some unique aspects, particularly the great diversity of wildlife species, their greatly different environmental requirements and their mobility and other behavioural attributes. Bearing these aspects in mind, it is apparent that one national series of maps cannot effectively represent the capability of land to produce all species of wildlife. For this reason, the current wildlife land capability inventory is restricted to the consideration of only ungulate species and waterfowl.

The Wildlife Land Capability Classification is not as exhaustive as the title implies. The term "wildlife" will consist of all species of mammals, birds, reptiles, amphibians and fish. The concept can also include invertebrates and floral aspects of the environment. But for simplification, land units are rated in regard to their capabilities to produce only ungulates and waterfowl. It is also recognized that in some parts of Canada, upland game birds and other wildlife species not included in this inventory may assume equal or greater importance in economic and/or social value. Nevertheless, for nationwide, comparative purposes, the restriction of the inventory to ungulates and waterfowl seems to best serve current needs for information of this nature. It is clearly recognized, however, that in obtaining

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and assessing the information required for the national inventory, additional information concerning other aspects and species of importance may be gathered, stored and utilized by co-operating provincial agencies.

The basic approach to the land capability classification system, developed through consultation between Federal and Provincial A.R.D.A. administrations and professional wildlife biologists<sup>(2)</sup> was endorsed by all provincial representatives at a meeting held in Ottawa on February 21st and 22nd, 1966. Various modifications were incorporated at this meeting while others were introduced by the National Advisory Sub-committee on Land Capability Classification for Wildlife. The system outlined here was ratified by all Provincial and Federal representatives at a meeting of this sub-committee in Quebec City on July 11th, 1966, for national use during the balance of the Canada Land Inventory.

#### CONSIDERATIONS

Wildlife is part of, and depends upon, the ecosystem within which it is found. A land capability classification system for wildlife must identify the basic factors which are essential to the continued existence of the ecosystem.

Physiographic features which are significant for waterfowl and ungulates are used to separate the land surface

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(2)

W.A. Benson, May, 1965. Outline of the Canada Land Capability Classification for Wildlife. Canada Land Inventory, ARDA, Ottawa.

into units for classification. Although wildlife directly depends upon the plant community in which it lives, the latter is in turn dependent upon physical characteristics of the environment, such as soil composition, climate and topography. Because it is known that plant communities can be manipulated through management to stages of seral succession which are productive for wildlife and because such management is limited by the physical characteristics of a given site, land capability ratings are applied to land surface units described in physical terms, significant from a wildlife standpoint.

In view of the need to ultimately consider the alternative uses of land, the present classification system ignores the present ownership and use of land. The capability ratings are established upon ecological conditions which can be expected to prevail if the land unit under consideration were to be established for the primary purpose of producing ungulates or waterfowl. It is acknowledged, however, that some major, long-lasting human influences are virtually irreversible and must be considered as part of the ecological picture for purposes of this classification. Under such conditions, capability ratings are not assigned on the basis of pristine conditions which are no longer applicable to the general ecology of the area or to good wildlife management practices. It is also acknowledged that the effects of some agricultural practices over large areas in some provinces are too large and well established not

to be considered as permanent limiting factors to ungulates. Such use over the broad areas may be the basis for eliminating these areas from the present inventory. Similarly, cities, towns, villages, and densely populated urban areas, where present use is prohibitive for wildlife production and where irreversible changes in the environment are prevalent, may be omitted from consideration in the capability classification.

As in the classification of land currently in use by forestry and agriculture, it must be recognized that factual information concerning the capability of land to produce wildlife is limited to basic physical and ecological factors and that the classification of these lands is largely subjective.

It must also be recognized that the scale used in the presentation of results imposes severe restrictions upon the details shown by the inventory, but that larger scales, used provincially as input maps, are not similarly restricted. Thus, information required provincially for inventory or for other purposes may be placed upon input maps in such a way that the maps published by ARDA will not be affected.

#### ASSUMPTIONS AND PROCEDURES

Certain assumptions and procedures must be understood by those applying the accompanying classification and by those using it. These are:

1. The separation of the land surface into units



for classification will be on the basis of physical characteristics significant from a wildlife standpoint.

2. Delineation of each unit will be on the basis of all known or inferred relevant information about the unit. This may include such things as parent material, soil profile, depth and moisture, fertility, landform, climatic factors, vegetation, etc. References to parent material, soil depth, etc., refer only to their effect on vegetation useful to wildlife.
3. Research data, recorded observations and experience are used as the basis for placing land units in capability classes and sub-classes. Where such information is lacking, classes and sub-classes are assigned on the basis of experience gained with similar factors elsewhere.
4. Good wildlife management practices, which are feasible and practical are assumed. Such good practices include those concerning land and animal species with the objective of producing optimum sustained yields of the species concerned. Present production is useful for classification purposes only when it reflects productivity on sites in ideal conditions.
5. Difficulty in obtaining access, land ownership, or distance from cities or roads do not affect

- capability ratings. Excessive or insufficient hunting pressures offer no limitation to the capability of a unit.
6. The degree of limitation determines the class designation. The subclass is the factor which causes the limitation. Thus there may be many different land units with the same degree of limitation hence the same class - but the nature of the limitation may be quite different in each, as shown by the subclass.
  7. The level of detail provided by wildlife land capability maps is determined by the scale at which they are produced.
  8. Capability ratings are subject to change as new information becomes available.
  9. Indicator species of ungulates for which the capability ratings are assigned will be shown, when possible.

#### LAND CAPABILITY CLASSIFICATION FOR WATERFOWL

##### CLASS 1

LANDS IN THIS CLASS HAVE NO SIGNIFICANT LIMITATIONS TO THE PRODUCTION OF WATERFOWL.

Capability on these lands is very high. Soils in this class are fertile, have good water holding capacity. The land is topographically suited to the formation of wetlands with relatively impermeable soil surfaces and high water tables.

Climate is such that sufficient precipitation occurs at important seasons and evapotranspiration is not great enough to curtail usefulness of water bodies. Predominant water areas on these lands are both shallow and deep permanent marshes, and deep, open water areas with well developed marsh edges.

#### CLASS 1S

Water areas in this special class are Class 1 areas that also serve as important migration stops.

#### CLASS 2

LANDS IN THIS CLASS HAVE VERY SLIGHT LIMITATIONS TO THE PRODUCTION OF WATERFOWL.

Capability on these lands is very high. Slight limitations are due to climate, fertility, or permeability of the soils. Topography tends to be more undulating than rolling; a higher proportion of the water areas are small temporary ponds, or deep, open water areas with poorly developed marsh edges.

#### CLASS 2S

Water areas in this special class are Class 2 areas that also serve as important migration stops.

#### CLASS 3

LANDS IN THIS CLASS HAVE SLIGHT LIMITATIONS TO THE PRODUCTION OF WATERFOWL.

Capability on these lands is moderately high but productivity may be reduced in some years because of

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occasional droughts. Slight limitations are due to climate or to characteristics of the land that affect the quality and quantity of habitat. These lands have a high proportion of both temporary and semi-permanent shallow marshes poorly interspersed with deep marshes and bodies of open water.

#### CLASS 3S

Water areas in this special class are Class 3 areas that also serve as important migration stops.

#### CLASS 3M

Lands in this special class may not be useful for waterfowl production but are important as migration or wintering areas. This class has no subclasses.

#### CLASS 4

LANDS IN THIS CLASS HAVE MODERATE LIMITATIONS TO THE PRODUCTION OF WATERFOWL

Capability on these lands is moderate. Limitations are similar to those in Class 3, but the degree is greater. Water areas are predominantly temporary ponds, or deep, open waters with poorly developed marsh edges or both.

#### CLASS 5

LANDS IN THIS CLASS HAVE MODERATELY SEVERE LIMITATIONS TO THE PRODUCTION OF WATERFOWL.

Capability on these lands is moderately low. Limitations are usually a combination of two or more of the following factors: climate, soil moisture, permeability, fertility, topography, salinity, flooding, and poor interspersion of water areas.

CLASS 6

LANDS IN THIS CLASS HAVE SEVERE LIMITATIONS TO THE PRODUCTION OF WATERFOWL.

Capability on these lands is very low. Limitations are easily identified. They may include aridity, salinity, very flat topography, steep-sided lakes, extremely porous soils, and soils containing few available minerals..

CLASS 7

LANDS IN THIS CLASS HAVE SUCH SEVERE LIMITATIONS THAT ALMOST NO WATERFOWL ARE PRODUCED.

Capability on these lands is negligible or nonexistent. Limitations are so severe that waterfowl production is precluded or nearly precluded.

SUBCLASSES

With the exception of Class 1, the classes are divided into subclasses according to the nature of the limitations that determine the class. The following subclasses are used to denote significant limiting factors that affect either the waterfowl or the ability of the land to produce suitable habitat conditions.

SUBCLASS A: aridity - The limitation is an arid condition of the land or the susceptibility of the land to periodic droughts, which results in low pond water levels or premature drying of marshes in the breeding season.

SUBCLASS B: free-flowing water - The limitation is usually due to fast or excess water flow which inhibits

development of marsh habitat along the stream edge. It may also be due to a lack of flow through low-lying land which results in habitat of poor quality.

- SUBCLASS C: climate - A combination of adverse climatic factors which act to reduce favorable habitat and production and survival of waterfowl.
- SUBCLASS F: fertility - The limitation is insufficient nutrients in the soil and water for optimum plant growth.
- SUBCLASS G: landform - Poor distribution or interspersion of marshes or basins, a limiting factor of the land, which prevents the development of optimum waterfowl habitats.
- SUBCLASS I: inundation - The limiting factor is excessive water level fluctuation or tidal action, which adversely affects the habitat or the nesting success of waterfowl.
- SUBCLASS J: reduced marsh edge - The limitations are topographic features that adversely affect the width or development of optimum marsh conditions along the edge of water areas.

- SUBCLASS M: soil moisture - Poor water-holding capacity of soils, which adversely affects the formulation and permanency of water areas.
- SUBCLASS N: salinity - Excessive salinity, alkalinity, acidity, lack of essential trace elements, or abundance of toxic elements which limits the development of plant and animal communities essential for waterfowl production.
- SUBCLASS R: soil depth - Restriction of the rooting zone by bedrock or other impervious layers which limits development of suitable plant communities.
- SUBCLASS T: adverse topography - Either steepness or flatness of the land which limits the development or permanency of wetlands.
- SUBCLASS Z: water depth - Excessively deep or shallow waters limiting the development of optimum waterfowl habitat.

LAND CAPABILITY CLASSIFICATION FOR UNGULATES

CLASS 1

LANDS IN THIS CLASS HAVE NO SIGNIFICANT LIMITATIONS TO THE PRODUCTION OF UNGULATES.

Capability on these lands is very high. They provide a wide variety and abundance of food plants and other habitat elements.

CLASS 1W

Lands in this special class are Class 1 areas that are winter ranges on which animals from surrounding areas depend.

CLASS 2

LANDS IN THIS CLASS HAVE VERY SLIGHT LIMITATIONS TO THE PRODUCTION OF UNGULATES.

Capability on these lands is high. Slight limitations are due to climatic or other factors.

CLASS 2W

Lands in this special class are Class 2 areas that are winter ranges on which animals from surrounding areas depend.

CLASS 3

LANDS IN THIS CLASS HAVE SLIGHT LIMITATIONS TO THE PRODUCTION OF UNGULATES

Capability on these lands is moderately high but productivity may be reduced in some years. Slight limitations are due to characteristics of the land that affect the quality and quantity of habitat, or to climatic factors that limit the mobility of ungulates or the availability of food and cover.

CLASS 3W

Lands in this special class are Class 3 areas that are winter ranges on which animals from surrounding areas depend.



CLASS 4

LANDS IN THIS CLASS HAVE MODERATE LIMITATIONS TO THE PRODUCTION OF UNGULATES.

Capability on these lands is moderate. Limitations are similar to those in Class 3 but the degree is greater.

CLASS 5

LANDS IN THIS CLASS HAVE MODERATELY SEVERE LIMITATIONS TO THE PRODUCTION OF UNGULATES.

Capability on these lands is moderately low. Limitations are usually a combination of two or more of climate, soil moisture, fertility, depth to bedrock or other impervious layer, topography, flooding, exposure and toxicity.

CLASS 6

LANDS IN THIS CLASS HAVE SEVERE LIMITATIONS TO THE PRODUCTION OF UNGULATES.

Capability on these lands is very low. Limitations are so severe that they are easily recognized, for example, soil depth may be negligible or climatic factors so extreme that ungulate populations are severely reduced.

CLASS 7

LANDS IN THIS CLASS HAVE LIMITATIONS SO SEVERE THAT THERE IS NO UNGULATE PRODUCTION.

SUBCLASSES

With the exception of Class 1, the classes are divided into subclasses according to the nature of the limitations which determine the class. In most cases the limitations

do not affect the animals themselves, but rather the ability of the land to produce suitable food and cover plants. For convenience the subclasses are placed in two main groups, those relating to climate and those relating to inherent characteristics of the land.

#### CLIMATE

The following subclasses are used to denote significant climatic factors that may affect either the animals or the ability of the land to produce suitable food and cover:

SUBCLASS A: aridity - Drought or aridity that adversely affects the habitat.

SUBCLASS C: climate - A combination of climatic factors acting to reduce favorable habitat, and the production and survival of ungulates.

SUBCLASS Q: snow depth - Excessive snow depth that reduces the mobility of ungulates and availability of food plants.

SUBCLASS U: exposure or aspect - Special climatic factors, such as exposure to prevailing winter winds, that adversely affect the animals or their habitat.

#### LAND

The following subclasses are used to denote significant characteristics of land that limit its usefulness for producing suitable food and cover. Some may also have a

slight adverse effect on the animals.

SUBCLASS F: fertility - Lack of nutrients in the soil for optimum plant growth.

SUBCLASS G: landform - Poor distribution or interspersion of landforms necessary for optimum ungulate habitat.

SUBCLASS I: inundation - Excessive water level fluctuation or tidal action that adversely affects the habitat or survival of ungulates.

SUBCLASS M: soil moisture - Poor soil moisture, either excessive or deficient.

SUBCLASS N: adverse soil characteristics - Excessive salinity, lack of essential trace elements, or abundance of toxic elements in the soil.

SUBCLASS R: soil depth - Restriction of the rooting zone by bedrock, other impervious layers, or soil structure.

SUBCLASS T: adverse topography - Either steepness or flatness of the land.

#### CONVENTIONS FOR USE

1. The capability class will be shown in Arabic numerals.
2. The subclass will be shown in upper case.
3. The indicator species will be shown in lower case and will be listed in order of abundance. Only species

comprising 10% or more of the ungulate population will be shown.

The following symbols are to be used for indicator species:

<u>Symbol</u>	<u>Ungulate</u>
A	Antelope
B	Bison
C	Caribou
D	Deer
E	Elk
G	Mountain Goat
M	Moose
S	Mountain Sheep

4. In a complex, capability classes will be shown in order of their relative proportion in the unit with the class with the largest proportion shown first.
5. The symbol will consist of:
  - a. a capability class from 1 to 7 or a special class followed by the letter S, M, or W, the same size as the numeral.
  - b. a maximum of 3 subclasses on 1:50,000 sheets.
  - c. a maximum of 2 subclasses on 1:250,000 sheets.
  - d. a maximum of 3 indicator species with each capability class.
  - e. a maximum of 3 classes in a complex, but generally not more than 2.

- f. the proportion of each class of a complex to the nearest 10 per cent.

EXAMPLES OF SYMBOLIZATION

- |   |   |  |
|---|---|--|
| $\begin{array}{c} 1 \\ \hline D \end{array}$  | - | single class and one indicator species   |
| $\begin{array}{c} 1W \\ \hline D \end{array}$   | - | single special class and one indicator species   |
| $\begin{array}{c} 2 \\ \hline M \end{array} T$  | - | single class with one subclass and one indicator species   |
| $\begin{array}{c} 2 \\ \hline M \end{array} \begin{array}{c} W \\ \hline N \end{array} T$   | - | single special class with two subclasses and two indicator species   |
| $\begin{array}{c} 4 \\ \hline M \end{array} \begin{array}{c} R \\ \hline C \end{array} T$   | - | single class with three subclasses and three indicator species   |
| $\begin{array}{c} 2 \\ \hline D \end{array} \begin{array}{c} 8 \\ \hline N \end{array} T \quad \begin{array}{c} 2 \\ \hline D \end{array} \begin{array}{c} R \\ \hline C \end{array}$   | - | single class complex with two subclasses affecting different parts of the area and one indicator species                     |
| $\begin{array}{c} 2 \\ \hline D \end{array} \begin{array}{c} 8 \\ \hline N \end{array} T \quad \begin{array}{c} 4 \\ \hline E \end{array} \begin{array}{c} 2 \\ \hline N \end{array} T$   | - | two class complex with two subclasses and indicator species: One set on 80 per cent of the area and the other on 20 per cent |
| $\begin{array}{c} 4 \\ \hline D \end{array} \begin{array}{c} 5 \\ \hline R \end{array} C \quad \begin{array}{c} 6 \\ \hline D \end{array} \begin{array}{c} 3 \\ \hline N \end{array} C \quad \begin{array}{c} 2 \\ \hline E \end{array} \begin{array}{c} W \\ \hline F \end{array} T$ | - | three class complex with combination of subclasses and one indicator species for each class                                  |

The significant points to be noted in the above examples are:

1. For class 1 no subclasses are shown
2. No more than two subclasses are shown for any one class when it is part of a complex.

3. Insofar as possible the symbol should be shown within the map unit which it describes. When this is impossible leaders should be distinct and the symbol should not be too close to a symbol for the adjoining area.
  
4. Indicator species should be placed immediately below the class to which it applies. This means that the symbol of indicator species may be repeated for each class in a complex. Indicator species not shown means this information is unavailable.