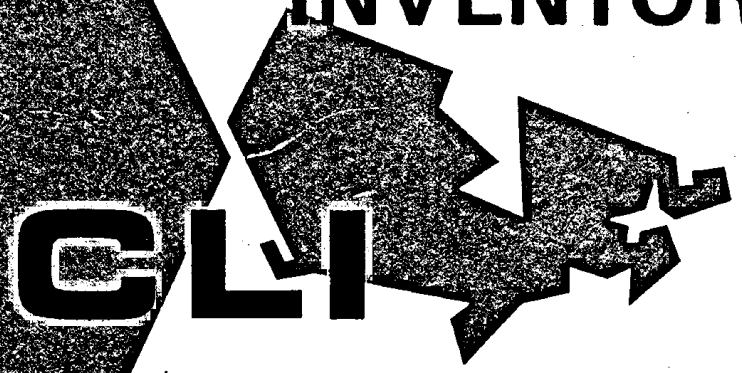
Environment Canada
Environnement Canada

Lands Directorate
Direction générale des terres

DAVID A. WILSON

THE CANADA LAND INVENTORY



OBJECTIVES, SCOPE AND ORGANIZATION

Dartmouth Env. Can. Lib./Bib.
39 049 051

HD
311
C3213
no. 1

The Canada Land Inventory

Report No. 1	1965
Revised	1970
Reprint	1978

HD
311
C3213
no.1

THE CANADA LAND INVENTORY

Library
JUN 0 9 2004
Environment Canada

Report No. 1 / 1965
Revised 1970
Reprint 1978

OBJECTIVES, SCOPE AND ORGANIZATION

Environment Canada
Library
5th Floor, Queen Square
45 Alderney Drive
Dartmouth, N.S. B2Y 2N6

Environment Canada
Lands Directorate

Environnement Canada
Direction générale des terres

Published under Authority
Minister of Regional Economic Expansion

© Minister of Supply and Services Canada 1978

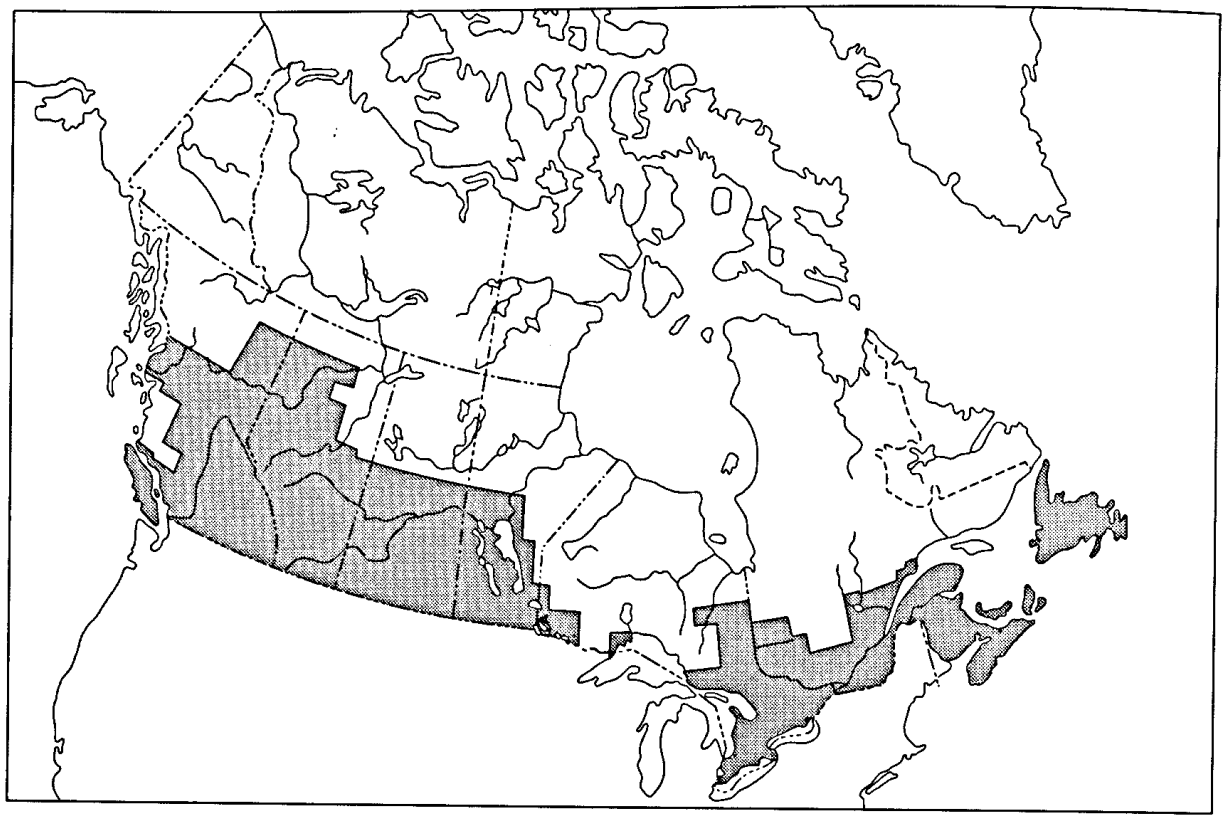
Cat. No. En63-1/1970

ISBN 0-662-10041-7

CONTENTS

APPENDICES

AREAS COVERED BY THE CANADA LAND INVENTORY



THE CANADA LAND INVENTORY

The Canada Land Inventory is a comprehensive survey of land capability and use designed to provide a basis for resource and land use planning. It includes assessments of land capability for agriculture, forestry, recreation, wildlife, present land use, and pilot land use planning projects in each province. It was undertaken as a co-operative federal-provincial program and is administered under the Agricultural Rehabilitation and Development Act (ARDA) of June, 1961.

Competition for land for alternative uses, and increased government economic and social planning in rural areas, has made apparent the need for improved knowledge of the productive capability of Canada's lands, their location and extent.

The deliberations of the "Resources for Tomorrow" Conference of 1961 resulted in strong recommendations by specialists representing all resource sectors for a land capability survey. As comprehensive resource management and social planning programs took shape under the aegis of the Agricultural Rehabilitation and Development Act, and as provincial governments ventured further into the sphere of regional development planning, it became increasingly apparent that without a land capability inventory programs of land adjustment and regional economic development would be based on judgments which, in the absence of essential information, would be fallible and costly.

Canada's relatively abrupt transition from a primarily agricultural economy to a primarily urban-industrial-economy resulted in changes in land use; further changes may be expected as new economic and demographic changes occur. Effective planning for change of this nature requires an information base of the physical quality of lands and soils and the location and quantity of each type.

TECHNICAL BACKGROUND

The co-operative Soil Survey organizations of Canada have been classifying and mapping soils according to their inherent characteristics and qualities as natural bodies for several decades. The Soil Surveys have resulted in published maps and reports which are the source of much fundamental information on the soils of Canada. Similarly federal and provincial Departments of Forestry, Parks and Recreation, and Wildlife have been carrying out studies relating land capability to productivity. These studies have provided the essential background data necessary for subjective interpretations to assess the capability of land for various uses.

Land classification according to present use is another approach that has been the subject of studies by geographers, economists, land administrators and planners. Classifying and mapping for land use is quite distinct from capability classification.(1) Geographers from the Canada Department of Energy, Mines and Resources have been engaged in a program of land-use mapping since 1950 and have accelerated the program through extensive interpretation of aerial photographs.(2) The Dominion Bureau of Statistics, the Economics Division of the Canada Department of Agriculture,

and the statistical agencies of the provinces are continuously compiling information on the social and economic factors of land use.

A third method of land classification, employed by the Canada Land Inventory, is an assessment according to land capability for different uses. As the incentive to use land more efficiently is increased through competition, there is increasing recognition of the need to assess land capability and apply this information to land-use policy and program formulation.

Accurate assessment of land-capability for various uses is possible in Canada because the fundamental work has been done in classifying and mapping soils, gathering climatic data, studying present uses, and compiling statistics on productive capacity. With the aid of this information, scientists in the disciplines related to agriculture, forestry, recreation, and wildlife, are able to rate the capability of land employing classification systems that provide a basis for effective land-use planning.

The Canada Land Inventory (CLI) covers settled portions of rural Canada and adjoining areas which affect the income and employment opportunities of rural residents. Thus it covers the area of Canada where questions of alternative use of land have a strong bearing on rural development.

WHAT THE INVENTORY PROVIDES

The CLI was designed primarily for planning rather than for management. It is of a reconnaissance type, it provides information essential to land development planning at the municipal, provincial and federal levels of government. It does not provide the detailed information

required for management of individual parcels of land, nor for land planning in small watersheds, local government units, etc. The CLI, which uses a computer mapping technique, will facilitate more detailed future studies as more detailed land capability information becomes available and as socio-economic factors change.

RECENT HISTORY

The need for a land capability inventory did not come up suddenly; it was the result of decades of intense technological and social change. Concurrently, data gathering techniques improved, and the amount of technical data accumulated to a degree which made CLI a feasible idea.

The federal-provincial-university soil survey organizations had established precedents in co-operative undertakings which were invaluable for an undertaking such as CLI.

The Senate of Canada Special Committee on Land Use, and the "Resources for Tomorrow" Conference of 1961, provided forums for the increased concensus of opinion supporting the idea of a capability inventory.[1]

In 1962, terms of reference, organizational form, and financial and administrative capability to carry out the program were established within the ARDA administration.

In November 1962, a seminar on the proposed inventory was held in Ottawa. Participants were drawn from all regions of Canada representing most relevant disciplines and areas of interest. They expressed the unanimous opinion that an inventory was urgently needed. They recommended

---

[1] See Appendix VIII for recommendations of these groups.

that it include provision for research and data collection on soil capability for agriculture, land capability for forestry, wildlife and recreation, present land use, socio-economic and climatology classifications.

The first major step toward definition of immediate objectives was taken by the National Soil Survey Committee at a meeting in Winnipeg in March 1963. The meeting proposed that the National Soil Survey Committee develop a national capability classification system for agriculture. The meeting also proposed that, with ARDA assistance, the federal-provincial soil survey organizations carry out an inventory based on a new classification of the settled areas of Canada. The proposed classification system was adopted in May 1963.

Formal federal-provincial consideration of the Canada Land Inventory took place in November 1963, when a memorandum on the subject was presented to the Canadian Council of Resource Ministers. This memorandum, put forward by the ARDA Administration, stated the need for the inventory, outlined its proposed scope, and recommended a division of responsibilities. The Canadian Council of Resource Ministers approved the proposal in principle and recommended that the inventory proceed on the basis of working agreements between individual provinces and ARDA.

On October 3, 1963, the Government of Canada officially approved undertaking this comprehensive land resource inventory. The inventory has, accordingly, been planned and implemented co-operatively by the federal government and the provincial governments. Each province is reimbursed by the federal government for all additional direct operational and staff costs incurred in the conduct of the project.

During 1963 and 1964, the federal and provincial ARDA administrations, with the support of many other organizations, established an effective pattern of co-ordination throughout Canada. Some 100 agencies of the federal and provincial governments were involved along with several universities, non-governmental organizations, private companies and private individuals. With such a broad participation, one essential prerequisite for success was co-ordination -- chiefly in the formulation of practical, acceptable objectives and criteria, and in the reasonably precise scheduling of the inventory.

The task entails bringing together all available information on the capabilities and uses of land, filling in the gaps in present information and interpreting all material into suitable classification systems. The collection of these data has involved large numbers of federal and provincial resources research-staff personnel, augmented by university personnel and consulting agencies.

To present the data in a form required for land-use planning at the local, regional, provincial, and national level is a formidable task. Conventional methods of map compilation, area measurement and comparison between maps and statistical tables, would have imposed severe restrictions on the inventory program.

It was necessary to investigate computer mapping, specifically a system which would collect and store data from maps and statistical tables in a form that could be quickly analyzed by electronic computers. No satisfactory computer mapping system existed when the CLI program was initiated, but investigations showed that a system capable of accepting physical, social and economic data for evaluation of land areas was feasible. One has been built and is expected to be in operation in 1970.

OBJECTIVE AND SCOPE

The broad objective of the Canada Land Inventory is to classify lands as to their capabilities, to obtain a firm estimate of the extent and location of each land class and to encourage use of CLI data in planning.

A vast amount of information on Canada's land resources is being gathered, stored, analyzed and published in a way that permits the inventory to be a valuable working tool for rural development planning across Canada. Lands are classified according to:

- their physical capability for use in agriculture, forestry, recreation, and wildlife;
- their present use.

Specific CLI objectives are defined for each sector of the inventory. They are:

Soil Capability for Agriculture (a)

The agricultural capability inventory provides information, in the form of maps and statistical tables, on the location, quality and extent of land suitable for the production of annual field crops, forage, improved pasture and native grazing. The data are used at municipal, provincial and national levels for planning the efficient use of agricultural resources. The information is particularly useful to delineate agricultural lands, identify submarginal farmland, consolidate farms into viable units, establish an equitable assessment base and indicate where urban and industrial expansion might take place without unduly reducing agricultural production.

The capability inventory is based on the interpretation of the data provided by systematic soil surveys, generally at the scale of one or two inches to the mile. Through interpretation, the soils are ranked

according to their general suitability for the production of common field crops, taking into account the effects of climatic and soil limitations in a system of mechanized farming.

The classification was developed jointly by the National Soil Committee and federal and provincial ARDA administrations. In this classification, the mineral soils are grouped into seven classes depending on the degree of limitation and into thirteen subclasses, according to the kinds of limitation.[1] Class 1 soils have no significant limitations and, together with Classes 2 and 3, are considered capable of sustained production of common field crops. Class 4 soils are physically marginal for sustained arable agriculture. Soils in Class 5 are unsuitable for annual field crops but suitable for forage production and improved pasture, while those in Class 6 are restricted in their use to native grazing. Class 7 is unsuitable for agricultural use. Organic soils are not included in the classification but are shown separately on the maps.

With the financial support of the Department of Regional Economic Expansion, the classification was carried out within the inventory area by federal and provincial Soil Survey organizations. Most of the agricultural areas of Canada will be classified by the end of 1970. The Canada Department of Agriculture is responsible for the co-ordination, compilation and preparation of the agricultural capability data for computer

---

[1] The Soil Capability Classification for Agriculture is fully described in CLI Report No. 2 and is summarized in Appendix I of this publication.

input at the scale of 1:50,000 and for publication of maps at the scale of 1:250,000.[1]

Land Capability for Forestry (b)

The classification of land capability for forestry was developed to provide an improved technical basis for land-use planning. Fully compatible with the other sectors, the classification serves to indicate the lands on which intensive management practices might be justified. (Land Capability for Forestry, CLI, Report No. 4, 1970.) As major commitments in the allocation of forest lands are planned, and as forest management is of a long-term nature, dedication of land to this use should be undertaken only after careful consideration of alternative uses.

The objective of the land capability inventory for forestry is to describe the potential capability of the land under indigenous tree species growing at full stocking and assuming good management. Capability is in terms of mean annual increment per acre, expressed in cubic feet.

Development of the national classification system was completed through pilot projects in each province, followed by regional and national meetings of provincial, federal, and university specialists. Basic data for classification were available in most provinces in the form of soil survey and forest inventory maps and reports. Interpretation of these data, together with new field survey data, permitted the system to be established.

The maps are being used for the intended purpose, namely in forestry capability rating for regional planning. Other applications include

---

[1] In British Columbia the scale is 1:126,720.

preliminary appraisals for designated timberland lease areas, a basis for land assessment purposes, wildlife and recreation land-use planning, and teaching of forest land management.

Forest land capability maps are first produced at a scale of 1:50,000 and generalized to a scale of 1:250,000 for publication.[1] The Canadian Forestry Service of the Department of Fisheries and Forestry is responsible for national and regional co-ordination as well as technical assistance as required by the provinces.

Land Suitability for Recreation (c)

Increased urbanization, improved transportation and higher standards of living during the past fifteen years, have greatly increased the demands for outdoor recreation opportunities. This is indicated by an expanded tourist industry, by the more extensive park networks built, and by the increased recreational travelling people do, particularly those people living in metropolitan centres.

Industrial automation, barely felt as yet, will within a decade or two, compound this demand. Outdoor recreation, therefore, is a legitimate consideration in a comprehensive inventory of land resources.

The objectiyes of the recreation land classification program are to provide a reliable estimate of the quality, quantity, type and distribution of outdoor recreation resources within settled parts of Canada and to supply basic information necessary for the formulation of policy and plans by the levels of government involved. Compatibility with other sectors of CLI is mandatory to facilitate inter-sector comparisons in integrated resource management planning.

---

[1] In British Columbia the scale is 1:126,720.

The recreation sector's initial task was to develop a national classification system acceptable to all provinces and, in conjunction with the provinces, to apply the classification to all lands within the inventory area. The classification system has been developed using seven classes to rank land for its capability for outdoor recreational use while recognizing present popular preferences.[1]

The basis of the classification is the quantity of recreation-land-use which may be generated and sustained per unit area of land per year, under perfect market conditions. A high class land unit, therefore, has a high index of attraction in terms of popular preferences and a "use tolerance" which permits intensive use without undue degradation of the resource. For purposes of uniformity, perfect ranking does not take into consideration present use or assessability.

In 1970, the recreation inventory program will be largely completed. Recreation land capability maps are being published at the scale of 1:250,000; these, and the associated 1:50,000 map sheets, and the information supplied by the other sectors are useful to area planners in their attempts to achieve optimum productivity from land resources. The information is being used in outdoor recreation planning for the identification of potential park and recreation areas ranging from intensive day-use sites for urban populations to national parks. The information is useful for the

---

[1] See Appendix III for Summary of Land Capability Classification for Recreation, or Land Capability Classification for Recreation, Canada Land Inventory, Report No. 6, 1970.

preliminary zoning for various recreation uses within large parks, for the designation of lakeshore cottage lots and for the reservation of water frontage for public use.

The recreation sector has conducted an inventory of outdoor recreation facilities, which, together with the capability inventory and demand studies presently underway, should give a more complete picture of the outdoor recreation market demand and supply situation necessary for the formulation of more adequate policies and programs.

Development of the classification and implementation of recreation land capability inventory has been co-ordinated by staff seconded to the Canada Land Inventory for the purpose, from the National and Historic Parks Branch, Department of Indian Affairs and Northern Development.

Land Capability for Wildlife (d)

Wildlife constitutes a separate resource with its own values. Decisions on land use for wildlife will generally be made in the context of recreational requirements. Because of their mobility, land requirements for wildlife will differ at different stages of the wildlife resources' life cycles. Areas used for production and those used for viewing, photography, or harvest of the resources, may not only be physically separated, but may be of a different biological and physical nature.

A nationally accepted system of evaluating and describing land capability for wildlife use has been developed for each of two general headings, Ungulates[1] and Waterfowl[2]. The system was developed in full

---

[1] See Appendix IV for Summary of Land Capability Classification for Ungulates.

[2] See Appendix V for Summary of Land Capability Classification for Waterfowl.

realization that many other kinds of wildlife are important. These two groups were selected because of their broad appeal to the public and their wide national distribution. Criteria for capability mapping were developed by officials of the Canadian Wildlife Service and the Provincial Game Agencies. The mapping program for waterfowl capability is being implemented by Canadian Wildlife Service officials, while ungulate capability mapping is being carried on by Provincial officials.

The land capability classification developed for wildlife reflects the physical characteristics of land units, meteorological and other factors which influence wildlife. The classification includes seven categories of capability, ranging from very good to very poor.[1] In the printed maps for public use, the land capability is indicated by map coloration and suitable symbols. Factors which limit the production of the resource are designated by letters.

Officials of the Canadian Wildlife Service and Department of Indian Affairs and Northern Development co-ordinate the mapping program for the Canada Land Inventory.

Capability for Sport Fish (e)

A nationally accepted system of mapping capability of water bodies and water sheds for sports fish was developed.[2] It is similar in some respects to the system of land capability for wildlife, with two important differences. Sports fish capability is a four-class system

---

1 Land Capability Classification for Wildlife, Canada Land Inventory, Report No. 7, 1970.

2 See Appendix VI for Sports Fish Capability Classification.

because the aquatic environment does not lend itself easily to finer subdivisions without very large expenditures of manpower and money. Because it deals only with the aquatic environment, the system relies heavily on the physical and chemical factors of the environment rather than on land form.

Like the wildlife capability inventories, it attempts to generalize and provide information for a broad range of species. It defines basic productivity of the water which can then be expressed in terms of the productivity of fish of a wide variety of species.

Map data are prepared for use by planners. Printed maps will not be produced.

Present Land Use (f)

The present land use mapping program of the Geographical Branch of the Canada Department of Energy, Mines and Resources has been underway since 1950. The mapping of present land use has been done at the scale of 1:50,000 using a uniform nation-wide classification.[1] The program has been speeded up by making maximum use of Census of Canada data, aerial photograph interpretation and other sources of information such as assessment field sheets. The coverage of present land use is now almost completed for the inventory area. Present land use data will not be published in map form, but will be made available as computer mapping inputs.

Socio-economic Land Classification (g)

Statistical data are available from Dominion Bureau of Statistics records on most of the important socio-economic factors associated with

---

[1] See Appendix VII for Present Land Use Classification.

present land use. This data can, where required, be related to the physical data for a specific area or region on a census division or other basis in order to compare human statistics with land resource capability and use.

Agro-climatic Classification (h)

A federal ARDA research project was carried out to assess effects of recorded climatic conditions to determine agro-climatic classifications, and thus delineate climatic zones significant for crop production. The Ontario Research Foundation conducted this research under the guidance of an inter-agency committee. The Meteorological Branch of the Department of Transport provided the necessary climatic data.[1]

In the past, there has been no firm requirement for agro-climatic classifications for Canada; thus no recognized classification system had been developed. This study produced first approximations for agro-climatic zonations and indicated requirements for further research or zonation techniques. A process for computer mapping of inventory data makes it possible to include detailed agro-climatic characterizations as part of the inventory.

Inventory Data - Geo-Information System (i)

A critical part of the CLI program is the development of a system permitting concise and compact data storage allowing comparisons within, and between, sectors, output analyses in map or statistical form, and comparison of data for given regions and correlation of socio-economic or other data on selected areas.

---

[1] The Climates of Canada for Agriculture, Canada Land Inventory, Report No. 3.

The Geographic Information System (GIS) was developed to do this. It is a system designed to accept any geographic specific information, that is area, line or point data. Once entered as input in the GIS, a map, or other data, may be retrieved, by specific programming and in the manner desired. Thus, it is possible to obtain area calculations and summaries for a specific area and purpose. Output may be in map or tabular form. This facility allows greater use of the data for planning proposals.

Pilot Land-Use Projects (j)

In November 1967, the CLI program was extended to cover pilot projects in land-use planning. The federal government may underwrite the costs of provincially proposed and sponsored pilot-scale land-use planning studies under this program.

It was realized that the maximum usefulness of the Inventory would be achieved only by developing and evaluating applications of the data in the planning process. The objective was to provide opportunities for the assessment of the adequacy of the data in development planning, and to familiarize those engaged in land resource planning and management with the data.

It was also anticipated that the pilot projects would promote greater co-operation and co-ordination amongst resource-sector specialists in developing multi-disciplinary approaches to land planning. The work undertaken should demonstrate the value of CLI data for land resource development planning and promote the acceptance of the data as basic input for development planning.

To ensure maximum flexibility in the development of possible applications of the Inventory data, very few methodological specifications

have been laid down for the projects. However, certain general conditions must be met before proposals for land-use planning studies are approved. These conditions have been established to ensure that a comprehensive view towards land resource planning will be developed in the projects, and to encourage the implementation of the land-use plans formulated in the studies. These conditions are:

1. The area selected for study should exhibit land-use adjustment problems involving more than one resource sector, and have a range of physical capability for several different uses.
2. The area boundaries should be drawn to conform as closely as possible to the boundaries of aerial units for which socio-economic data are available. For example, census enumeration areas, municipalities, census divisions, etc.
3. The Canada Land Inventory maps for all sectors must be available for the area.
4. The provincial agency undertaking the project must be affiliated with the provincial department responsible for land and/or regional planning.
5. A permanent provincial public servant must be appointed as the project co-ordinator on a full-time basis for the duration of the project.
6. A committee of senior officers representing the resource sectors (i.e., agriculture, forestry, recreation, and wildlife) and, if possible, officers representing agencies concerned with community and human resource development must be established to guide the project.
7. The project should be formulated within the province's policy framework for economic and social development and be made an integral part of the planning process established to achieve provincial development goals.

8. In order that the experience gained in the projects may be shared amongst the provinces, a report that describes and evaluates the methodology used in the study should be submitted for publication.

A province is free to engage federal agencies and private consultants, as well as provincial departments and agencies, in its land-use planning study.

All costs of the projects that are incurred over and above the routine costs of provincial agencies, except the salaries of permanent provincial public servants, are underwritten by the federal government. In addition to financial aid, technical assistance is also available from the Department of Regional Economic Expansion to the agencies responsible for land-use planning projects.

Because very few constraints have been placed on methodology, it is hoped that the agencies sponsoring the studies will take full advantage of the opportunity presented by the pilot land-use planning program to examine as many of the relevant variables as possible when formulating their land-use plans. There is an urgent need to develop the conceptual framework and analytical techniques that permit the integrated analysis of the physical, economic, social, and institutional determinants of land-use. There is also a need to investigate and develop instruments for plan implementation that are acceptable to the community, resource-based industries, and to senior governments.

ORGANIZATION AND METHODS

The Canada Land Inventory was undertaken as a co-operative federal-provincial research project under the Agricultural Rehabilitation

and Development Act. The division of responsibilities between the federal and provincial governments has been agreed to in principle as follows:

The Government of Canada agreed to:

- sponsor and co-ordinate the planning, development and publication of the inventory;
- finance all additional expenditures required of the provinces in the conduct of the inventory;
- foster the development of national classification systems and criteria for their application through co-operative work of federal and provincial agencies;
- provide technical assistance to the provinces in the conduct of the inventory, through the co-operative work of federal research personnel and provincial staffs in related fields;
- provide interprovincial co-ordination of survey methodology and presentation of results;
- provide a system for data processing and map compilation as required in the inventory;
- undertake the publication of results as required, on a national basis, at the map scale of 1:250,000.

The Provincial Governments agreed to:

- undertake the planning, development and conduct of the inventory within the province, with the financial and technical assistance of the federal government;
- establish a Provincial Inventory Committee to provide technical and administrative co-ordination for the inventory within the the province;
- develop a provincial plan for inventory work;
- conduct the inventory with technical and financial assistance provided by the federal goverment;
- undertake publication of results of the inventory which may be of particular interest to the province;
- provide the federal government with all inventory data required for compilation and publication of results on a national basis.

The success of this comprehensive land inventory depends on the co-ordinated effort of several federal government departments, two or more departments of each provincial government, and services from universities and consulting agencies.[1] The organizational structure established to provide this co-ordination and to effect data collection, compilation, storage, analysis and publication is briefly as follows:

Department of Regional Economic Expansion - Canada Land Inventory Branch

This Branch of the Planning Division consists of a Director, six technical co-ordinators, and an administrative and clerical staff. The unit provides the over-all technical and administrative co-ordination in the planning, development and publication of the inventory. Planning Division provides:

- initiative and co-ordination in the development of classification systems;
- co-ordination between federal and provincial research staffs in the application of the classification systems;
- interprovincial co-ordination of survey methodology and presentation of results;
- technical assistance to the provinces through provision of data collected or produced by federal government agencies and consulting firms;
- collection, composition and editorial functions in the publication of inventory results.

---

[1] See Appendix IV for list of co-operating federal and provincial government agencies.

Provincial ARDA - Land Inventory Committees

These committees were established within the framework of the provincial ARDA committees. Each committee has the services of a Land Inventory Co-ordinator for the province. The provincial inventory committees and co-ordinators are providing the technical and administrative co-ordination in the planning, development and publication of the inventory within the province. Their role is:

- develop a provincial plan for the inventory work;
- supervise and administer the inventory within the province, with technical and financial assistance from the federal government;
- be responsible for the publication of the results of the inventory pertaining to the province.

Cartographic Services

The federal government has provided map compilation, production and printing facilities for the inventory. The compilation and production of maps is done by the Cartography Section of the Soils Research Institute, Canada Department of Agriculture. The provision of base maps and the printing of inventory maps is the responsibility of the Surveys and Mapping Branch of the Canada Department of Energy, Mines and Resources.

APPENDIX I

SUMMARY OF

SOIL CAPABILITY CLASSIFICATION FOR AGRICULTURE

AGRCL

In this classification, on the basis of soil survey information, mineral soils are grouped into seven classes. Soils in Classes 1, 2, 3 and 4 are considered capable of sustained use for cultivated field crops; those in Classes 5 and 6 only for perennial forage crops, and those in Class 7 for neither.

1-4
5-6
7

Important criteria on which the classification system is based are:

- Soils will be well managed and cropped, using a largely mechanized system;
- Land requiring improvements (including clearing) that can be made economically by the owner is classed according to its limitations or hazards in use as if the improvements have been made. Land requiring improvements deemed beyond the means of the individual owner is classed according to its present condition.
- These factors are not considered: distances to market, type of roads, location, size of farms, type of ownership, cultural patterns, skill or resources of individual operators, and hazard of crop damage by storms.

The classification does not include capability of soils for trees, tree fruits, small fruits, ornamental plants, recreation, or wildlife.

The classes are based on intensity rather than the type of agricultural limitations they display. Each class includes many kinds of soils, and many of the soils in a class need different management and treatment.

CLASSES

1 - SOILS IN THIS CLASS HAVE NO SIGNIFICANT LIMITATIONS IN USE FOR CROPS

The soils are deep, are well to imperfectly drained, hold moisture well, and in the virgin state were well supplied with plant nutrients. They can be managed and cropped without difficulty. Under good management they are moderately high to high in productivity for a wide range of field crops.

2 - SOILS IN THIS CLASS HAVE MODERATE LIMITATIONS THAT RESTRICT THE RANGE OF CROPS OR REQUIRE MODERATE CONSERVATION PRACTICES

The soils are deep and hold moisture well. The limitations are moderate and the soils can be managed and cropped with little difficulty. Under good management they are moderately high to high in productivity for a fairly wide range of crops.

3 - SOILS IN THIS CLASS HAVE MODERATELY SEVERE LIMITATIONS THAT RESTRICT THE RANGE OF CROPS OR REQUIRE SPECIAL CONSERVATION PRACTICES

The limitations are more severe than for Class 2 soils. They affect one or more of the following practices: timing and ease of tillage; planting and harvesting; choice of crops; and methods of conservation. Under good management they are fair to moderately high in productivity for a fair range of crops.

4 - SOILS IN THIS CLASS HAVE SEVERE LIMITATIONS THAT RESTRICT THE RANGE OF CROPS OR REQUIRE SPECIAL CONSERVATION PRACTICES, OR BOTH

The limitations seriously affect one or more of the following practices: timing and ease of tillage; planting and harvesting; choice of crops; and methods of conservation. The soils are low to fair in productivity for a fair range of crops but may have high productivity for a specially adapted crop.

5 - SOILS IN THIS CLASS HAVE VERY SEVERE LIMITATIONS THAT RESTRICT THEIR CAPABILITY TO PRODUCING PERENNIAL FORAGE CROPS, AND IMPROVEMENT PRACTICES ARE FEASIBLE

The limitations are so severe that the soils are not capable of use for sustained production of annual field crops. The soils are capable of producing native or tame species of perennial forage plants, and may be improved by use of farm machinery. The improvement practices may include clearing of bush, cultivation, seeding, fertilizing, or water control.

6 - SOILS IN THIS CLASS ARE CAPABLE ONLY OF PRODUCING PERENNIAL FORAGE CROPS AND IMPROVEMENT PRACTICES ARE NOT FEASIBLE

The soils provide some sustained grazing for farm animals, but the limitations are so severe that improvement by use of farm machinery is impractical. The terrain may be unsuitable for use of farm machinery, or the soils may not respond to improvement, or the grazing season may be very short.

7 - SOILS IN THIS CLASS HAVE NO CAPABILITY FOR ARABLE CULTURE OR PERMANENT PASTURE

This class also includes rockland, other non-soil areas, and bodies of water too small to show on the maps.

O - ORGANIC SOILS (Not placed in capability classes)

AGRS1 2

SUBCLASSES (~~unmapped~~)

Excepting Class 1, the classes are divided into subclasses on the basis of kinds of limitation. The subclasses are:

C - adverse climate - The main limitation is low temperature or low or poor distribution of rainfall during the cropping season, or a combination of these limitations.

C - adverse climate
D - undesirable soil structure and/or low permeability
E - erosion (and gully land)
F - low natural fertility ~~correctable by careful management and fertilizer use~~
I - inundation by streams or lakes
M - moisture limitation, usually due to soils' low water-holding capacity
N - salinity
P - stoniness
R - consolidated bedrock near surface
S - adverse soil characteristics in general
T - topography
W - excess water
X - cumulative minor adverse characteristics

C - adverse climate

D - undesirable soil structure and/or low permeability - The soils are difficult to till, absorb water slowly or the depth of the rooting zone is restricted.

E - erosion damage - Past damage from erosion limits agricultural use of the land.

F - fertility - Low natural fertility due to lack of available nutrients, high acidity or alkalinity, low exchange capacity, high levels of calcium carbonate or presence of toxic compounds.

I - inundation - Flooding by streams or lakes limits agricultural use.

M - moisture - A low moisture holding capacity, caused by adverse inherent soil characteristics, limits crop growth (not to be confused with climatic drought).

N - salinity - The soils are adversely affected by soluble salts.

P - stoniness - Stones interfere with tillage, planting, and harvesting.

R - shallowness to solid bedrock - Solid bedrock is less than three feet from the surface.

S - soil limitations - A combination of two or more subclasses D,F,M, and N.

T - adverse topography - Either steepness or the pattern of slopes limits agricultural use.

W - excess water - Excess water, other than from flooding, limits use for agriculture. The excess water may be due to poor drainage, a high water table, seepage or runoff from surrounding areas.

X - minor cumulative limitations - Soils having a moderate limitation due to the cumulative effect of two or more adverse characteristics which individually would not affect the class rating. (This subclass is always used alone and only one level below the best possible class in a climatic sub-region.)

FOR. CAPAB.

Nova Scotia's variation after ref. to CLI

FOREST LAND CAPABILITY
INPUT PRIORITY MAP
CAPE BRETON NORTH SUBDIVISION

Mix of CLI class & subclass.

LEGEND

INPUT PRIORITY CLASS	GENERAL SOIL TYPE	POTENTIAL WOOD PRODUCTION CU FT/AC/YR.
1	DEEP, WELL DRAINED, HIGH FERTILITY	71-90 CLI
2	DEEP, WELL DRAINED, MED. FERTILITY	51-70
3	SHALLOW, WELL DRAINED, MED. FERTILITY	51-70
4	DEEP, WELL DRAINED, CLIMATICALLY EXPOSED MED. FERTILITY	51-70
5	IMPERFECTLY DRAINED	51-70
6	DEEP, WELL DRAINED, LOW FERTILITY	31-50
7	SHALLOW WELL DRAINED, LOW FERTILITY	31-50
8	CLIMATICALLY EXPOSED, LOW FERTILITY	31-50
9	POORLY DRAINED	31-50
10	WET AND DRY SOILS, LOW FERTILITY	31-50
11	UNPRODUCTIVE DUE TO EXTREMES OF CLIMATE, MOISTURE, STONINESS, ETC.	0-30

SCALE

MILES 2 0 2 4 6 MILES

land without
ractices. It
h improved
symbol may
nt changes

MMERCIAL

-drained to
d are naturally
ey frequently
not subject to
will usually

oductivity into
(171 to 190),
necessary.
AL FORESTS.
edium to fine

e) are:
; depth, some-
or adverse soil
cubic feet per

APPENDIX II

SUMMARY OF
LAND CAPABILITY CLASSIFICATION FOR FORESTRY

In this classification all mineral and organic soils are grouped into one of seven classes based upon their inherent ability to grow commercial timber. The best lands of Canada for commercial tree growth will be found in Class 1; those in Class 7 cannot be expected to yield timber in commercial quantities; these classes represent the extremes. Because of unsuitable climate no Class 1 lands will be found in several regions of Canada, and in certain regions the Class 2 areas will be too small to show at the chosen scales of mapping.

Important factors on which classification is based are:

- All known or inferred information about the unit including subsoil, soil profile, depth, moisture, fertility, landform, climate and vegetation.
- A productivity range associated with each capability class based on the mean annual increment of the best species, or group of species, adapted to the site at, or near, rotation age. Productivity classes are expressed in gross merchantable cubic foot volume to a minimum diameter of four inches. Thinnings, bark, and branch wood are not included. The productivity as expressed is that of "normal", i.e., fully-stocked stands. It may be assumed that only good management would have produced stands of this nature.
- The following factors are not considered: location, access, distance to markets, size of units, ownership, present state or special crops such as Christmas trees.

The classes are based on the natural state of the land without improvements such as fertilization, drainage or amelioration practices. It is realized that in some instances productivity may change with improved forest management to the degree that limitations shown in the symbol may alter and/or class changes may take place. However, significant changes will only be achieved through costly and continuing practices.

CLASSES

1 - LANDS HAVING NO IMPORTANT LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS

Soils are deep, permeable, of medium texture, moderately well-drained to imperfectly drained. They have good water-holding capacity and are naturally high in fertility. Their topographic position is such that they frequently receive seepage and nutrients from adjacent areas. They are not subject to extremes of temperature or evapotranspiration. Productivity will usually be greater than 111 cubic feet per acre per year.

When required this class may be subdivided on the basis of productivity into Classes 1 (111 to 130), 1a (131 to 150), 1b (151 to 170), 1c (171 to 190), 1d (191 to 210), and by 20 cubic foot classes thereafter, as necessary.

2 - LANDS HAVING SLIGHT LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS.

Soils are deep, well-drained to moderately well-drained, of medium to fine texture and have good water-holding capacity.

The most common limitations (all of a relatively slight nature) are: adverse climate, soil moisture deficiency, restricted rooting depth, somewhat low fertility, and the cumulative effects of several minor adverse soil characteristics. Productivity will usually be from 90 to 110 cubic feet per acre per year.

Classes 1-3 CLI classes as critical forestry class in Coll. R

3 - LANDS HAVING MODERATE LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS

Soils may be deep to somewhat shallow, well to imperfectly drained, of medium to fine texture with moderate to good water-holding capacity. They may be slightly low in fertility or suffer from periodic moisture imbalances.

The most common limitations are: adverse climate, restricted rooting depth, moderate deficiency or excess of soil moisture, somewhat low fertility, impeded soil drainage, exposure (in maritime areas) and occasional inundation.

Productivity will usually be from 71 to 90 cubic feet per acre per year.

4 - LANDS HAVING MODERATELY SEVERE LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS

Soils may vary from deep to moderately shallow, from excessive through imperfect to poor drainage, from coarse to fine texture, from good to poor moisture holding capacity, from good to poor structure and from good to low natural fertility.

The most common limitations are: moisture deficiency or excess, adverse climate, restricted rooting depth, poor structure, excessive carbonates, exposure, or low fertility.

Productivity will usually be from 51 to 70 cubic feet per acre per year.

5 - LANDS HAVING SEVERE LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS

Soils are frequently shallow to bedrock, stoney, excessively or poorly drained, of coarse or fine texture. They may have poor moisture holding capacity and be low in natural fertility.

The most common limitations (often in combination) are: moisture deficiency or excess, shallowness to bedrock, adverse regional or local climate, low

5 cord/ac.

natural fertility, exposure particularly in maritime areas, excessive stoniness and high levels of carbonates.

Productivity will usually be from 31 to 50 cubic feet per acre per year.

6 - LANDS HAVING SEVERE LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS

1st shot (even if takes 200 yrs & grows to commercial size)

No critical capability

The mineral soils are frequently shallow, stoney, excessively drained, of coarse texture and low in fertility. A large percentage of the land in this class is composed of poorly drained organic soils.

11 330

The most common limitations (frequently in combination) are: shallowness to bedrock, deficiency or excess of soil moisture, high levels of soluble salts, low natural fertility, exposure, inundation and stoniness.

Viable marginal

Productivity will usually be from 11 to 30 cubic feet per acre per year.

7 - LANDS HAVING SEVERE LIMITATIONS WHICH PRECLUDE THE GROWTH OF COMMERCIAL FORESTS

Mineral soils are usually extremely shallow to bedrock, subject to regular flooding, or contain toxic levels of soluble salts. Actively eroding or extremely dry soils may also be placed in this class. A large percentage of the land is very poorly drained organic soils.

The most common limitations are: shallowness to bedrock, excessive soil moisture, frequent inundation, active erosion, toxic levels of soluble salts, and extremes of climate or exposure.

Productivity will usually be less than 10 cubic feet per acre per year.

SUBCLASSES

Except for Class 1, subclasses indicate the kind of limitation for each class. The subclasses are as follows:

(1) Climate - Denotes a significant adverse departure from what is considered the median climate of the region, that is, a limitation as a result of local climate. Adverse regional climate is expressed by the class level.

A - droughty or arid conditions as a result of climate;

C - a combination of more than one climatic factor, or when it is not possible to decide which of two or more features of climate is significant;

H - low temperatures, that is too cold;

U - exposure.

(2) Soil Moisture - Denotes a soil moisture condition less than optimum for the growth of commercial forests, but not including inundation.

M - soil moisture deficiency;

W - soil moisture excess;

X - a pattern of "M" and "W" too intimately associated to map separately.

(3) Permeability and Depth of Rooting Zone - Denotes limitations of soil permeability or physical limitation to rooting depth.

D - physical restriction to rooting by dense or consolidated layers, other than bedrock;

R - restriction of rooting zone by bedrock;

Y - intimate pattern of shallowness and compaction or other restricting layers.

(4) Other Soil Factors - Denote factors of the soil which, individually or in combination, adversely affect growth.

E - actively eroding soils;

F - low fertility;

I - soils periodically inundated by streams or lakes;

L - excessive levels of calcium;

N - excessive levels of toxic elements such as soluble salts;

P - stoniness which affects forest density or growth;

S - a combination of soil factors, none of which by themselves would affect the class level but cumulatively lower the capability class.

TREE SPECIES INDICATORS not necessarily there

The species which can be expected to yield the volume associated with each class are shown as part of the symbol. Only indigenous species adapted to the region and land are shown. Where only one species indicator is shown in a complex, it applies to all classes. Examples of species symbols are:

pP ..... Ponderosa Pine

alF ..... Alpine Fir

lP ..... Lodgepole Pine

D ..... Douglas Fir

eS ..... Engelmann Spruce

APPENDIX III

SUMMARY OF

LAND CAPABILITY CLASSIFICATION FOR RECREATION

Seven classes of land are differentiated on the basis of the intensity of outdoor recreational use, or the quantity of outdoor recreation which may be generated and sustained per unit area of land per annum under perfect market conditions.

"Quantity" may be measured by visitor days, a visitor day being any reasonable portion of a 24 hour period during which an individual person uses a unit of land for recreation.

"Perfect market conditions" implies uniform demand and accessibility for all areas, which means that location relative to population centres and to present access do not affect the classification.

"Intensive and dispersed activities" are recognized. "Intensive activities" are those in which relatively large numbers of people may be accommodated per unit area, while "dispersed activities" are those which normally require a relatively larger area per person.

Important factors affecting the classification are:

- The purpose of the inventory is to provide a reliable assessment of the quality, quantity and distribution of the natural recreation resources within settled parts of Canada.
- The inventory is essentially of a reconnaissance nature, based on interpretation of aerial photographs, field checks, and available records. The finished maps should be interpreted accordingly.

- The inventory classification is designed in accordance with present popular preferences in non-urban outdoor recreation. Urban areas (generally over 1,000 population with permanent urban character), as well as some non-urban industrial areas, are not classified.
- Land is ranked according to natural capability under existing conditions, whether in natural or modified state. But no assumptions are made concerning its capability if it is given further major artificial modifications.
- Sound recreation land management and development practices are assumed for all areas in practical relation to the natural capability of each area.
- Water bodies are not directly classified. Their recreational values accrue to the adjoining shoreland or land unit.
- Opportunities for recreation afforded by the presence in an area of wildlife and sports fish are indicated in instances where reliable information was available. But the ranking does not reflect the biological productivity of the area; wildlife capability is indicated in a companion series of maps.

CLASSES

1 - LANDS IN THIS CLASS HAVE VERY HIGH CAPABILITY FOR OUTDOOR RECREATION

Class 1 lands have natural capability to engender and sustain very high annual use based on one or more recreational activities of an intensive nature.

Class 1 land units should be able to generate and sustain a level of use comparable to that evident at an outstanding and large bathing beach or a nationally known ski slope.

2 - LANDS IN THIS CLASS HAVE A HIGH CAPABILITY FOR OUTDOOR RECREATION

Class 2 lands have natural capability to engender and sustain high annual use based on one or more recreational activities of an intensive nature.

3 - LANDS IN THIS CLASS HAVE A MODERATELY HIGH CAPABILITY FOR OUTDOOR RECREATION

Class 3 lands have natural capability to engender and sustain moderately high annual use based usually on intensive or moderately intensive activities.

4 - LANDS IN THIS CLASS HAVE MODERATE CAPABILITY FOR OUTDOOR RECREATION

Class 4 lands have natural capability to engender and sustain moderate annual use based usually on dispersed activities.

5 - LANDS IN THIS CLASS HAVE MODERATELY LOW CAPABILITY FOR OUTDOOR RECREATION

Class 5 lands have natural capability to engender and sustain a moderately low total annual use based on dispersed activities.

6 - LANDS IN THIS CLASS HAVE LOW CAPABILITY FOR OUTDOOR RECREATION

Class 6 lands lack the natural quality and significant features to rate higher, but have the natural capability to engender and sustain low annual use based on dispersed activities.

7 - LANDS IN THIS CLASS HAVE VERY LOW CAPABILITY FOR OUTDOOR RECREATION

Class 7 lands have practically no capability for any popular types of recreation activity, but there may be some capability for very specialized activities with recreation aspects, or they may simply provide open space.

SUBCLASSES

Subclasses indicate the kinds of features which provide opportunity for recreation. They are, therefore, positive aspects of land and do not indicate limitations to use. Features may be omitted from a unit, either because of the imposed three-feature limit, or because their presence was unknown or unconfirmed.

The degree to which these features are judged capable, collectively, of generating and sustaining use for recreation determines the

class. The sequence in which they are listed indicates the order of their significance. Subordinate features may be relatively insignificant and the class of a unit should not be interpreted to indicate the capability of a second or third use.

The subclasses are:

A - land providing access to water affording opportunity for angling or viewing of sports fish;

B - shoreland capable of supporting family beach activities. In high class units this includes family bathing. In Classes 4 and 5, the activities may preclude bathing due to water temperature or other limitations;

C - land fronting on and providing direct access to waterways with significant capability for canoe tripping;

D - shoreland with deeper inshore water suitable for swimming, or boat mooring, or launching;

E - land with vegetation possessing recreational value;

F - waterfall or rapids;

G - significant glacier view or similar experience;

H - historic or pre-historic site;

J - area offering particular opportunities for gathering and collecting items of popular interest;

K - shoreland or upland suited to organized camping. This subclass is usually associated with other features;

L - interesting landform features other than rock formations;

M - frequent small water bodies, or continuous streams occuring in upland areas;

N - land (usually shoreland) suited to family or other recreation lodging use;

O - land which affords an opportunity for viewing of upland wildlife;

P - areas exhibiting cultural landscape patterns of agricultural, industrial or social interest;

Q - areas exhibiting variety, in topography or land and water relationships, which enhances opportunities for general outdoor recreation such as hiking and nature study or for aesthetic appreciation of the area;

R - interesting rock formations;

S - a combination of slopes, snow conditions and climate providing downhill skiing opportunities;

T - thermal springs;

U - shoreland fronting water accommodating yachting or deep water boat tripping;

V - a vantage point or area which offers a superior view relative to the class of the unit(s) which contain it, or a corridor or other area which provides frequent viewing opportunities;

W - land affording opportunity for viewing of wetland wildlife;

X - miscellaneous features with recreational capability;

Y - shoreland providing access to water suitable for popular forms of family boating;

Z - areas exhibiting major, permanent, non-urban man-made structures of recreational interest.

APPENDIX IV

SUMMARY OF
LAND CAPABILITY CLASSIFICATION FOR UNGULATES

In general, the needs of all ungulates are similar; the individual of each species requires sufficient amounts of the proper food, protective cover, and space to survive, grow, and reproduce. The land's ability to meet these needs is determined by the individual requirements of the species, or group, under consideration, the physical characteristics of the land, and factors, such as climatic, which influence plant and animal life.

The land is divided into units on the basis of physiographic characteristics important to wild ungulates. The degree of limitation associated with each unit determines its capability class. The subclass denotes the primary factor that causes the limitation.

This classification system is based on two important considerations:

- Capability ratings are established on the basis of the optimum vegetational stage (successional stage) that can be maintained with good wildlife management practices.
- Capability ratings assigned do not reflect present land use (except in extreme cases such as heavily populated urban areas), ownership, lack of access, distance from cities, or amount of hunting pressure.

CLASSES

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

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

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

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

Capability on these lands is high, but less than Class 1. Slight limitations are due to climatic, or other factors.

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

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 limiting the mobility of ungulates, or the availability of food and cover.

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

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.

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 factors of climate, soil moisture, fertility, depth

to bedrock or other impervious layer, topography, flooding, exposure, and adverse soil characteristics.

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.

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:

A - aridity - Drought or aridity that adversely affects the habitat;

C - climate - A combination of climatic factors acting to reduce favourable habitat, and the production and survival of ungulates;

Q - snow depth - Excessive snow depth that reduces the mobility of ungulates and availability of food plants;

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:

F - fertility - Lack of nutrients in the soil for optimum plant growth;

G - landform - Poor distribution or interspersion of landforms necessary for optimum ungulate habitat;

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

M - soil moisture - Poor soil moisture, either excessive or deficient;

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

R - soil depth - Restriction of the rooting zone by bedrock or other impervious layers;

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

UNGULATE INDICATOR SPECIES

Species of ungulates for which capability ratings are assigned are shown by the following symbols:

A ..... Antelope

C ..... Caribou

D ..... Deer (white-tailed deer, Columbia black-tailed deer, mule deer)

E ..... Elk

G ..... Mountain Goat

M ..... Moose

S ..... Mountain Sheep

APPENDIX V

SUMMARY OF
LAND CAPABILITY CLASSIFICATION FOR WATERFOWL

In general, the needs of all waterfowl are similar; the individual of each species requires sufficient amounts of the proper food, protective cover, and space to survive, grow, and reproduce. The land's ability to meet these needs is determined by the individual requirements of the species, or group under consideration, the physical characteristics of the land, and other factors that influence the plant and animal communities.

The land is divided into units on the basis of physiographic characteristics important to waterfowl populations. The degree of limitation associated with each unit determines its capability class. The subclass denotes the primary factor that causes the limitation.

This classification system is based on two important considerations:

- Capability ratings are established on the basis of the optimum vegetational stage (successional stage) that can be maintained when good wildlife management is practiced.
- Capability ratings assigned do not reflect present land use (except in extreme cases such as heavily populated urban areas), ownership, lack of access, distance from cities, or amount of hunting pressure.

CLASSES

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

Capability on these lands is very high. They provide a wide variety and abundance of important habitat elements. Rolling topography is well-suited to the formation of wetlands. Predominant water areas on these lands include shallow and deep permanent marshes, and deep, open water areas with well-developed marsh edges.

1S - Water areas in this special class are Class 1 areas also serving as important migration stops.

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

Capability on these lands is high but less than Class 1. Slight limitations are due to climate, fertility, or soil permeability. Topography tends to be more undulating than rolling; a higher proportion of the water areas than in Class 1 are small temporary ponds or deep, open water areas with poorly developed marsh edges.

2S - Water areas in this special class are Class 2 areas also serving as important migration stops.

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 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.

3S - Water areas in this special class are Class 3 areas also serving as important migration stops.

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.

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 mainly temporary ponds, or deep, open waters with poorly developed marsh edges, or both.

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.

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.

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 nearly or completely precluded.

SUBCLASSES

With the exception of Class 1, and special Class 3M, 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 may affect either the waterfowl or the ability of the land to produce suitable habitat conditions.

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

B - free-flowing water - The limitation is usually due to fast or excess water flow, which inhibits development of marsh habitat along stream edges. It may also be due to a lack of flow through low-lying land, which results in poor quality habitat.

C - climate - A combination of adverse climatic factors may act to reduce favourable habitat, and thus the production and survival of waterfowl.

F - fertility - The limitation indicates insufficient nutrients in the soil and water for optimum plant growth.

G - landform - Poor distribution or interspersion of marshes or basins may be a limiting factor of the land and may prevent the development of an optimum waterfowl habitat.

I - inundation - The limiting factor is excessive water level fluctuation, or tidal action, adversely affecting the habitat or the nesting success of waterfowl.

J - reduced marsh edge - The limitations are topographic features adversely affecting development of optimum marsh conditions along the edge of water areas.

M - soil moisture - Poor water holding capacity of soils, adversely affecting the formation and permanency of water areas.

N - adverse soil and water characteristics - Excessive salinity, alkalinity, acidity, lack of essential trace elements, or abundance of toxic elements may limit the development of plant and animal communities essential for waterfowl production.

R - soil depth - Restriction of the rooting zone by bedrock or other impervious layers may limit development of suitable plant communities.

T - adverse topography - Steepness or flatness of the land may limit the development or permanency of wetlands.

Z - water depth - Excessively deep or shallow waters may limit the development of optimum waterfowl habitat.

APPENDIX VI

SUMMARY OF CAPABILITY CLASSIFICATION OF FRESH WATERS FOR SPORT FISH

Because sport fish are carnivores at the peak of the food chain, their yield capability is low in terms of energy in the system. Capability of individual water bodies for sport fish depends on both the habitat of the food chain organisms, and of the sport fish themselves.

Sport fish capability of individual water areas with equal inputs of solar energy is classified on the basis of nutrients. The class is determined by the degree to which physical and chemical factors limit the habitat of the food chain organisms and the sport fish. Subclasses are the factors which cause the limitation.

Research data, recorded observations and experience are used as the basis for placing water areas in capability classes and subclasses. Where such information is lacking, classes and subclasses are assigned on the basis of experience gained with similar water areas elsewhere.

Good sport fish management practices, which are feasible and practical, are assumed. Present production is useful for classification only when it reflects capability of sport fish production.

Present use (including pollution), ownership, access, angling pressure or distance from roads or cities offer no limitation to the capability of the water for sport fish.

Capability ratings are subject to change as new information becomes available.

CLASSES

1 - WATERS IN THIS CLASS HAVE NO IMPORTANT LIMITATIONS TO THE PRODUCTION OF SPORT FISH

Class 1 waters are fertile, fairly shallow, or have ample shoal areas. They are warm, well oxygenated and free of inorganic turbidity.

2 - WATERS IN THIS CLASS HAVE SLIGHT LIMITATIONS TO THE PRODUCTION OF SPORT FISH

Class 2 waters have a good level of nutrients but may have slight limitations due to physical and/or chemical factors.

3 - WATERS IN THIS CLASS HAVE MODERATE LIMITATIONS TO THE PRODUCTION OF SPORT FISH

Class 3 waters are relatively poor in nutrients, with moderate to severe limitations to game fish production.

4 - WATERS IN THIS CLASS HAVE SEVERE LIMITATIONS TO THE PRODUCTION OF SPORT FISH

Class 4 waters are poor in nutrients, and have severe limitations to game fish production.

SUBCLASSES

D - depth - Limitations due to depth could include mean depth, littoral development, or basin shape.

F - flow - Limitations include irregular water flow in streams, water level fluctuations or changes in flushing rate.

L - light penetration - Limitation due to inorganic turbidity.

N - nutrient - Limitation due to lack of nutrient in the water.

O - oxygen - Limitation due to shortage of dissolved oxygen at all seasons of year. Extreme cases of oxygen deficiency show up through a winter or summer kill of fish populations.

T - temperature - Limitation may be due to low surface temperature, or to unfavourable thermal stratification.

S - special factors - Moderate limitations due to a single factor, or the cumulative effect of two or more adverse characteristics, which may affect class ratings. The factors may include short shoreline compared to area, ion imbalance, or lack of special physical features such as spawning facilities.

APPENDIX VII

SUMMARY OF CLASSIFICATION FOR
PRESENT LAND USE

Category		Symbol
I	URBAN	
	Land used for urban and associated non-agricultural purposes.	
	1. Built-up Area (Parks and other open spaces within built-up areas are included.)	B
	2. Mines, Quarries, Sand and Gravel Pits (Land used for the removal of earth materials.)	E
	3. Outdoor Recreation (Golf courses, parks, beaches, summer cottage areas, game preserves and historical sites.)	O
II	AGRICULTURAL LANDS	
	1. Horticulture, Poultry and Fur Operations Land used for intensive cultivation of vegetables and small fruits including market gardens, nurseries, flower and bulb farms, and sod farms. Large scale commercial fur and poultry farms are also included because of their specialized agricultural nature.	H
	2. Orchards and Vineyards Land used for the production of tree fruits, hops and grapes.	G
	3. Cropland Land used for annual field crops: grain oilseeds, sugar beets, tobacco, potatoes, field vegetables, associated fallow, and land being cleared for field crops.	A

Category		Symbol
	4. Improved Pasture and Forage Crops Land used for improved pasture or for the production of hay and other cultivated fodder crops including land being cleared for these purposes.	P
	5. Rough Grazing and Rangeland	K
	(a) Areas of natural grasslands, sedges, herbaceous plants and abandoned farmland whether used for grazing or not. Bushes and trees may cover up to 25 per cent of the area. If in use, intermittently-wet, hay lands (sloughs or meadows) are included.	
	(b) Woodland grazing: If the area is actively grazed and no other use dominates, in some grassy, open woodlands, bushes and trees may somewhat exceed 25 per cent cover.	
III	WOODLAND	
	Land covered with tree, scrub or bush growth, including:	
	1. Productive Woodland Wooded land with trees having over 25 per cent canopy cover and over approximately 20 feet in height. Plantations and artificially reforested areas are included regardless of age.	T
	2. Non-Productive Woodland Land with trees or bushes exceeding 25 per cent Crown cover, and shorter than approximately 20 feet in height. Much cut-over and burned-over land is included.	U
IV	WETLAND	
	Swamp, Marsh or Bog Open wetlands, except those which frequently dry up, and show evidence of grazing or hay cutting. (See K Agricultural Lands.)	M

Category		Symbol
V	UNPRODUCTIVE LAND	
	Land which does not, and will not, support vegetation. e.g. eroded soil or rock and active depositional features.	
	1. Sand (Sand bars, sand flats, dunes, beaches.)	S
	2. Rock and Other Unvegetated Surfaces (Rock barrens, badlands, alkali flats, gravel bars, eroded river banks, mine dumps.)	L
VI	WATER	Z

APPENDIX VIII

RECOMMENDATION BY THE "RESOURCES FOR TOMORROW" CONFERENCE AND SENATE OF CANADA SPECIAL COMMITTEE ON LAND USE

"RESOURCES FOR TOMORROW" CONFERENCE,
MONTREAL, OCTOBER 23-28, 1961.

Agriculture Workshop A - Review and Conclusions
(Vol. 3, p. 63)

The Workshop agreed that it is highly desirable that a national policy on agricultural land and water use, including consideration of regional requirements, be developed. Such a national policy on agricultural land and water use should be developed in relation to other resources as part of an over all plan for all renewable resources.

Agriculture Workshop B - Review and Conclusions
(Vol. 3, pp. 71-72)

After some discussion of reports from earlier sessions, the Workshop formulated the following recommendations for the consideration of the Conference Steering Committee:

1. It is necessary that each province compile all its existing information and data pertinent to the use of land.
2. These data should be evaluated by the provinces and the evaluations integrated on a national basis with a view to achieving uniform standards.
3. The evaluations will indicate the need for additional surveys and research to complete the inventories.

Forestry Workshop B - Discussion
(Vol. 3, p. 107)

The group then reached consensus on the following over all conclusions and guidelines:

1. Type and intensity of management of forest land. In order to establish the basis for decisions on the type and intensity of forest land management, it is agreed that for the country as a whole:
   (a) Criteria of economic productivity be defined, taking into consideration such factors as productive capacity of land and access to markets.
   (b) A forest land-use classification be made in which criteria are taken into account.
   (c) A study be made of trends in social and economic pressures developing, with regard to the use of forest land in Canada.

Wildlife Workshop A - Lead-off Speaker
(Mr. Harper, Vol. 3, p. 116)

It would seem that a nation-wide program of land use planning with all resource interests represented will be essential before any new large scale programs of resource development occur. An inventory of wildlife resources would then indicate what we have, and greatly assist us in planning for what we need.

Recreation Workshop A - Lead-off Speaker
(Mr. MacDonald, Vol. 3, p. 172)

An organization established to provide an adequate recreational resource base cannot put forth its best effort unless it has the tools to work with, and the tool in this case is accurate information...There is a

need for basic research in the relationship of natural environment to recreation, a present recreation land-use inventory and a recreation land-use capability inventory.

Recreation Workshop A - Discussion
(Vol. 3, p. 175)

There is a need for fundamental studies. The Workshop agreed unanimously that knowledge and information in certain basic fields is inadequate. These basic fields include the following as they apply to recreation: the potentialities and limitations of the supply of renewable resources....

The clear need is for a comprehensive and balanced research program for recreation, including (but not limited to) the following:

(a) Present recreation land-use inventory.

(b) Recreation resource-capability inventory. To be determined here, are the extent and quality of the resource base suitable for various types of public and private recreation development. Specific resource areas proposed for study were: the shorelines of the Atlantic Provinces and Great Lakes; the Territories and Arctic Archipelago; and the regional resources within a 50 to 100 mile radius of large urban centres.

Recreation Workshop B - Discussion
(Vol. 3, p. 185)

There was a general agreement that three broad deficiencies hampered the management of renewable resources for recreational purposes. First was lack of knowledge concerning the potentialities and limitations of the supply of renewable resources and the present and future character of

demand for their use.... Within this framework (inventories), the Workshop suggested specific projects:

(a) A recreation land-use inventory, designed to reveal the present extent, location and accessibility of public and private resources for recreation purposes.

(b) A recreation land-use capability inventory, designed to reveal the extent and quality of the resource base throughout Canada for varied recreational development.

Research Co-ordinators' Joint Statement
(Vol. 3, Appendix II)

The Conference affirmed the following needs:

1. To complete a country-wide assessment of resource supplies, which may be set against long-term assessment of resource needs.

2. To make possible systematic studies of:
   (a) Problems of resource management and development in all fields;
   (b) economic potentials and social needs in all regions.

PROCEEDINGS OF THE SPECIAL COMMITTEE OF THE SENATE ON LAND USE IN CANADA
NO. 4, AUGUST 20, 1958.

Recommendations:

1. That it be called to the attention of the proper authorities the need of a systematic land-use survey, based upon appropriate factors, to provide for an economic classification of the land according to its suitability.

This recommendation was restated in Proceeding No. 12, July 8, 1959.

APPENDIX IX

CO-OPERATING FEDERAL AND PROVINCIAL GOVERNMENT AGENCIES

GOVERNMENT OF CANADA

Department of Agriculture

- Departmental Administration
  - Data Processing Section
- Economics Branch
- Research Branch

Department of Energy, Mines and Resources

- Inland Waters Branch
- Policy and Planning Branch

Department of Finance

Department of Fisheries and Forestry

- Canadian Forestry Service

Department of Indian Affairs and Northern Development

- Canadian Wildlife Service
- National and Historic Parks Branch

Department of Regional Economic Expansion

- Administration Directorate
- Agricultural Rehabilitation and Development Act
- Maritime Marshland Rehabilitation Administration
- Planning Division
- Prairie Farm Rehabilitation Administration

Department of Trade and Commerce

- Dominion Bureau of Statistics

Department of Transport

Meteorological Branch

PROVINCIAL GOVERNMENT OF NEWFOUNDLAND

Department of Mines, Agriculture and Resources

Agriculture Branch

Resources Branch - Newfoundland Forest Service

PROVINCIAL GOVERNMENT OF PRINCE EDWARD ISLAND

Department of Agriculture

ARDA Administration

Department of Industry, Natural Resources and Fisheries

Department of Municipal Affairs and Tourist Development

PROVINCIAL GOVERNMENT OF NOVA SCOTIA

Department of Agriculture

ARDA Administration

Soil Survey Unit

Immigration and Land Settlement Services

Nova Scotia Agricultural College

Department of Lands and Forests

Forestry Branch

Parks Branch

Wildlife Conservation Branch

Department of Municipal Affairs

Assessment Branch

Department of Provincial Secretary

Director of Research

Nova Scotia Research Foundation

PROVINCIAL GOVERNMENT OF NEW BRUNSWICK

Interdepartmental New Brunswick ARDA Committee

Department of Agriculture

- Plant Industry Branch

Department of Natural Resources

- Fish and Wildlife Branch
- Forests Branch
- Parks Branch

PROVINCIAL GOVERNMENT OF QUEBEC

Department of Executive Council

- Quebec Planning of Development Bureau
- Office of the Provincial Committee of Canada Land Inventory
- ARDA Administration

Department of Lands and Forests

- Planning Branch
- Research Service
- Canada Land Inventory Branch
- Woods and Forests Branch
- Forest Inventory Service

Department of Agriculture and Colonization

- Research Service
- Soil Division

Department of Tourism, Fish and Game

- Wildlife Service
- Parks Branch
- Canada Land Inventory Branch

PROVINCIAL GOVERNMENT OF ONTARIO

Department of Agriculture and Food

- ARDA Branch
- Farm Economics, Co-operatives and Statistics Branch

Department of Lands and Forests

- Fish and Wildlife Branch
- Parks Branch
- Research Branch
- Lands and Surveys Branch
- Timber Branch

Department of Municipal Affairs

Department of Treasury and Economics

University of Guelph

- Department of Soil Science

University of Toronto

- Faculty of Forestry

PROVINCIAL GOVERNMENT OF MANITOBA

- Planning and Priorities Committee of Cabinet
- ARDA Administration

Department of Agriculture

- Extension Service Branch
- Publications and Statistics Branch
- Soils and Crops Branch

Department of Mines and Natural Resources

- Research and Planning Division
- Field Operations Division
- Mines and Departmental Services Division
- Water Control and Conservation Branch

Department of Municipal Affairs

- Assessment Branch
- Municipal Planning Branch

PROVINCIAL GOVERNMENT OF SASKATCHEWAN

Department of Agriculture

- ARDA Administration
- Lands Branch
- Research and Planning Branch
- Statistics Branch

Department of Municipal Affairs

- Saskatchewan Assessment Commission

Department of Natural Resources

- Forestry Branch
- Parks and Conservation Branch
- Wildlife Branch
- Resource Lands Branch

Saskatchewan Water Resources Commission

PROVINCIAL GOVERNMENT OF ALBERTA

Department of Agriculture

- Accounts Branch (Provincial Auditor)
- Conservation and Utilization Branch
- Conservation and Utilization Committee

Department of Lands and Forests

- Accounts Branch (Provincial Auditor)
- Fish and Wildlife Division
- Land Classification Section
- Parks Division
- Technical Division

University of Alberta

Alberta Institute of Pedology

PROVINCIAL GOVERNMENT OF BRITISH COLUMBIA

Department of Agriculture

Administration Division
ARDA Division
Soil Survey Division

Department of Lands, Forests and Water Resources

Forest Service
Lands Service
Water Resources Service

Department of Recreation and Conservation

Fish and Game Branch
Parks Branch

University of British Columbia

Faculty of Agriculture
Department of Plant and Soil Sciences
Faculty of Education
Department of Adult Education