LECTURE 2_21:
APR. 1, 2014

ENDANGERED SPECIES & PROTECTED AREAS

GLOBAL & NATIONAL RESPONSES TO LOSSES OF BIODIVERSITY, AND PROTECTED AREAS

Text Reference: Dearden and Mitchell (2012), Ch. 14, pp. 512-534.

Geography/Environmental Studies 1120/1140
T. Randall, Lakehead University, WA 2014

Guest Speaker (Wed, Apr. 2) (to Lakehead)

- **Dr. Jonathan Newman**

- Director, School of Environmental Sciences, University of Guelph

  "***Mission Accomplished or Mission Impossible: Predicting the Biological Impacts of Climate Change***"

  Wednesday, April 2, 2014, 3:00 p.m.,
  ATAC 2020

  All Welcome

New IPCC Report

- **Climate Change 2014: Impacts, Adaptation and Vulnerability**
  - The Summary for Policymakers of the Working Group II contribution to the Fifth Assessment Report was approved, and the full report accepted, by the IPCC on 30 March 2014.

- http://www.ipcc-wg2.gov/AR5/

IPCC: Intergovernmental Panel on Climate Change

ipcc
INTERGOVERNMENTAL PANEL ON climate change

CLIMATE CHANGE 2014:

IMPACTS, ADAPTATION, AND VULNERABILITY

Outline

Source: Dearden and Mitchell (2012)

- **Upcoming Class Lectures:**
  - March 25 & 27 (Biodiversity and Extinction Pressures)
  - ~~March 27~~ April 1 (Global and National Responses to Losses of Biodiversity & Map Literacy 6)
  - ~~April 1 (National and Personal Perspectives/Can-do's on the Challenges Ahead – environmental challenges~~)
  - April 3 (Course Review and Examination Hints)
- **Final Exam**
  - Tuesday, April 8th, 9 am to noon
  - Multiple Choice and Map Literacy Components
  - Cumulative from January

Recall from last lecture

Stressors on Biodiversity

BC Case Study

Biodiversity: (threat framework)

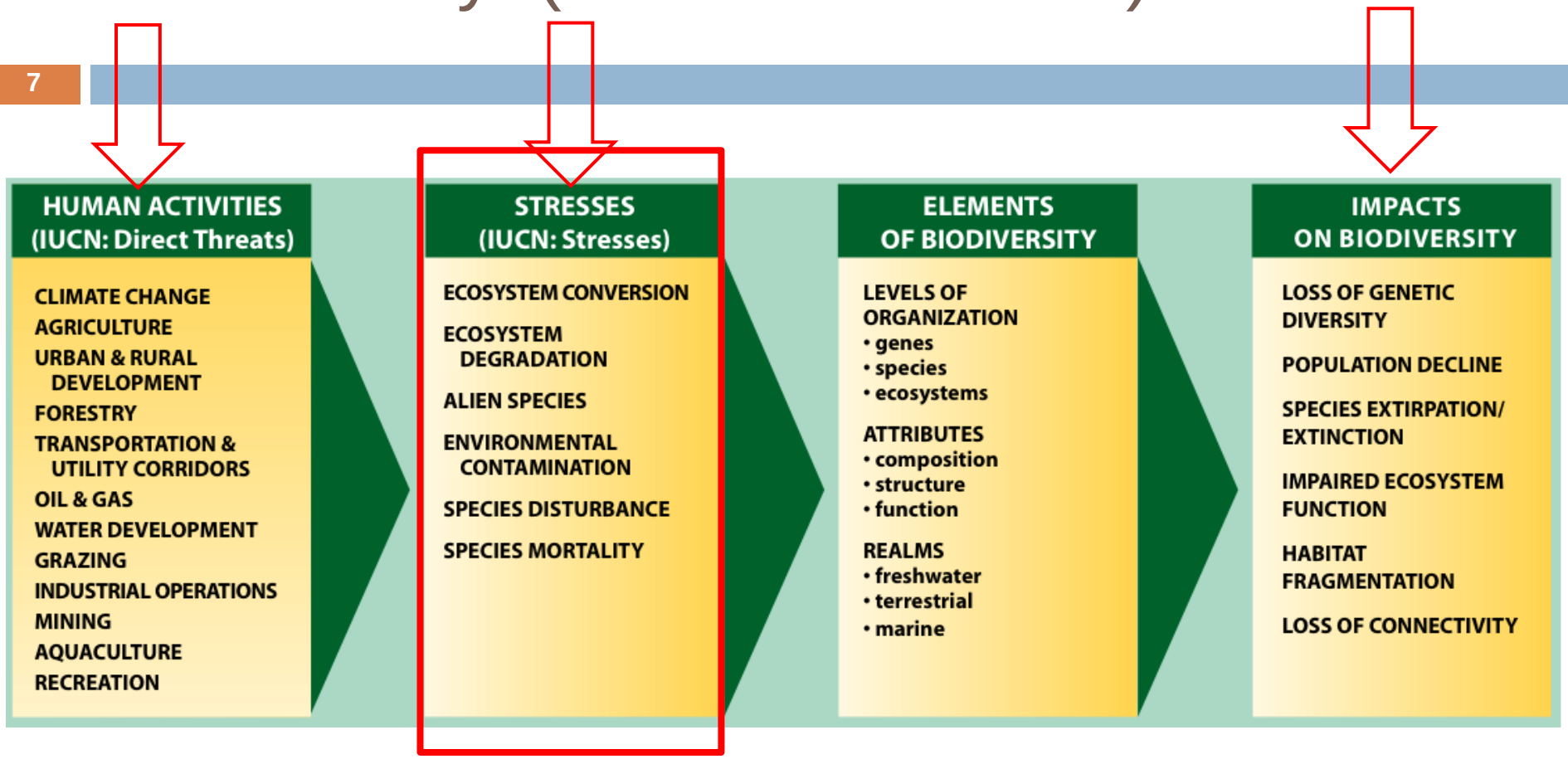


Fig. 31: The biodiversity threat framework.
Source: Austin *et al.* (2008)

IUCN = World Conservation Union

6 identified stressors on biodiversity (BC)

Major

1. Ecosystem Conversion
2. Ecosystem Degradation
3. Species Invasion

Other (lesser-ranked)

4. Environmental Contamination
5. Species Disturbance
6. Species Mortality

**"*Losses to biodiversity usually originate from more than one source / stressor*" (Austin *et al.*, 2008)

Ecosystem Conversion

- Direct and complete conversion of natural landscapes;
  - i.e., forest, wetlands, grasslands → human land uses
- Its magnitude varies spatially (map 12, next slide)
- Significant conversion in:
  - Southeast coast of Vancouver Island (Coastal Douglas-fir BGC zone)
  - Southern interior's Bunchgrass / Ponderosa Pine BGC zone
- Though small fraction of Province's land has been converted (~2%) these conversions are concentrated in the three rarest BGC zones (Table 25, next slide)

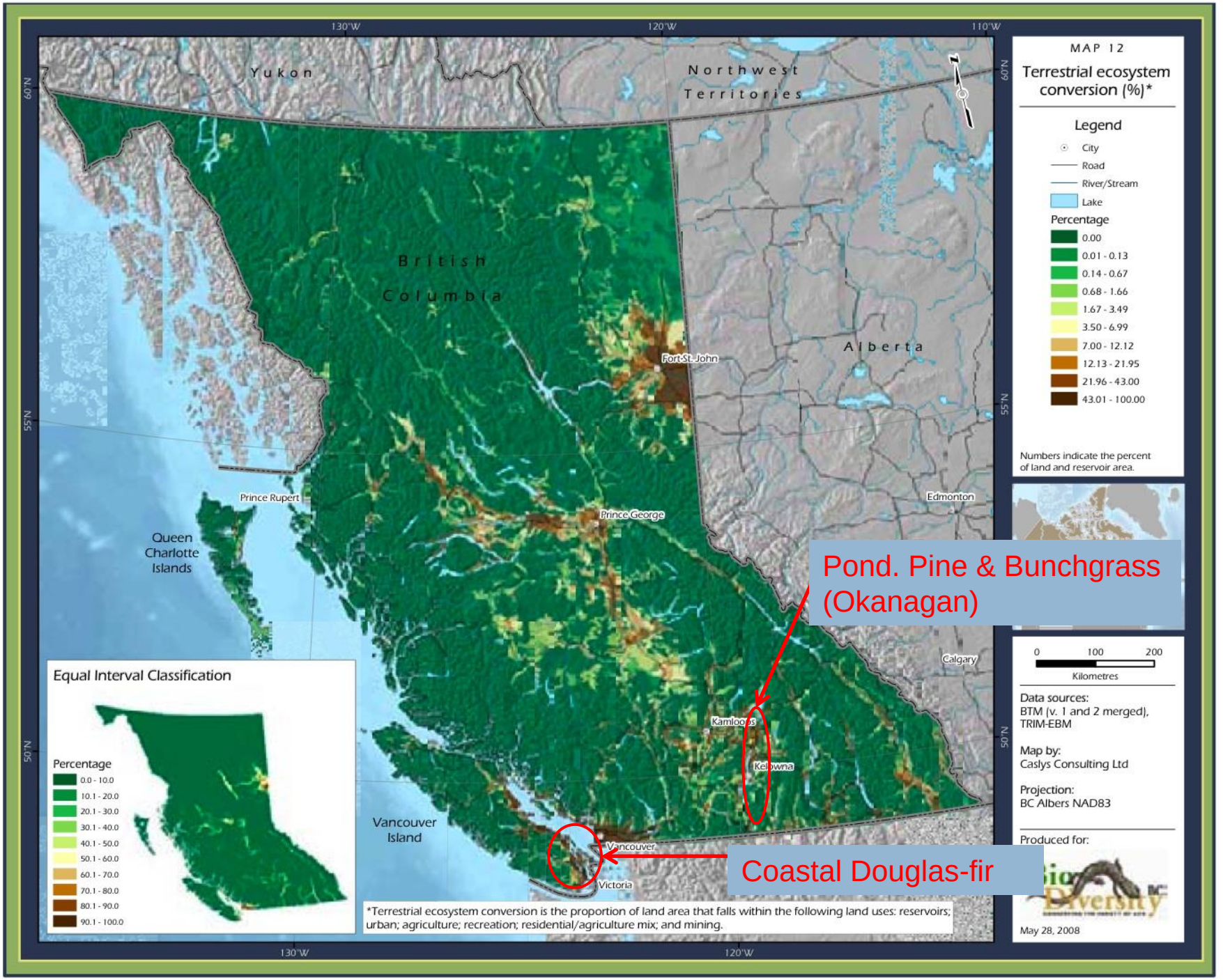
Biodiversity: (conversions by biogeoclimatic zone (excerpt of table only, top 6 by %)

TABLE 25. AREA OF TERRESTRIAL ECOSYSTEM CONVERSION IN B.C. SINCE EUROPEAN CONTACT.

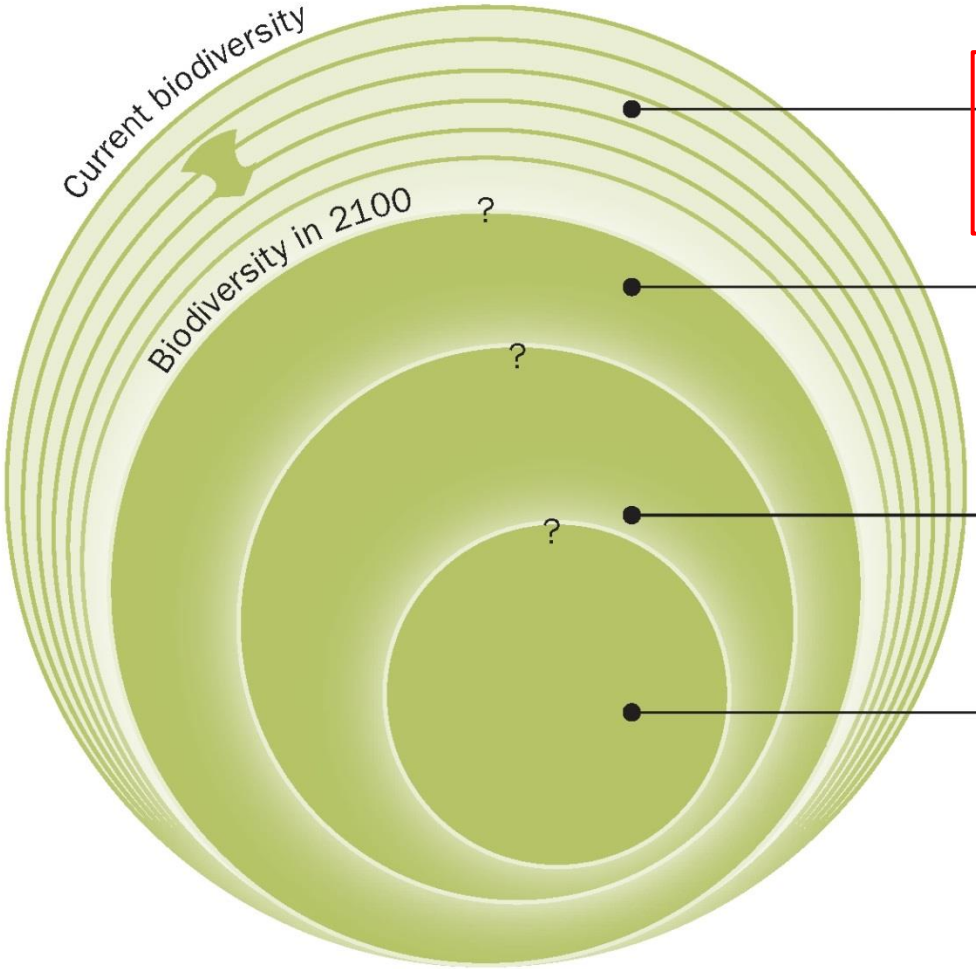
Biogeoclimatic Zone	Conservation Status	Total Land Area Before Ecosystem Conversion (Km2)	Area Of Ecosystem Conversion (Km2)	Area Of Ecosystem Remaining (Km2)	Percent Of Land Area Converted To Human Uses
Coastal Douglas-fir	Imperilled (G2)	2,561	1,251	1,310	49%
Bunchgrass	Imperilled (G2)	2,579	531	2,048	21%
Ponderosa Pine	Imperilled/vulnerable (G2/G3)	3,513	617	2,896	18%
Interior Douglas-fir	Vulnerable (G3)	42,721	2,302	40,419	5%
Boreal White and Black Spruce	Apparently secure (G4)	159,473	6,106	153,367	4%
Sub-boreal	Apparently secure	95,551	3,206	92,345	3%

Table. 25: Areas of terrestrial ecosystem conversion in BC since European Contact. … based on imagery taken between 1991 and 2001

Source: Austin *et al.* (2008)


MAP 12
Terrestrial ecosystem conversion (%)*
Legend
City
Road
River/Stream
Lake
Percentage
0.00
0.01 - 0.13
0.14 - 0.67
0.68 - 1.66
1.67 - 3.49
3.50 - 6.99
7.00 - 12.12
12.13 - 21.95
21.96 - 43.00
43.01 - 100.00
Numbers indicate the percent of land and reservoir area.
Yukon
Northwest Territories
British Columbia
Alberta
Fort St. John
Prince Rupert
Prince George
Edmonton
Calgary
Kamloops
Kelowna
Vancouver
Victoria
Queen Charlotte Islands
Vancouver Island
Pond. Pine & Bunchgrass (Okanagan)
Coastal Douglas-fir
Equal Interval Classification
Percentage
0.0 - 10.0
10.1 - 20.0
20.1 - 30.0
30.1 - 40.0
40.1 - 50.0
50.1 - 60.0
60.1 - 70.0
70.1 - 80.0
80.1 - 90.0
90.1 - 100.0
0 100 200
Kilometres
Data sources:
BTM (v. 1 and 2 merged), TRIM-EBM
Map by:
Caslys Consulting Ltd
Projection:
BC Albers NAD83
Produced for:
May 28, 2008
*Terrestrial ecosystem conversion is the proportion of land area that falls within the following land uses: reservoirs; urban; agriculture; recreation; residential/agriculture mix; and mining.
130°W
120°W
110°W
60°N
55°N
50°N

The outer circle in the figure represents the present level of global biodiversity. Each inner circle represents the level of biodiversity under different value frameworks. Question marks indicate the uncertainties over where the boundaries exist and therefore the appropriate size of each circle under different value frameworks.



With consideration of non-utilitarian values:
Additional amount of biodiversity that should be conserved for non-utilitarian values such as intrinsic values and the equitable distribution of biodiversity.

With consideration of resilience, thresholds, and option values:
Additional amount of biodiversity that should be conserved for utilitarian reasons because of its role in maintaining capacity to adapt to change, as precaution against thresholds, and for option and existence values.

With consideration of the biodiversity role in ecosystem services:
Additional amount of biodiversity that should be conserved for utilitarian reasons because of its role in providing and sustaining ecosystem services.

Business as usual:
What will remain under current trends and policies given trade-offs with economic development, agriculture, etc.

Please note that the circle's sizes are only conceptual and do not correspond to any calculation or estimate.

Figure 14.1 | How much biodiversity will remain a century from now under different value frameworks? *Source: Millennium Ecosystem Assessment (2005).*

Source: Dearden and Mitchell (2012)

Responses to Biodiversity Losses

International Responses

National Response

Protected Areas

CITES (established 1973)

- CITES: Convention on International Trade in Endangered Species
- Initially ratified by >120 countries (incl. Canada)
- Establishes lists of species for which trade is controlled or monitored (e.g., orchids, parrots, primates)

Checklist of CITES Species

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments that aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

The Checklist of CITES Species allows the exploration of more than 35,000 species of animals and plants and their degree of protection.

START EXPLORING

http://checklist.cites.org/#

e.g., Elephant …

Elephantidae

ALL APPXS.

Elephas maximus

Chordata - Mammalia - Proboscidea - Elephantidae

- ENG - Asian Elephant, Indian Elephant
- SPA - Elefante asiático
- FRE - Eléphant d'Asie, Eléphant d'Inde

I
II
III

1975 1980 1985 1990 1995 2000 2005 2010

See reservations to CITES

ALL LOCATIONS

X CLEAR SEARCH

Bangladesh, Bhutan, Cambodia, China, India, Indonesia and 7 more.
See all...

Global Ban on Ivory Trade (since 1989)

Listed in Appendix I since 1975

Article II

Fundamental Principles

1. **Appendix I** shall include all species threatened with extinction which are or may be affected by trade. Trade in specimens of these species must be subject to particularly strict regulation in order not to endanger further their survival and must only be authorized in exceptional circumstances.

2. **Appendix II** shall include:

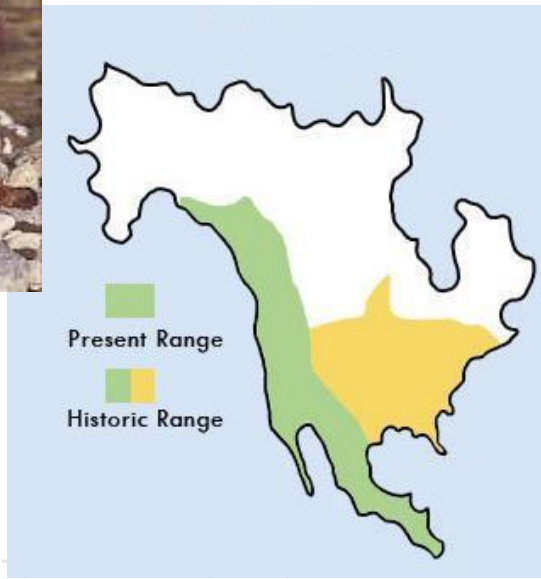
(a) all species which although not necessarily now threatened with extinction may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with their survival; and

(b) other species which must be subject to regulation in order that trade in specimens of certain species referred to in sub-paragraph (a) of this paragraph may be brought under effective control.

3. **Appendix III** shall include all species which any Party identifies as being subject to regulation within its jurisdiction for the purpose of preventing or restricting exploitation, and as needing the co-operation of other Parties in the control of trade.

Source: Article II of CITES
http://www.cites.org/eng/disc/text.php#II

e.g., Cougar … (North American

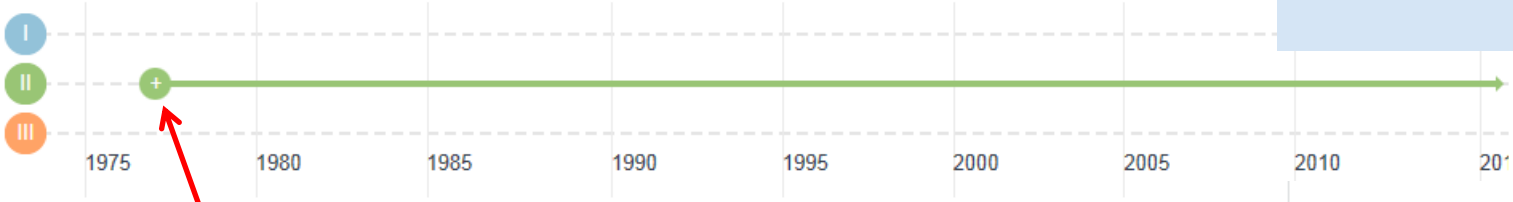


Puma concolor

(Felis concolor)

Chordata - Mammalia - Carnivora - Felidae

- ENG - Cougar, Deer Tiger, Mountain Lion, Puma, Red Tiger
- SPA - León americano, León bayo, Mitzli, Onza bermeja, Puma
- FRE - Puma



NB: this taxon is split-listed. See also timeline(s) for lower taxa.

Argentina, Belize, Bolivia (Plurinational State of), Brazil, Canada, Chile and 17 more.
See all...

of)
- Brazil
- Canada
- Chile
- Colombia
- Costa Rica
- Ecuador

Listed in Appendix II since 1977

Other International Treaties Focused on Biodiversity Conservation

- CITES (1973→
- Convention on Conservation of Migratory Species of Wild Animals (1982→
- Convention on Conservation of Antarctic Marine Living Resources (1982→
- International Convention for the Regulation of Whaling --- International Whaling Commission (1946 →
- International Convention for the Protection of Birds (1950 →

- ** **CBD: Convention on Biological Diversity** (1992→

Convention on Biological Diversity

- Output from Rio 1992, World Summit on Sustainable Development;
- Canada … 1st industrialized nation to sign the CBD;
- 168 signatories …
- Goal from Rio 1992
  - "to achieve a significant reduction (by 2010) in current rates of biodiversity loss"

http://www.cbd.int/convention/parties/list/default.shtml#tab=0

List of Parties

Note: Information on the *Nagoya – Kuala Lumpur Supplementary Protocol on Liability and Redress* is available under the *Cartagena Protocol* tab section.

Convention on Biological Diversity | Cartagena Protocol | Nagoya Protocol

Convention on Biological Diversity : 193 Parties (**168** Signatures)

* Note : **rtf** = Ratification, **acs** = Accession, **acp** = Acceptance, **apv** = Approval, **scs** = Succession

Please click on a column heading to select a sorting order

No.	Country Name	Signed	Party	
1.	Afghanistan	1992-06-12	2002-09-19	rtf
2.	Albania		1994-01-05	acs
3.	Algeria	1992-06-13	1995-08-14	rtf

Convention on Biological Diversity

- has 3 main objectives:
  1. The conservation of biological diversity
  2. The sustainable use of the components of biological diversity
  3. The fair and equitable sharing of the benefits arising out of the utilization of genetic resources

CBD (Canada), but not follow up conventions (at Cartagena, 2000 or Nagoya, 2010)

Canada - Country Profile

Hide map

Canada

Convention

Party since: 1992-12-04
By: Ratification

Cartagena Protocol

Non Party

Nagoya Protocol

Non Party

Nagoya – Kuala Lumpur Protocol

Non Party

- The ***Cartagena Protocol*** *on Biosafety to the Convention on Biological Diversity* is an international agreement which aims to ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biological diversity, taking also into account risks to human health. It was adopted on 29 January 2000

Convention on Biological Diversity

- Output from Rio 1992, World Summit on Sustainable Development;
- Canada … 1st industrialized nation to sign the CBD;
- Goal from Rio 1992
  - "to achieve a significant reduction (by 2010) in current rates of biodiversity loss"
- Follow up meeting (in 2010) in Nagoya, Japan
  - World had failed to slow down the rate of biodiversity loss

- The ***Nagoya Protocol*** *on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity* is an international agreement which aims at sharing the benefits arising from the utilization of genetic resources in a fair and equitable way, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding, thereby contributing to the conservation of biological diversity and the sustainable use of its components. It was adopted 29 October 2010 in Nagoya, Japan.

Growth in Protected Areas (global area)

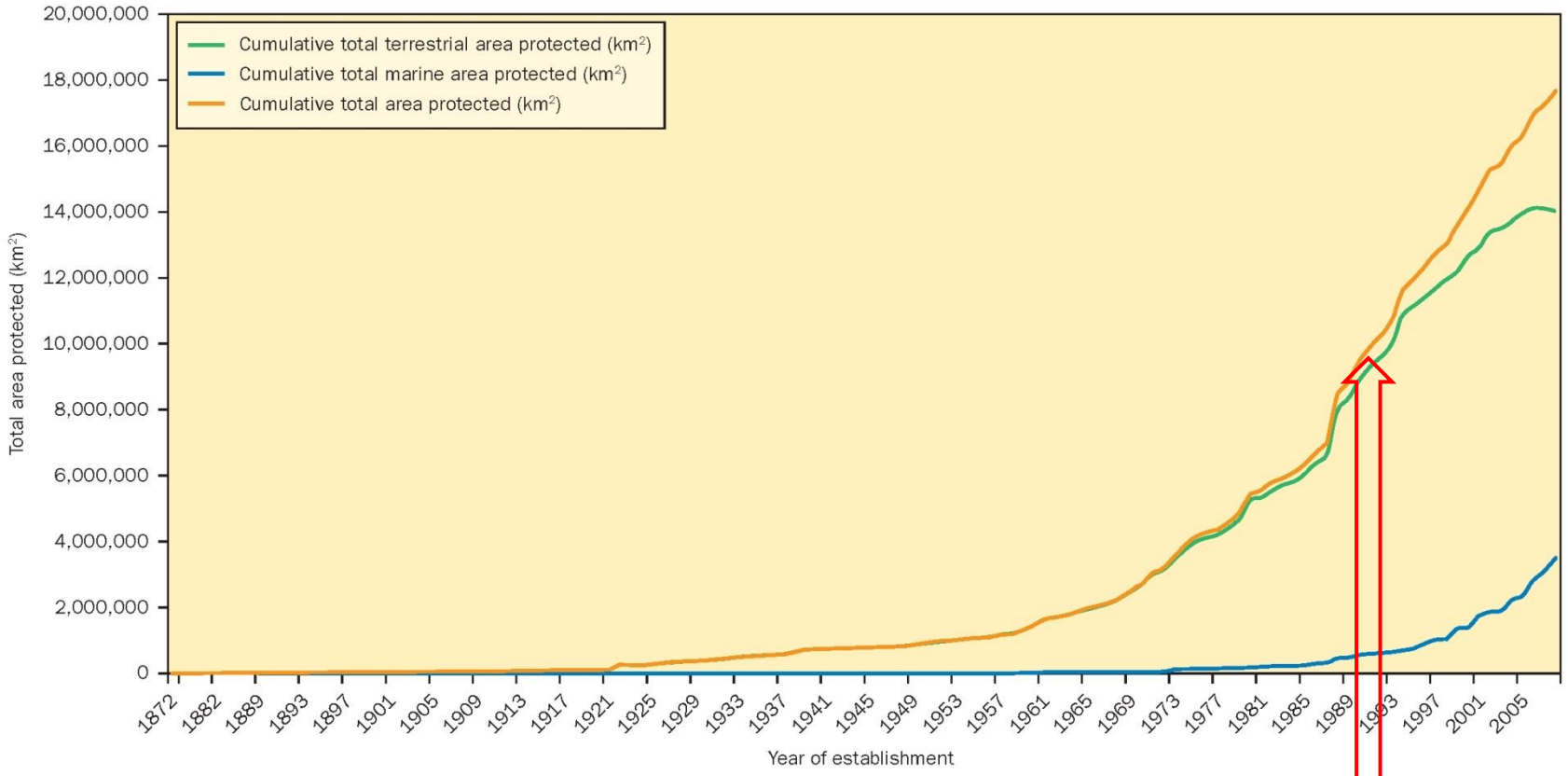


Figure 14.4 | Growth in nationally designated protected areas, 1872–2008. *Source: IUCN and UNEP-WCMC (2009) The World Database on Protected Areas (WDPA): January 2009. Cambridge, UK: UNEP-WCMC.*

Rio 1992
CBD 1993 →

Responses to Biodiversity Losses

International Responses

National Response (Canada)

Protected Areas

Government …

- 6 Canadian provinces have ‘endangered species’ legislation

  (NB 1974; QC 1989; MB 1990; NS 1998; NL 2001; ON 2007)
- Federally, SARA (Species at Risk Act), signed 2002
  - Part of Canada’s being a signatory to Rio in 1992;
- CESCC: the Canadian Endangered Species Conservation Council, comprised of:
  - Federal Ministers of Environment / Canadian Heritage / Fisheries & Oceans
  - Provincial / Territorial Ministers responsible for conservation + management of wildlife
- COSEWIC: Committee on the Status of Endangered Wildlife in Canada
  - Since 1976 … responsible to determine status of endangered species …

COSEWIC's assessment (2007, 2011)

Table 14.2 | Summary of COSEWIC's Assessment Results for the Risk Categories

	Extinct	Extirpated	Endangered	Threatened	Special concern	Total
Mammals	2	3	20	16	29	70 (69)
Birds	3	2	29	26	20	80 (71)
Reptiles		4	17	11	9	41 (38)
Amphibians		2	9	5	6	22 (20)
Fish	7	3	48	37	49	144 (111)
Lepidopterans Arthropods		3	29	6	6	44 (13)
Molluscs	1	2	19	3	6	31 (26)
Plants		3	94	48	40	185 (168)
Mosses	1	1	8	3	4	17 (16)
Lichens			5	3	7	15 (9)
Total	14 (13)	23 (22)	278 (225)	158 (141)	176 (155)	649 (556)

Note: Figures shown are for 2011, with 2007 figures in parentheses.

Source: Adapted from Summary of COSEWIC's Assessment Results for the Risk Categories: www.cosewic.gc.ca/rpts/Full_List_Species.html

2011 totals

2007 totals

Source: Dearden and Mitchell (2012)

Responses to Biodiversity Losses

International Responses

National Response (Canada)

Protected Areas

***IUCN: International Union for Conservation of Nature**

Protected Areas

- **Protected areas** … emerged as one of the key strategies to combat the erosion of biodiversity both internationally and in Canada
- IUCN helps to provide leadership and set standards for conservation;
- Canada's national park system … central to the protection of rare and endangered species
- Canada's national parks have also played an important role as sites for reintroduction of endangered species

Table 14.4 | IUCN Classification of Protected Areas

Category	Name	Description
Ia	Strict nature reserve	Strictly protected areas set aside to protect biodiversity and also possibly geological/ geomorphological features, where human visitation, use, and impacts are strictly controlled and limited to ensure protection of the conservation values.
Ib	Wilderness area	Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.
II	National park	Large natural or near-natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreationa and visitor opportunities.
III	Natural monument or feature	Areas set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave, or even a living feature such as an ancient grove
IV	Habitat/species management area	Areas that aim to protect particular species or habitats and where management reflects this priority. Many category IV protected areas will need regular, active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category.
V	Protected landscape or seascape	An area where the interaction of people and nature over time has produced a distinct character with significant ecological, biological, cultural, and scenic value, and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.
VI	Protected areas with sustainable use of natural resources	Areas conserving ecosystems and habitats, together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area.

Source: Dudley et al. (2010: 34).

Source: Dearden and Mitchell (2012)

Growth in Protected Areas (particularly strong in the past decade → approximately 13% of the Earth's land surface, though at varying levels of 'conservation")

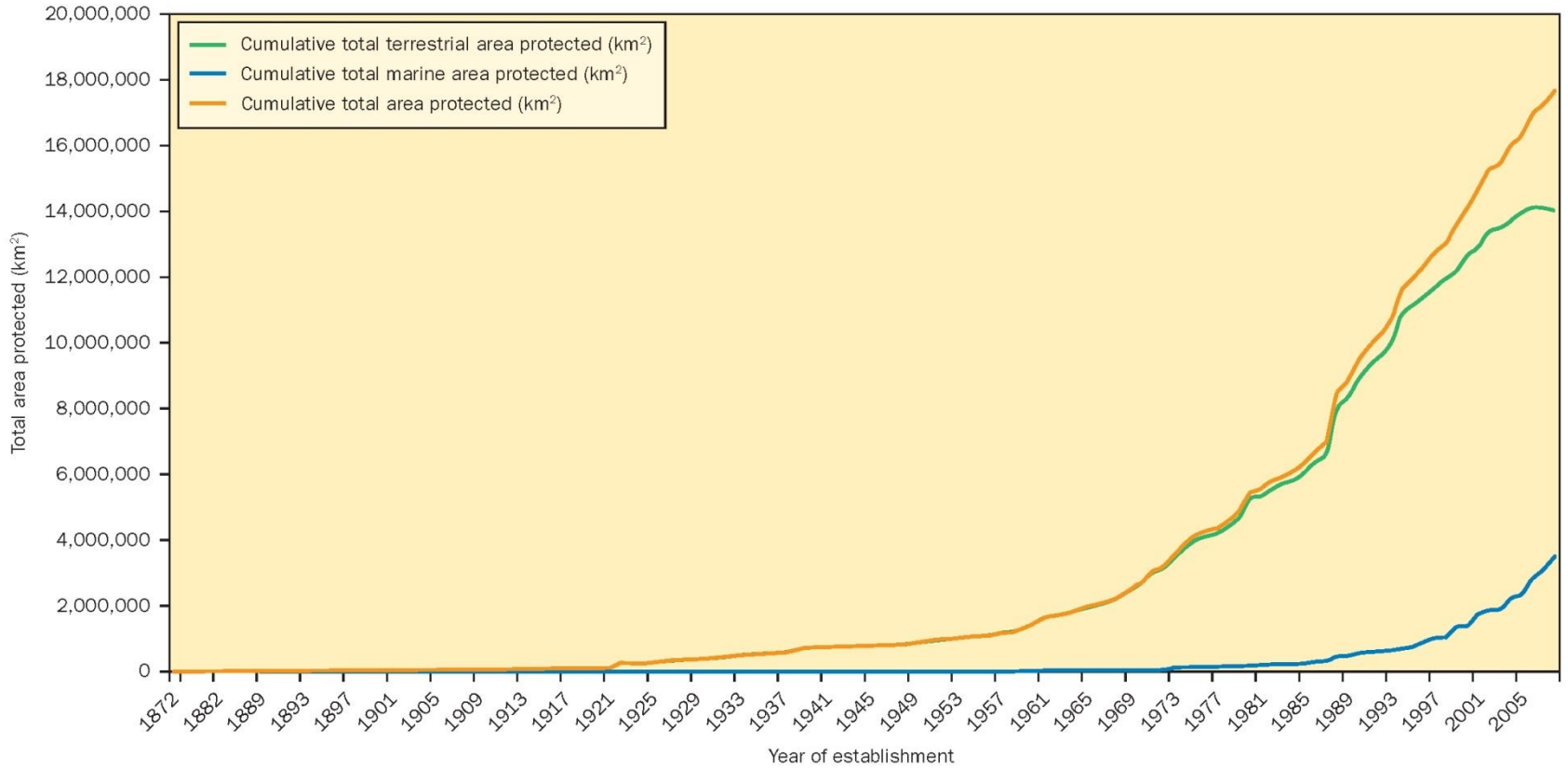


Figure 14.4 | Growth in nationally designated protected areas, 1872–2008. *Source: IUCN and UNEP-WCMC (2009) The World Database on Protected Areas (WDPA): January 2009. Cambridge, UK: UNEP-WCMC.*

Source: Dearden and Mitchell (2012)

Factors influencing rapid growth in the establishment of protected areas:

1. Increased recognition of the rate of losses in biodiversity and its severity;
2. Growing awareness (at the political level) of the links between environmental and societal health …. i.e., think about “sustainability” concept …
3. Realization (??quantification) of the value of ecosystem services (e.g., nutrient cycling, soil formation, climate regulation …)
4. Mounting evidence of the effectiveness of protected areas in helping to combat environmental degradation;

Protected Areas

- **Protected** one strategies f f b international
- IUCN helps an conservation,
- Canada's national park system … central to the protection of rare and endangered species
- Canada's national parks have also played an important role as sites for reintroduction of endangered species (e.g., Bison and Whooping Crane on Wood Buffalo NP, Box 14.12 in text)

Canada's National Park **system plan**

- 1880s' first NPs;
- System plan:
  - 39 "terrestrial' physiographic regions to be represented;
  - Goal: on NP in each;
  - Directed by Parks Canada
- Now also includes a 29-region marine system plan

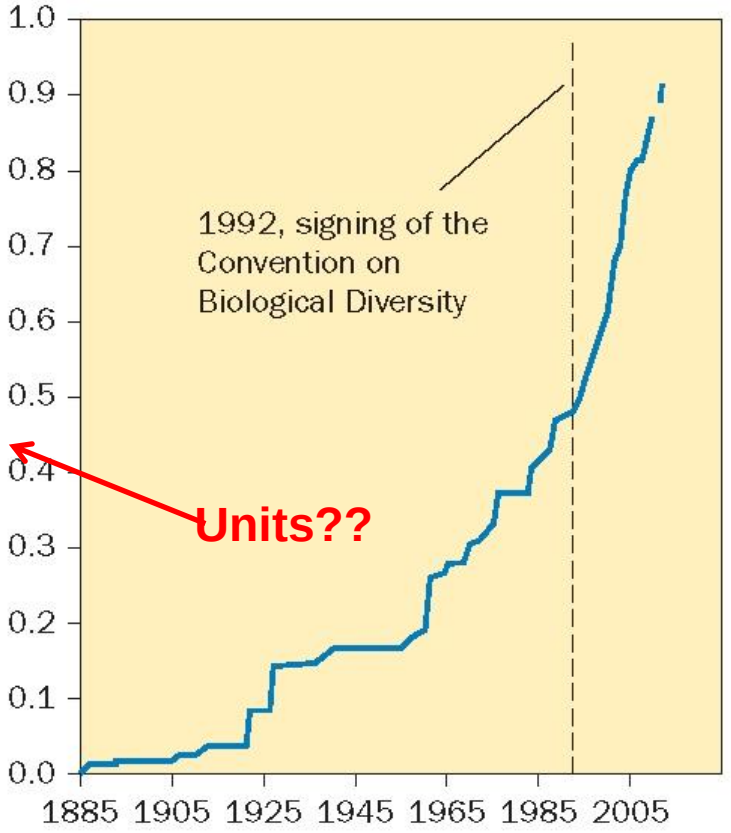


Figure 14.5 | Terrestrial protected areas in Canada. *Source Federal, Provincial, and Territorial Governments of Canad (2012:48).*

Source: Dearden and Mitchell (2012)

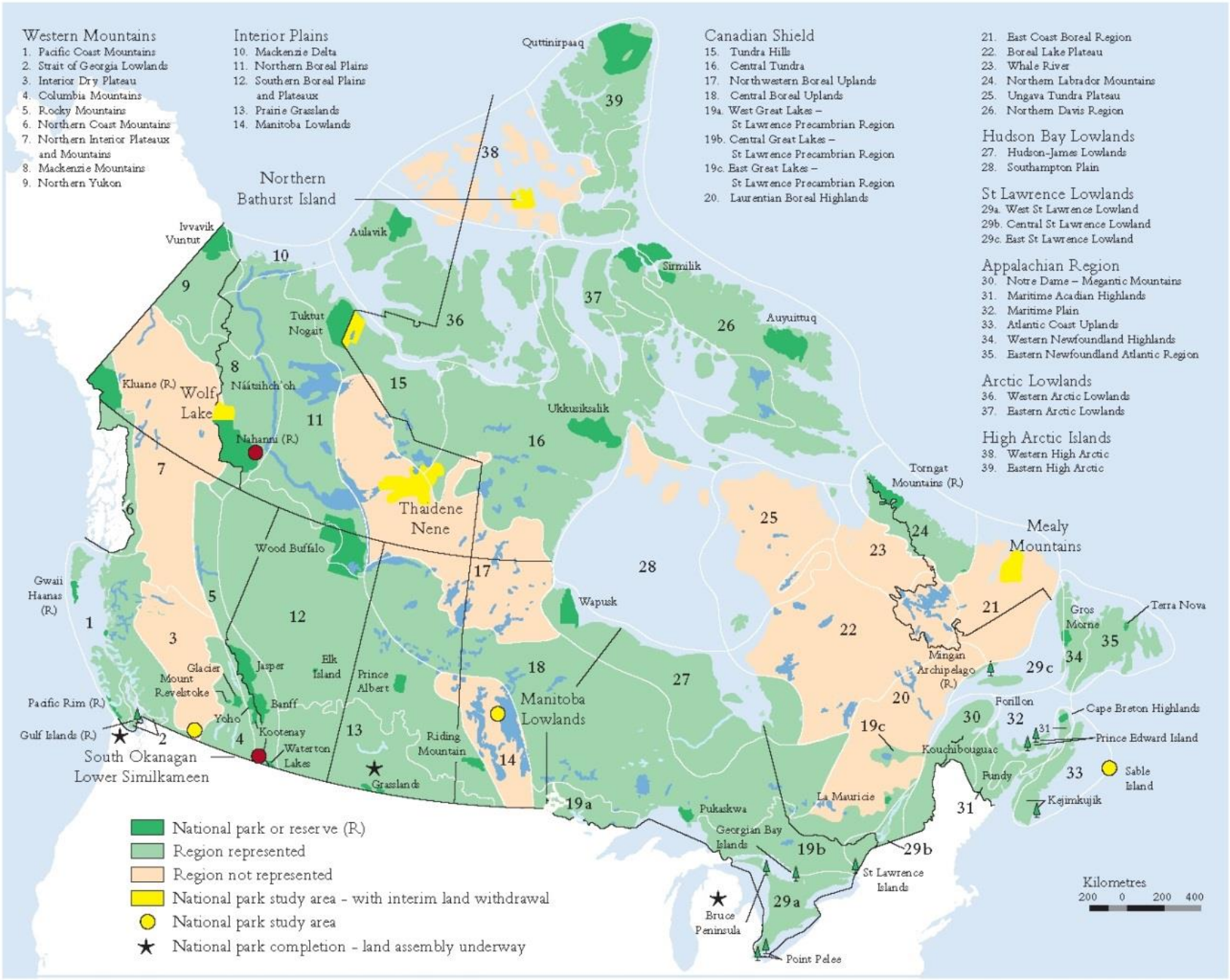


Figure 14.6 | Canada's national park system and state of completion as of 2010. *Source: Parks Canada Agency (2011: 7).*

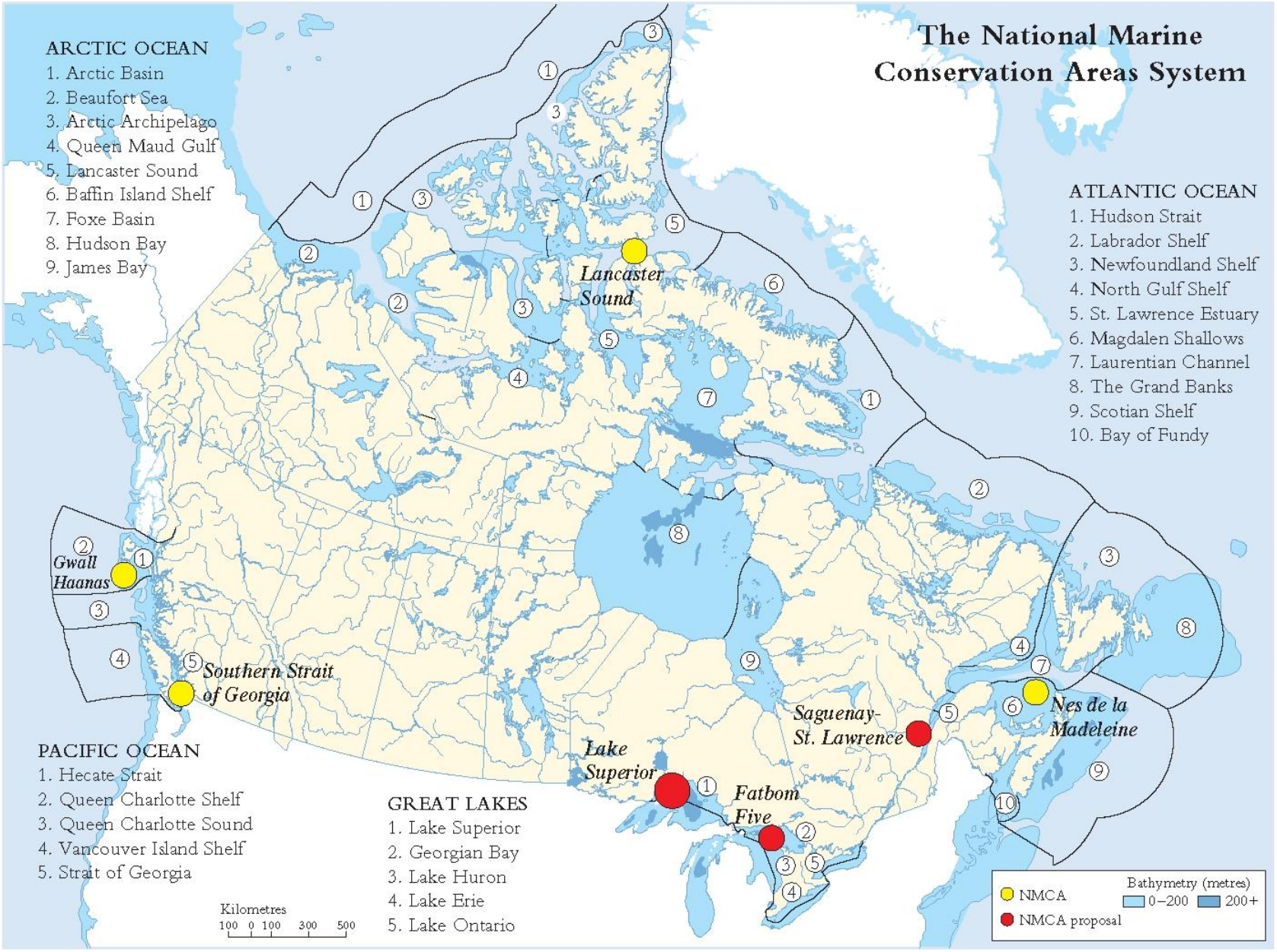


Figure 14.7 | The system of national marine conservation areas of Canada. *Source: Parks Canada Agency (2011: 10).*

Canada's National Park **system plan**

- State of the plan circa 2010:
  - Still far from meeting goals of one NP per physiographic area and marine area;
  - ~60% of terrestrial units represented;
  - ~15 of marine units represented;
- Significant land base preserved in certain provinces.

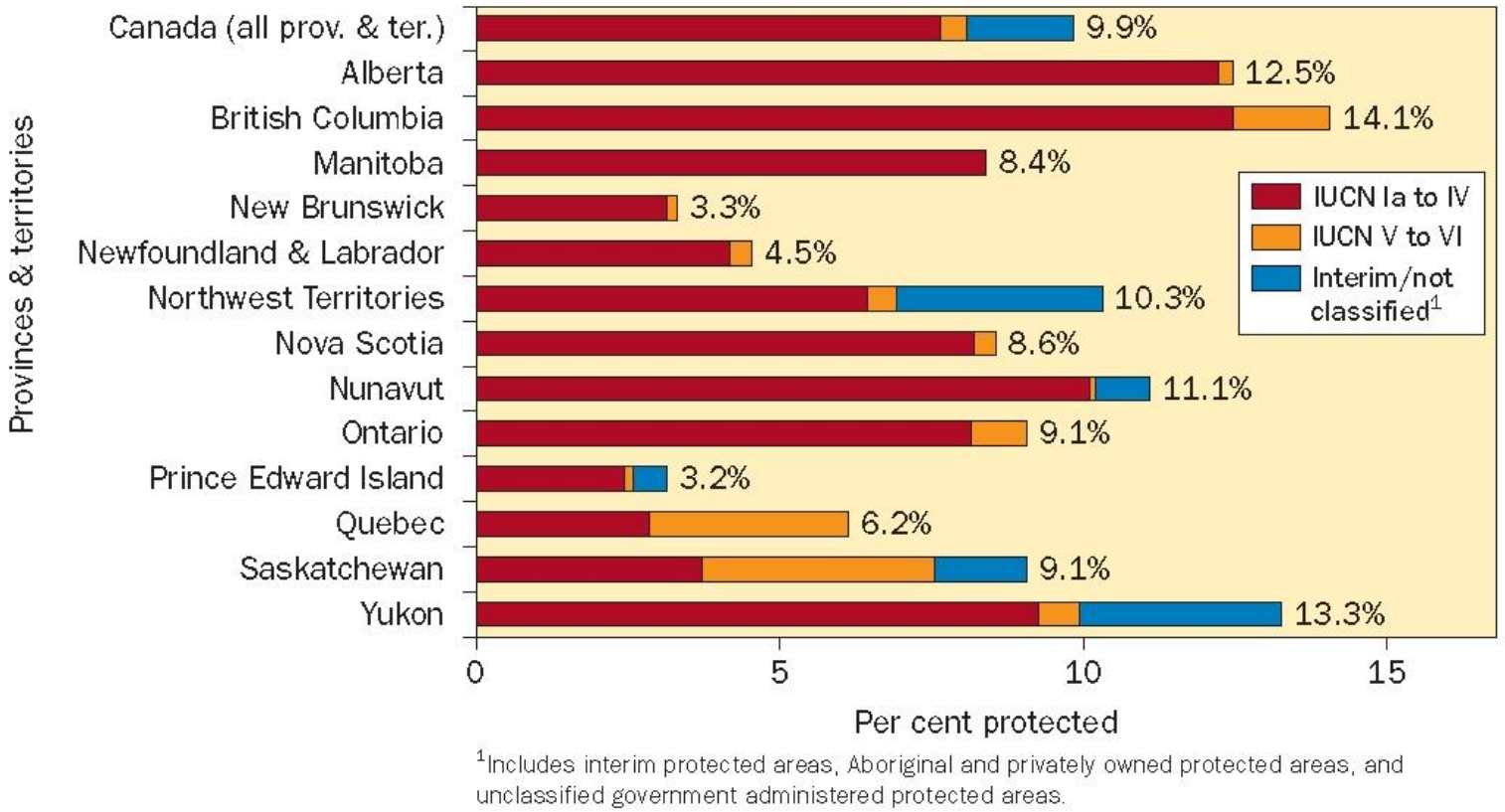


Figure 14.8 | Percentage of land in protected areas in each province and territory. *Source: Environment Canada (2006b).*

References

- Austin. MA, Buffett, DA, Nicolson, DJ, Scudder, GGE and Stevens, V (eds), 2008. *Taking Nature's Pulse: The Status of Biodiversity in British Columbia*. Biodiversity BC: Victoria, BC, 268 pp. Available at: www.biodiversitybc.org
- Dearden, P and Mitchell, B. 2012. *Environmental Change and Challenge*, Fourth Edition, Don Mills, Ontario: Oxford University Press {Chapter 14: 'Endangered Species and Protected Areas'}