

Arctic Biodiversity Assessment

Status and Trends in Arctic Biodiversity



Basic Principles for the Scientific Report, Timelines and
Technical guidelines to authors

Conservation of Arctic Flora and Fauna

Arctic Council

Version of March 2009

Search for authors

During the next five years, CAFF is going to produce two biodiversity reports:

- “**Arctic 2010 Biodiversity Highlights**” to be published in 2010.
- “**Arctic Biodiversity Assessment – Status and trends**” – a scientific report to be published in 2013.

Furthermore, a **scientific overview** report for policy-makers and the general public will be published shortly after the scientific report.

The “Arctic 2010 Biodiversity Highlights” report will feature c. 20 prominent Arctic species and ecosystems, for which we have adequate data to present on status and trends in distribution and population size (see Appendix 1). Each theme will be of 2-3 printed pages.

The scientific report will be an in depth report on “all” Arctic biodiversity including species, ecosystems and genetics. It is planned to be of 300-400 printed pages with quantitative accounts of Arctic biodiversity.

We are now seeking nominees for lead authors for each chapter of the *Arctic Biodiversity Assessment* (the scientific report). Ideally for each chapter we are looking for a lead and a co-lead – one from North America and one from Eurasia.

Each lead author for the scientific report should take responsibility for one of the following chapters:

- Species groups
- Terrestrial ecosystems
- Aquatic (freshwater) ecosystems
- Marine ecosystems
- Ecosystem goods and services
- Genetic diversity

Lead authors will play a major role in selecting co-leads and contributing authors, and they will develop the outline and the guidelines for authors in close co-operation with the Chief scientist. What is presented in Appendix 2 of the “ABA Principles and Timelines” (below) is – as stated – only a sketch.

The main role of the lead authors will be to co-ordinate the entire process around their respective chapters for the ABA scientific report. This will be done in consultation with the Chief scientist, who will organize a number of workshops in the initial phase of the work process.

A lead author has the superior responsibility for the text of his or her chapter. In the

Terrestrial ecosystems
Aquatic (freshwater) ecosystems
Marine ecosystems
Ecosystem goods and services

Genetic diversity

chapters. This means that he or she will actually write the texts together with the respective co-lead authors. The co-leads for these chapters will make major contributions to the text - i.e. write significant parts of it and make sure that all relevant information from his or hers hemisphere is included.

For the species accounts chapters this is a bit different. Here the co-leads will write the full texts for their respective chapters (mammals, birds etc.), which will then be put together by the lead author into a coherent chapter on all species groups. You may therefore say that the co-leads for the species chapters function as "lead authors" for mammals, birds etc., respectively.

Contributing authors will mainly provide information and read the texts, make comments and amendments etc.

In the printed report, the lead author and the co-lead(s) will appear as "lead authors" in the first line (with the responsible lead author listed first) and the contributing authors in a second line. This is exactly as it is done in the ACIA report.

Basic principles for the ABA Scientific Report and Timelines

Challenges:

The biggest challenge will be to limit the report to something which is achievable.

Report Focus: The purpose of the report is to “Synthesize and assess the status and trends of biological diversity in the Arctic.”

- The focus is on trends in historical time, where possible.
- Trends including the entire Holocene should be included where appropriate (e.g. to describe the northwards ranges of plants and invertebrates during the climatic optimum 6,000-8,000 years ago as documented from sediment cores etc).
- Immigration of species to the Arctic following deglaciation is not part of this review, but prehistoric genetic bottlenecks are.

Scientific Credibility: The scientific credibility of the report should be at a high level (i.e. the same as in the Arctic Climate Impact Assessment (ACIA)):

- In principle all info should stem from peer reviewed scientific papers.
- Information should be as data based (quantitative) as possible.
- Data from other well established and scientifically screened data sources should be included
- Published community based knowledge should also be included where relevant and appropriate.
- Data and other material originating from non peer reviewed sources will be critically screened by the responsible lead and co-lead authors before inclusion in the report.
- Furthermore, all chapters in the scientific report will go through a peer review process before publication.
- All sources must be properly cited.
- Data ownership must be respected by full reference to the data provider: data obtained during the preparation of this report must not be used elsewhere without the permission of the data owner.
- Lead authors, co-lead authors and contributing authors are encouraged to publish results obtained during this project in scientific journals, ensuring issues of data ownership are fully respected.

Chief Scientist: The chief scientist will be Dr. Hans Meltofte from Greenland/Denmark.

- Responsibilities include report vision, organization and coordination of lead authors
- Preparation of a detailed “Guidelines to authors” (in cooperation with the steering committee and the group of lead authors and co-lead authors).

Report Writing: The report will be written by a team of lead authors, co-lead authors and contributing authors.

- The report will be written in U.S. English
- CAFF will provide assistance in English language editing
- If the scientific report and/or the overview report is translated into other languages, the English version will be the only authoritative version.

Chapter Leads and Co-Leads: Chapter leads and co-leads should be of high scientist standing, broadly informed, have time to do the job and be able to live up to deadlines;

- Preferably, each chapter should have co-leads based in the opposite hemisphere of the lead author to ensure that all relevant info from each hemisphere is made available

- For the species chapters there will be co-leads for each of the major systematic groups: mammals, birds, amphibians and reptiles, fish, invertebrates, plants, fungi and invasive species.
- Lead and co-lead authors responsibilities include:
 - identifying contributing authors who are representative of the breadth of issues included in their chapters and the geographic coverage of the report
 - developing a detailed report outline in cooperation with the chief scientist
 - participating in coordination meetings with the Chief Scientist
 - organizing workshops with their contributing authors, if appropriate
 - providing all maps, graphs and other illustrations in workable formats, which will then be standardized by the graphics team producing the scientific report. This may include involvement of e.g. Grid-Arendal and World Conservation Monitoring Centre (WCMC).
 - ensuring all information in their chapters is submitted to the Chief Scientist in a coherent fashion
 - ensuring that all available sources of information and established networks holding info on Arctic biodiversity are used (i.e. Global Biodiversity Information Facility, the Canadian Ecosystem Status and Trends Report, Arctic Birds Breeding Conditions Survey, WCMC, community based knowledge etc.)
- National delegates on the CAFF and ABA steering committees have an important role to play in securing that lead authors and contributing authors from their respective countries live up to their commitments and deadlines.

Contributing Authors: Contributing authors will be responsible for submitting short written reports in the format requested by the lead and co-lead authors.

- Contributions from contributing authors will be re-written by the lead and co-lead authors into coherent texts.
- Authors should secure copyrights, permissions to reproduce graphic material etc. (the secretariat may help with this).

Geographic boundaries: Authors should follow the boundaries as defined below, with recognition that different topics may cover additional bordering areas as needed to provide scientific and ecological completeness.

Terrestrial

The entire Arctic tundra region (subzones A-E on the Circumpolar Arctic Vegetation Map; CAFF 2003) will be addressed as comprehensively as possible in terms of species and ecosystem processes and services.

Oceanic tundra (e.g. the Aleutian Islands), the forest tundra, and other adjacent areas will be addressed as appropriate in regard to (a) key ecosystem processes and services, (b) species of significance to the Arctic tundra region, (c) influences on the Arctic tundra region and (d) potential for species movement into the current Arctic tundra region, e.g., due to global change.

Marine

(to be developed)



For the separation between the high Arctic and the low Arctic, we follow the division between subzones C and D on the Circumpolar Arctic Vegetation Map (see appendix 3).

Various shapefiles and data for the Circumpolar Arctic Vegetation Map are available here: <http://data.arcticatlas.org/>

Similar data for the marine areas will be provided as soon as they have been defined in more detail.

Chapter content: The chapters should give an overview of the individual topics without species lists.

- All texts should be **brief** and with a clear focus on status and trends in historical time. We are **not** going to produce a “Handbook of the plants and animals of the Arctic.”
- In the species chapters focus should be on status and trends in **distribution, population densities** and **numbers** (population size).
- In the ecosystem chapters focus should be on status and trends in **distribution, composition** (habitat and species richness), **productivity** (e.g. greening), **phenology** and **processes** (e.g. grazing and predation).
- Distributional, quantitative and trend info on individual taxa should be given in tables, maps and figures.
- Species lists will not be printed in the report but will be published on the net.
- The selected species and themes for the Arctic 2010 Biodiversity Highlights report form an exception to this, since these may appear as box texts of no more than two printed pages (see Appendix 1; these will be selected and edited by the lead and co-lead authors to fit into the scientific report together with new box texts where appropriate).
- To the extent that the scientific literature holds analyses of causal explanations for observed changes in populations and distributions, these should be referred to.
- Similarly, to the extent that the scientific literature holds modelling or other info on future prospects for Arctic biodiversity and ecosystems, these should be referred to as well.
- Cumulative effects should be considered in all chapters, but “A-wet-finger-in-the-wind”-prognoses should be avoided.
- All **bias** in the direction of giving more emphasis on negative trends than positive trends and *vice versa* must be avoided.
- Except for the box texts on individual species etc., the report will not include single species maps; only maps of species richness, ecosystem diversity etc.

Time Lines:

To accomplish all this within the work period demands tight deadlines.

Scientific report:

Chief scientist to begin the work	1 July 2008	
All lead authors appointed	1 October 2008	3 months
All contributing authors appointed	1 January 2009	3 months
Texts on selected indicators ready (from 2010-report)	1 July 2009	6 months
Last data and texts delivered to the lead authors	1 January 2010	6 months
Manuscripts delivered to the chief scientist	1 July 2010	6 months
Manuscripts ready for peer review	1 July 2011*	12 months
Manuscripts ready for scientific report layout	1 July 2012	12 months
Chapters distributed for proof reading	1 October 2012	3 months
Scientific report ready for the printers	1 January 2013	3 months
Scientific report printed	1 April 2013	3 months

* followed by distribution to the CAFF board.

The **scientific overview** report will be initiated as soon as the chapter texts have been delivered to the Chief scientist (CS).

Science report manuscripts available to CS

1 July 2010

Manuscript ready for review by CAFF	1 January 2012	18 months
Manuscript ready for layout	1 July 2012	6 months
Report distributed for proof reading	1 October 2012	3 months
Report available in digital format	1 April 2013	6 months
Overview report printed	1 July 2013	3 months

Length: The length of the scientific report should be about 300-400 printed pages (maximum of 2 million characters with spaces) in the same format as the ACIA report.

- This includes in the order of 25% illustrations in the form of maps and graphs etc. but with no “coffee-table-book-photos.” (We save them for the overview report.)
- The suggested distribution of text is as follows:

Chapter Title	Approximate Printed Pages*
Introductory topics (incl. main sources of info & main drivers of change)	20
Synthesis (integration across species, ecosystems, drivers and pressures)	20
Species accounts	160
Terrestrial Ecosystems	40
Freshwater Ecosystems	40
Marine Ecosystems	40
Ecosystem Services	40
Genetic Diversity	20
Identified knowledge gaps and scientific recommendations	10
End Matter (glossary?, index etc.)	10

* each printed page is approximately 5000 characters with spaces plus illustrations

Besides a printed version, a digital version of the book will be accessible on the net, where species lists – where appropriate – will appear as an appendix.

Outreach: CAFF will consider general public outreach initiatives.

Technical guidelines

Please find below a set of technical guidelines for how to write and submit chapters for the ABA. Please adhere carefully to these guidelines, as it will make the editorial process much easier for us all.

Please keep in mind that the texts should be of scientific standard; however phrases, which are not generally understood within all branches of natural science, must be avoided. Bear in mind that many readers will not have English as their first language. Avoid over-long sentences; break them down into smaller chunks.

Use Microsoft Word and Times New Roman 12 pt. for texts and all special characters.

The language should be U.S. English. Please adjust your spelling control accordingly.

For standardization of wording on threats, stressors etc., please follow the nomenclature in: <http://www3.interscience.wiley.com/cgi-bin/fulltext/120122733/PDFSTART>

Layout

Chapter titles (but not headlines) are Written with Capital Initials for all Important Words (no dot in the end)

Authors (you and your colleagues) should be arranged according to contribution:

1. Lead author and co-lead author(s)
2. Contributing authors

A list of authors and their institutional affiliations will be provided at the beginning of the report.

Headlines are arranged in a decimal system:

- 1.
- 2.
- 2.1.
- 2.1.1.
- 2.1.2.
- etc.

Do not use more than three levels of headlines.

Please refrain from all style formatting of headings and texts etc.

Each chapter must have a list of contents following the list of authors:

Contents

Synthesis

1. Introduction

1.1. chapters

Acknowledgements (data providers, reviewers etc.)

References

(no dots in the ends of headlines)

All titles and texts should be aligned with the left margin and have a loose right margin.

Some technicalities

Please use A4-format paper documents all over (not Letter format).

Do not hyphenate unless a hyphen would always appear in a phrase (e.g. “long-tailed” or “two-thirds of the species”).

Never use two or more spaces in succession.

Do not indent the beginnings of paragraphs. Use a line space to separate them from the text/heading above.

Do not use (manual) returns within the text or between lines. Use them only to end paragraphs or headings, or to separate items in a list.

Do not add line spaces to make your paragraphs fit pages exactly. The typesetter will treat the text as one body of text – and added spaces will confuse them.

Do not use an o in upper case for degree, but use the correct ° symbol.

Do not insert a comma before the grammatical conjunction (nearly always *and* or *or*) that precedes the last item in a list of three or more items unless it is needed to reduce ambiguity. E.g., “snow, ice or permafrost” but “summer and winter, Arctic and Antarctic, and coastal and interior.”

Arctic is written with capital initial both as a geographical region and when used as an adjective, e.g. Arctic plant species and Arctic fox, whereas low Arctic and high Arctic are spelled with small initials in low and high, and sub-Arctic is spelled with a small initial and a hyphen.

Metric units are used throughout with standard SI abbreviations and no dot in the end. Units are not repeated in running text like “15 and 20 m”.

Please use mL (millilitre) instead of cm³ and L (litre) instead of dm³ – the upper case ‘L’ should be used for litre rather than lower case ‘l’ as the latter can be confused with the numeric character 1.

Use ‘/’ for “per” rather than negative superscripts.

10 in corresponding power should be used if the number of 0’s exceeds 3 (e.g. 10⁴ rather than 10,000 m²).

Use e.g. “micro g/L” instead of the Greek symbol.

Species and place names

Use common names for species and other taxa wherever these are commonly known followed by scientific (Latin) names the first time a species or other taxa is mentioned.

Scientific species and subspecies names are given in italics without parentheses.

Please use internationally accepted standard works for all nomenclature and provide references to these.

For the spelling of place names, please use the Times Atlas of the World, Comprehensive Edition. Where indigenous names are used for the same places, you may give them in parallel to the English names the first time the English names are mentioned e.g. Scoresbysund / Ittoqqortoormiit. If a place name does not appear in the Times Atlas of the World, please provide its geographical coordinates.

Figures should be written as follows:

One to nine in letters (except metric statements like 3 km), 10 and more in figures. Furthermore, in sentences containing figures in a fairly close and logical sequence or in a series of numerals, use e.g. “the numbers were 3, 7 and 9 per year.”

Figures of 1,000 and more are written with comma-separation except in calendar years.

1970s (not 1970's)

1992-1994 (not 1992-94)

mid-1990s

the 18th century

25% (without space)

5 °C (with space)

74° 30' N (with spaces)

250 km (with space, but no dot after metric abbreviations)

09:00 hours

Use “densities of 15-20 per km²” in running texts, not “densities of between 15-20 per km²” or “densities of between 15 and 20 per km².”

Use e.g. “ind./km²” in tables and maps etc.

Rattling off like, (1), (2), and (3)

Dates are written “2 September 2008” or “2-8 September 2008” or “20 May – 25 June 2008.”

Statistics

E.g. ($r = 0.61$, $p = 0.004$, $df = 27$). Please note the use of spaces and italics carefully.

Acronyms

When using acronyms for the first time, spell the full name out and put the abbreviation in parentheses. After that, use the abbreviation. Provide a list of acronyms at the end of your text.

References to figures and tables in the text:

(Fig. 1)

(Tab. 2)

(Fig. 3 in Johnson 1990)

Captions for figures and tables are given in italics:

Fig. 2.3.1. Changes in population size.....

Tab. 2.2.3. Numbers of

Figures and tables are numbered according to 1st or 2nd grade headings, so that they will hold no more than two decimals.

Figures, tables and box texts

During the editorial and reviewing process, we do not need original illustrations. Instead, please provide all illustrations and tables as low-resolution Word-components of the same document, i.e. only one file per chapter.

Please do not place figures, tables and box texts within the body texts, but keep them on separate sheets at the end of each manuscript and indicate the position in the text as follows:

<Fig. 6.3 near here>

<Tab. 4.3 near here>

<Box 2 near here>

Please make sure that all figures and tables are referred to in the text, and that they are in chronological order.

Preparing figures

Please use color illustrations wherever feasible. The maximum size of a figure is 17.5 x 26.1 cm including space for the legend.

Line drawings are to be submitted in an electronic form suitable for direct reproduction. However, font size, colors etc. for graphics are not pre-specified. These will be standardized during final production of the report. Therefore, **all drawings must be submitted in editable vector based formats (.EPS)**.

Graphs can be submitted as native Excel graphics (.XLS). From all other programs please export the graphs in EPS format. If this option is not possible, a PDF file can be submitted instead.

Maps should be exported from the GIS system in EPS format with minimum resolution of 300 dpi. The use of fonts with symbols should be avoided and converted to graphics instead.

Halftones (photos etc.) must be original electronic (or scanned) versions at a minimum final resolution of 300 dpi in pixel based format (.TIF, .PSD, .JPG uncompressed) – and not photocopied from previously published books or articles. Photocopies from published sources are not suitable for reproduction. Therefore, original electronic versions must be obtained from the author/publisher. If this is not possible, high resolution scanned versions (600 dpi) can be submitted.

If the photo contains overlay with text, arrows etc. please submit two versions – with and without the overlay.

Electronic submission of figures

When finally submitting figures on disk, please ensure that the files are saved in an editable format (EPS, TIF, uncompressed JPG – or in special cases XLS, PDF). PowerPoint files or figures embedded within Word files **cannot** be accepted. Files in GIF format are **not** acceptable as they do not reproduce well in print.

Preparing tables

Each table should be typed on a separate page. A brief title should be typed above each table. Care must be taken to ensure that units are clearly stated, preferably in the title of the table or column headings. Any explanatory material essential to the understanding of the table should be placed in footnotes to the table. Footnotes should be identified by lowercase letters and **not** numbers or symbols. Please submit tables at the end of the manuscript with figures and figure legends.

The column headings and the body of the table should be as simple as possible. Column headings should be separated from the body of the table with a rule but, if possible, do not use rules within the body of the table. Information within the table will be set off by spacing and indentation. Do not use vertical rules.

References

Text citations can be given in two ways; (a) with a date in parentheses, e.g. "as demonstrated by Jones (1986)"; (b) with the names and date in parentheses, e.g. "according to recent findings (Jones 1986, Chernov & Matveyeva 1997)". Please note the chronological order of references.

Where you make use of more than one paper by the same author and year, use (Jones 1993a, 1993b).

Where a paper has more than two authors, use the form (Chernov *et al.* 2002).

When referring to a paper that has been accepted for publication, but till not printed, use (Smith in press). In that case, full reference is provided in the list of references. Submitted papers are treated as unpublished material until acceptance.

The reference list should be arranged alphabetically according to surnames. Where the first author is referred to more than once, the order should be as follows:

(a) **Single authors.** Where more than one reference is given for a single author the publications should be listed chronologically.

(b) **Two authors.** References, for which there are two authors should be arranged first alphabetically, then chronologically; for text citations, use both authors' names and the year.

(c) **Three or more authors.** References with three or more authors should be arranged chronologically. For text citations use the surname of the first author, *et al.*, and the year.

Volume numbers and the first and last page numbers are required in the reference list, but not the total number of pages in books and reports etc.

e.g:

Chernov, Y.I. 1995. Diversity of the Arctic terrestrial fauna. In: F.S. Chapin, III, and C. Körner (eds.). Arctic and Alpine Biodiversity: Patterns, Causes and Ecosystem Consequences, pp. 81-95. Springer-Verlag, Berlin.

Chernov, Y.I. 2002. Arctic biota: taxonomic diversity. Zool. Zhurn. 81(12): 1411-1431. [In Russian with English summary].

Chernov, Y.I. & Matveyeva, N.V. 1997. Arctic ecosystems in Russia. In: F.E. Wielgolaski (ed.). Ecosystems of the World, pp 361-507. Elsevier, Amsterdam.

If titles are in languages other than English, please use English titles of summaries **if given in the paper** and add e.g. “[In Russian with English summary].” Do not translate titles yourself.

When referring to Internet sources, use e.g. (BioBasis 2008) in the text and

BioBasis 2009: http://www2.dmu.dk/1_Viden/2_Miljoe-tilstand/3_natur/biobasis/biobasisdata.asp [Accessed 4 November 2009]

in the reference list.

Please keep Internet references active for the web-based version of the report.

Before submitting your chapter, please check the list of references against the text to ensure that the spelling of authors' names and dates given are consistent, and that all references in the list are referred to in the text and *vice versa*.

You may use Reference Manager, but this is not a pre-condition.

For journal abbreviations, use

<http://library.caltech.edu/reference/abbreviations/>

Advice on permission letters

Authors who plan to use illustrations, charts, tables or other material from previously published sources must obtain written permission from the copyright owner (this is usually the publisher) and send the letter granting this permission to us, unless the material has been or will be moderated by us. Authors should also write to the author of the original material to obtain permission as a courtesy measure. A draft letter is provided below. At the same time, please ask for the original electronic versions since photocopies do not reproduce well (see above).

Ensure that you have secured permission to reproduce the material in **both print and electronic form**.

If any verbatim quotation of text matter amounting to more than 50 words is to be included, permission should be obtained following the same procedure as noted above.

If you use material from your own published work, permission must still be obtained from the publisher.

The source of the data must always be credited, e.g. as a footnote to a table, as parenthetical information in a figure legend or as a footnote to the text.

Submission of manuscripts

It is of critical importance that you submit your contributions within the stated deadlines. **Failure to meet these deadlines will jeopardize the whole process** and delay the publication of our report.

Please name your files according to chapter name, followed by the date of the version, e.g.:
Terrestrial Ecosystems 20 May 2010.doc

All documents should be marked with a page header with the text:
ABA Draft – do not circulate or cite without permission

Files are submitted by e-mail to the chief scientist, Hans Meltofte: mel@dmu.dk

At the same time please provide names and e-mail addresses for **at least three potential referees** for each chapter.

Permission form

Dear Sir/Madam,

I am/we are preparing a work to be published by the Arctic Council under the tentative title:

Arctic Biodiversity Assessment

I/we should appreciate permission to reproduce the following in printed and electronic form in the work, and in future revisions and editions thereof:

May I/we please have non-exclusive world rights in all languages?

Unless you indicate otherwise, I/we will use the complete reference entered above as the credit line.

Yours faithfully,

Name:

Address:

I/we grant permission for use of the material mentioned above.

Date Signature.....

Name.....

(please return this form to the author requesting permission)

Definitions

WORD	Definition	Source
Indicator Species	A species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem. They reflect the quality and changes in environmental conditions as well as aspects of community composition.	Global Biodiversity Assessment GBA
Sustainable Use	The use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity or of any of its components, thereby maintaining their potential to meet the needs and aspirations of present and future generations.	Food and Agriculture Organization of the United Nations
Species Assemblages	Is the term used to describe the collection of species making up any co-occurring community of organisms in a given habitat or fishing ground.	Food and Agriculture Organization of the United Nations
Option value	The insurance premium people are willing to pay to keep the option of using biodiversity directly and indirectly in the future. The information or scientific option value of biodiversity is called quasi-option value.	Global Biodiversity Assessment GBA
Non-Use/Passive values	Non-use or passive values stem from altruism towards friends, relatives or other people who may be users (vicarious use value); altruism towards future generations of users (bequest value); and altruism towards non-human species or to nature in general (existence value). This may be motivated by moral, ethical, spiritual or religious considerations.	Global Biodiversity Assessment GBA
Keystone Species	A species that influences other members of its community far out of proportion to its abundance. A species whose loss would cause a greater than average change in diversity or abundance of other species, community structure, and/or ecosystem processes. The original concept of keystone species was applied to predators that could have such impacts. This term can now be applied to species at all trophic levels	Integrated Land Management Bureau and Government of South Carolina
Indirect Value	The value of biodiversity in supporting economic and other activities in society. This value stems from the role of biodiversity in maintaining ecosystem services that support biological productivity, regulate climate, maintain soil fertility and cleanse water and air.	Global Biodiversity Assessment GBA

Existence Value	What people are willing to pay (or the benefits they are willing to forgo) to ensure the continued existence of specific components of biodiversity. Existence value is sometimes referred to as intrinsic value.	Global Biodiversity Assessment GBA
Ecozone	Large scale biogeographic division based on and characterized by the historic and evolutionary patterns of landforms, soils, water features, vegetation and climate.	Terrestrial Ecozones of Canada
Ecosystem	A sub-unit of an ecozone where the individuals, populations and species occur in a defined area, including their interactions with each other and with their physical environment.	
Ecological Community	a group of species inhabiting a particular area. Habitat - the biological and physical environment of a particular species.	Global Biodiversity Assessment GBA
Direct Value	The value of those components of biodiversity that satisfy human society's needs. Consumptive use of genes, species or ecological communities, or biological processes to meet needs, such as food, fuel, medicine, energy and wood. Non-consumptive use of components of biodiversity, such as recreation, tourism, science and education.	Global Biodiversity Assessment GBA
Biome	a continental-scale region characterized by its distinctive vegetation and climate	Global Biodiversity Assessment GBA

Biodiversity	<p>Biodiversity is defined by the Convention on Biological Diversity as 'the variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part, this includes diversity within species, between species and of ecosystems. More simply, biodiversity is the variety of the world's organisms, including their genetic makeup and the communities they form.</p> <p>Biodiversity is dynamic: the genetic composition of species changes over time in response to natural and human-induced selection pressures; the occurrence and relative abundance of species in ecological communities changes as a result of ecological and physical factors</p>	Global Biodiversity Assessment GBA
Bequest value	<p>What people are willing to pay (or the benefits they are willing to forgo) to ensure that future generations enjoy access to specific components of bio diversity.</p>	Global Biodiversity Assessment GBA

Appendix 1: Themes to be presented in the “Arctic 2010 Biodiversity Highlights” report

Species

1. Polar bears
2. Reindeer/caribou
3. Shorebirds and seabirds (red knot, murre and common eider)
4. Range changes in invertebrates e.g., Arctic butterflies?
5. Flora – bryophytes
6. Arctic char
7. Invasive species (man induced)
8. Emerging species (natural migrations)

Terrestrial ecosystems

9. Greening of the Arctic
10. Reproductive Phenology (including snow-cover)

Freshwater ecosystems

11. Permafrost change (wetland change – status and trends)
12. Ice-cover duration (including nutrient change)

Marine Ecosystems

13. Changing distribution of fish in general
14. Seafloor destruction

Ecosystem goods and services

15. Reindeer herding
16. Changes in harvest (subsistence & commercial)
17. Human footprint
18. Change in protected areas (species and area protection)
19. Linguistic diversity

Genetic Diversity

20. Past & present bottlenecks in population genetics including red listed species

Appendix 2: Sketch outline of scientific report chapters

Lead and co-lead authors will develop chapter outlines in co-operation with the Chief scientist before initiating the writing.

Below is an example of how the chapters could develop.

Species chapters

Taxa should not be presented in systematic order, but according to “prominence” and in the order given by CAFF: terrestrial, freshwater, marine.

Under Heading 3, only shorebirds are given as an example. Level 3 headings for other taxa should be given as appropriate.

Heading 1	Heading 2	Heading 3
Introduction to species chapter (5 printed pages?)		
1. Mammals (30 printed pages?)	Synthesis	
	1.1. Introduction	
	1.2. Land carnivores	
	1.3. Land herbivores	
	1.4. Sea mammals	
	Acknowledgements	
	References	
2. Birds (30 printed pages?)	Synthesis	
	2.1. Introduction	
	2.2. Waterfowl	
	2.3. Shorebirds	2.3.1. Introduction
		2.3.2. Species richness, distribution, trends, causes and prospects
		2.3.3. Densities, trends, causes and prospects
		2.3.4. Population sizes, trends, causes and prospects
	2.4. Seabirds	
	2.5. Other birds	
	Acknowledgements	
	References	
3. Amphibians and reptiles (2 printed pages?)	Synthesis	
	3.1. Introduction	
	3.2. Amphibians	
	3.3. Reptiles	
	Acknowledgements	
	References	
4. Fish (25 printed pages?)	Synthesis	
	4.1. Introduction	
	4.2. Ray-finned fish	
	4.3. Sharks, rays and allies	

- Acknowledgements
- References
- 5. Invertebrates (30 printed pages?)
 - Synthesis
 - 5.1. Introduction
 - 5.2. Insects
 - 5.3. Spiders
 - 5.4. Parasites and pathogens
 - 5.5. Soil fauna
 - 5.6. Lake zooplankton
 - 5.7. Marine zooplankton
 - 5.8. Benthos
 - Acknowledgements
 - References
- 6. Plants (30 printed pages?)
 - Synthesis
 - 6.1. Introduction
 - 6.2. Vascular plants
 - 6.3. Mosses
 - 6.4. Macro algae
 - 6.5. Lake phytoplankton
 - 6.6. Marine phytoplankton
 - 6.7. Marine macro algae
 - Acknowledgements
 - References
- 7. Fungi (5 printed pages?)
 - Synthesis
 - 7.1. Introduction
 - 7.2. Lichens
 - 7.3. Non-lichenized fungi
 - Acknowledgements
 - References
- 8. Invasive alien species (3 printed pages?)
 - Synthesis
 - 8.1. Introduction
 - etc.
 - Acknowledgements
 - References

E.g. for birds, the number of taxa in different systematic groups found in the Holarctic, Nearctic (Western Hemisphere) and Palearctic (Eastern Hemisphere), respectively, may be presented in standardized tables (see below). These tables form the background for the texts, which comment on the patterns (e.g. the number of species endemic to the High Arctic). Furthermore, the texts will focus on taxa with well known range or population changes illustrated in graphs and maps wherever feasible.

Ecosystem chapters

E.g. Terrestrial ecosystems

Use plant community names etc. from the CAVM-team map of the Arctic.

Heading 1	Heading 2	Heading 3
Erect-shrub tundras	Summary Introduction Plant community name	Introduction Distribution, composition (dominating species and species richness), trends, causes and prospects Productivity (primary and secondary), trends (greening/desiccation), causes and prospects Phenology, trends, causes (snowmelt etc.) and prospects Processes (e.g. grazing and predation), trends, causes and prospects

Carbon fluxes should be dealt with, but not as a prominent theme.

Chapters on Ecosystem services and Genetic diversity are outlined as appropriate

Species chapter table example (proposal):

Terrestrial birds

Region	Orders	Families	Genera	Species	Subspecies	Stable*	Increasing*	Decreasing*	No info.*	Redlisted
Arctic	#	#	#	#	#	#	#	#	#	#
WH Arctic	#	#	#	#	#	#	#	#	#	#
WH high Arctic	#	#	#	#	#	#	#	#	#	#
WH low Arctic	#	#	#	#	#	#	#	#	#	#
EH Arctic	#	#	#	#	#	#	#	#	#	#
EH high Arctic	#	#	#	#	#	#	#	#	#	#
EH low Arctic	#	#	#	#	#	#	#	#	#	#

Seabirds

Region	Orders	Families	Genera	Species	Subspecies	Stable	Increasing	Decreasing	No info.	Redlisted
High Arctic ocean	#	#	#	#	#	#	#	#	#	#
Pacific low Arctic	#	#	#	#	#	#	#	#	#	#
Atlantic low Arctic	#	#	#	#	#	#	#	#	#	#

*) here, trend information should present the most recent trends (e.g. 10-20 y), while the development during historical times is presented in the text.

For each sector of the Arctic, all taxa with a regular appearance in the zone is included, but not accidentals such as forest species etc. Taxa listed under “Arctic” are species within the Arctic proper, whereas a species can be listed both under the high Arctic and the low Arctic. “Redlisted” denotes taxa on the IUCN Red List of Threatened Species. WH = Western Hemisphere; EH = Eastern Hemisphere.

Appendix 3

What is the Arctic?

The name Arctic derives from ancient Greek *Arktikós*, the land of the Great Bear, which is the star constellation close to the North Star, Arcturus. There are several meanings of the Arctic. From a geophysical point of view, the Arctic may be defined as the land and sea north of the Arctic Circle, where there is midnight sun in the summer and winter darkness. But from an ecological point of view, it is more meaningful to use the name for the land north of the tree line, which generally has a mean temperature below c. 10–12 °C for the warmest month, that is, July (Jonasson et al., 2000). With this definition, the Arctic land area comprises about 7.5 million km², or some 5.5% of the land surface on Earth. Similarly, the Arctic sea is the area with annual ice cover at least in parts of the year, comprising the Arctic Ocean with adjacent seas.

The Arctic may be divided into a number of subzones based on floristic types (CAVM Team, 2003). Here, the division between the High Arctic and the Low Arctic is most relevant, and we use the separation between subzones C and D on the CAVM, meaning that the divide is close to a mean of c. 6 °C for the warmest month.

The vegetated lowland of the Arctic is often named tundra, which originates from Finnish *tunturi*, meaning land without forest. In general, the low Arctic has much more lush vegetation than the high Arctic, where large lowland areas may be almost devoid of vegetation, like the Arctic deserts of the northernmost lands in the world.

The sub-Arctic is the northernmost part of the Boreal zone, that is, the area between the timberline and the tree line. Hence, the sub-Arctic is not part of the Arctic, like the sub-tropics are not part of the tropics. Like the Arctic, the Boreal has its name from Greek, in that Boreas was the god of the cold northern winds and bringer of winter. These zones often continue to the south – out of the Arctic – as sub-alpine, low-alpine, and high-alpine zones in mountainous area.