

CAFF Monitoring Series Report No. 11
March 2014

**Arctic Terrestrial Biodiversity Monitoring Plan:
implementation and work plan
Akureyri, Iceland, February 25-27, 2014**

First implementation workshop of the Circumpolar Biodiversity
Monitoring Program's Terrestrial Steering Group



Acknowledgements

CAFF Designated Agencies:

- Directorate for Nature Management, Trondheim, Norway
- Environment Canada, Ottawa, Canada
- Faroese Museum of Natural History, Tórshavn, Faroe Islands (Kingdom of Denmark)
- Finnish Ministry of the Environment, Helsinki, Finland
- Icelandic Institute of Natural History, Reykjavik, Iceland
- The Ministry of Housing, Nature and Environment, Greenland
- Russian Federation Ministry of Natural Resources, Moscow, Russia
- Swedish Environmental Protection Agency, Stockholm, Sweden
- United States Department of the Interior, Fish and Wildlife Service, Anchorage, Alaska

CAFF Permanent Participant Organizations:

- Aleut International Association (AIA)
- Arctic Athabaskan Council (AAC)
- Gwich'in Council International (GCI)
- Inuit Circumpolar Council (ICC) – Greenland, Alaska and Canada
- Russian Indigenous Peoples of the North (RAIPON)
- Saami Council

This publication should be cited as: Terrestrial Steering Group. 2014. Arctic Terrestrial Biodiversity Monitoring Plan: Implementation and work plan Akureyri, Iceland, February 25-27, 2014. CAFF Monitoring Series Report No. 11. CAFF International Secretariat, Akureyri, Iceland. ISBN: 978-9935-431-31-8

Editing: Marlene Doyle

Layout: Courtney Price

Cover photo: Incredible Arctic/Shutterstock.com

For more information please contact:

CAFF International Secretariat

Borgir, Nordurlod

600 Akureyri, Iceland

Phone: +354 462-3350

Fax: +354 462-3390

Email: caff@caff.is

Internet: www.caff.is



— CAFF Designated Area



The CBMP Terrestrial Steering Group gratefully acknowledges funding for the workshop provided by the Nordic Council of Ministers

Table of Contents

Background	4
Workshop purpose	4
Work plan development process.....	5
Terrestrial Steering Group 2014-2017 Work Plan	7
Governance structure	8
Literature cited	8
Appendix A: Workshop Participants	9
Appendix B: Prioritized biodiversity information required to address management needs.....	10
Appendix C: Biotic group work plans	12
Vegetation work plan	12
Avian work plan.....	13
Arthropod work plan.....	13
Mammal work plan	14
Appendix D: Integrative/cross-biotic group work plan	15

Background

The [Conservation of Arctic Flora and Fauna](#) (CAFF), biodiversity working group of the Arctic Council, established the [Circumpolar Biodiversity Monitoring Program](#) (CBMP) to address the need for coordinated monitoring of Arctic environments. The CBMP includes an international network of scientists, conservation organizations, government agencies, Permanent Participant Arctic community experts and leaders. Using an ecosystem-based monitoring approach that includes species, ecological functions, ecosystems, their interactions, and potential drivers, the CBMP focuses on developing and implementing long-term plans for monitoring the integrity of Arctic biomes.

The CBMP Terrestrial Expert Monitoring Group (CBMP-TEMG) developed the [Arctic Terrestrial Biodiversity Monitoring Plan](#) (CBMP-Terrestrial Plan) (Christensen et al., 2013) as the framework for coordinated, long-term Arctic terrestrial biodiversity monitoring. The goal of the CBMP-Terrestrial Plan is to improve the collective ability of Arctic traditional knowledge (TK) holders, northern communities, and scientists to detect, understand and report on long-term change in Arctic terrestrial ecosystems and biodiversity.

The TEMG, now the [Terrestrial Steering Group](#) (TSG), has initiated the implementation phase of the CBMP-Terrestrial Plan. The CBMP Terrestrial Steering Group, along with a set of invited experts (see Appendix A for a participants list), met in Iceland from February 25-27th to develop a three year work plan to guide implementation of the CBMP-Terrestrial Plan. This report describes the outcome of that workshop.



Gyr Falcon. Photo: Stanislav Duben /Shutterstock.com

Workshop purpose

The aim of the workshop was to develop a three year work plan to guide implementation of the CBMP-Terrestrial Plan. The participants were tasked with devising an approach to both (a) determine what capacity and information may be currently available and (b) to outline near-term required steps to begin implementing the plan and reporting on an initial set of Arctic terrestrial biodiversity focal ecosystem component attributes.

The specific objectives of the workshop were to:

1. Identify key products for TSG for the next two years.
2. Identify key components of a pan-Arctic status report for priority focal ecosystem components (FEC) attributes for policy and decision makers.
3. Develop a prioritized set of activities to meet reporting objectives.
4. Identify key milestones and timelines for the successful implementation of the [Arctic Terrestrial Biodiversity Monitoring Plan](#) for the next two years.
5. Identify expert networks required for successful implementation of the plan.
6. Identify key gaps and opportunities for the TSG related to plan implementation and identify near-term next steps to address gaps.

Work plan development process

The [Arctic Terrestrial Biodiversity Monitoring Plan](#) was used as the starting point. The workshop participants followed the process outlined in Figure 1 to develop the work plan. First, the set of overall management needs for biodiversity information, as well as information needs by biotic group, identified in the [Arctic Terrestrial Biodiversity Monitoring Plan](#) were evaluated against criteria to identify priority requirements for biodiversity information to support management. The following criteria were used for ranking:

- ▶ Importance to decision-making and communities (legislation, management, subsistence harvest management)
- ▶ Urgency
- ▶ Contributes toward the Arctic Biodiversity Assessment (CAFF, 2013) implementation recommendations

The workshop participants noted that, in most cases, the management information requirements identified as high priority must be addressed in order to address those information needs listed as secondary priorities. Therefore, the ranking, in most cases, reflects a logical order of data collection and integration rather than a prioritization of relative importance. The prioritized set of information needs can be found in Appendix B.

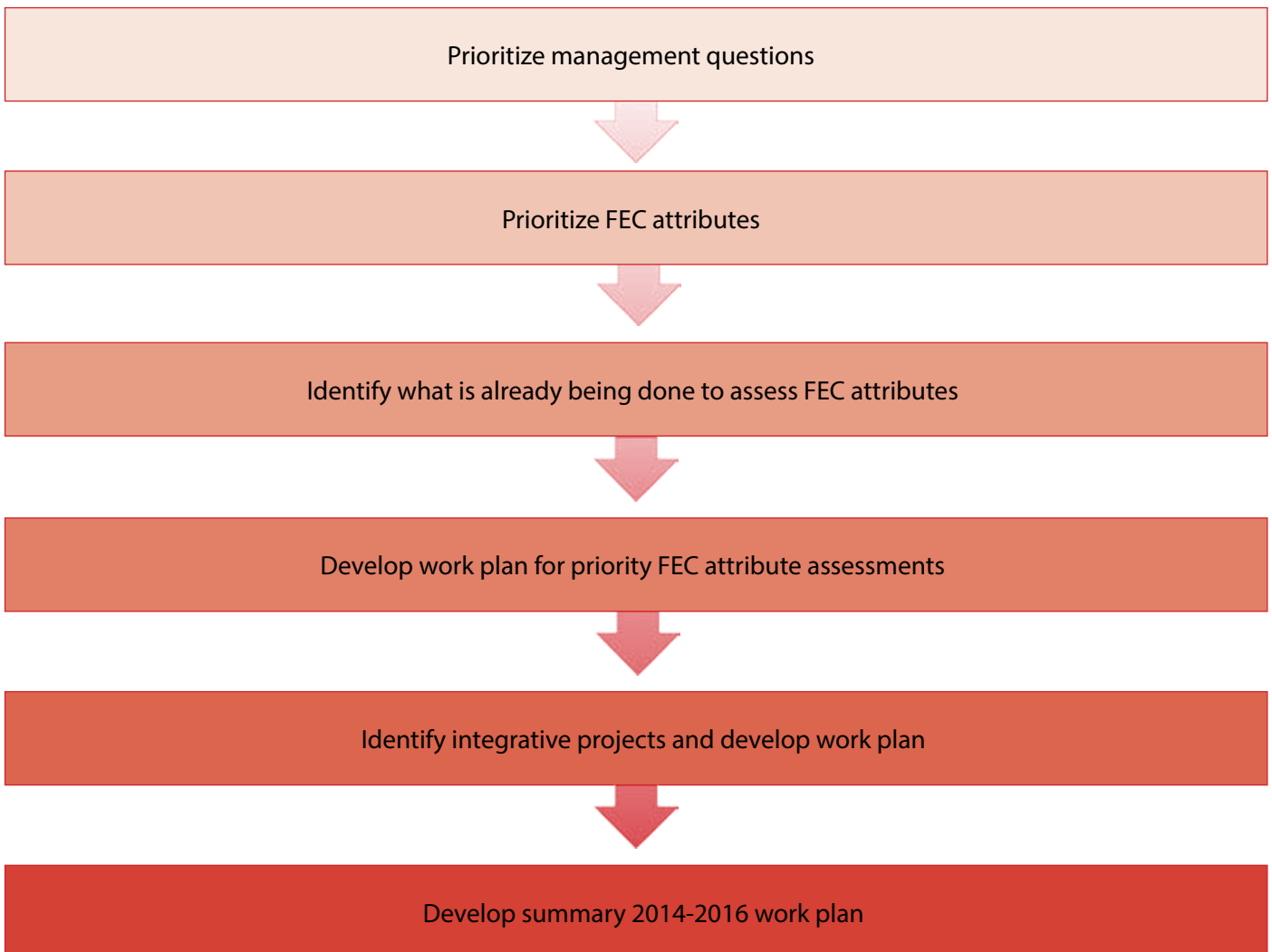


Figure 1. Process used to develop Terrestrial Steering Group 2014-2016 work plan.

The CBMP-Terrestrial Plan identifies a set of Focal Ecosystem Components (FECs) and related attributes and parameters that should be monitored in a coordinated fashion to track Arctic terrestrial biodiversity. The plan categorizes the FEC attributes as either “essential” or “recommended.” However, the list of monitoring attributes and parameters is lengthy. Further prioritization was required in order to effectively target limited resources and capacity toward prioritized activities.

Working in breakout teams organized by biotic group (birds, vegetation, invertebrates, mammals), workshop participants further prioritized the “Essential” and “Recommended” FEC attributes based on the following set of criteria. Some groups also elected to prioritize and rank parameters.

- ▶ Relevance to priority management questions, as identified
- ▶ Feasibility/Likelihood of success
 - Availability of data and ease of access
 - Completeness of data in space and time
 - Ease and cost of data integration and analysis
- ▶ Contributes toward what can be reported in the 2017 State of The Arctic Biodiversity Report/early products
- ▶ Impact, visibility of analysis
- ▶ International in scope

Based on estimated priority, a high, medium or low ranking was designated for each attribute. In addition, the participants noted whether the timeline for analysis for the parameter or attribute would be short (2 years), medium (4 years) or long term (6 years plus). The teams also identified key information needs for FECs attribute status and trend data related to other biotic groups. The FEC attribute and parameter rankings and timelines for analysis by biotic group are available on request.

Following presentations of ongoing monitoring, coordination, assessment and reporting by several Arctic terrestrial biomonitoring networks and organizations, workshop participants drafted three-year work plans for each biotic group to guide actions for the first several years of CBMP-Terrestrial Plan implementation. Participants also agreed to a summarized work plan for the Terrestrial Steering Group refined Steering Group governance, a reporting and communication agenda, and performance review.



Terrestrial Steering Group 2014-2017 Work Plan

Biotic group specific work plans that describe the first several years of CBMP-Terrestrial Plan implementation activities were developed (Appendix C). For all biotic group work plans, key activities to be undertaken and target timelines for completing the tasks were identified. Common elements to each biotic group work plan are: investigation of existing data sources, research into mechanisms to harmonize monitoring methods, approaches and/or data outputs, and integrated assessments. Further, a short work plan for activities to enhance coordinated cross-biotic groups efforts was developed (Appendix D). An overall work plan was developed to guide implementation of the CBMP Terrestrial Plan (see Table 1). Plan implementation is subject to capacity and resources to deliver on planned objectives.

Table 1. CBMP Terrestrial Steering Group Summary Work Plan

Milestone	Activities & Deliverables	Timeline
1. Plan published	a. Final plan endorsed by CAFF board and published	2013
	b. Executive summary published (if needed)	2013
2. Governing structure activated	a. CBMP Terrestrial Steering Group (TSG) established	2013
	b. National / Biotic Group Terrestrial Expert Networks (TENs) established; Linkage to existing monitoring networks developed	2014-2015
3. Data management	a. Data nodes and hosts, web-entry and data standards identified for priority FEC attribute as per implementation schedule	Ongoing
	b. Data nodes linked to Arctic Biodiversity Data Service (ABDS) and web portal analysis tools developed as required	Ongoing
	c. Metadata on long-term terrestrial biomonitoring integrated into the Polar Data Catalogue	2014
4. FEC attributes (indicator) development	a. Existing data sets identified and aggregated	2014-2017
	b. Existing data sets analyzed to establish indicator baselines	2015-2017
	c. FEC attributes analyzed and updated	2015-2017
5. Establish coordinated monitoring in each country	a. Integrated site-based monitoring protocol approach developed for Arctic terrestrial biodiversity monitoring stations	2017
	b. Focal monitoring stations for integrated terrestrial monitoring identified within each country; Relationships developed to collaborate on plan implementation	2014-2017
	c. Recommended TSG endorsed protocols and parameters identified and accessible	2015-2017
6. Reporting and communication	a. Annual performance reports and work plans	2014-2017
	b. Targeted State of the Arctic Terrestrial Biodiversity report (initial assessment of contemporary and historical data)	2017
	c. State of the Arctic Terrestrial Biodiversity reports (update - incorporating new monitoring data) – four years after initial report (to align with Marine and Freshwater Steering Groups) and subsequently every five years	2020
	d. Selected FEC attribute status reports – every two years (on ABDS). A pilot report will be presented in 2015.	2015
	e. Scientific publications (ongoing)	ongoing
	f. General communications	ongoing
7. Program review	a. Review of parameters, sampling approaches, data management approach, analysis and reporting (second review four years after initial review and subsequently every five years)	2017
	b. External independent review of parameters, sampling approaches, data management approach, analysis, and reporting (nine years after initial report and subsequently every 10 years)	2020

Governance structure

The workshop participants discussed and agreed to a refined governance structure to facilitate implementation of the CBMP-Terrestrial Plan (Figure 2). Terrestrial Steering Group members will participate as both country representatives, and also as participants in biotic group steering teams (vegetation, arthropods, birds, mammals). Relevant experts to support and provide guidance to the biotic group teams will be engaged in a flexible fashion. The revised structure was deemed most useful for supporting synergistic work among monitoring practitioners and stakeholders. In addition, having Terrestrial Steering Group members play a dual role as country representative and biotic group participants will increase efficiencies and reduce costs in administering the implementation of the plan.

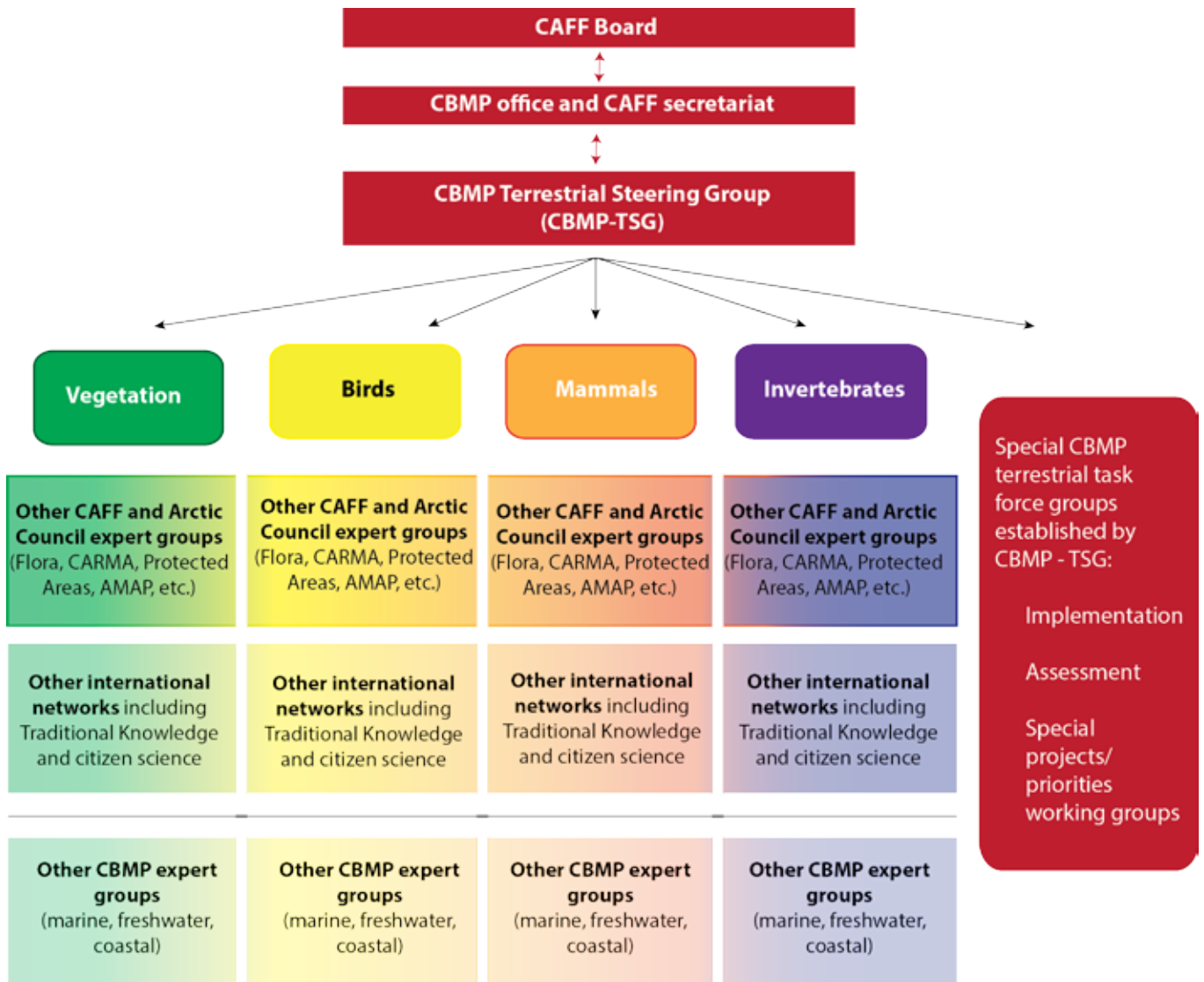


Figure 2. Refined Terrestrial Steering Group governance structure.

Literature cited

CAFF 2013. Arctic Biodiversity Assessment. Status and trends in Arctic biodiversity. Conservation of Arctic Flora and Fauna, Akureyri.

Christensen, T., J. Payne, M. Doyle, G. Ibaruchi, J. Taylor, N.M. Schmidt, M. Gill, M. Svoboda, M. Aronsson, C. Behe, C. Buddle, C. Cuyler, A.M. Fosaa, A.D Fox, S. Heiðmarsson, P. Henning Krogh, J. Madsen, D. McLennan, J. Nymand, C. Rosa, J. Salmela, R. Shuchman, M. Soloviev, and M. Wedge. 2013. The Arctic Terrestrial Biodiversity Monitoring Plan. CAFF Monitoring Series Report Nr. 7. CAFF International Secretariat. Akureyri, Iceland. ISBN 978-9935-431-26-4

Appendix A: Workshop Participants

Table A1: Workshop participants

First Name	Last Name	Institution	Email
Peter	Aastrup	Aarhus University	pja@dmu.dk
Mora	Aronsson	Swedish University of Agricultural Sciences	mora.aronsson@slu.se
Tom	Barry	CAFF Secretariat	tom@caff.is
Tom	Christensen	CBMP Co-Chair/Aarhus University	toch@dmu.dk
Christine	Cuylar	Greenland Institute of Natural Resources	chris.cuylar@natur.gl
Marlene	Doyle	Environment Canada	Marlene.Doyle@ec.gc.ca
Knud	Falk*	Consultant (Aarhus University)	knudfalk@hotmail.com
Tony	Fox*	Aarhus University	tfo@dmu.dk
Starri	Heiðmarsson	Icelandic Institute of Natural History	starri@ni.is
Hóddi	Helgason	CAFF Secretariat	hoddi@caff.is
Gabriela	Ibarguchi	Queen's University	ibarguchi@biology.ca
Paul Henning	Krogh	Aarhus University	phk@dmu.dk
Kári Fannar	Lárusson	CAFF Secretariat	kari@caff.is
Maribeth	Murray	Arctic Institute of North America	murraym@ucalgary.ca
John	Payne	CBMP Co-Chair/NSSI, BLM	jpayne@blm.gov
Courtney	Price	CAFF Secretariat	courtney@caff.is
Morten	Rasch	Aarhus University (INTERACT)	mras@dmu.dk
Jukka	Salmela	Metsähallitus, Finland	jukka.salmela@metsa.fi
Mikhail	Soloviev	Lomonosov Moscow State University	mikhail-soloviev@yandex.ru
Michael	Svoboda	Environment Canada	Michael.Svoboda@ec.gc.ca
Evgeny	Syroechkovskiy	All-Russian Institute for Nature Conservation (ARRINC)	ees_jr@yahoo.co.uk
Jason	Taylor	US National Parks Service	Jason_J_Taylor@nps.gov
Morten	Wedege	Norwegian Environment Agency	miw@miljodir.no
Sian	Williams	Arctic Institute of North America	icefields@yukon.net

* participating via Skype



Meeting participants, AKureyri, Iceland February 27, 2014. Photo: Bjarni Eiríksson

Appendix B: Prioritized biodiversity information required to address management needs

The TSG noted that data collected to address the high priority management needs for biodiversity and ecosystem information, can be used to address the lower priority needs in many cases or are prerequisites for addressing the other management needs. The prioritization, in many cases, reflects a logical order of data collection and integration rather than a ranking of relative importance.

Overall priority information needs (for the initial years of CBMP-Terrestrial Plan implementation)

Highest priority

- a. What are the status, distribution, and conditions of terrestrial focal species, populations, communities, and landscapes/ecosystems and key processes/functions occurring in the Arctic?
- b. How and where are these terrestrial focal species, populations, communities, and landscapes/ ecosystems and key processes/functions changing?



Secondary priority

- c. What and how are the primary environmental and anthropogenic drivers influencing changes in biodiversity and ecosystem function?
- d. Where are the areas of high ecological importance including, for example, resilient and vulnerable areas (related to the FECs) and where are drivers having the greatest impact?

Vegetation priority information needs (for the initial years of CBMP-Terrestrial Plan implementation)

Highest priority

- a. What are the status and trends of vegetation species and communities with respect to diversity, abundance, productivity, distribution, structure and composition? Where and how are these changing?
 - What are the status, trends and extent of plant species of conservation concern (rare plants)?
 - How is habitat and forage for focal mammals and birds changing?
 - Where, and how abundant, are non-native plant species and how are they changing?



Secondary priority

- b. How and where are the major changes in vegetation status and trends occurring?
 - How is vegetation changing along major physiognomic ecotones, e.g., treeline, shrubline
 - How and where are the productivity, local abundance and distribution of Arctic shrubs changing and how is this affecting ecosystem function and biodiversity?
 - How are the composition, structure, distribution and extent of landscapes changing?
 - How are soil fungal (mycorrhiza and decomposers) composition and relative abundance changing and what is the impact on soil ecosystem function, structure and stability?
 - How are edible plant species and communities changing? (e.g., quality and availability, location, and type)
- c. What are the drivers influencing changes in vegetation and what changes are occurring?
- d. Where are the vegetated regions of priority importance, such as locations of high vulnerability?

Avian priority information needs (for the initial years of CBMP-Terrestrial Plan implementation)

Highest priority

- a. What are the trends in avian populations (in abundance and distributions) at the local/site-based ecosystem level and how do these relate to global/ flyway population level changes?



Secondary priority

- b. What and how are the primary drivers (biotic, abiotic and anthropogenic) influencing avian diversity and ecosystem function (within and beyond the Arctic) and how are these changing?
 - What are the implications of changes in drivers for birds and other species (phenology, structure, productivity, abundance, and breeding success)?
 - For bird species of concern or that are declining, what are the factors affecting phenology, distribution and abundance?
 - What can we do about negative trends (including related to food security)?

Mammal priority information needs (for the initial years of CBMP-Terrestrial Plan implementation)

Highest priority

- a. What are the status and trends of the relevant mammal populations (i.e., FECs) in the Arctic?
- b. Where in the Arctic are the populations changing?



Secondary priority

- c. What and how do the primary biotic, abiotic and anthropogenic drivers influence the various FECs, and hence, influence mammal diversity and ecosystem function?
- d. Where are the most important regions for FECs (including calving grounds, migratory corridors, major hunting/ grazing/foraging areas, etc.). How are these changing, and what drivers have an impact?
- e. What is the total area and location of these important regions? How much suitable habitat is available and where might shifts in future range use occur?

Invertebrate priority information needs (for the initial years of CBMP-Terrestrial Plan implementation)

Highest Priority

- a. What is the status (abundance, diversity) of functionally important terrestrial invertebrate taxa occurring in the Arctic?
- b. What are the main trends in the status of these taxa (i.e., changes in the diversity, distribution, abundance) and relevant ecological functions? Where and how are these changing, within and across years?
- c. What are the status and trends of invertebrate species of special interest, including invasive and introduced species, occurring in the Arctic?



Secondary Priority

- d. What are the key drivers behind the trends in key invertebrate taxa and associated ecological function?

Appendix C: Biotic group work plans

Vegetation work plan

The vegetation biotic group identified a set of steps that would be followed for each analysis, unless otherwise indicated in the work plan.



1. Identify all potential data sources related to priority vegetation attributes
 - a. Contact/develop a relationship with data owners as appropriate
 - b. Access all available data
2. Develop a process for data harmonization
 - a. Review data collection methods (taxonomy, protocols, etc.)
 - b. Determine if/how data can be harmonized
 - c. Develop database with all data to be harmonized. Create derived products within database, as necessary.
 - d. Harmonize and analyze data
 - e. Generate initial status report and maps with available data
 - f. Repeat harmonization process for all available data years where appropriate. Compare changes between years to establish trends
 - g. Post or link to harmonized data on ABDS
3. Identify temporal, thematic, or geographic gaps in available data
4. Propose priority gaps to be filled
5. Develop semi-automated routines to extract future versions of monitoring data to re-analyse data in future timeframes

Activity	Year
Vegetation diversity, composition and abundance (international assessment of site based ground observations)	
• Step 1	2014
• Step 2	2015
• Step 3-4	2015
• Step 5	201
Productivity (landscape/regional/pan-Arctic)	
• Step 1	2014
• Step 2	2015
• Step 3-5	2015
Productivity related to caribou forage	
Identify key products required	
• Step 1-2	2015
• Step 3-4	2016-2017
• Step 5	2017
Vegetation Diversity, composition and abundance (landscape/regional/pan-Arctic)	
• Step 1 – Linkage with Land Cover Change Index	2015
• Step 2 – Linkage with Land Cover Change Index	2016-2017
• Step 3-5	2017

Activity	Year
Phenology (landscape/regional/pan-Arctic)	
• Step 1	2015
• Step 2	2016-2017
• Step 3-5	2017
Phenology (international assessment of site based ground observations – first bloom)	
• Step 1	2015
• Step 2	2016-2017
• Step 3-5	2018
Rare Species Presence/ absence; number of individuals / population size	
• Step 1	2015-2016
• Step 2	2018- 2020
• Step 3-4	2016-2017
Non-Native Species Presence/ absence; number of individuals /population size	
• Step 1	2015-2016
• Step 2	2017-2020
• Step 3-4	2017-2020
Food species(edible plants for humans) - Species mix, Size distribution	
• Identify key products required	2015-2016
• Step 1-4	2017-2020



Avian work plan

Activities	Timeline
Collect monitoring metadata. Identify sources of data.	2014-2016 (ongoing)
Identify important sources of baseline data (collections, archives, samples, etc.)	2014-2016 (ongoing)
FEC attribute analysis <ul style="list-style-type: none"> Status of Arctic Geese Population Report 	2015
Develop Arctic Geese Database node as early product or case study	2015-2016
Identify sources of funding, expertise, capacity and resources required to implement plan	2014-2016 (ongoing)
Identify and report on avian monitoring knowledge gaps and priorities	2017
Identify required data harmonization techniques	2017-2018
Recommend standardized methods	2017
FEC attribute analysis <ul style="list-style-type: none"> Baselines for some species (reports of status/trends or more detailed analyses) Productivity & nesting data - report: long-term trends & nesting success 	2017
<ul style="list-style-type: none"> Develop community-based monitoring plan 	2017-2018
<ul style="list-style-type: none"> Identify management units and key habitats for wader species 	2020
FEC attribute analysis <ul style="list-style-type: none"> Status of Arctic Birds Report 	2020
Identify key habitat refugia and 'hotspots' of diversity	2020

Arthropod work plan



Activities	Timeline
Identification of relevant data sources, samples and networks to support potential implementation of CBMP arthropod monitoring (eg: ITEX, CanPolin, Sub-arctic lepidoptera network, INTERACT, CNNRO.)	2015
Protocol development <ul style="list-style-type: none"> Development of practical guidance for Arctic invertebrate monitoring (Buddle, 2013) Peer review of practical guidance document Test application of monitoring design at case study regions Finalize protocol 	2013 2014-2015 2015-2016 2016
Establish international arthropod network. Host workshop/meeting.	2015
Identify mechanisms to harmonize monitoring methods and data	2016-2020
Integrative assessments <ul style="list-style-type: none"> Assessment of abundance and diversity of the following arthropod functional groups: Blood-feeding, pollinators, prey, herbivores, decomposers. 	2017
Based on case study results and review, develop implementation approach for coordinated arthropod monitoring described in the CBMP-Terrestrial Plan, including: <ul style="list-style-type: none"> Sample analysis and taxonomy strategy Priority partners to implement Analyses and reports to be conducted 	2016-2017

Mammal work plan



Activities	Timeline
Caribou/Reindeer	
• Support CARMA related analysis and reporting	Ongoing
• Build closer collaboration with CARMA to align and integrate activities and outputs with CBMP-Terrestrial Plan implementation	2014
• Connect existing CARMA data with the ABDS	Ongoing
• Integrated assessment of phenology	2020
Moose	
• Identify data sources, networks and ongoing work to support priority FEC analysis. Develop relationships.	2016
• Integrated assessments of abundance and demographics	2016
• Integrated assessments of spatial Structure and health	2017
• Standardizing of methods and harmonizing data	2016-2020
Muskox	
• Identify data sources, networks and ongoing work to support priority FEC analysis. Develop relationships.	2016
• Integrated assessments of abundance and demographics	2016
• Integrated assessments of spatial structure and health	2017
• Standardizing of methods and harmonizing data	2016-2020
Lemmings/voles	
• Identify data sources, networks and ongoing work to support priority FEC analysis	2015
• Integrated assessment: Abundance	2017
• Integrated assessment: Health	2020
• Support informal pan-Arctic lemming/vole network	2016
• Standardizing of methods and harmonizing data	2016-2020
Medium-sized predators (wolverine, Eurasian lynx, Canada lynx, red fox, Arctic fox)	
• Identify data sources, networks and ongoing work to support priority FEC analysis related to Arctic foxes.	2015
• Integrated assessment: Arctic fox abundance	2016
• Integrated assessment: Arctic fox health	2017
• Support informal pan-Arctic Arctic fox network	2016
• Standardizing of methods and harmonizing data related to Arctic foxes	2016-2020

Appendix D: Integrative/cross-biotic group work plan

Activities	Timeline
INTERACT CBMP assessment	
<ul style="list-style-type: none"> • Conduct analysis of ongoing monitoring and research relevant to the implementation of the CBMP-Terrestrial Plan at INTERACT and Canadian Network of Northern Research Stations 	2014-2015
<ul style="list-style-type: none"> • Conduct analysis of opportunities to support implementation of the CBMP Terrestrial Plan at INTERACT sites and Canadian Network of Northern Reserach Stations. Identify gaps and priorities. 	2014-2015
Develop a sampling design for integrative, place-based assessment of Arctic change to assess ecosystem processes and linkages. Identify recommendations for monitoring parameters, protocols and study design.	2017
Ensure coherence and integration among biotic group plans following an ecosystem approach. Ensure coherence and integration with CBMP Marine, Freshwater and Coastal monitoring and analysis.	Ongoing
Research existing data sources and methods to harmonize monitoring methods and data outputs (see biotic group work plans)	Ongoing

For further information and additional copies
contact:

CAFF INTERNATIONAL SECRETARIAT
Borgir
Nordurslod
600 Akureyri
ICELAND

Telephone: +354 462 3350
Fax: +354 462 3390
E-mail: caff@caff.is
Internet: <http://www.caff.is>

ISBN: 978-9935-431-31-8
Prentstofan: Stell