Terrestrial Steering Group: Birds

Circumpolar Biodiversity Monitoring Program

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Avian Expert Group

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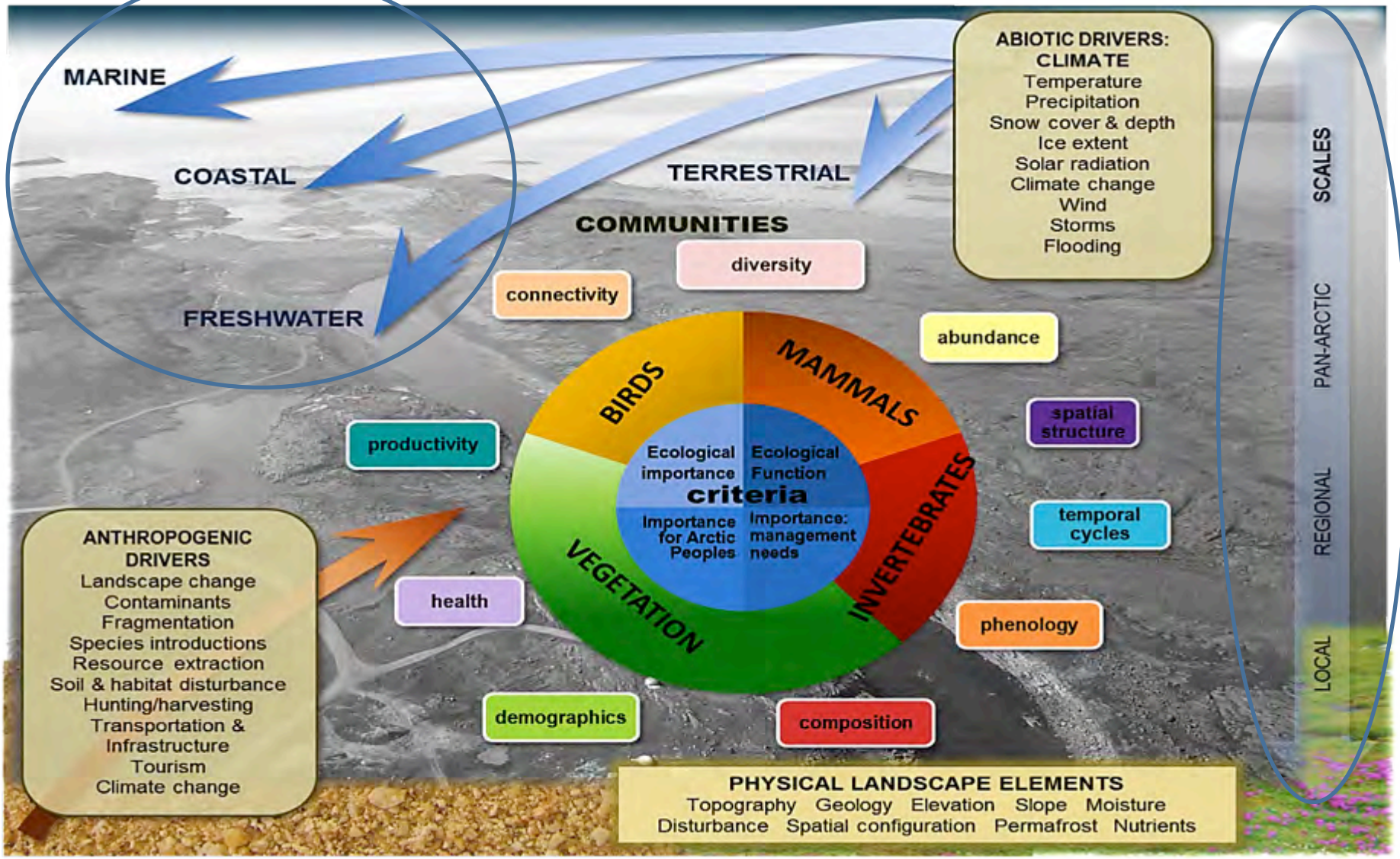
Conceptual Model for Terrestrial Biome

FECs : selected for monitoring based on criteria of ecological importance, community and management needs; BIRDS = often migratory



Climate & Environmental Effects

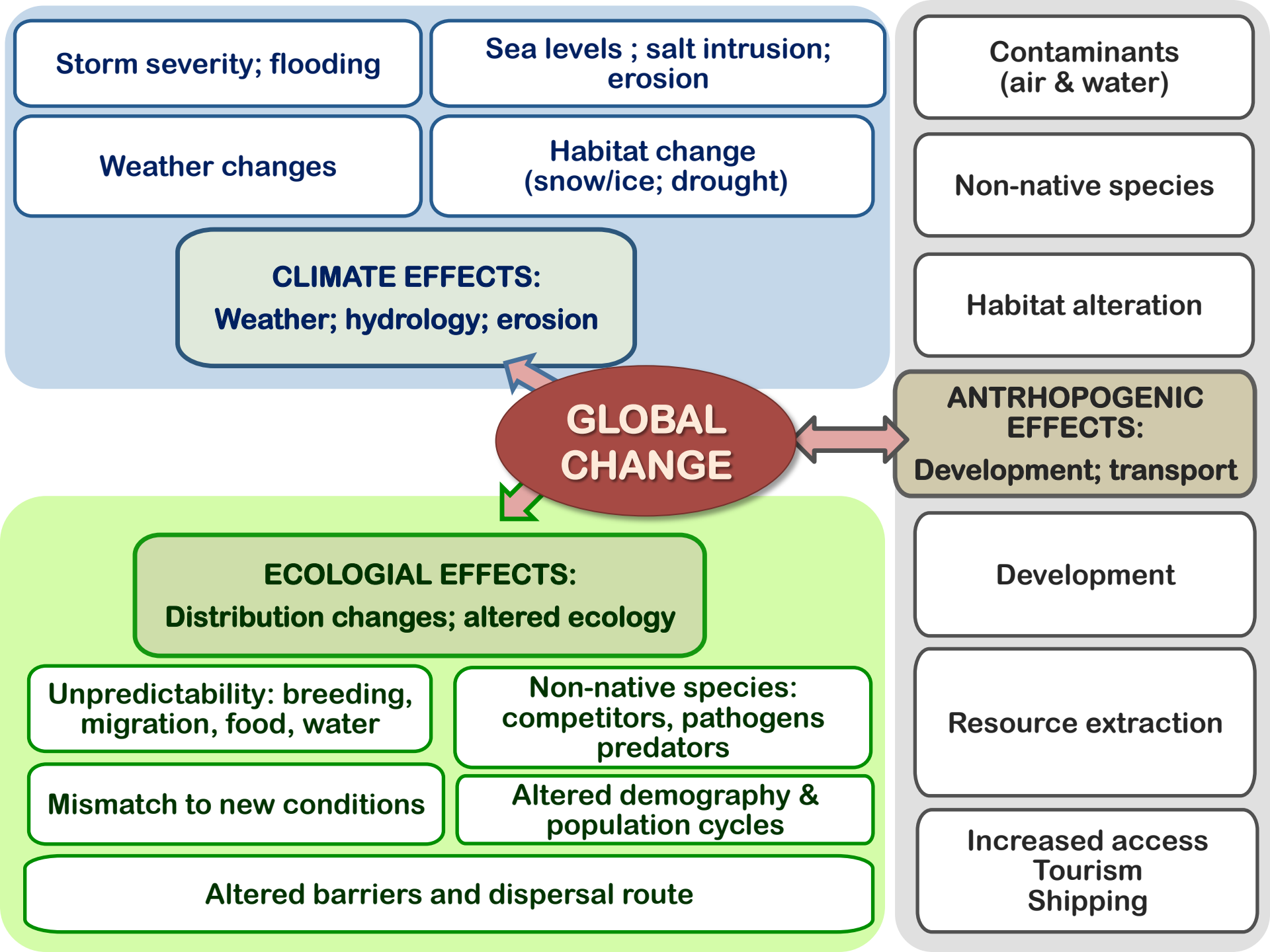
Anthropogenic effects

Climate effects

Ecological effects

HABITAT

- quality
- total area
- connectivity
- population sizes

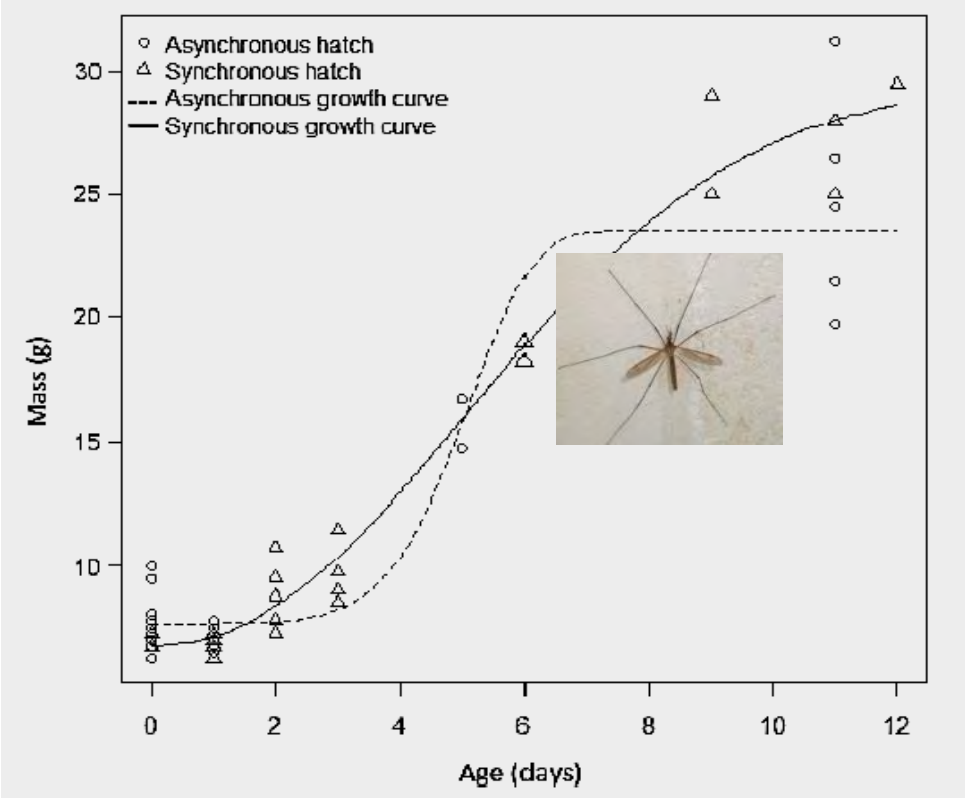

Storm severity; flooding
Sea levels ; salt intrusion; erosion
Weather changes
Habitat change (snow/ice; drought)
CLIMATE EFFECTS:
Weather; hydrology; erosion
GLOBAL CHANGE
ANTRHOPOGENIC EFFECTS:
Development; transport
Contaminants (air & water)
Non-native species
Habitat alteration
Development
Resource extraction
Increased access
Tourism
Shipping
ECOLOGIAL EFFECTS:
Distribution changes; altered ecology
Unpredictability: breeding, migration, food, water
Non-native species: competitors, pathogens predators
Mismatch to new conditions
Altered demography & population cycles
Altered barriers and dispersal route

E.g. Climate & Environmental Effects

Timing of breeding, peak food availability, and effects of mismatch on chick growth in birds nesting in the High Arctic

L. McKinnon, M. Picotin, E. Bolduc, C. Juillet, and J. Bêty

Source: Canadian Journal of Zoology, Volume 90, Number 8, August 2012 , pp. 961-971(11)



Pan-American

Actitis macularis
Spotted sandpiper

In Arctic and elsewhere:

- **Where is critical habitat located?**
- **What are key regions of diversity?**
- **What are the drivers?**

allaboutbirds.org

Selection for monitoring - Priorities

> **Biotic groups** (e.g. birds)
>> **Focal Ecosystem Components (FECs)** (e.g. herbivores)
>>> **Attributes** (e.g. abundance)
>>>> **Parameters** (e.g. density)

Highest priority assessed based on these criteria also :

- sensitivity to natural or anthropogenic drivers
- relevance to Traditional Knowledge-based management
- availability & sustainability: monitoring capacity , expertise
- relevance to targets and thresholds
- practicality
- validity
- ecological relevance

Some key monitoring priorities

- to monitor abundance and distribution in relation to biotic and abiotic drivers
  - (including supplementary data from wintering and staging areas outside Arctic)
- to monitor how changes affect birds and other functional groups
  - ecosystem function, interactions

http://www.hww.ca

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)?

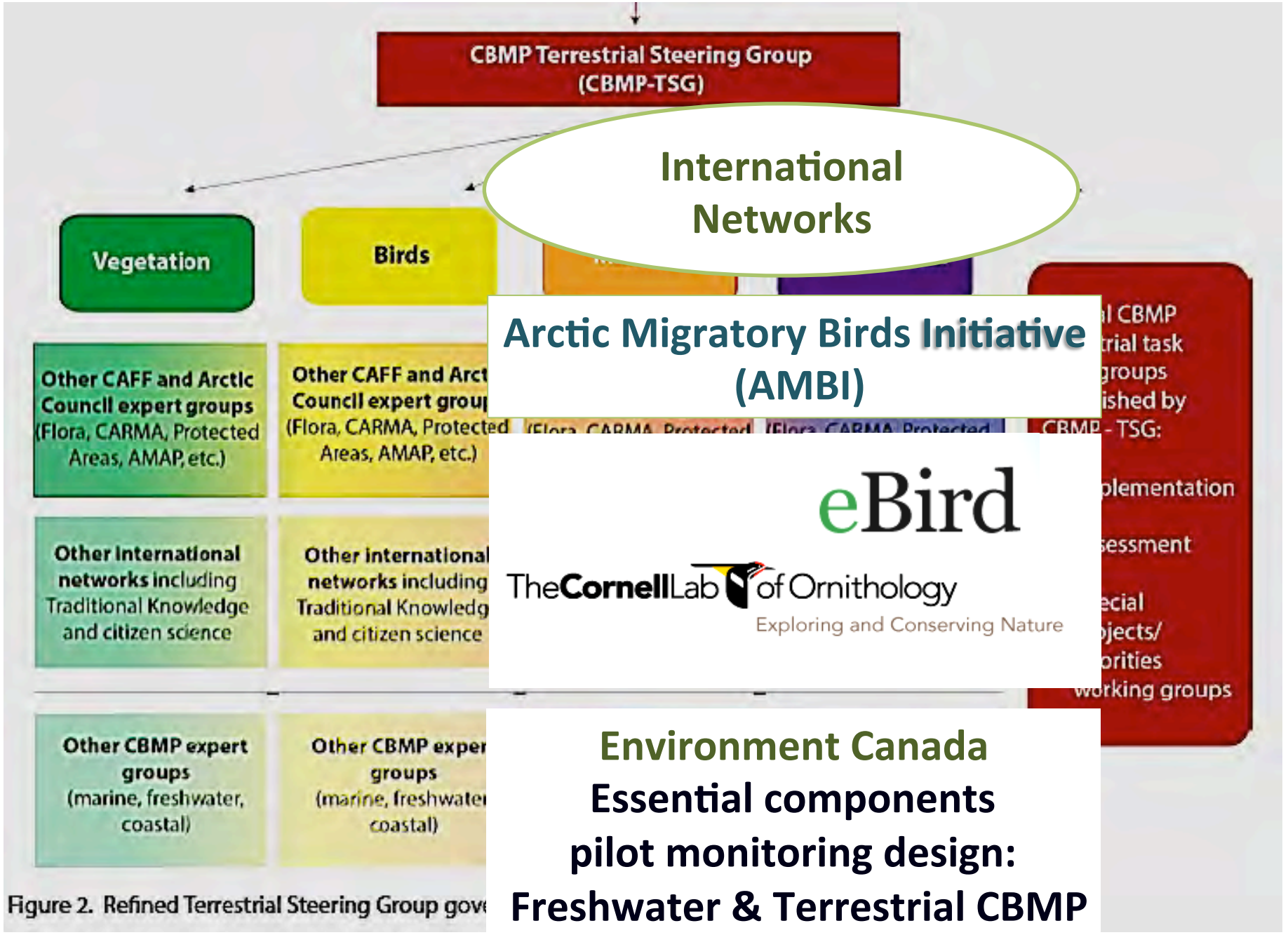


Figure 2. Refined Terrestrial Steering Group gove

Avian FECs, attributes and parameters

ESSENTIAL ATTRIBUTES

- Abundance
- Distribution
- Demography

RECOMMENDED ATTRIBUTES

- Community Structure
- Health
- Body condition

Avian functional groups included

Included:

- Herbivores (geese, swans, and ptarmigan)
- Omnivores (ducks, cranes)
- Insectivores (shorebirds, passerines)
- Carnivores (raptors, owls, skuas, ravens)

Not included: part of Marine or Freshwater CBMP Plans

- Seabirds
- Seaducks
- Many diving waterfowl sps. (e.g. foraging in aquatic environments; some overlap with Terrestrial Plan)
- Grebes

Implementation of Avian Monitoring

- Site- and station- based monitoring
- Focal species
- Remote sensing
- Aerial surveys
- Capture-mark-recapture
- Citizen science & Traditional Knowledge
- Include data from regions outside Arctic
- Opportunistic: focal studies, collaborations

Photo: Eric Reed; www.hww.ca

- CREATE METADATA
  - CBMP data portal: www.abds.is
  - Polar Data Catalogue: http://www.polardata.ca/

Example: methods, temporal recurrence

FOCAL ECOSYSTEM COMPONENT	ATTRIBUTE	PRIORITY	PARAMETER	SCALE	METHOD	PROTOCOL COMPLEXITY	TEMPORAL RECURRENCE	COMMENTS
Herbivores (geese, swan, ptarmigan)	Abundance and trends	Essential	Population size, number, habitat selection	1) local - global; 2) regional; 3) regional - global; 4) local	1) Various aerial and ground surveys; 2) non-breeding census; 3) banding (Capture-Mark-Recapture); 4) citizen science (TK)	BASIC and ADVANCED	1) annual; 2) annual; 3) annual; 4) continuous	Must be included; ptarmigan may be poorly covered by these methods
	Distribution	Essential	Local density; presence/absence, habitat selection, migration patterns	1) local - global; 2) regional; 3) regional - global; 4) local	1) Various aerial and ground surveys; 2) non-breeding census; 3) banding (Capture-Mark-Recapture); 4) citizen science (TK)	BASIC and ADVANCED	1) annual; 2) annual; 3) annual; 4) continuous	Must be included
	Demography	Essential	propensity; clutch size; brood size; age ratio; nest success; age specific survival, genetic diversity, breeding behavior, **phenology**	1-2) regional to global; 3) local; 4) local	1) banding (Capture-Mark-Recapture); 2) hunter collected wing plumage surveys; 3) site-specific studies; 4) egg collectors	BASIC and ADVANCED	1) annual; 2) annual; 3) annual; 4) annual	Demography feeds directly into population size and is of high priority. Often, it is the only measurable attribute at the flyway scale.
	Community structure	Recommended	Diversity index, habitat selection	See rows above	See rows above	ADVANCED	See rows above	Relative abundance of all species within defined area. Lower priority but data can be obtained from population abundance

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Implementing ABA recommendations

Priorities for Birds as part of monitoring and CBMP:

- ABA #10: Promote the sustainable management of the Arctic's biodiversity and habitat
  - TK, international cooperation, adaptive ecosystem mgt.

- ABA#13: Improve knowledge through increased and focused inventory, sustained monitoring and research
  - including ecosystem function, cycles, interactions

- ABA#16: Research & monitor cumulative effects, identify gaps and priorities especially for those impacts with rapid and significant potential effects

- Others: #5, #6 (habitat), #8 (migratory sps), #15 (outreach)

Questions for DISCUSSION

Input from You: - HOW TO ACHIEVE THESE:

- Integrate Arctic terrestrial monitoring
- Your initiatives – program , site, data, protocols
- Your initiative – implementing ABA recommendations
- Lessons learned – GOOD or BAD
- Assessing cumulative effects
- Gaps and priorities
- Are you aware of stressors not yet considered ?

Some key monitoring questions for Birds

- What are the primary biotic, abiotic and anthropogenic drivers influencing changes diversity and ecosystem function (within and outside the Arctic)?
- How are these changing?
- What are the implications for birds and other species? (phenology, structure, productivity)
- For species of concern, what factors affect phenology, distribution and abundance inside and/or outside Arctic?
- What are the trends of priority species (e.g. RAMSAR, national priorities, etc.) at the population flyway level?
- Are protected site networks living up to their intended criteria?
- How many birds can be harvested?
- Where and how are populations and communities changing?