# CIRCUMPOLAR MONITORING FRAMEWORK FOR POLAR BEARS

Photo: S. Amstrup

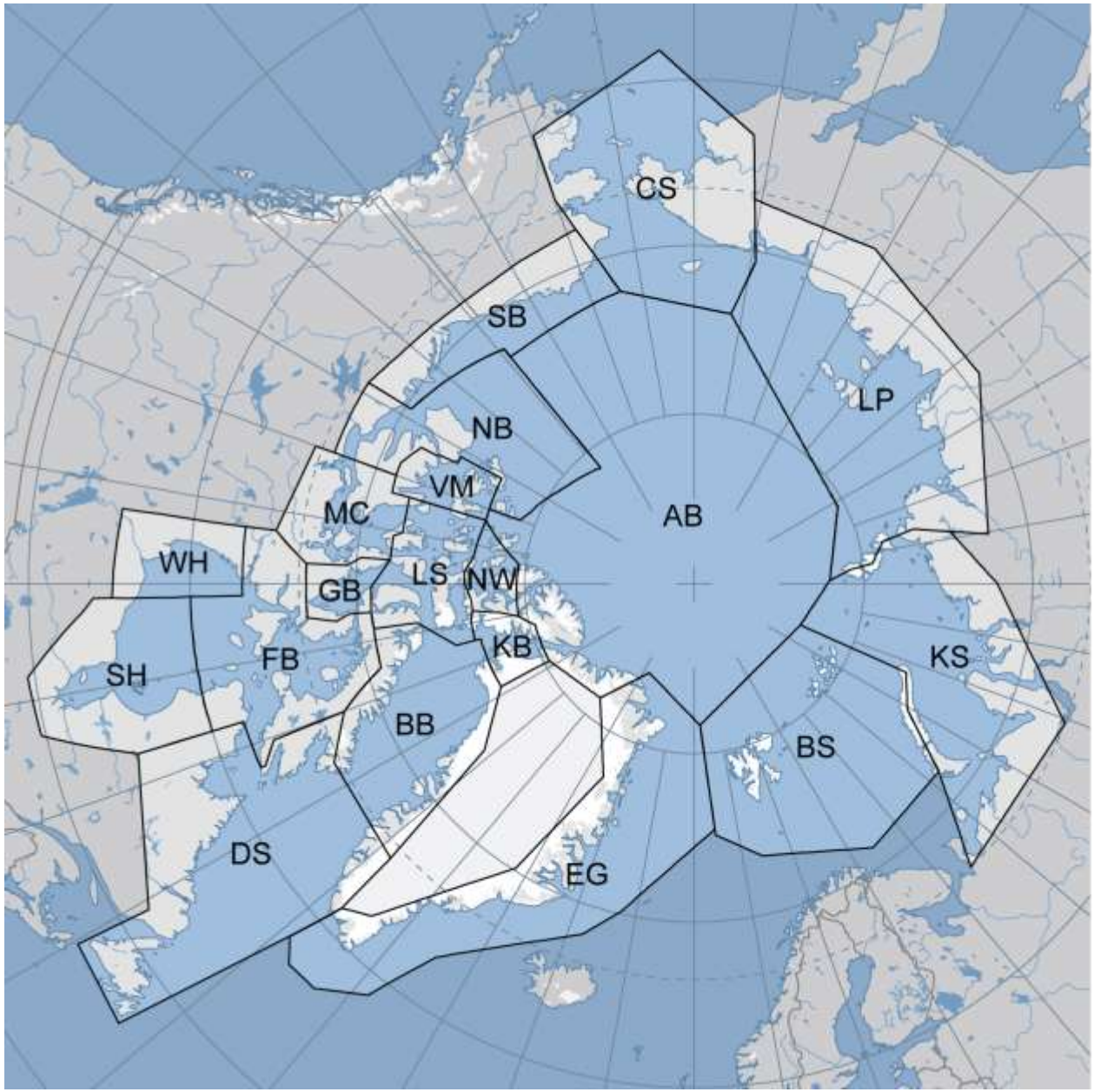
# Why a circumpolar monitoring plan?

Because:

- Anthropogenic climate warming undermines the concept of sustainability on which historic management has been based and dramatically increases the challenges to future polar bear welfare,
- the understanding of status and trends of polar bear populations is not equal across regions or subpopulations,
- monitoring resources have not been equally available, and methods are not equally appropriate in every area, and
- although climate warming ultimately threatens all polar bears, it will not affect all bears at the same time or in the same ways.

➢ A plan is needed to expand circumpolar understandings.

# The 19 CIRCUMPOLAR POLAR BEAR SUBPOPULATIONS




AB = Arctic Basin

BB = Baffin Bay

BS = Barents Sea

CS = Chukchi Sea

DS = Davis Strait

EG = East Greenland

FB = Foxe Basin

GB = Gulf of Boothia

KB = Kane Basin

KS = Kara Sea

LS = Lancaster Sound

LP = Laptev Sea

MC= M'Clintock Channel

NB = Northern Beaufort

NW = Norwegian Bay

SB = Southern Beaufort

SH = Southern Hudson Bay

VM = Viscount Melville

WH = Western Hudson Bay

**Dag Vongraven**
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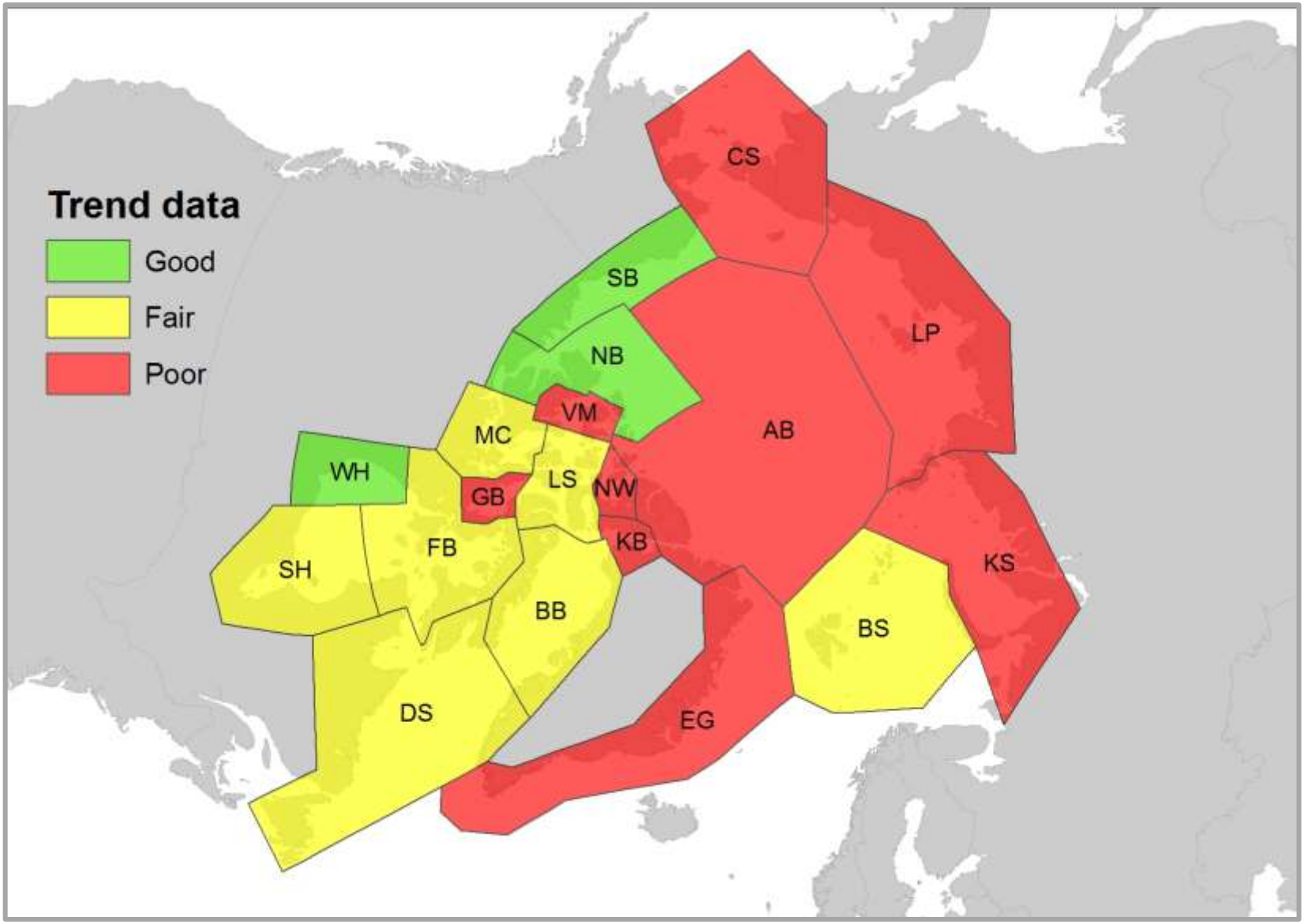
# Unequal status of knowledge – trend data



# Goals of a circumpolar monitoring plan?

- Improve trend detection
- Improve cost-efficiency
- Fill knowledge gaps
- Optimize existing capacity
- Identify vulnerable subpopulations
- Develop adaptive management
- Community-based monitoring & traditional knowledge

# Process

PBSG & CAFF

US Marine Mammal Commission funding

Background paper


CAFF

Edmonton workshop

experts develop plan

Peer-reviewed publication
*Ursus Monograph*


A circumpolar monitoring framework for polar bears

2005 2010 2011 2011 2012

## Challenge

- Funding and logistical limitations
- Absence of and need for information from all subpopulations

## Strategy

- Hierarchical approach: Rangewide ← Ecoregion ← subpopulation
- Combination of high and lower intensity methods that maximize comparability despite differences in intensity and methodology.

## Approach

- Polar bear ecoregions Amstrup et al. 2008
- Different monitoring intensities (at least one population with intensive strategy in each ecoregion, less intensive efforts in others)

## Objectives

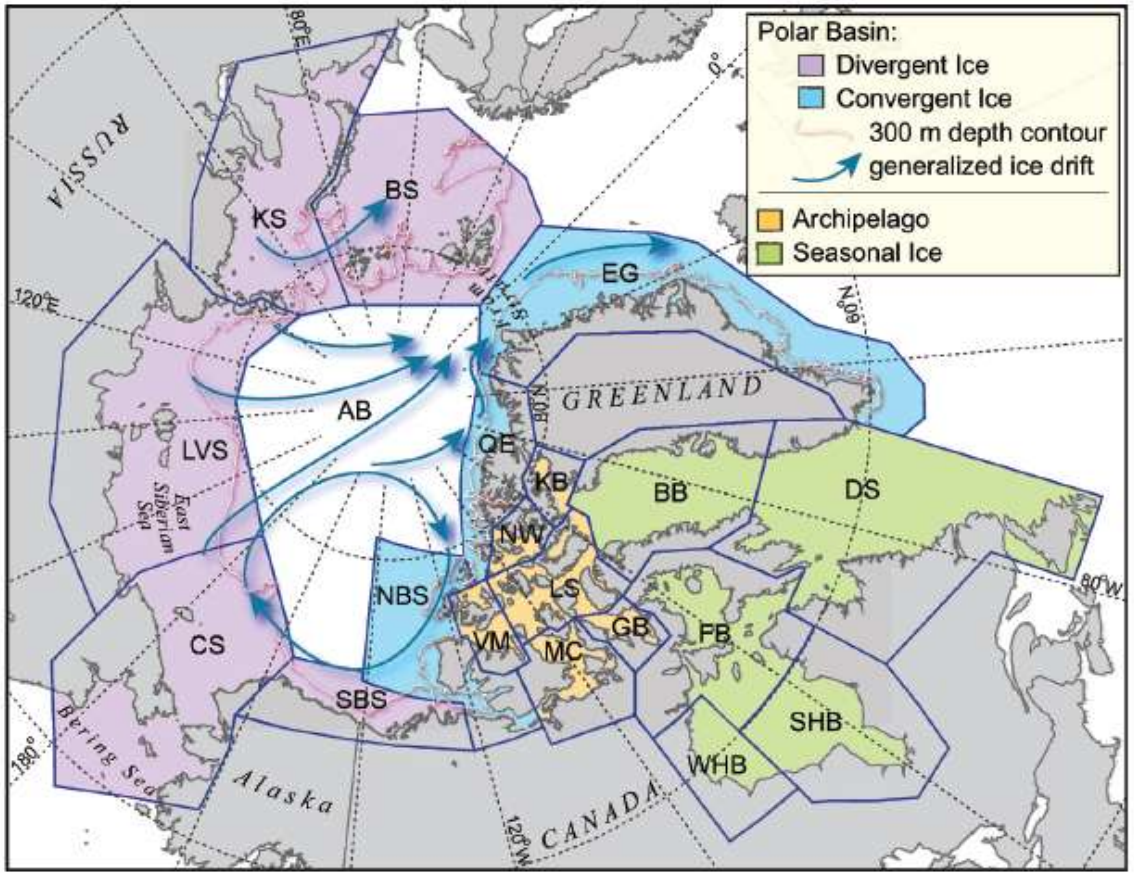
- Multiple lines of information comparability among subpopulations and regions
- Enable projection of results

# Polar bear ecoregions

- 19 subpopulations in 4 ecological regions based on:
  - sea ice patterns, polar bear responses to sea ice, and future ice conditions

Amstrup et al. 2008

| Ecoregion | Subpopulation |
|---|---|
| Divergent | Southern Beaufort Sea<br>Chukchi Sea<br>Laptev Sea<br>Kara Sea<br>Barents Sea |
| Convergent | East Greenland<br>Northern Beaufort Sea<br>Norwegian Bay |
| Archipelago | Kane Basin<br>Norwegian Bay<br>Lancaster Sound<br>Viscount Melville Sound<br>M'Clintock Channel<br>Gulf of Boothia |
| Seasonal | Baffin Bay<br>Davis Strait<br>Foxe Basin<br>Southern Hudson Bay<br>Western Hudson Bay |




Amstrup, S. C. et al. 2008. Geophys. Monogr. Ser., 180: 213—268..

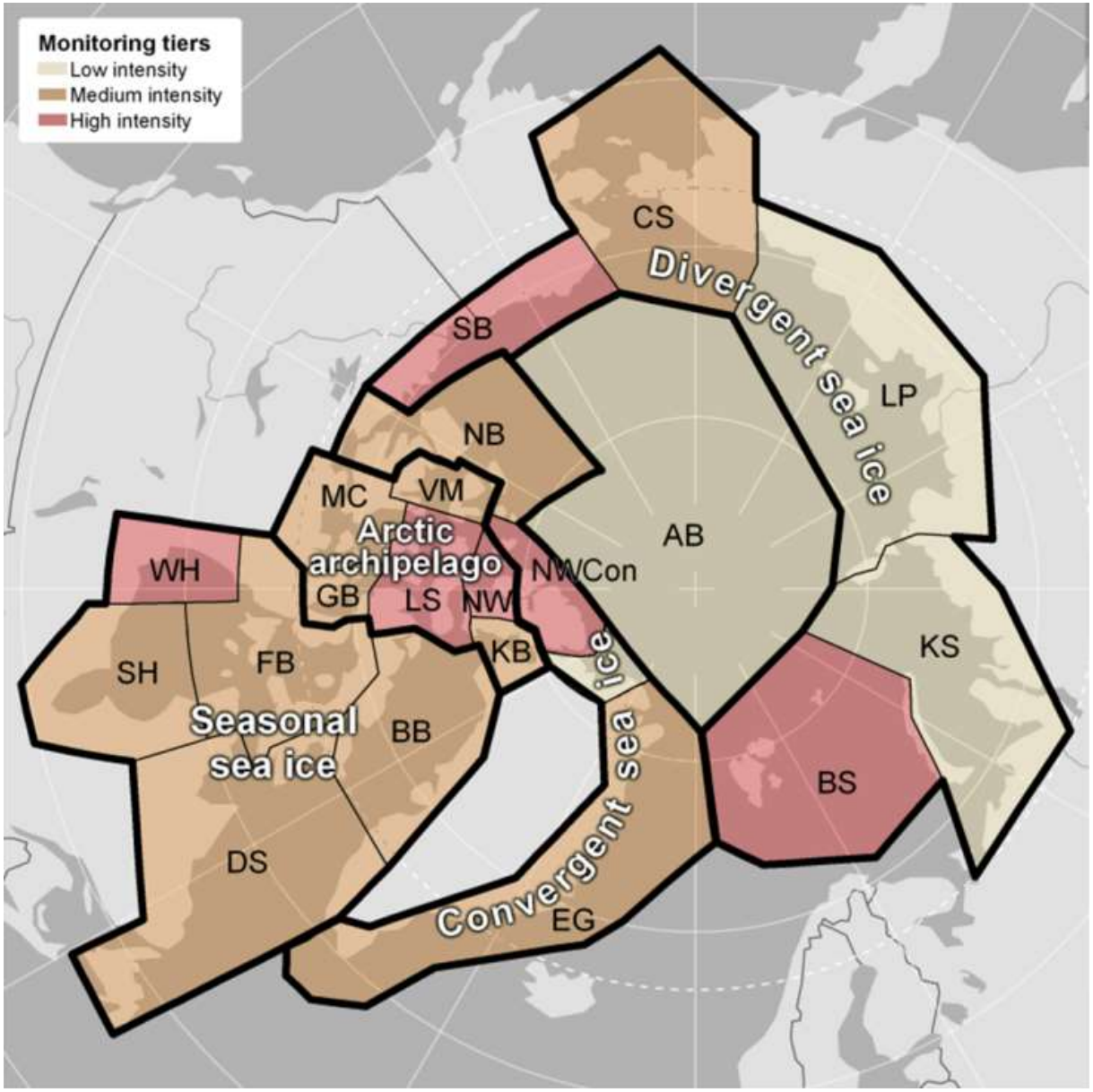
# Monitoring intensities differ among subpopulations

| Intensity | Alternative terms | Description of monitoring |
|---|---|---|
| **High** | Continuous | • 1 or more high intensity subpopulation per ecoregion<br>• serve as reference point<br>• facilitate projection of trends<br>• based on historical quantitative data, perceived threats, & monitoring costs<br>• other factors: geopolitical (e.g., protected areas), industrial development, & harvest |
| **Medium** | Adaptive | • periods of intense study or moderate ongoing monitoring<br>• some data exist<br>• monitored within an adaptive framework |
| **Low** | Opportunistic | • remoteness & cost result in basic and easily collected metrics<br>• less frequent monitoring<br>• opportunistic<br>• lower intensity<br>• remote technology (e.g., satellite)<br>Note: does not reflect threat level to the subpopulation |

# Monitoring intensities by ecoregion

| Eco-region | Subpopulation | Monitoring intensity |
|---|---|---|
| DIVERGENT | Barents Sea | High |
| | Chukchi Sea | Medium |
| | Kara Sea | Low |
| | Laptev Sea | Low |
| | Southern Beaufort Sea | High |
| CONVERGENT | East Greenland | Medium |
| | Northern Beaufort Sea | Medium |
| | Norwegian Bay | High |
| ARCHIPELAGO | Gulf of Boothia | Medium |
| | Kane Basin | Medium |
| | Lancaster Sound | High |
| | M'Clintock Channel | Medium |
| | Norwegian Bay | High |
| | Viscount Melville | Medium |
| SEASONAL | Baffin Bay | Medium |
| | Davis Strait | Medium |
| | Foxe Basin | Medium |
| | Southern Hudson Bay | Medium |
| | Western Hudson Bay | High |
| | Arctic Basin | Low |

# Monitoring intensities - geographic view



# Recommended monitoring parameters

**Scientific methods**

- abundance
- trend
- reproductive rates
- survival
- habitat change
- human-caused mortality
- human-bear conflicts
- distribution
- prey distribution and abundance
- health
- stature
- human activity
- behavioural change
- effects of monitoring itself

**Non-scientific methods**

- community-based monitoring
- traditional ecological knowledge

# Parameter: Abundance

| Recommended method | Intensity | Frequency |
|---|---|---|
| Physical mark & recapture<br>Genetic mark & recapture<br>Genetic mark & recapture and aerial surveys | High | • annually for 3+ years<br>• 5 year intervals |
| | Medium | • based on threat level |
| Indirect assessment and indices<br>Community based monitoring<br>Harvest based inference | High | • annually<br>• at least every 5 years |
| | Medium | • based on threat level |
| Standardized observations<br>Other indirect assessment and indices<br>Community based monitoring<br>Harvest-based inference | Low | • annually or as frequently as possible |

# Parameter: Survival

| Recommended method | Intensity | Frequency |
|---|---|---|
| Mark & recapture survival estimation | High / Medium | • based on threat level |
| Survival of radio-collared bears | High / Medium | • based on threat level |
| Litter loss, cub loss & cohort survival | High / Medium | • based on threat level |
| # of cubs, yearlings, & 2-year olds per adult female | High / Medium | • based on threat level |
| | Low | • as often as possible |
| Age structure | High / Medium | • based on threat level |
| | Low | • as often as possible |
| Cohort strengths | High / Medium | • based on threat level |
| | Low | • as often as possible |
| Age categories of bears visually observed | Low | • whenever possible |

# Parameter: Habitat and ecosystem change

| Recommended method | Intensity | Frequency |
|---|---|---|
| Satellite imagery of sea ice cover | High, Medium, Low | • Annually / as often as possible |
| Habitat analyses | High<br>Medium<br>Low | • Annually / as often as possible |
| Changes in sea ice habitat and physical factors | High / Medium<br>Low | • Annually / as often as possible |
| Denning distribution & changes in coastal habitats<br>Industrial or other human activities | High<br>Medium<br>Low | • Annually / as often as possible |
| Invasive or unusual species occurrence | High, Medium, Low | • Annually / as often as possible |
| Satellite imagery snow accumulation and persistence | High, Medium, Low | • Annually / as often as possible |

# Future work

Priority studies

- Further analysis of existing data
- Calibrate lower intensity methods with high intensity methods to maximize range-wide comparability

Circumpolar implementation

- Integration with traditional knowledge
- Include in National conservation plans-Polar Bear Range States

Regular assessments

- to be determined

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Photo: M. Ekker

# Thank you for your attention

Photo: A. Derocher