

CBMP-Freshwater Metadata Synthesis

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- **National Freshwater Expert Networks (FEN)**
 - Collect & analyse national monitoring data
 - Assess Arctic freshwater biodiversity status & trends
 - Associate cause of spatial & temporal trends in biodiversity
- **Primary FEN Objective 2013-2015**
 - Identify data for national trend analysis through extensive search for metadata on Focal Ecosystem Components (FECs)
 - Summarize metadata for lakes and rivers
 - ❖ Assess quality of potential data
 - ❖ Summarize spatial & temporal coverage of monitoring activities
 - ❖ Identify critical gaps in monitoring coverage
- **FEN Objective 2015-2017**
 - Collect & assess “high quality” data sets
 - Identify “ideal” monitoring stations within each country
 - Produce “State of Circumpolar Arctic Freshwater Biodiversity”

Metadata Collection

- **Approach varies by nation:**
 - Well-established national monitoring networks in some countries
 - Extensive searches in countries without Arctic monitoring networks
- **Sources include:**
 - Government & industry funded monitoring programs
 - Published literature
- **Focal Ecosystem Components:**
 - Biotic (e.g., fish, invertebrates) & Abiotic (e.g., water quality)
 - Identify feasibility of each FEC for inclusion in assessment
- **Establishment of temporal trends over 3 time periods:**
 - Contemporary (1950 to present)
 - Post-industrial (1800 to 1950)
 - Pre-industrial (1800 back to ~10,000 y BP)
- **Examples from Canada but similar data available for all countries**

CANADA: River Metadata for Biotic FECs

Time Period	Focal Ecosystem Component	Year Range	Sites 1 Y	Sites ≥ 5 Y
Contemporary (1950-Present)	Fish	1959-2013	0	44
	Benthic Inverts	1950-2013	488	4
	Benthic Algae	2006-2009	86	0
Post-Industrial (1800-1950)	Fish	1914-1950	5	0
	Benthic Inverts	1947-1950	14	0
	Benthic Algae	—	0	0
Pre-Industrial: No Data				

CANADA: River Metadata for Abiotic FECs

Time Period	Focal Ecosystem Component	Year Range	Sites 1 Y	Sites ≥ 5 Y
Contemporary (1950-Present)	Water Quality	1960-2013	306	226
	Water Temperature	1968-2013	119	57
	Hydrologic Regime	1950-2013	60	499
Post-Industrial (1800-1950)	Water Quality	—	0	0
	Water Temperature	—	0	0
	Hydrologic Regime	1915-1949	2	15

River Fish (1950-present)



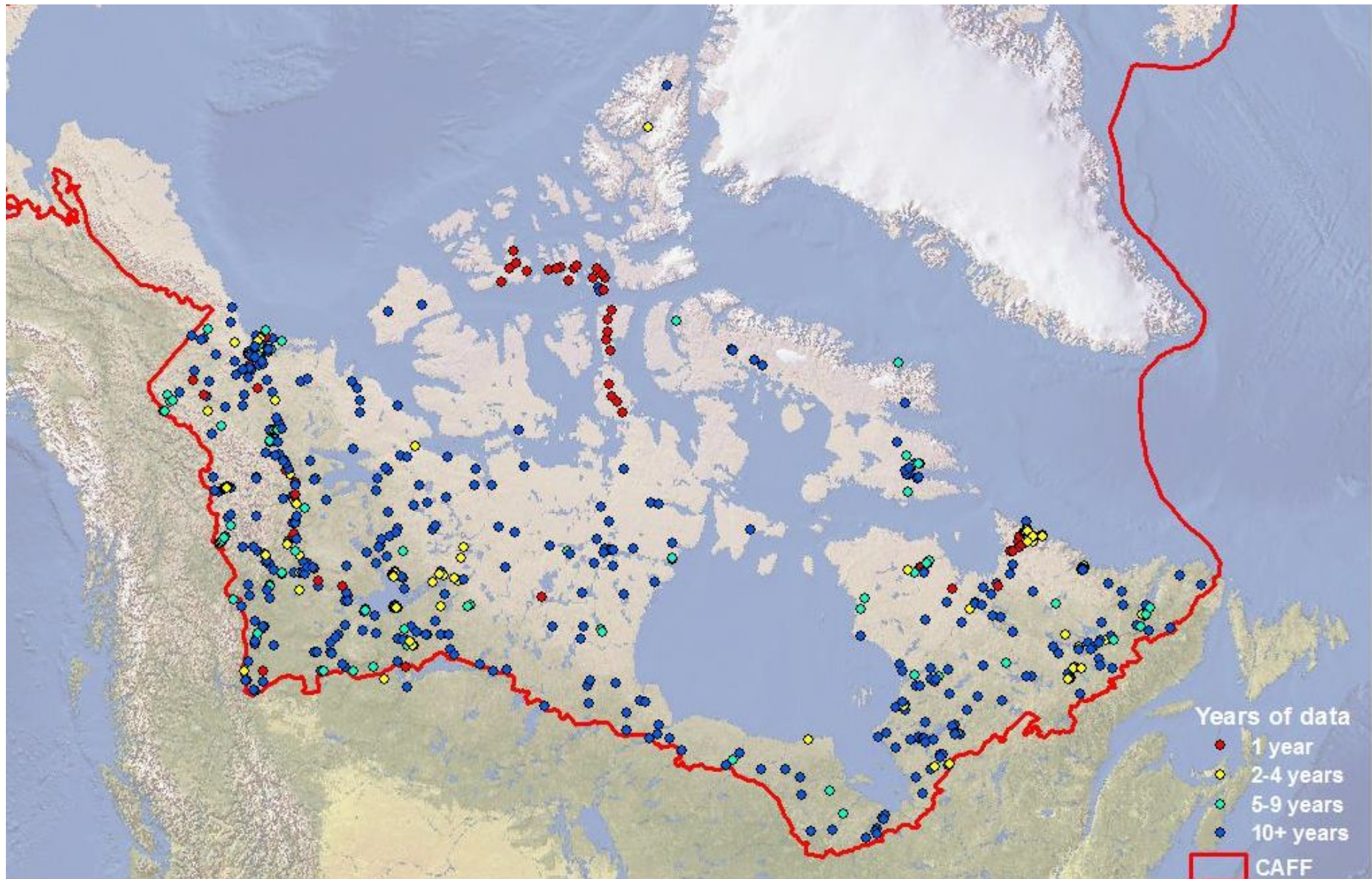
River Invertebrates (1950-present)



River Water Quality (1950-present)



River Hydrological Regime (1950-present)



Traditional Ecological Knowledge (TEK)

Can inform CBMP Freshwater assessments:

- Environmental change over long time scales
- Distant & recent baseline conditions where monitoring does not exist (ice thickness, freeze up & break up)
- Synthesizes continuous observation of environmental drivers (climate, fishing pressure)



Types of freshwater TEK data:

- Oral history (TEK interviews with local experts)
- Reports (industry, co-management, government)
- Archaeological reports
- Missionary recordings (audio/written) & photographs



photo credits: James Kuptana

Summary

- Scandinavian countries have long tradition of monitoring in Contemporary Period both spatially & temporally
- Other countries (e.g., Canada) have good spatial but poor temporal coverage during contemporary period
- Potential to use Traditional Knowledge to “fill in” gaps related to fish information (e.g., Post-Industrial)
- Need to determine role of remote sensing (time series?)
- Pre-industrial data for invertebrates and algae is for chironomids and diatoms (not benthic assemblage)
- Identify monitoring synergies between terrestrial and aquatic components

Next Steps

- National FENs currently completing metadata reports & data distribution maps
- Identify gaps in coverage within nations & across Arctic
- Information from all nations will be summarized into a common circumpolar report
- Nations to identify high priority sites for use in State of Arctic Freshwater Biodiversity Assessment
- Develop data sharing agreements where needed
- Acquisition of data from focal assessment sites along with QA/QC of sampling methods & data
- Freshwater Steering Group Annual Performance Report published in early 2015
- Copenhagen inter-FEN workshop (October 2015)

Acknowledgements

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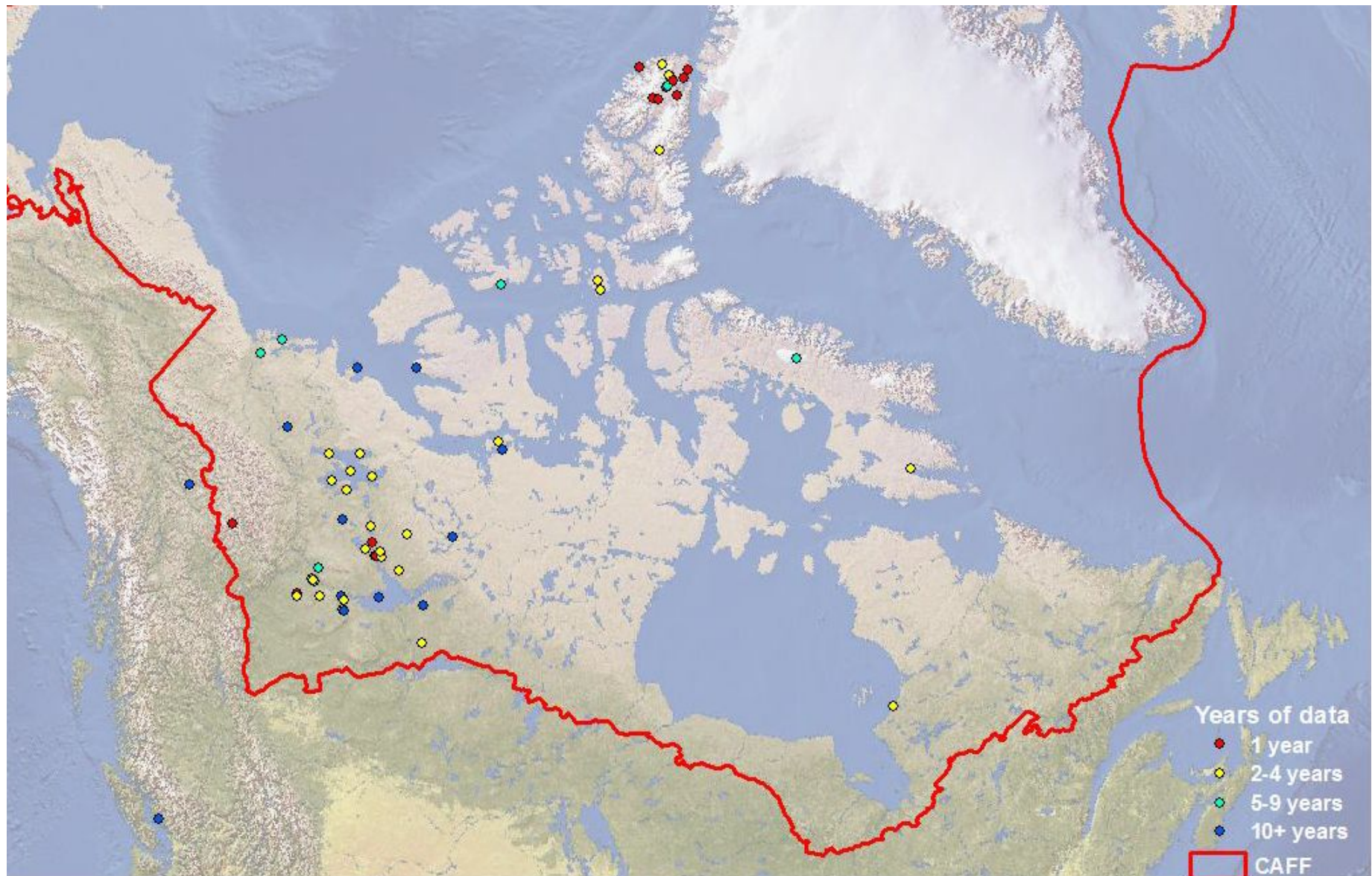
CANADA: Lake Metadata for Biotic FECs

Time Period	Focal Ecosystem Component	Year Range	Sites 1 Y	Sites ≥ 5 Y
Contemporary (1950-Present)	Fish	1958-2013	13	20
	Zooplankton	1982-2013	81	2
	Benthic Inverts	1990-2013	202	5
	Phytoplankton	1979-2012	16	1
	Benthic Algae	1979-2010	227	0
Post-Industrial (1800-1950)	Fish	1944-1949	7	1
	Zooplankton	—	0	0
	Benthic Inverts	1850-1950	0	56
	Phytoplankton	—	0	0
	Benthic Algae	1817-1950	0	19
Pre-Industrial: Benthic Inverts (15 sites) & Benthic Algae (66 sites)				

CANADA: Lake Metadata for Abiotic FECs

Time Period	Focal Ecosystem Component	Year Range	Sites 1 Y	Sites ≥ 5 Y
Contemporary (1950-Present)	Water Quality	1977-2013	1275	92
	Water Temperature	1979-2013	1126	92
	Hydrologic Regime	1950-2013	0	37
Post-Industrial (1800-1950)	Water Quality	—	0	0
	Water Temperature	1915-1950	4	1
	Hydrologic Regime	1934-1949	1	3

Lake Fish (1950-present)



Lake Zooplankton (1950-present)



Lake Water Quality (1950-present)

