

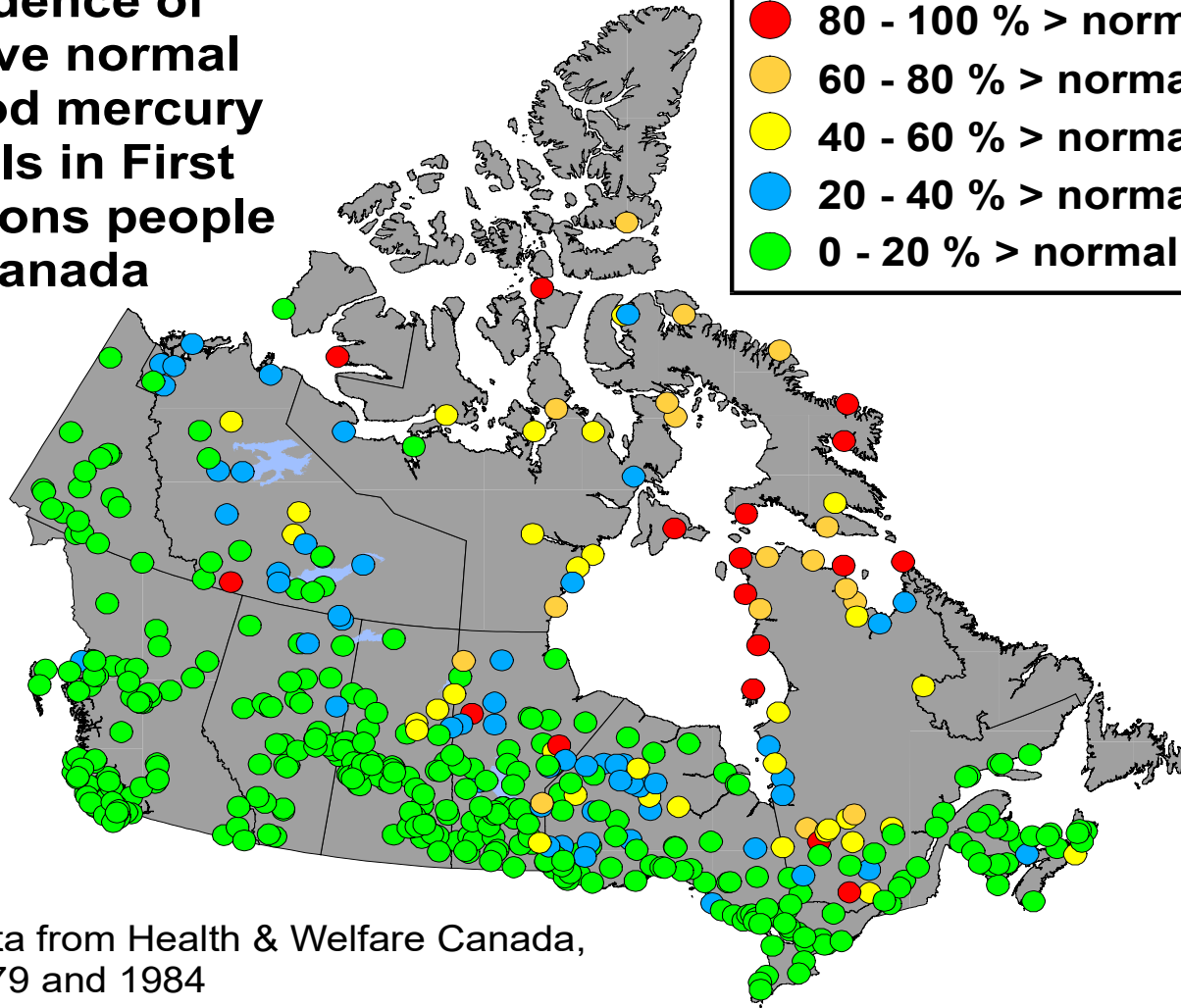
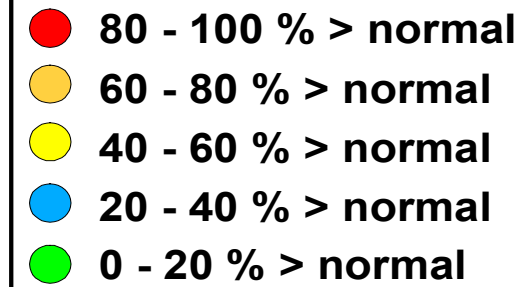
Source Apportionment and Natural Archives of Metals in Northern Canada

Project leader: Peter Outridge

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Incidence of above normal blood mercury levels in First Nations people in Canada



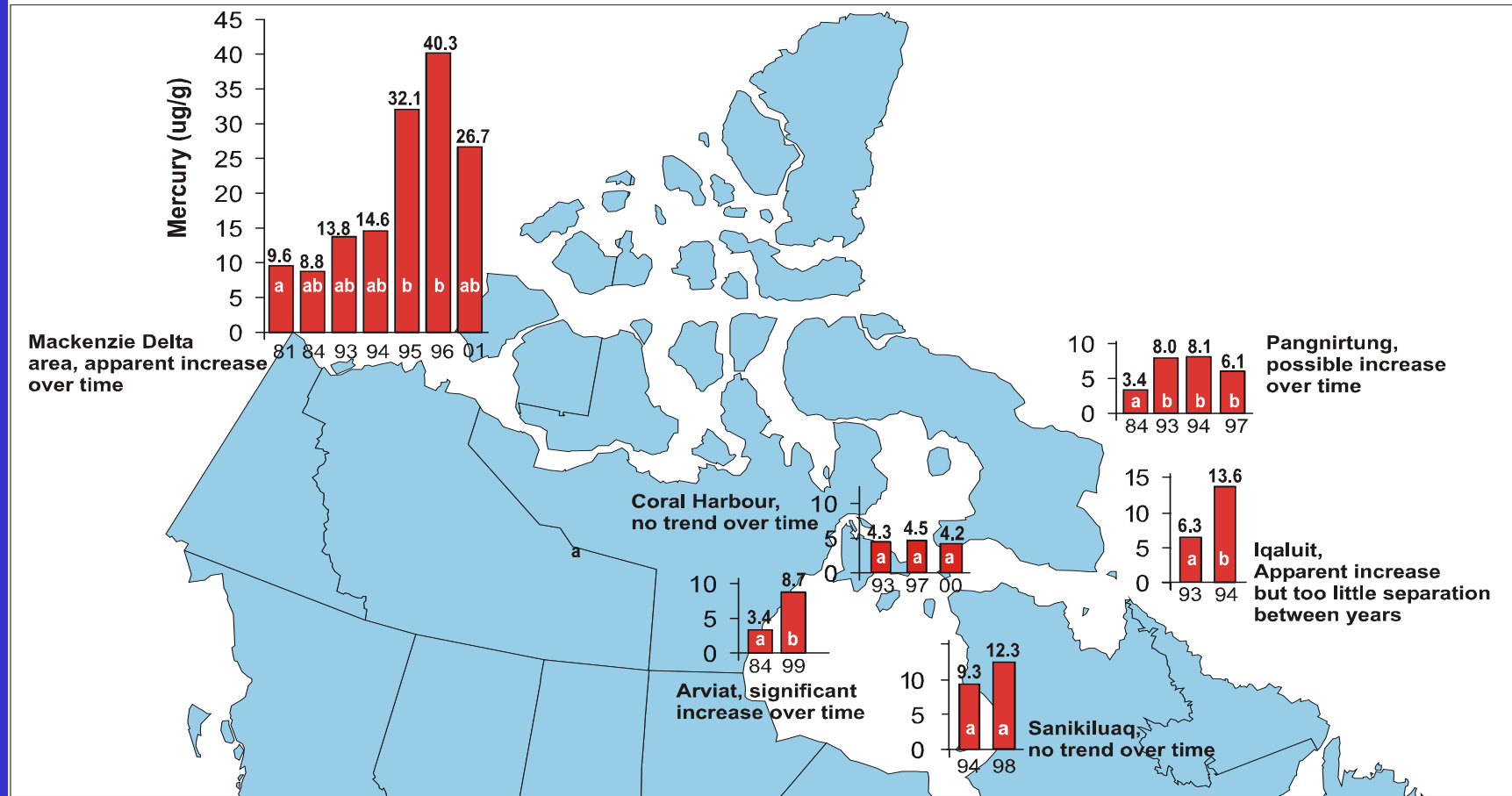
Data from Health & Welfare Canada,
1979 and 1984

In USA, 8% of women exceed recommended blood Hg limit (20 ug/dL)

(Source: Centres for Disease Control, Atlanta)

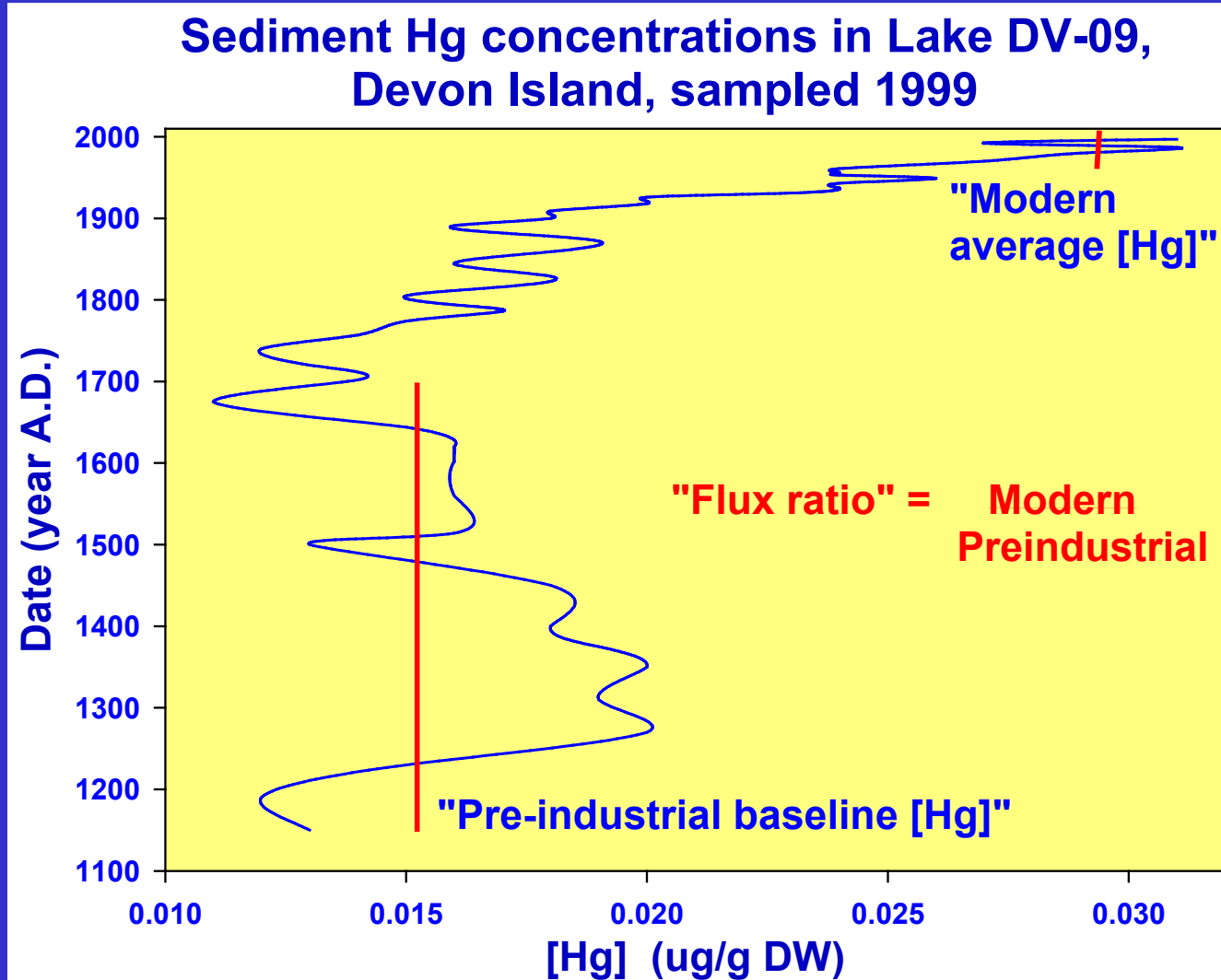
Marine traditional foods (beluga, seals, char) are the source of high human Hg

Age-adjusted Mercury (ug/g ww) in liver of beluga in Canada



BUT, what is the source of the high Hg in wild foods?

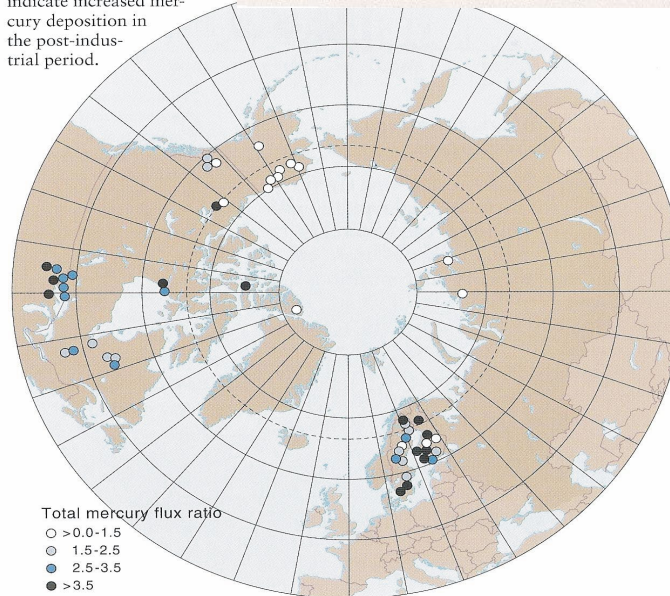
A typical Arctic sediment Hg profile



AMAP (2002) Summary Assessment Report on Arctic Contaminants and Health



The ratio of post-industrial to pre-industrial flux of mercury to lake sediments. Ratios above 1.0 indicate increased mercury deposition in the post-industrial period.



Diagenesis may affect metals profiles in sediments and peat bogs

Mercury in sediments and peat bogs may move after it is deposited, a process known as diagenesis. This movement can alter the profile of mercury in the sediment or peat layers, confounding trend analyses. Although there are still questions relating to diagenesis in lake sediments and peat bogs, a number of studies appear to provide good evidence that mercury deposition in the Arctic has increased considerably since the industrial era began.

Key Questions for Project

- How reliable are these natural archives (sediments, peat, ice, trees) as recorders of atmospheric metal deposition, esp. Hg ?
- In reliable archives, what is current state of Hg & other metal inputs from human sources?
- Is there any evidence of human-derived metals (Hg, Cd) in traditional northern foods ?

Existing Study Sites

(Natural Archives Reliability)

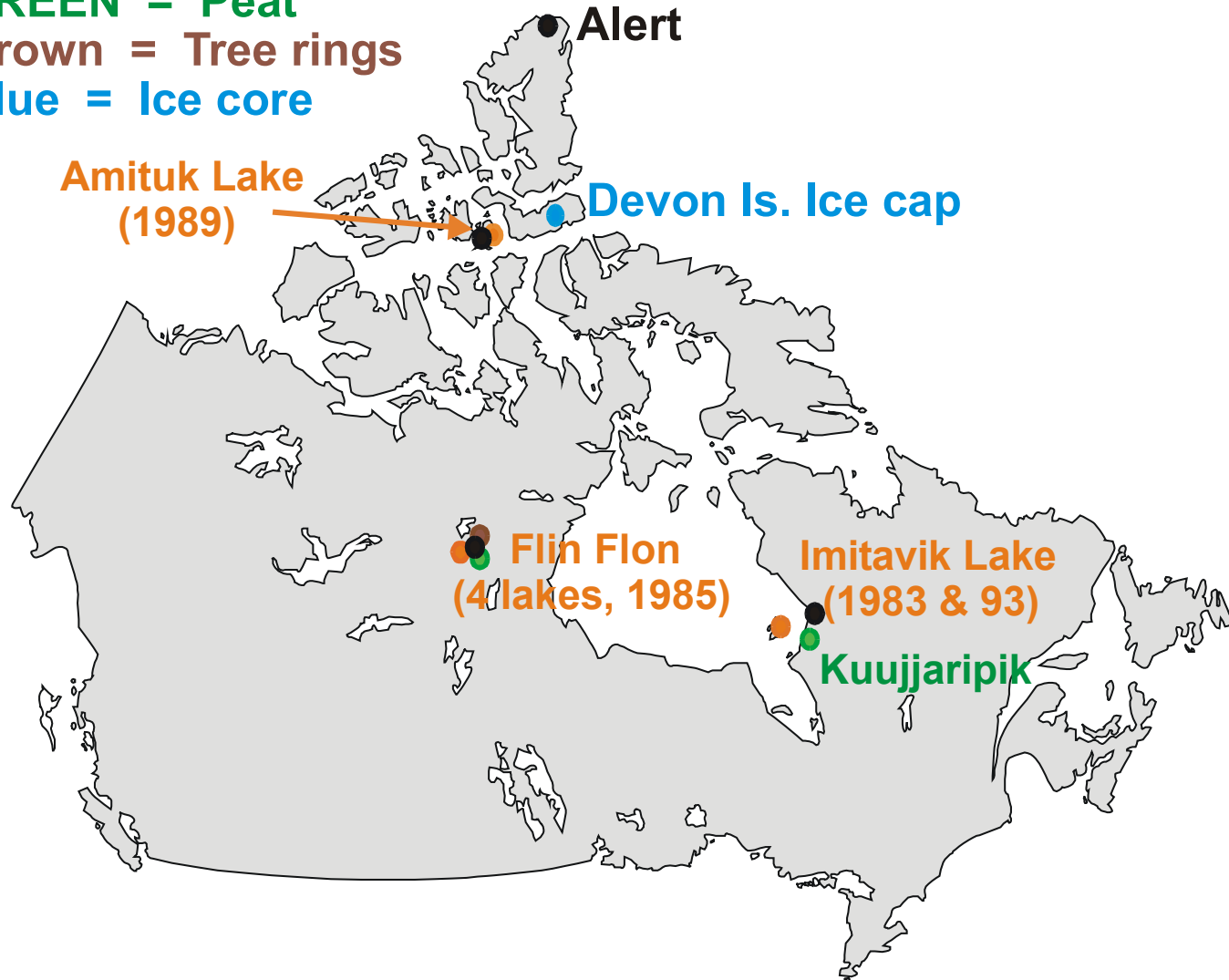
Black = Instrumented Record

Orange = Lake sediment

GREEN = Peat

Brown = Tree rings

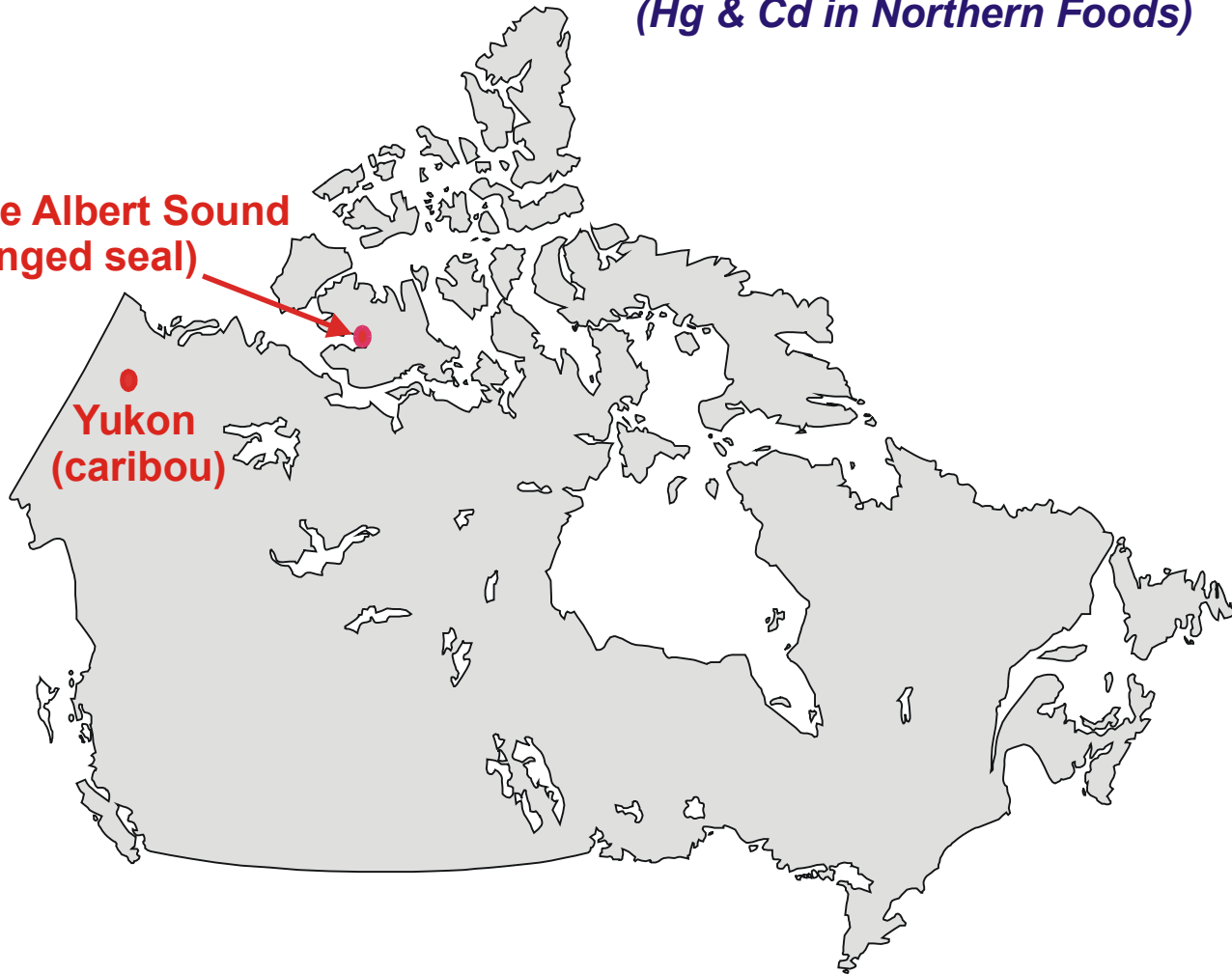
Blue = Ice core



Existing Study Sites (Hg & Cd in Northern Foods)

**Prince Albert Sound
(ringed seal)**

**Yukon
(caribou)**



Why and for whom are we doing this?

Environmental and human health assessments of Arctic metals

(Arctic Monitoring and Assessment Program [Arctic Council], Northern Contaminants Program [DIAND], Health Canada, Canadian Forest Service)

Maintaining integrity of food/environment for northern peoples

(Council of Yukon First Nations, Inuit Circumpolar Conference – Canada, Inuit Tapiriit Kanatami, Cree First Nation)

National and international policy/regulatory action

NRCan/MMS (U.N. Mercury Emission Treaty negotiations; U.N. ECE Metal Protocol review)

(Letters of Support on file from all 9 clients)

Realizing Our Outcomes

(2005-06 & beyond)

MITE PROGRAM OUTCOMES (SPS) :

Risk management decisions taken in accordance with the federal Toxic Substances Management Policy, encompass protocols that distinguish metals in the environment that are primarily anthropogenic, from those that are natural in origin.

Federal input to review of U.N. Economic Commission for Europe Heavy Metals Protocol and the Arctic Monitoring and Assessment Program Hg Assessment reflect improved understanding of background levels, source apportionments and historical accumulation trends

OUTPUTS & OTHER ACTIVITIES :

10 peer-reviewed journal articles.

8 conference presentations/posters.

Contribution to writing of AMAP and NCP environmental assessments

PL (Outridge) invited to co-lead 2006-07 AMAP Hg Update, and 2010 Hg Assessment. These form part of Arctic Council submission to UNECE and UNEP Hg & Cd assessments and regulatory policy development.

Community visits (Tuktoyuktuk, Inuvik, Holman)



Contributions from Partners and External Agencies (2003-06)

Total all sources : \$528 K

<u>Activity</u>	<u>Cash</u> (Analytical costs, Direct grants to GSC)	<u>In-Kind</u> (Salaries, samples, equipment, travel)	<u>Contributors</u>
Ice Core	\$105,000	\$80,000	PCSP, U. of Heidelberg
Tree Ring	--	\$1,000	Manitoba
Lake Sediment	\$11,000	\$125,000	Hamlet of Sanikiluaq, DFO, Manitoba, U. of Pennsylvania, CANMET
Peat Bog	\$58,000	\$64,000	U. of Heidelberg, Manitoba
Method Development	--	--	--
Northern Food	\$21,000	\$63,000	FJMC, DFO, McGill U., EC, Yukon TG