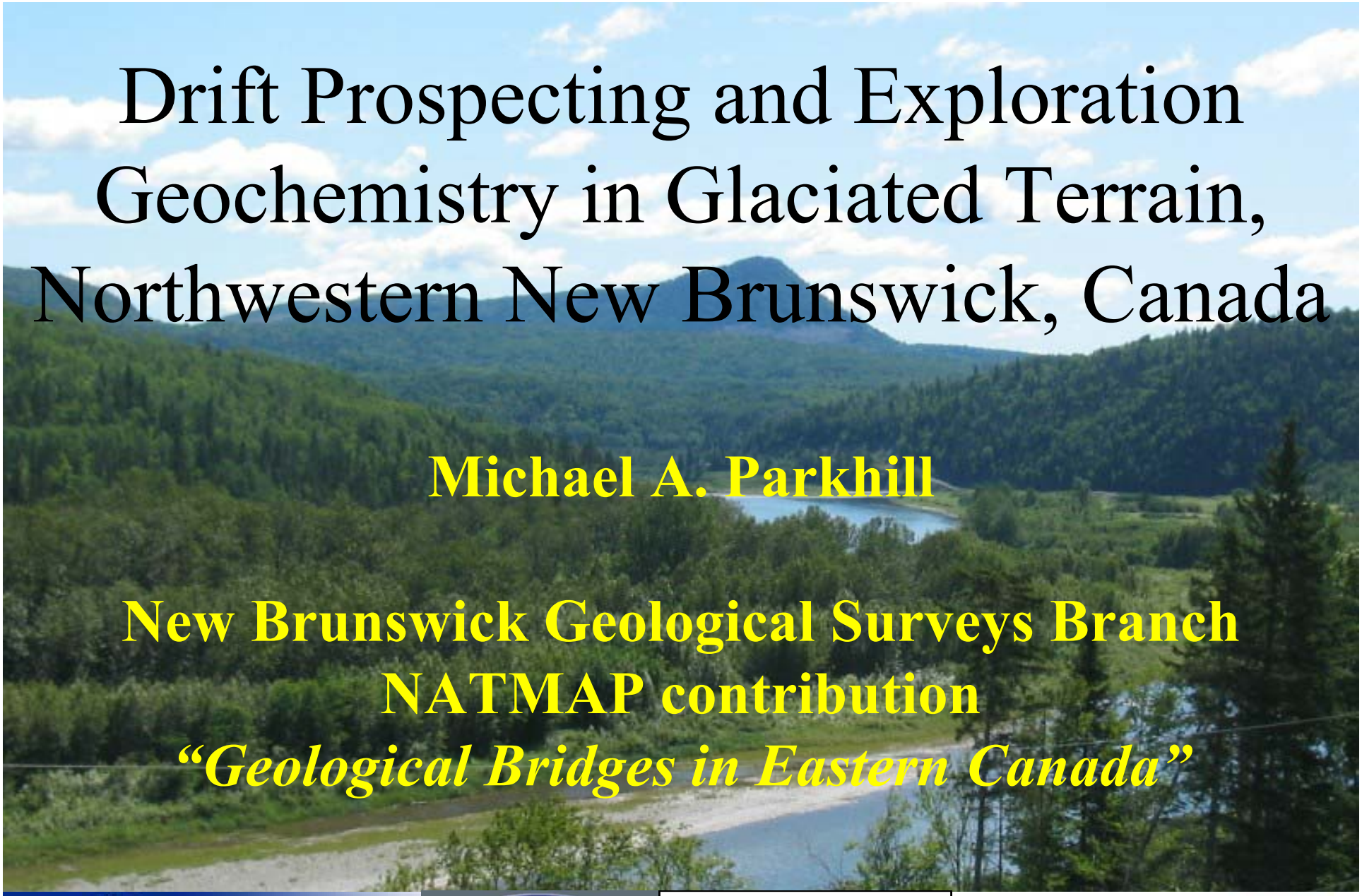
Drift Prospecting and Exploration Geochemistry in Glaciated Terrain, Northwestern New Brunswick, Canada



Michael A. Parkhill

New Brunswick Geological Surveys Branch

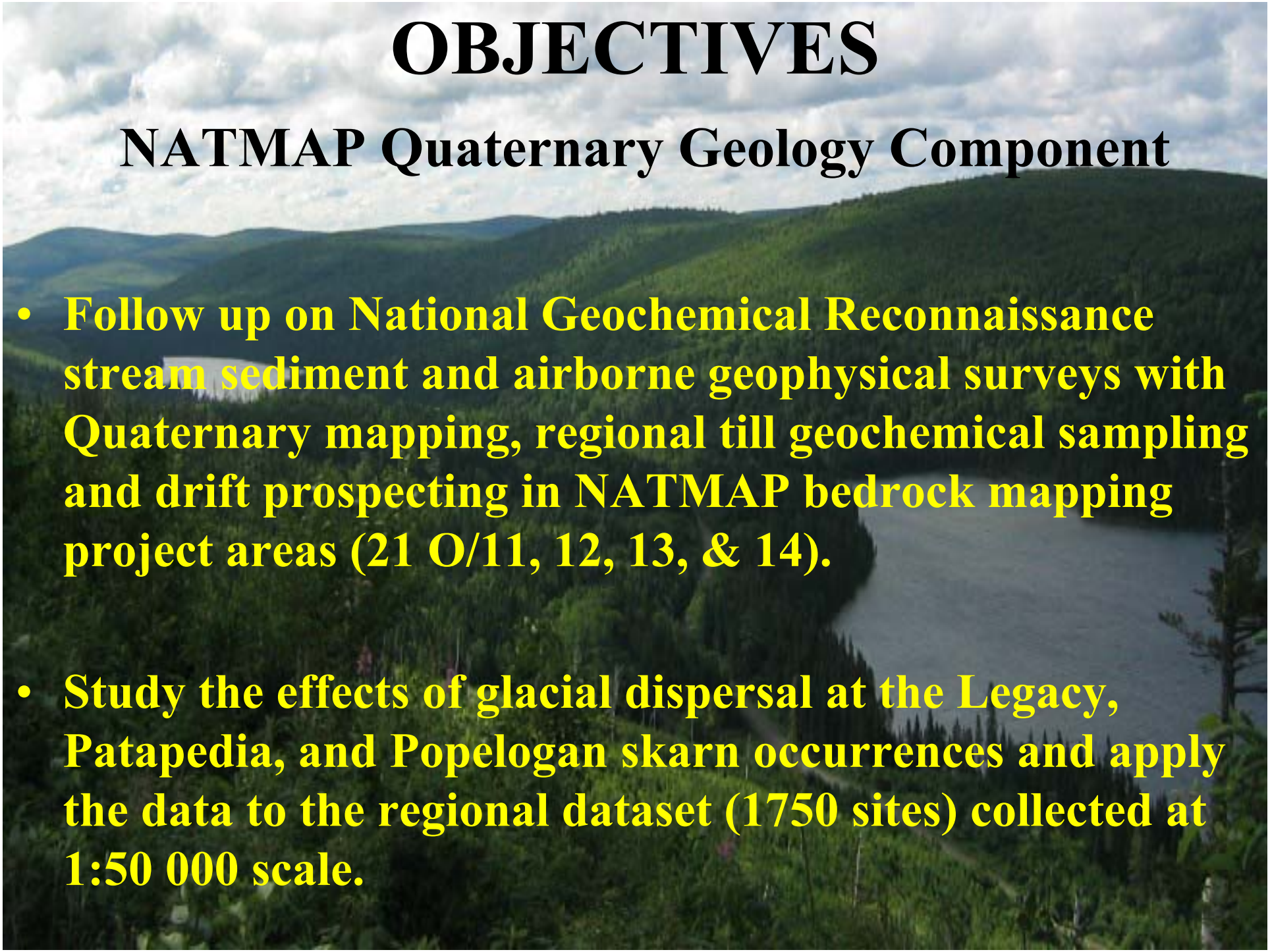
NATMAP contribution

"Geological Bridges in Eastern Canada"

New Nouveau Brunswick CANADA

Geological Bridges in Eastern Canada / Ponts géologiques dans l'est du Canada

NATMAP CARTNAT



OBJECTIVES

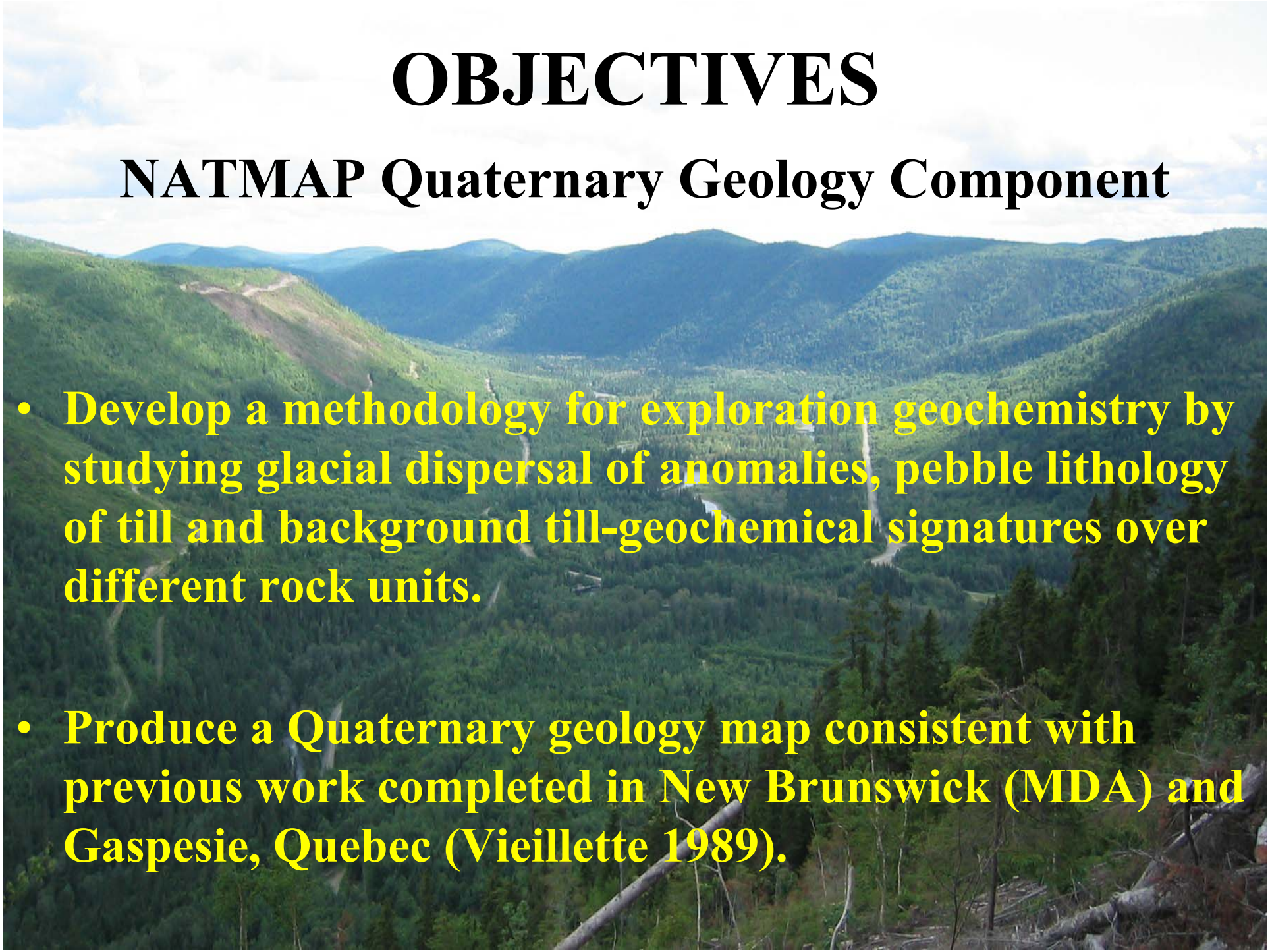
NATMAP Quaternary Geology Component

- **Follow up on National Geochemical Reconnaissance stream sediment and airborne geophysical surveys with Quaternary mapping, regional till geochemical sampling and drift prospecting in NATMAP bedrock mapping project areas (21 O/11, 12, 13, & 14).**

- **Study the effects of glacial dispersal at the Legacy, Patapedia, and Popelogan skarn occurrences and apply the data to the regional dataset (1750 sites) collected at 1:50 000 scale.**

OBJECTIVES

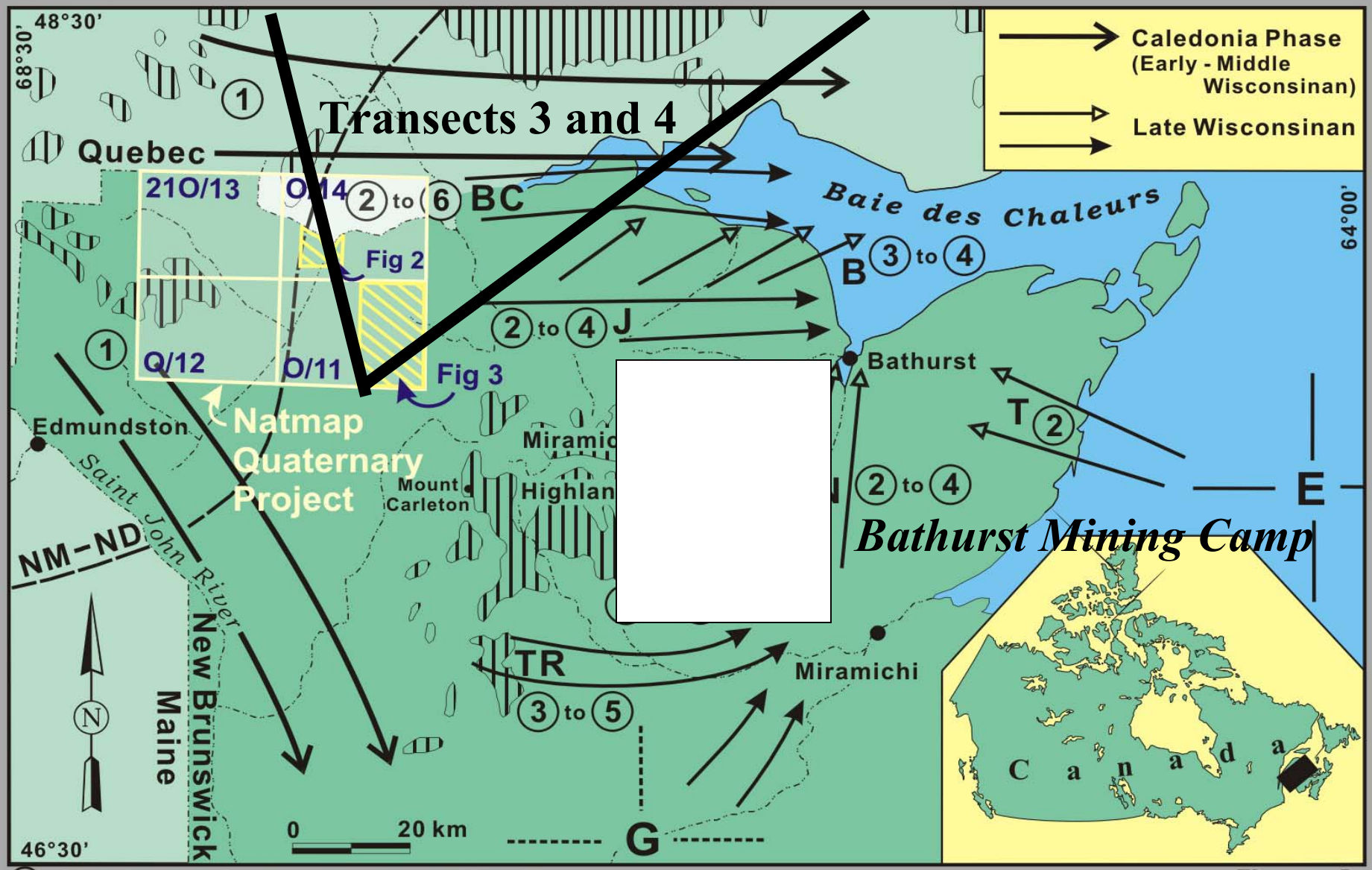
NATMAP Quaternary Geology Component



- **Develop a methodology for exploration geochemistry by studying glacial dispersal of anomalies, pebble lithology of till and background till-geochemical signatures over different rock units.**

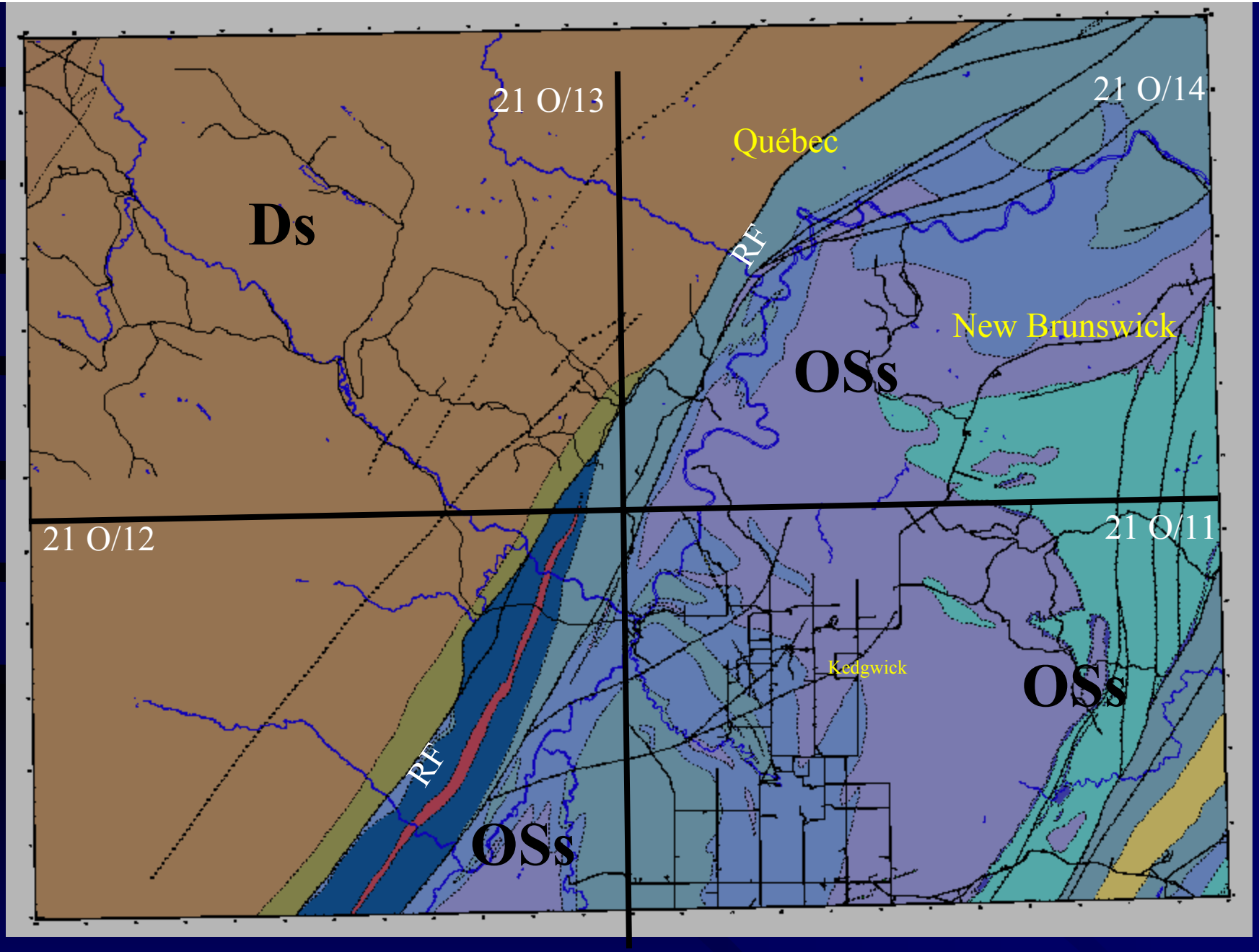
- **Produce a Quaternary geology map consistent with previous work completed in New Brunswick (MDA) and Gaspesie, Quebec (Vieillette 1989).**

Appalachian Foreland and Platform Architectures in Eastern Canada

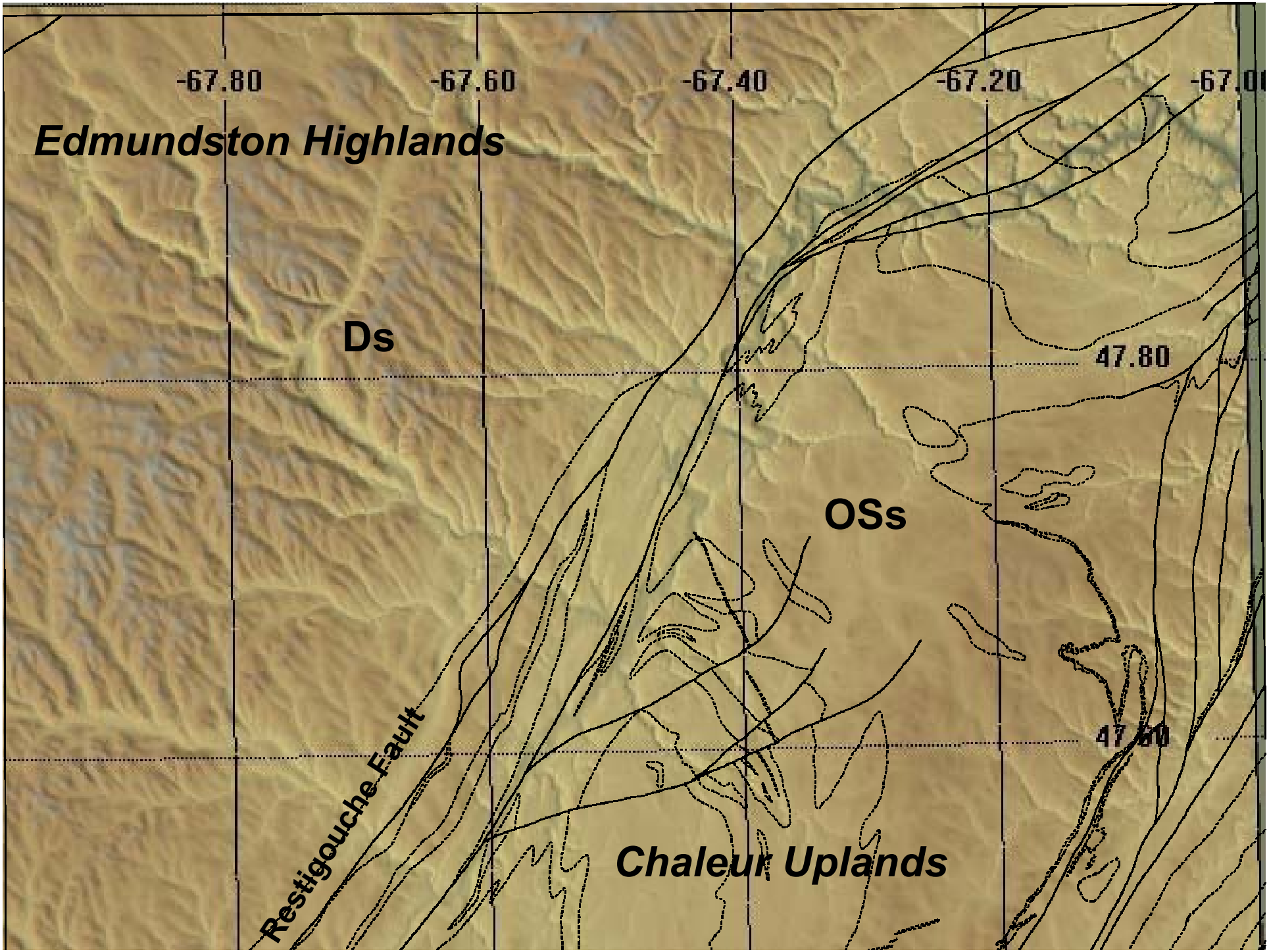


②-Numbers refer to sequence of Ice-Flow

Figure 1



Bedrock Geology (after Carroll, 2003)


-67.80
-67.60
-67.40
-67.20
Edmundston Highlands
Ds
47.80
OSs
Restigouche Fault
Chaleur Uplands

CHALEUR UPLANDS

EDMUNDSTON HIGHLANDS – "KEDGWICK NOTCH"


Basal Till
Pabos Formation

Thick till,
Chaleur Uplands

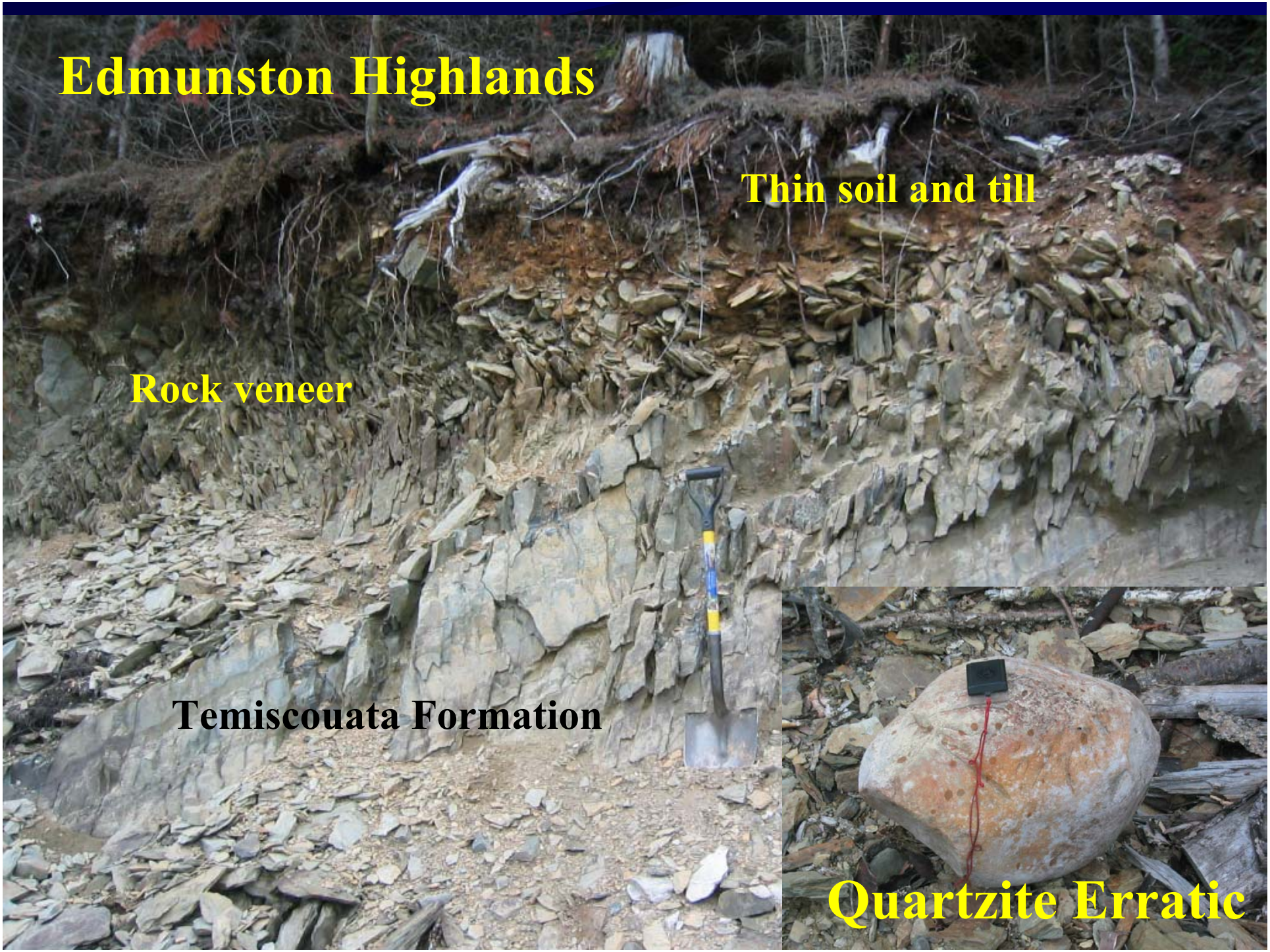
Edmundston Highlands area

Ae and Bf soil horizons

Clast rich basal till with sandy/ clay/loam matrix

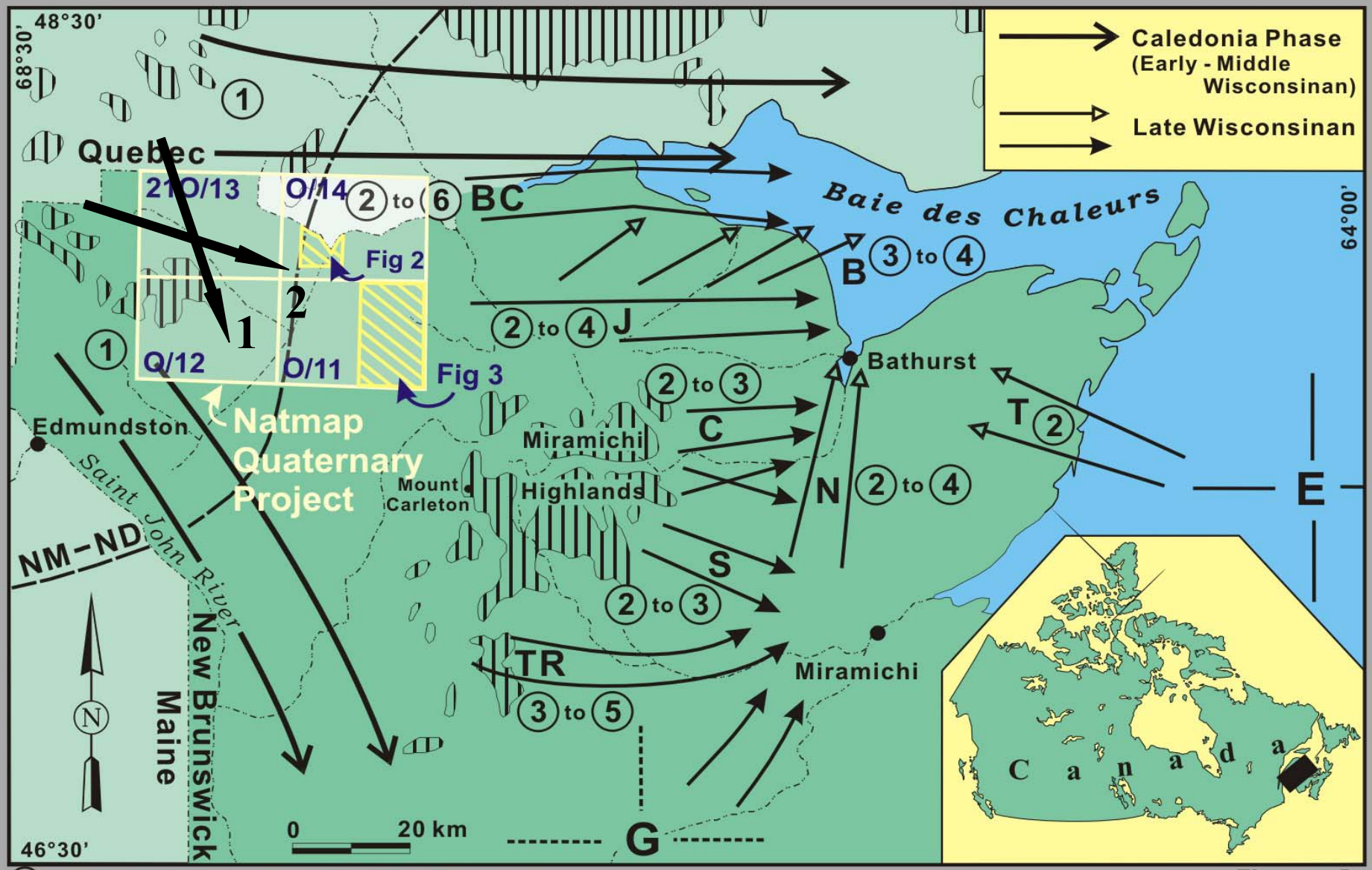
Basal till with higher clast content including several pebble erratics

Broken bedrock typical of regolith overlying the Temiscouata Fm.


Edmunston Highlands
Thin soil and till
Rock veneer
Temiscouata Formation
Quartzite Erratic

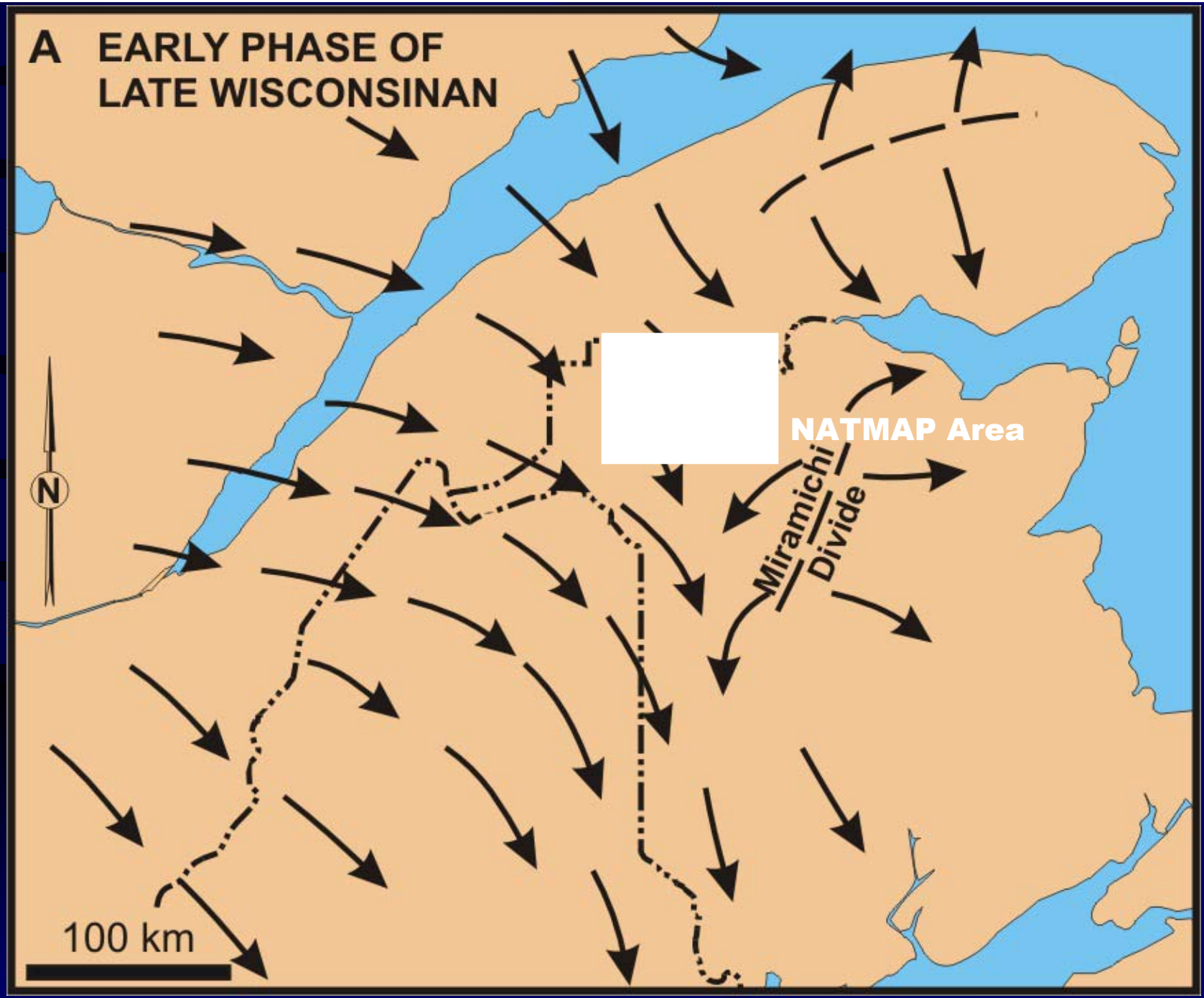

Locally derived stony basal till


Colluvium
Basal Till



② - Numbers refer to sequence of Ice-Flow

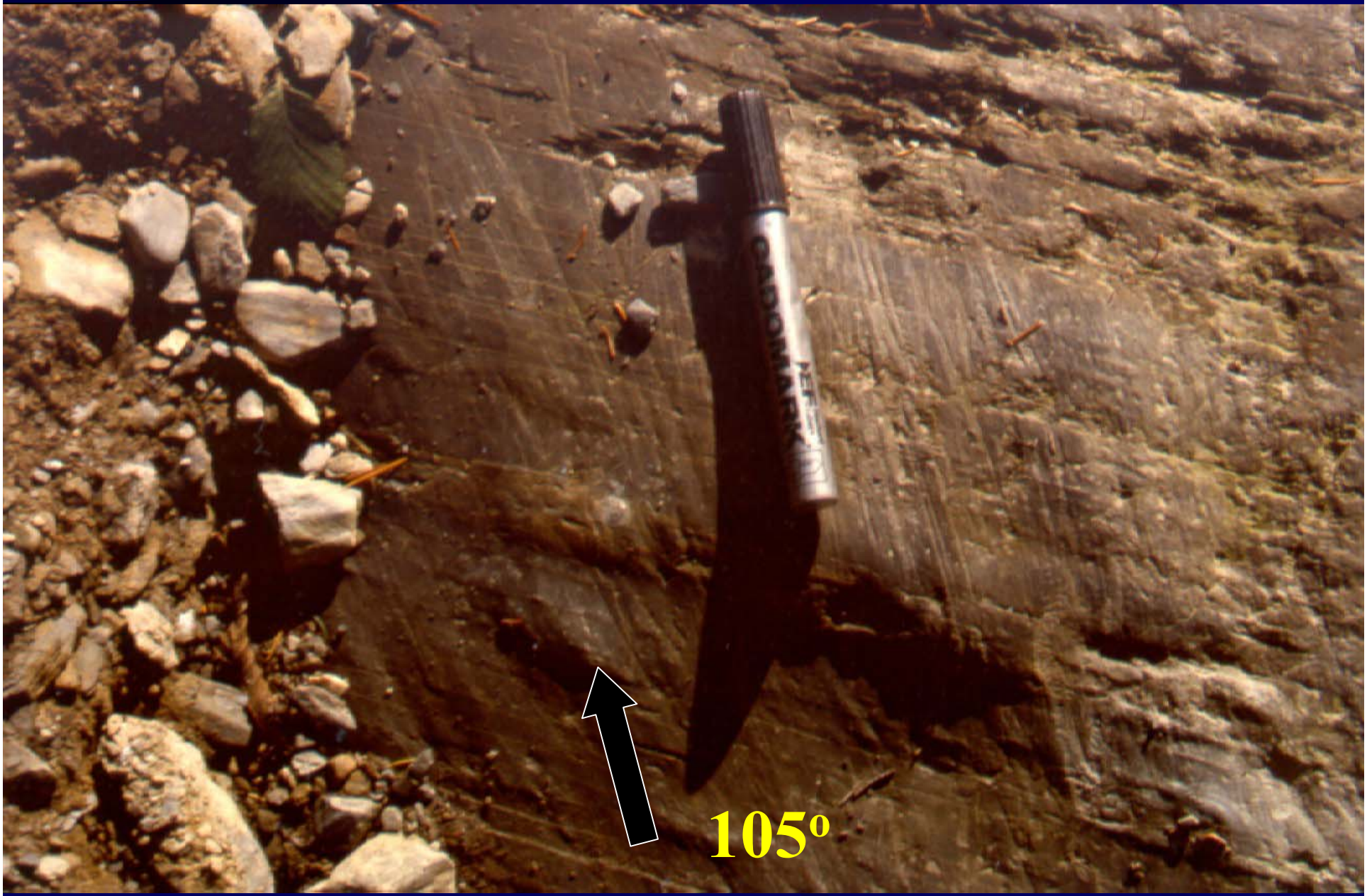
Figure 1

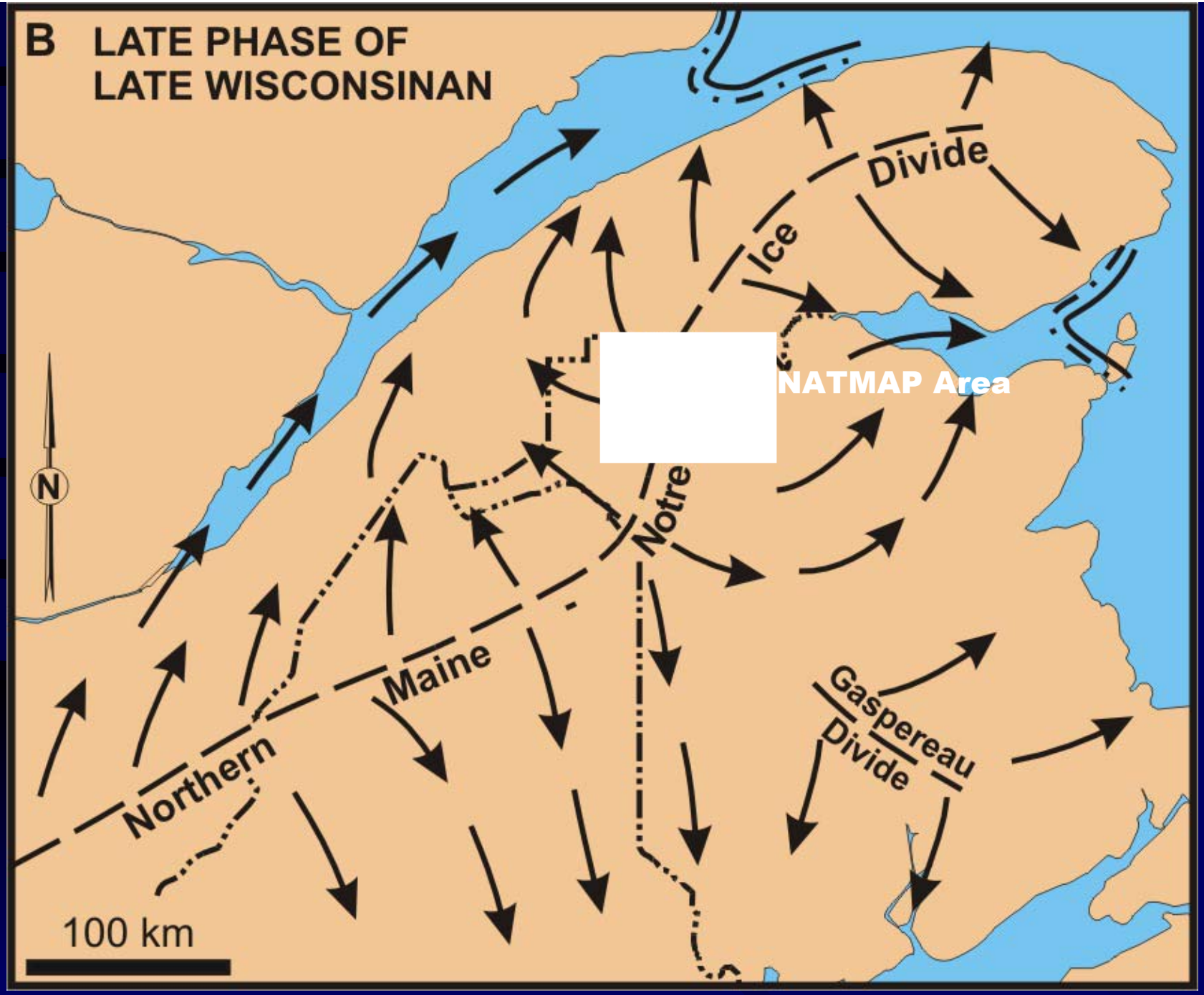


After Rappol, 1989

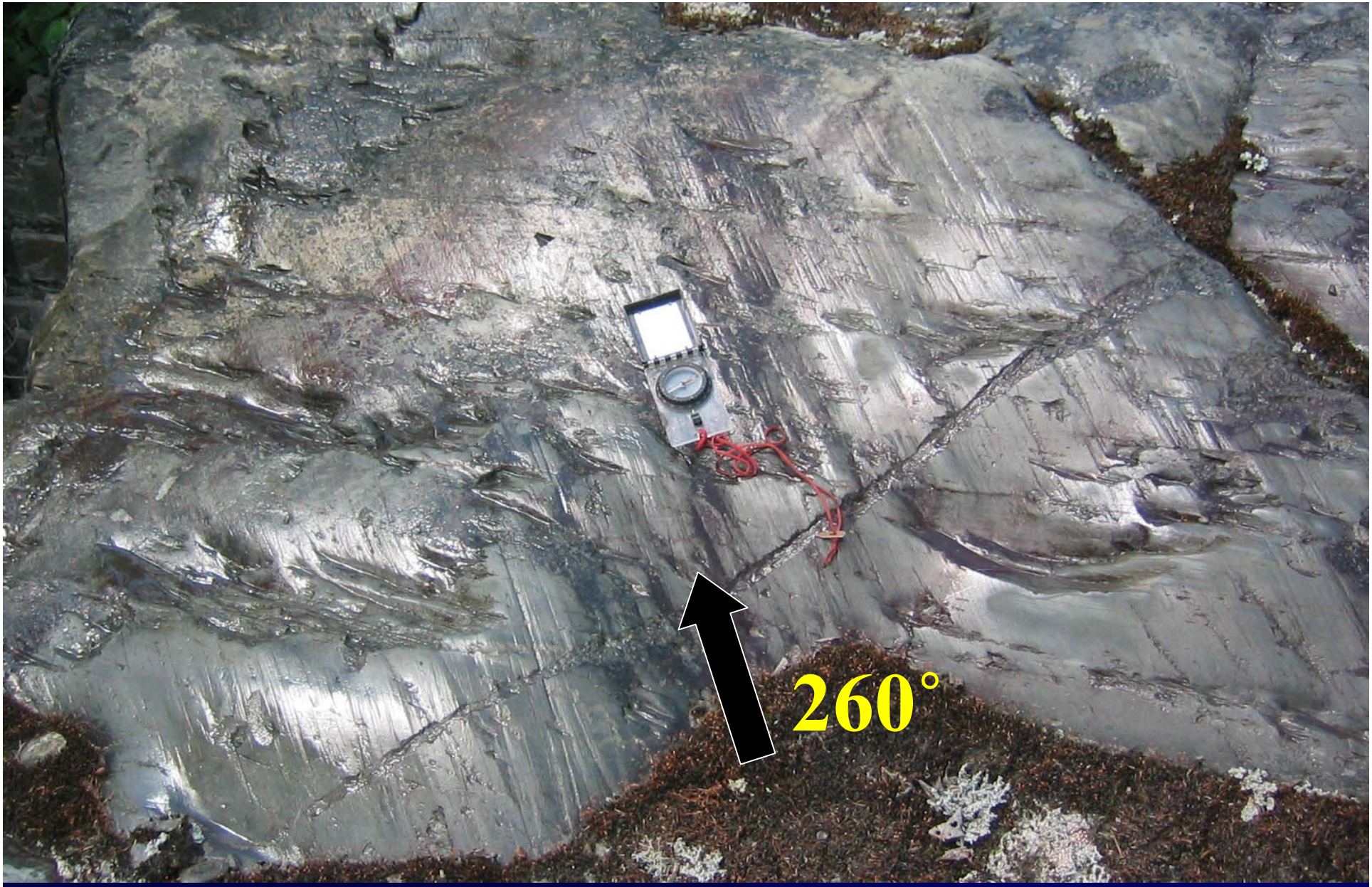

Former Glacial Meltwater Channel

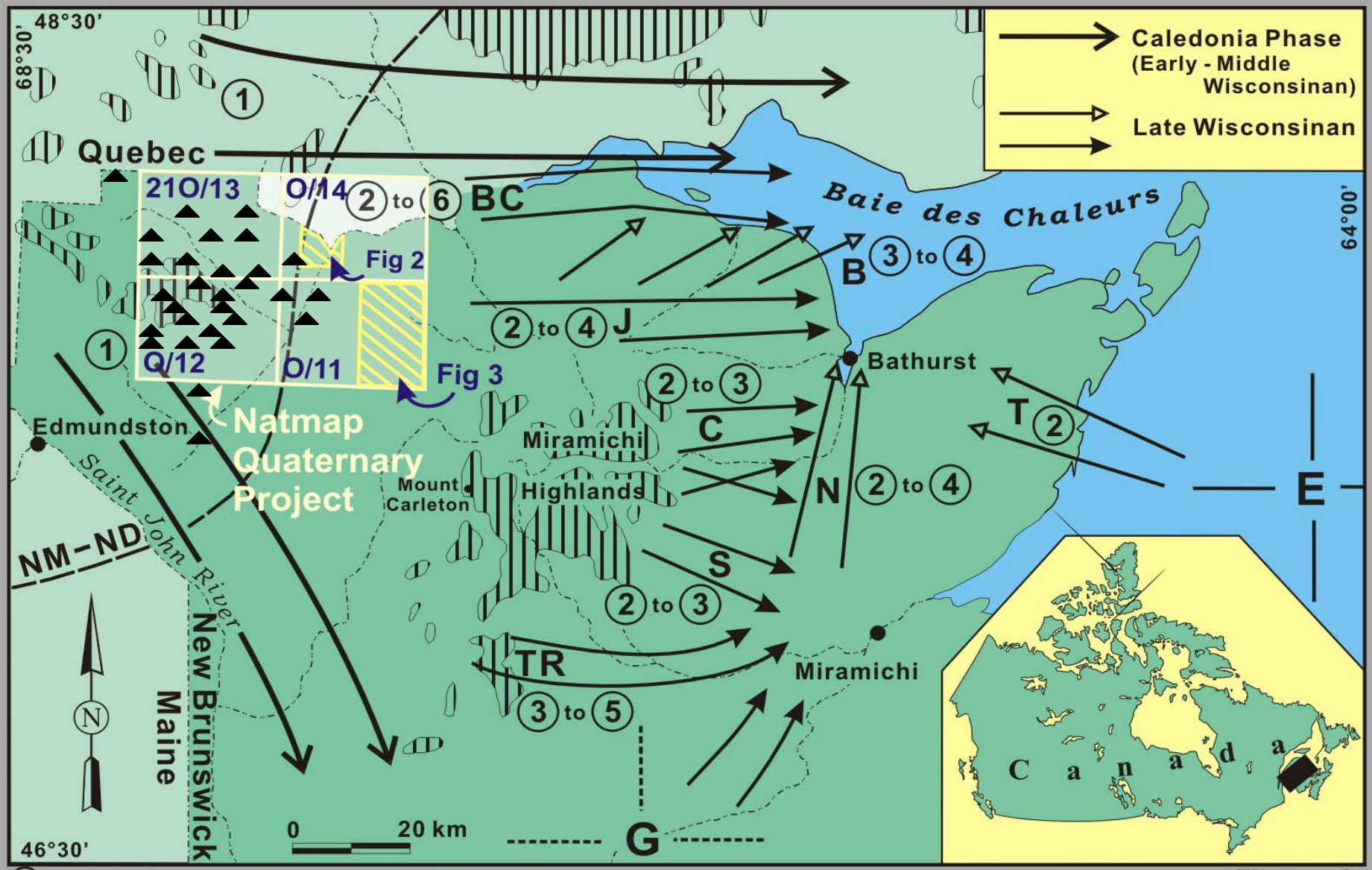
Glacial striae near Kedgwick River valley, Edmundston Highlands


105º



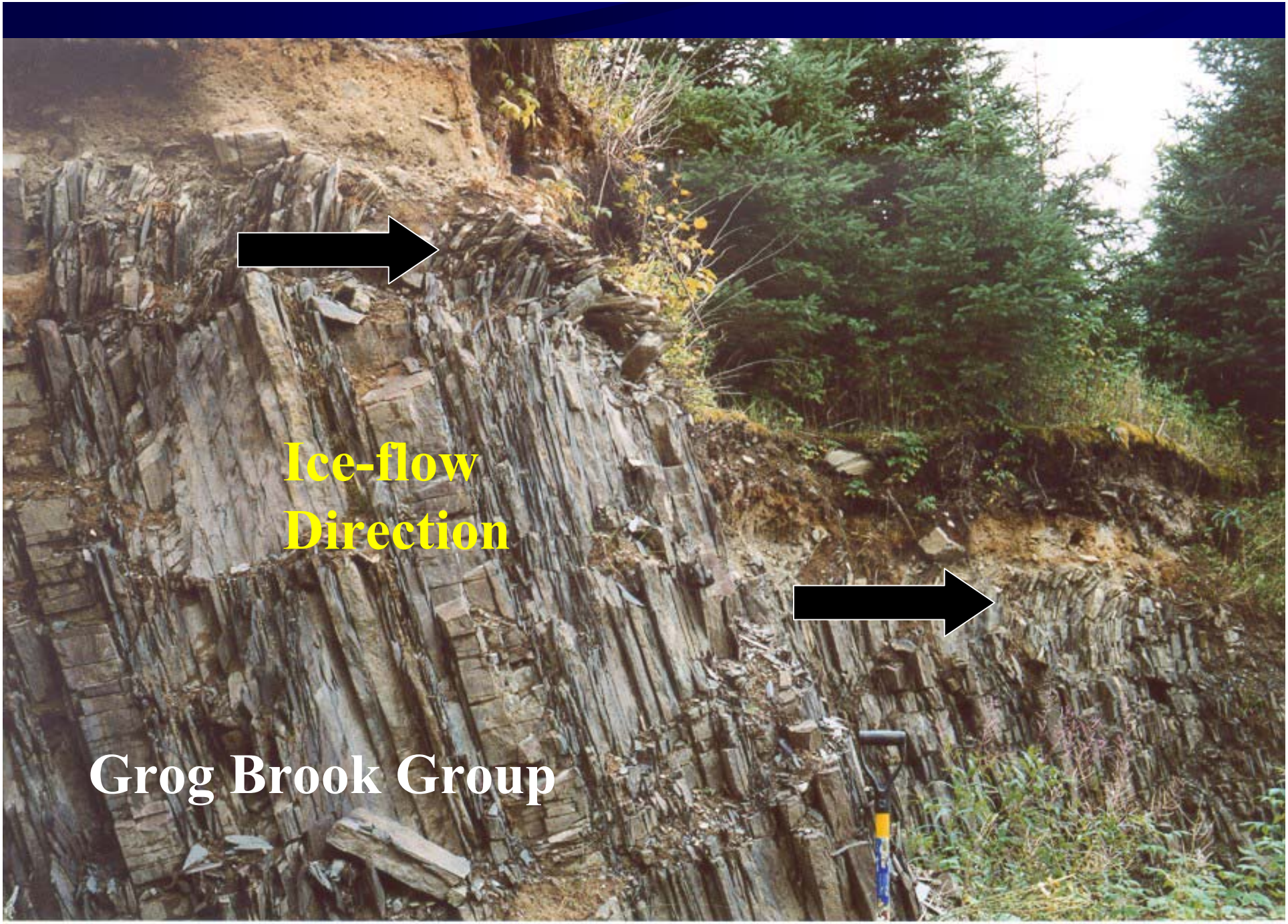
After Rappol, 1989


260°

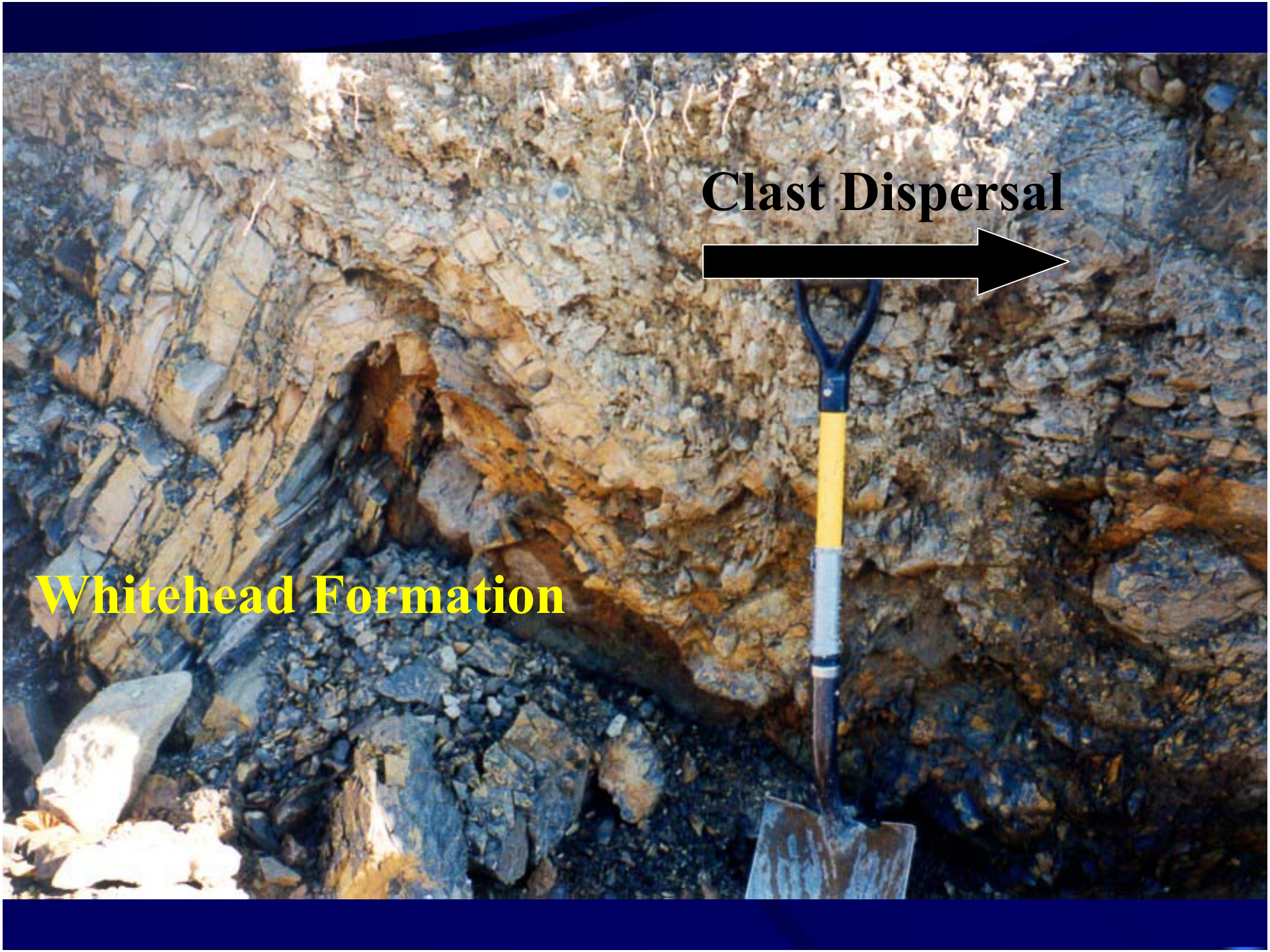


② - Numbers refer to sequence of Ice-Flow

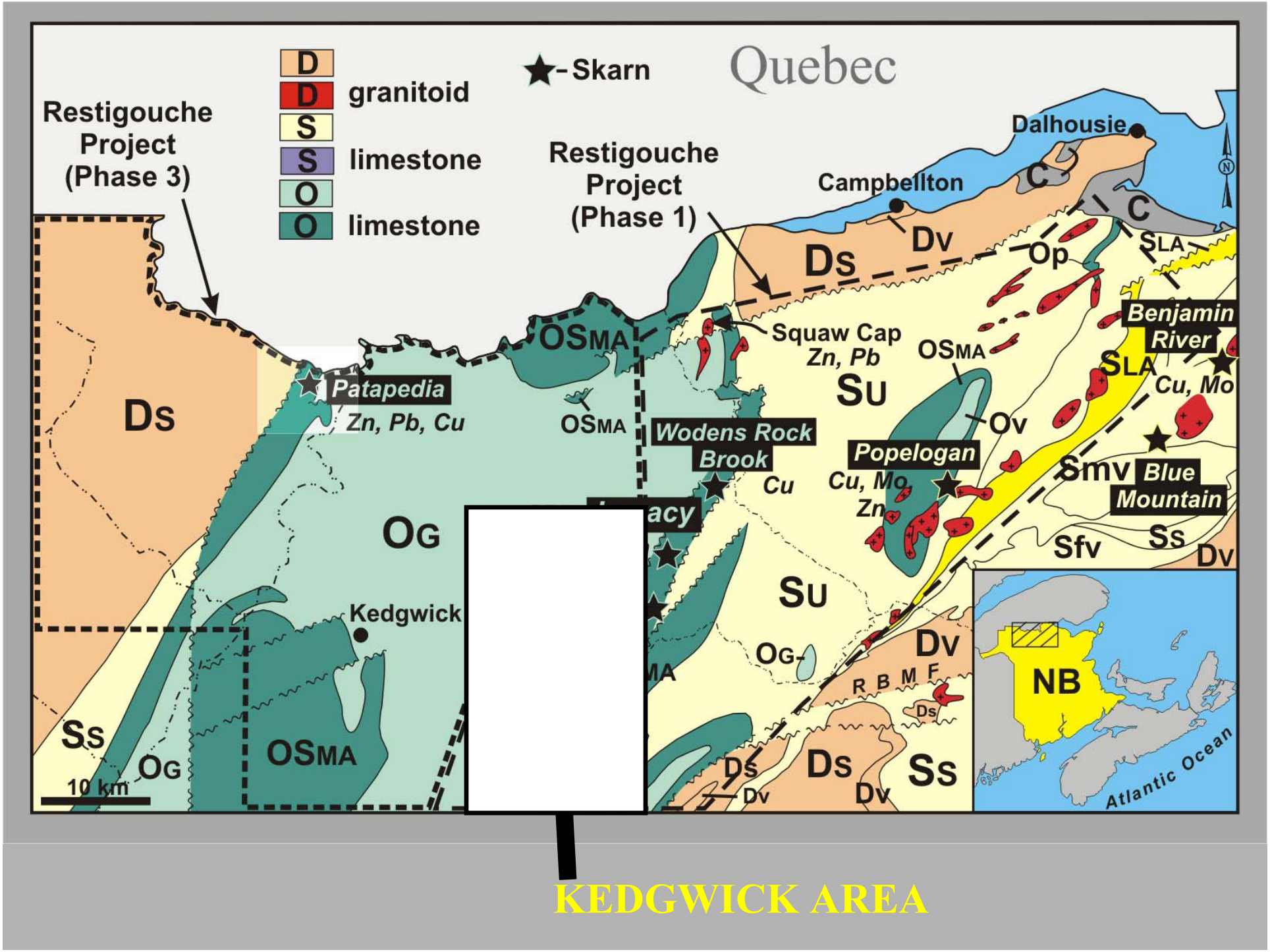
Figure 1


Ice-flow
Direction
Grog Brook Group


Ice-flow Direction
QUISIBIS MOUNTAIN PORPHYRY

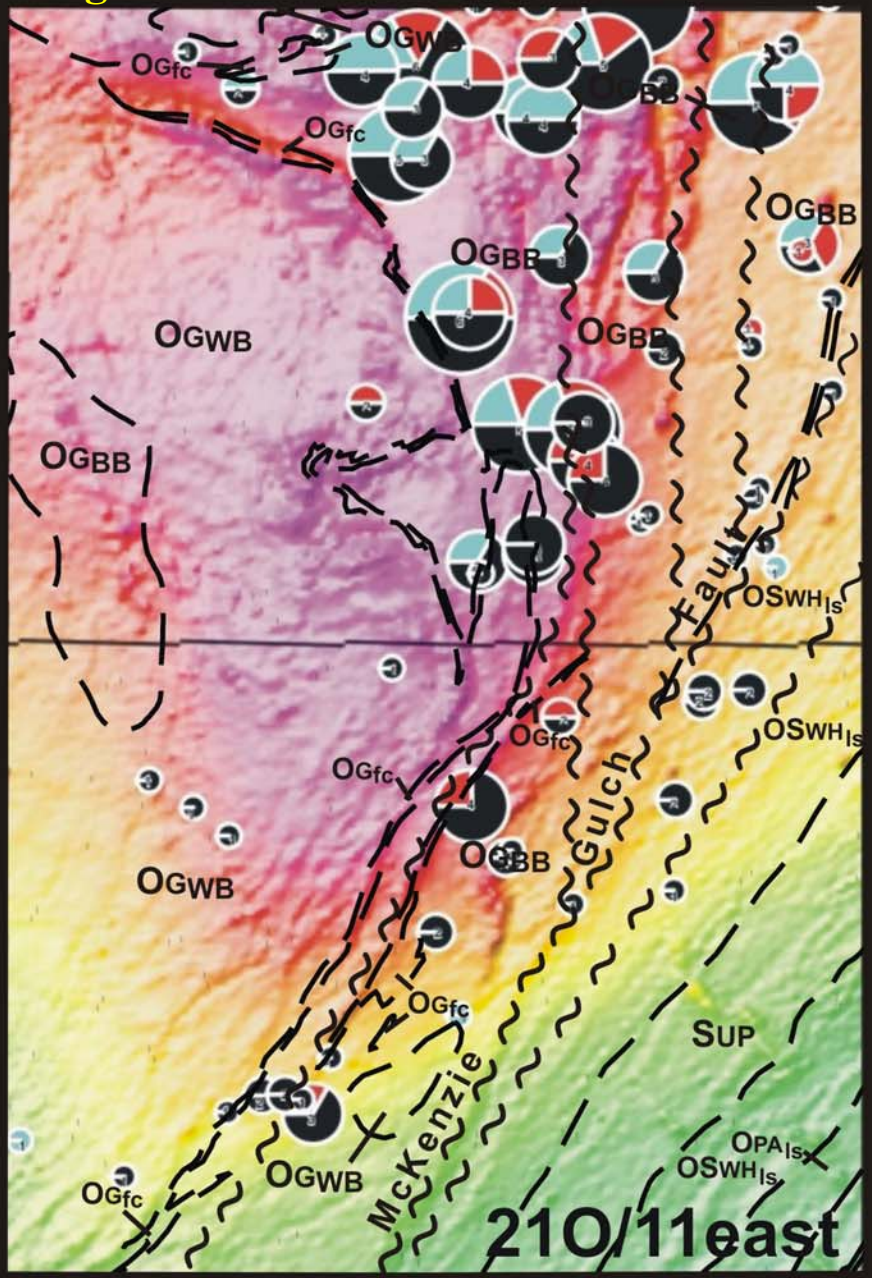

Clast Dispersal
Whitehead Formation


Basal Till
Pabos Fm
Felsic Dyke

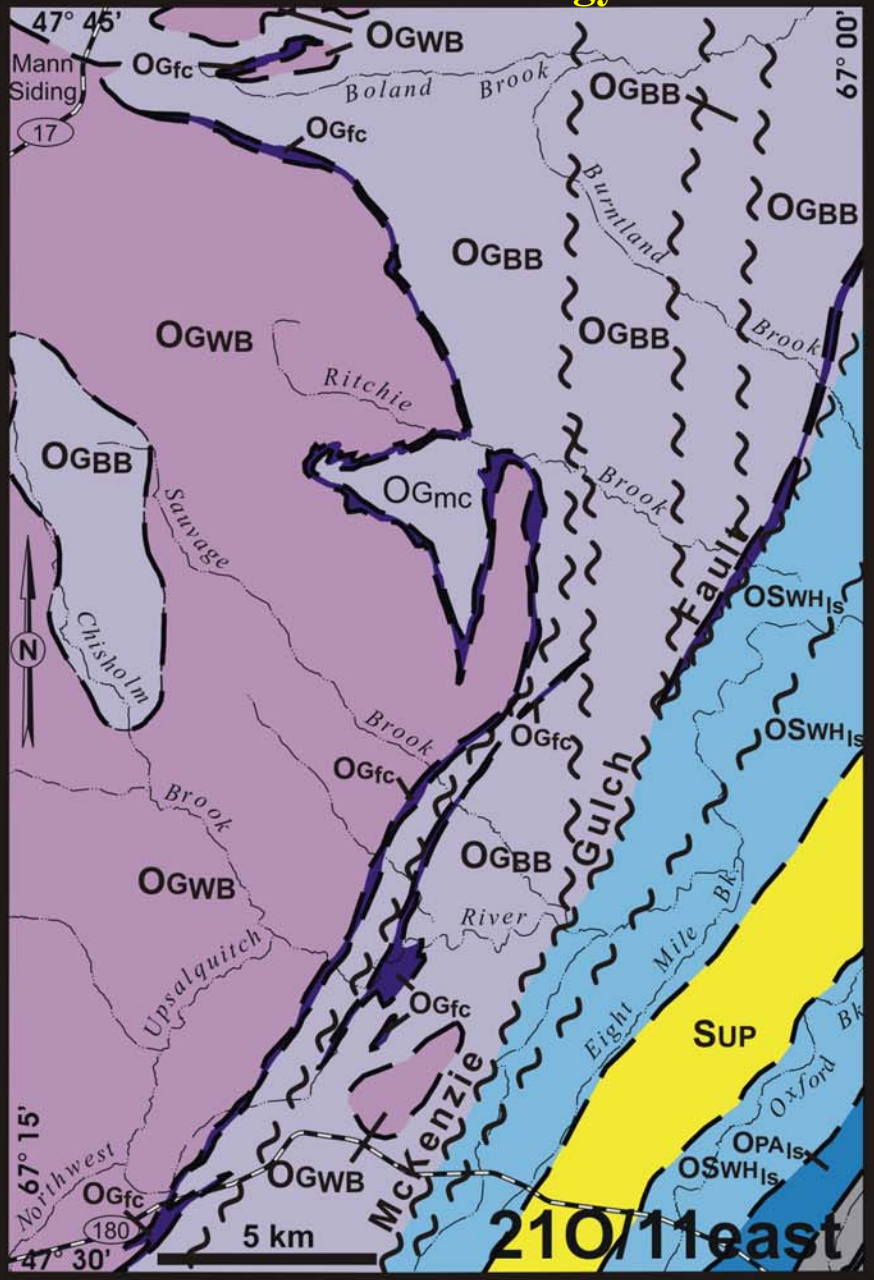


KEDGWICK AREA

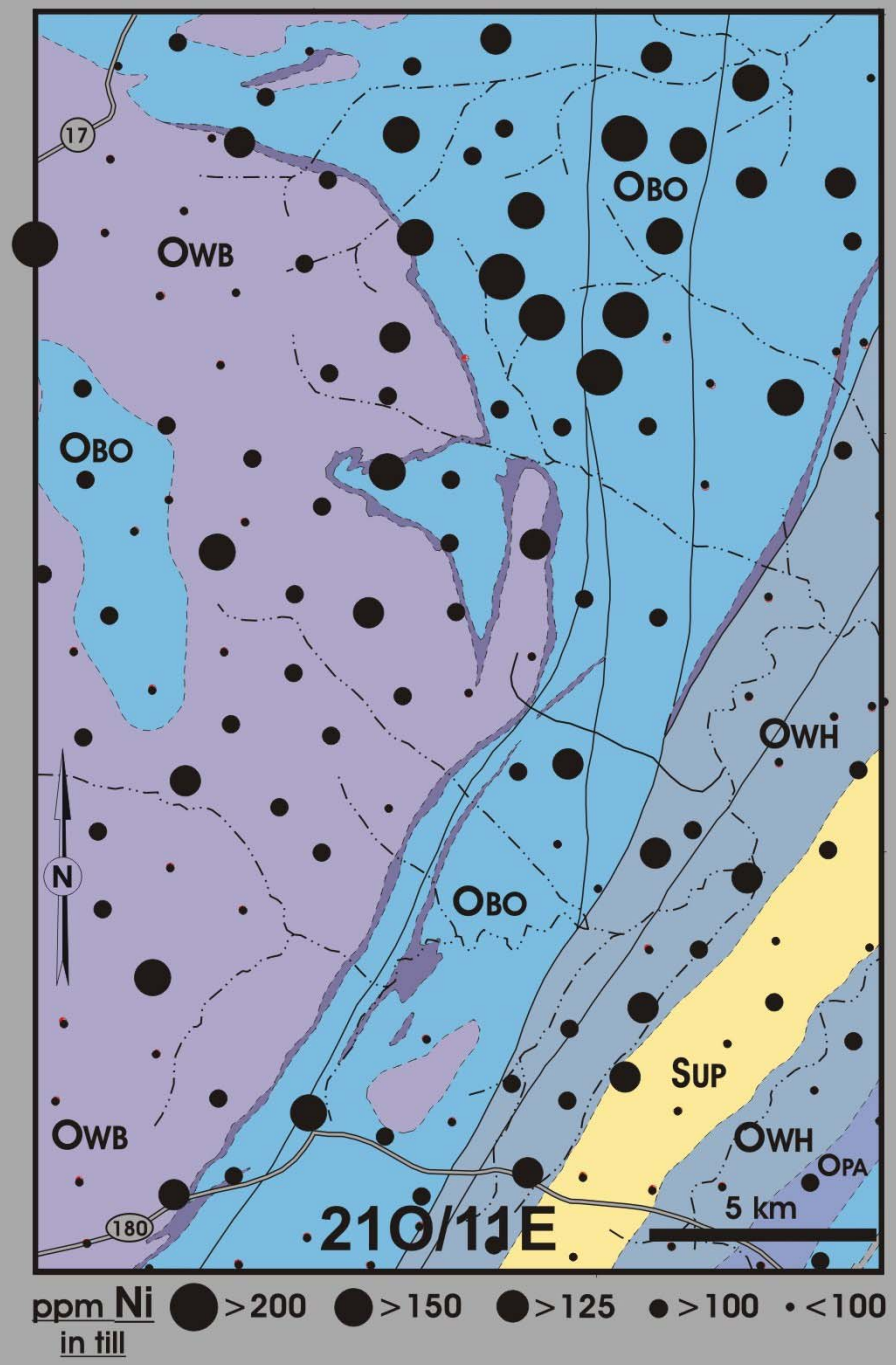
Magnetic & Stream Sediment Anomalies



Bedrock Geology



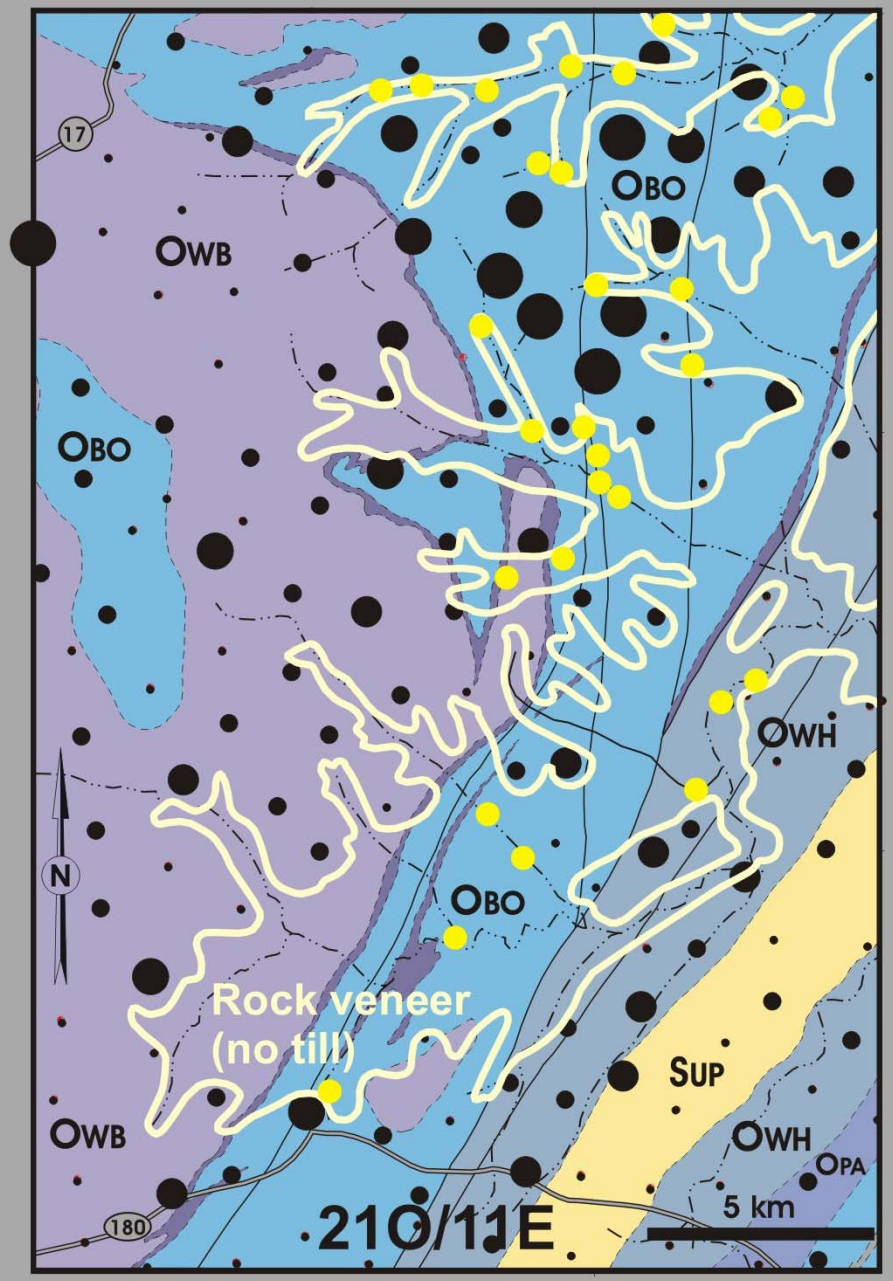
KEDGWICK AREA



KEDGWICK AREA

Ni in basal till

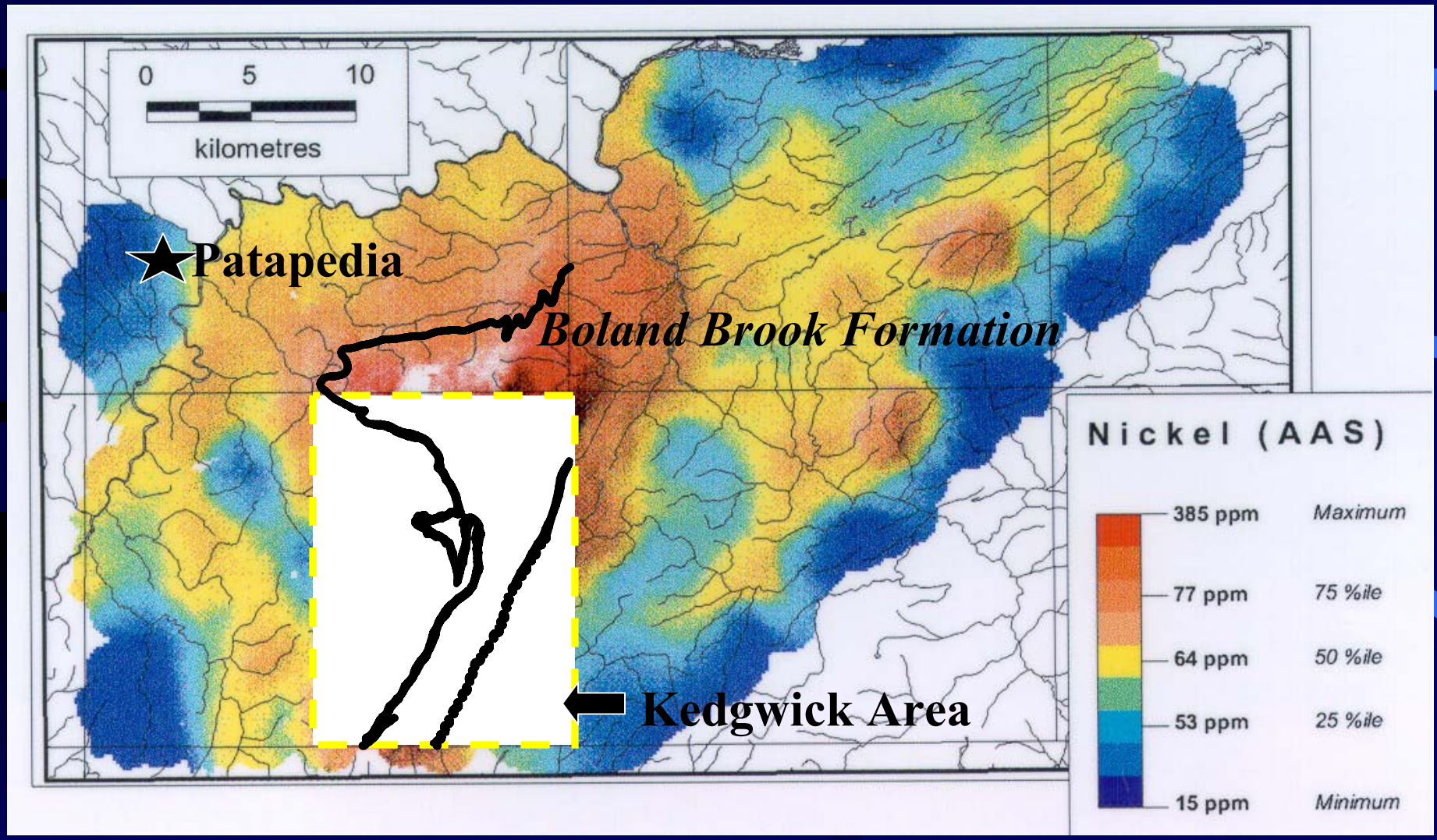
KEDGWICK AREA



Ni in stream sediments

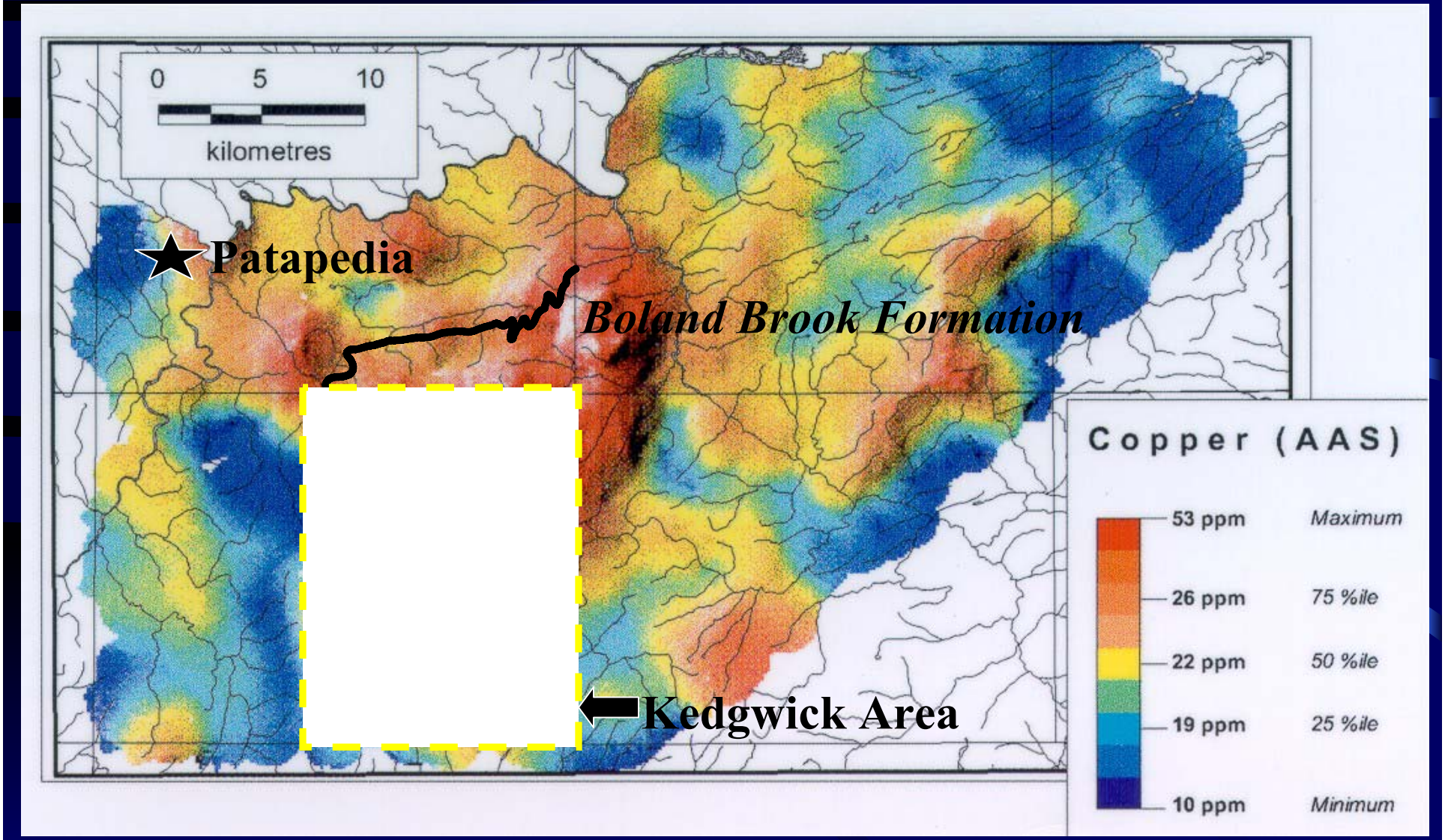

No till zone

Nickel in Stream-Sediments



Geochemical Data from Friske et. al. 1999; Open File 3820

Copper in Stream-Sediments



Geochemical Data from Friske et. al. 1999; Open File 3820

Kedgwick Area Ni Anomaly

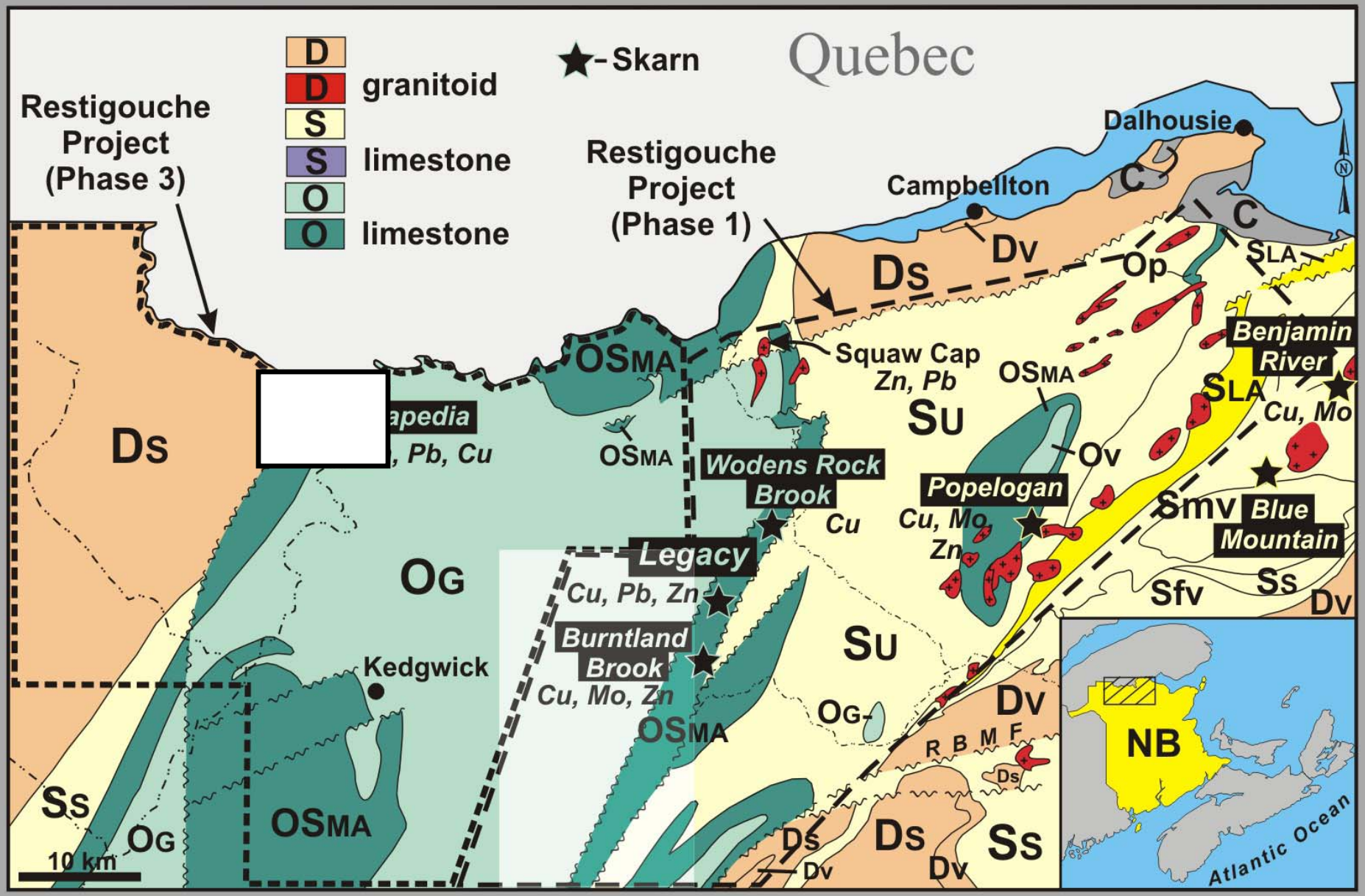
- Good correlation of Ni in stream-sediments and basal till, with the areal extent of the Boland Brook Formation and consistent Ni values of 2 – 3 times avg. continental crust invoke a ‘formational’ source for the Ni; possibly concentrated by mechanical and/or chemical processes related to relief.

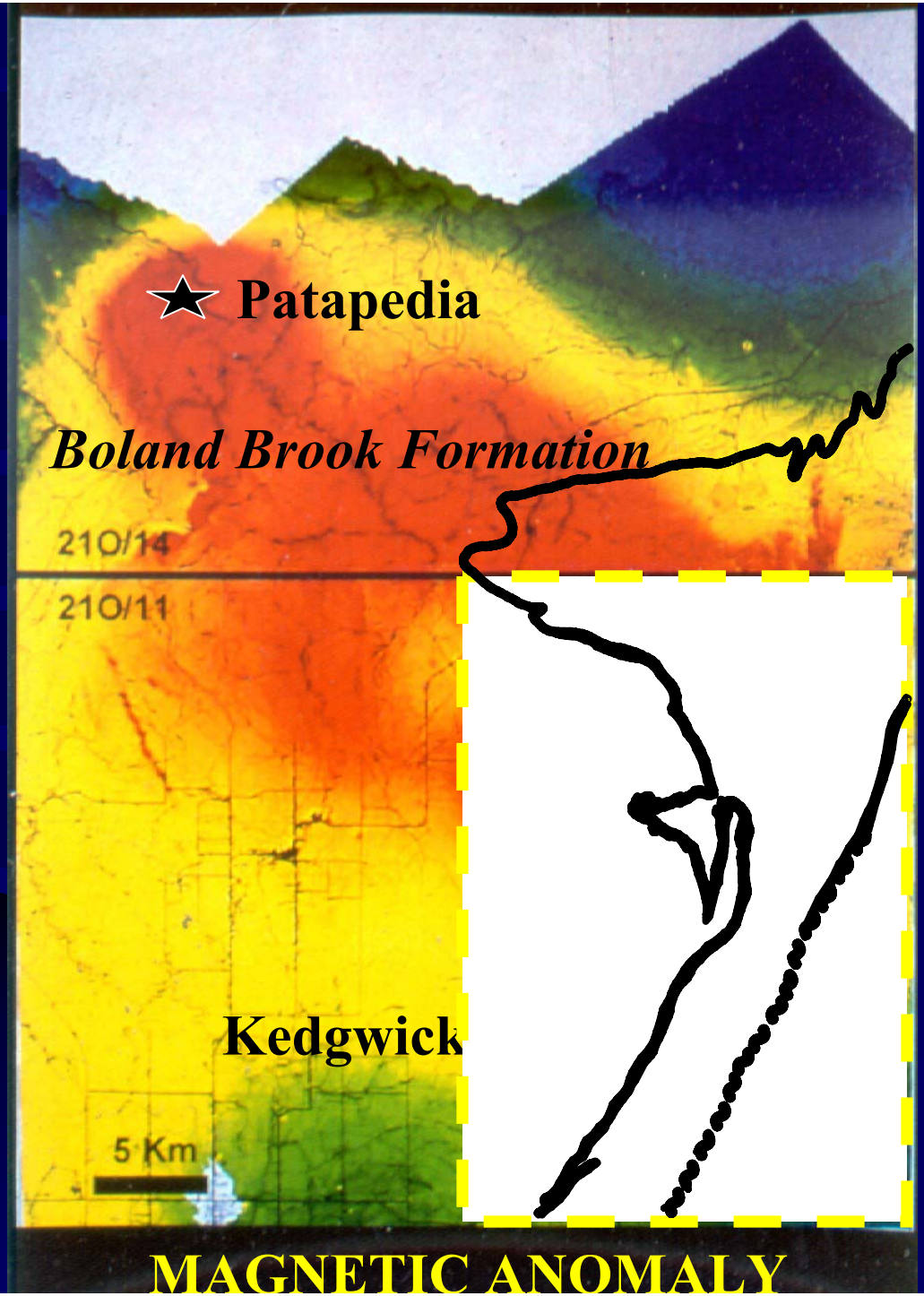
Cu-Skarns – Matapedia Group

1) Legacy deposit – 444,528t @ 1.7% Cu & 0.86 g/t Au over 0.3 m (+Ag, Pb, Zn)

2) Patapedia (N, C, S zones) – Cu, Zn, Pb

3) Popelogan (S) – Cu, Zn, Pb, W


Quebec
D granitoid
S limestone
O limestone
Skarn
Restigouche Project (Phase 3)
Restigouche Project (Phase 1)
Dalhousie
Campbellton
Ds
Dv
Op
C
SLA
OSMA
Squaw Cap
Zn, Pb
Su
Benjamin River
Cu, Mo
Ov
Popelogan
Cu, Mo
Zn
Wodens Rock Brook
Cu
Legacy
Cu, Pb, Zn
Burntland Brook
Cu, Mo, Zn
Og
Smv
Blue Mountain
Sfv
Ss
Kedgwick
R B M F
NB
Atlantic Ocean
10 km


★ Patapedia
Boland Brook Formation
210/14
210/11
Kedgwick
5 Km
MAGNETIC ANOMALY

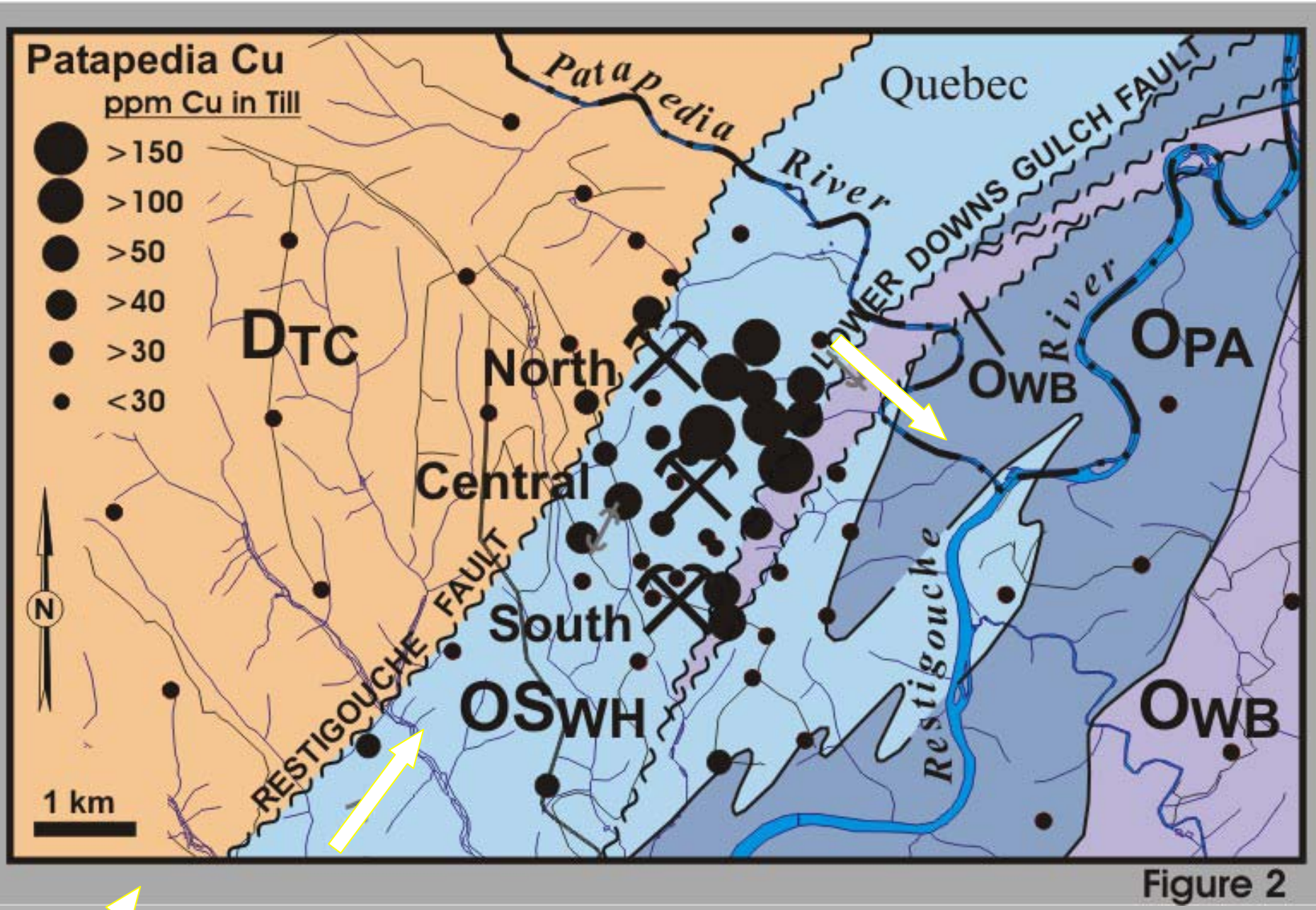
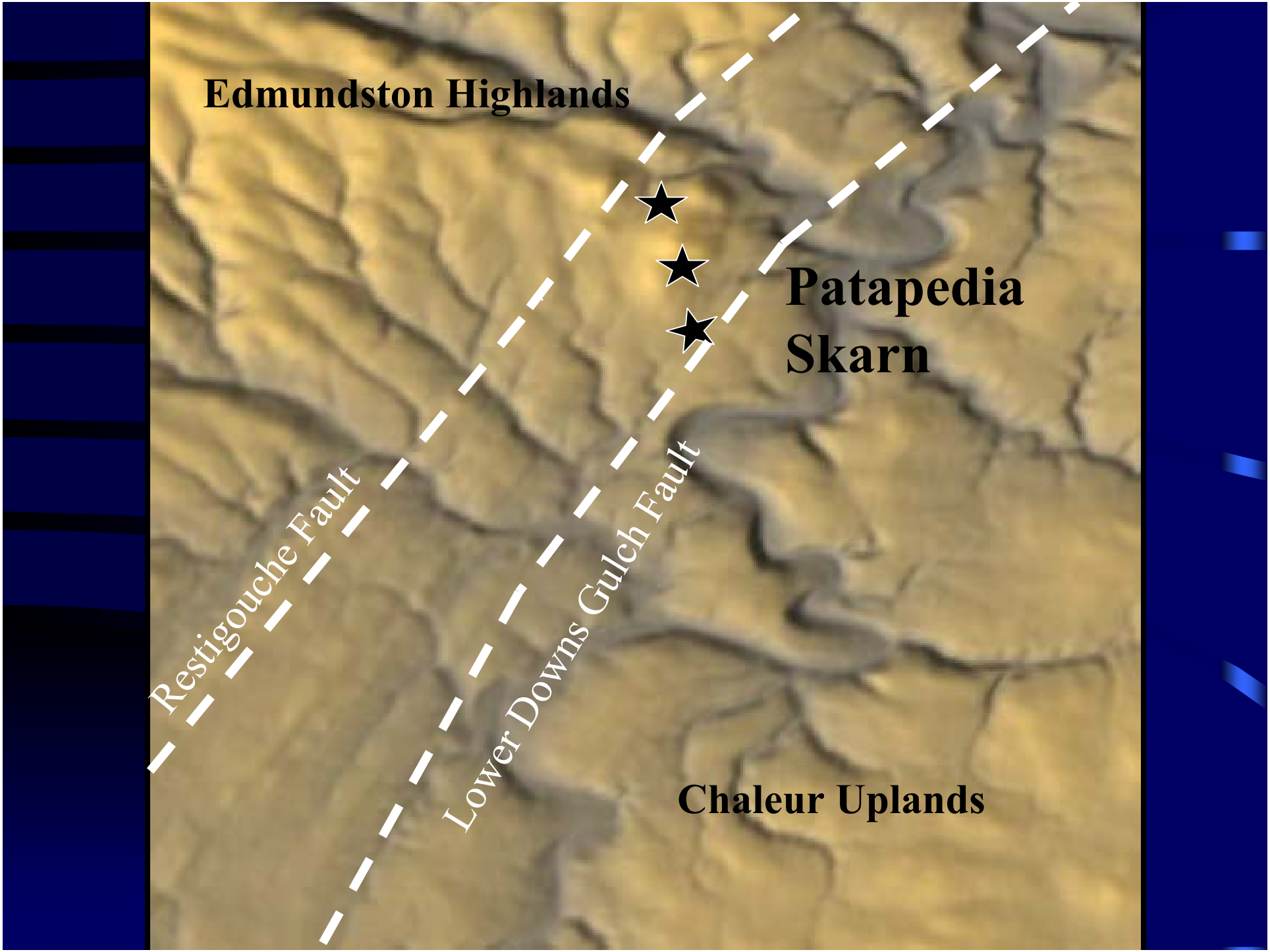


Figure 2

Glacial Striae


Edmundston Highlands
Patapedia
Skarn
Restigouche Fault
Lower Downs Gulch Fault
Chaleur Uplands

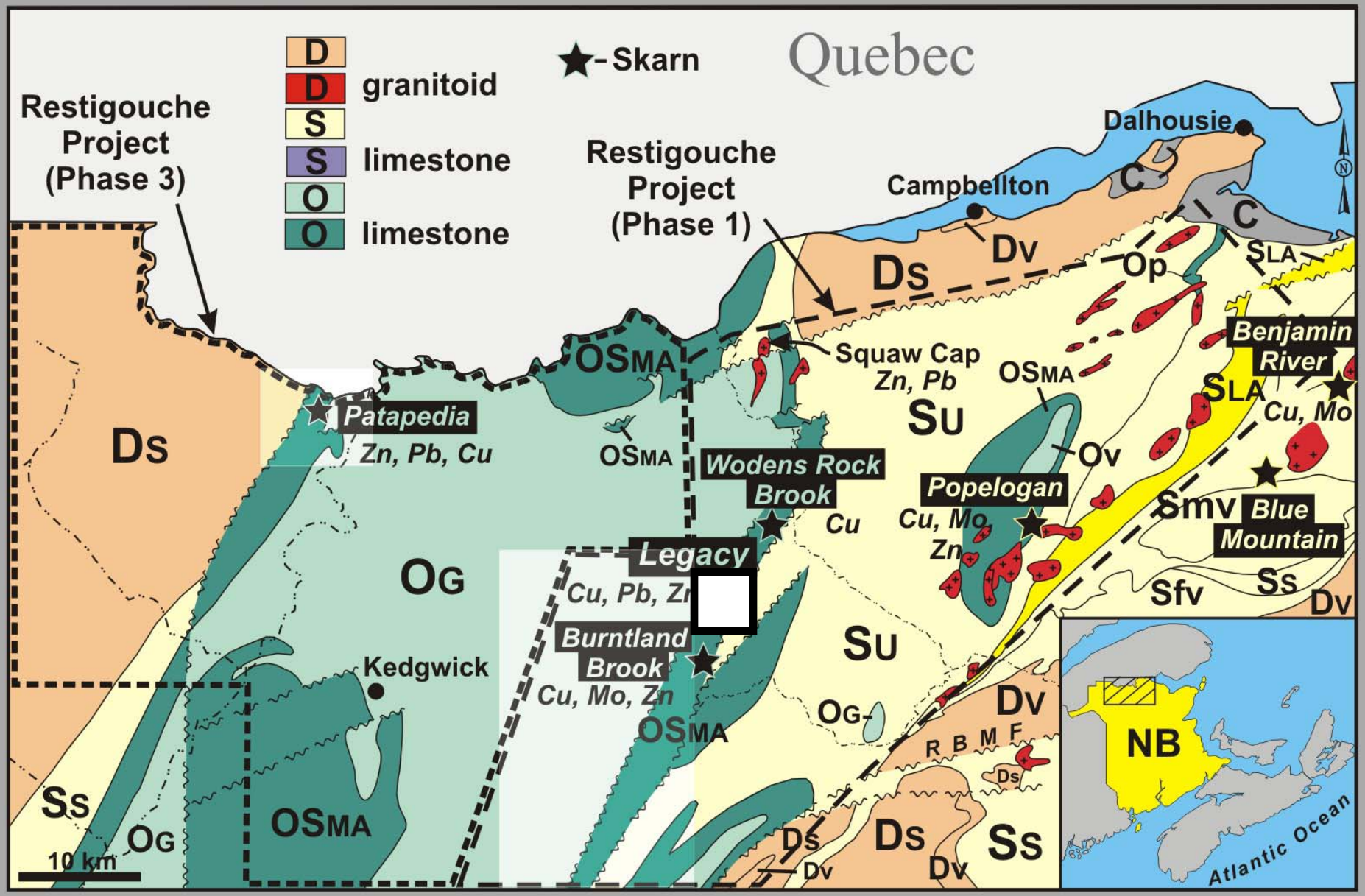
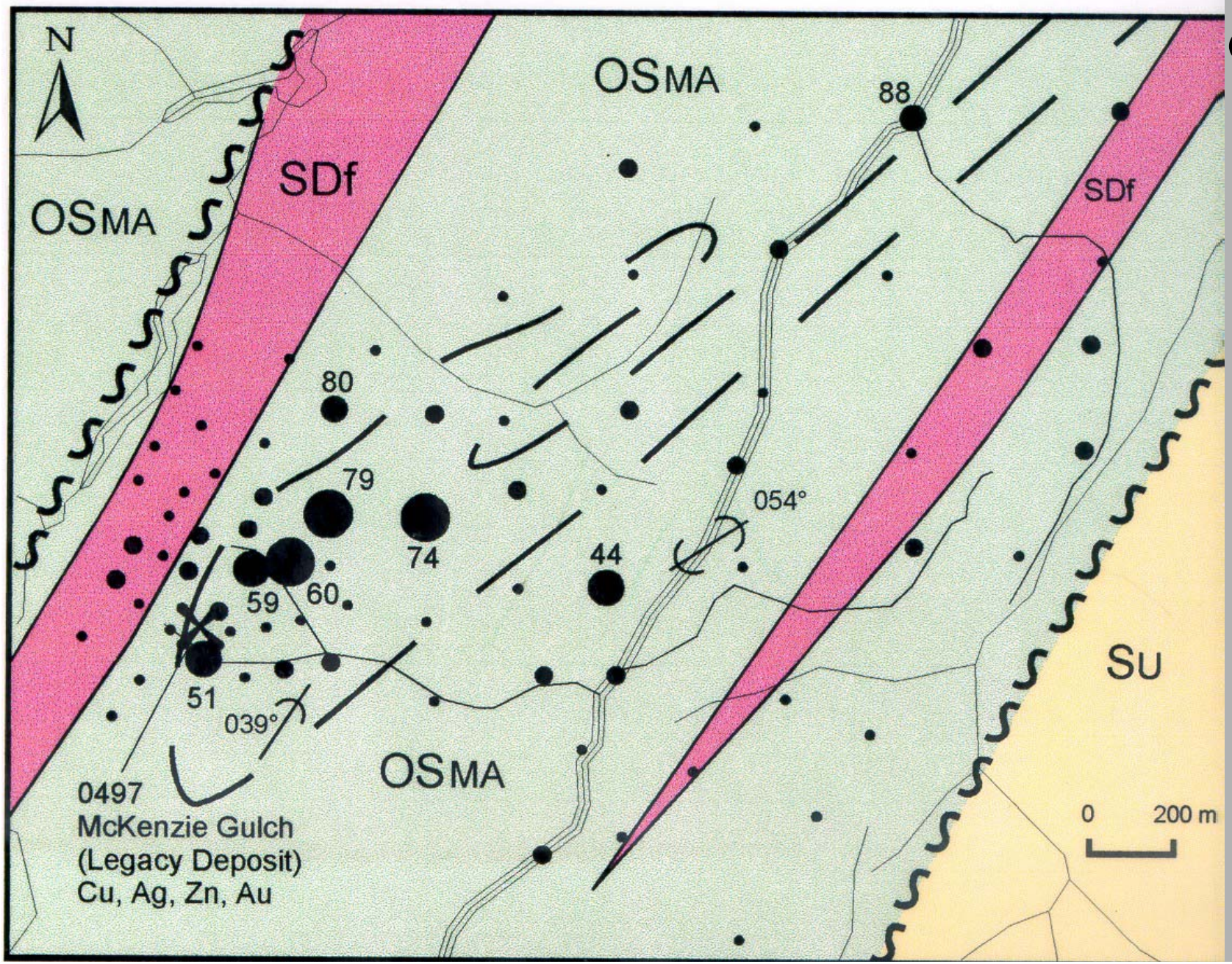

D
D granitoid
S
S limestone
O
O limestone
Skarn
Quebec
Restigouche Project (Phase 3)
Restigouche Project (Phase 1)
Dalhousie
Campbellton
C
C
Dv
Ds
Op
SLA
Benjamin River
Cu, Mo
Squaw Cap
Zn, Pb
OSMA
SU
SLA
Ov
Patapedia
Zn, Pb, Cu
OSMA
Wodens Rock Brook
Cu
Popelogan
Cu, Mo
Zn
Smv
Blue Mountain
Ds
OG
Legacy
Cu, Pb, Zn
Sfv
Ss
Dv
Burntland Brook
Cu, Mo, Zn
SU
Kedgwick
OG
Dv
R B M F
Ds
NB
Atlantic Ocean
Ss
OG
OSMA
10 km
Ds
Dv
Ds
Dv
Ss

Figure 1b Cu in Basal Till **Legacy Deposit**



Cu ppm

- **> 285**
- **> 174**
- **> 117**
- **< 42**

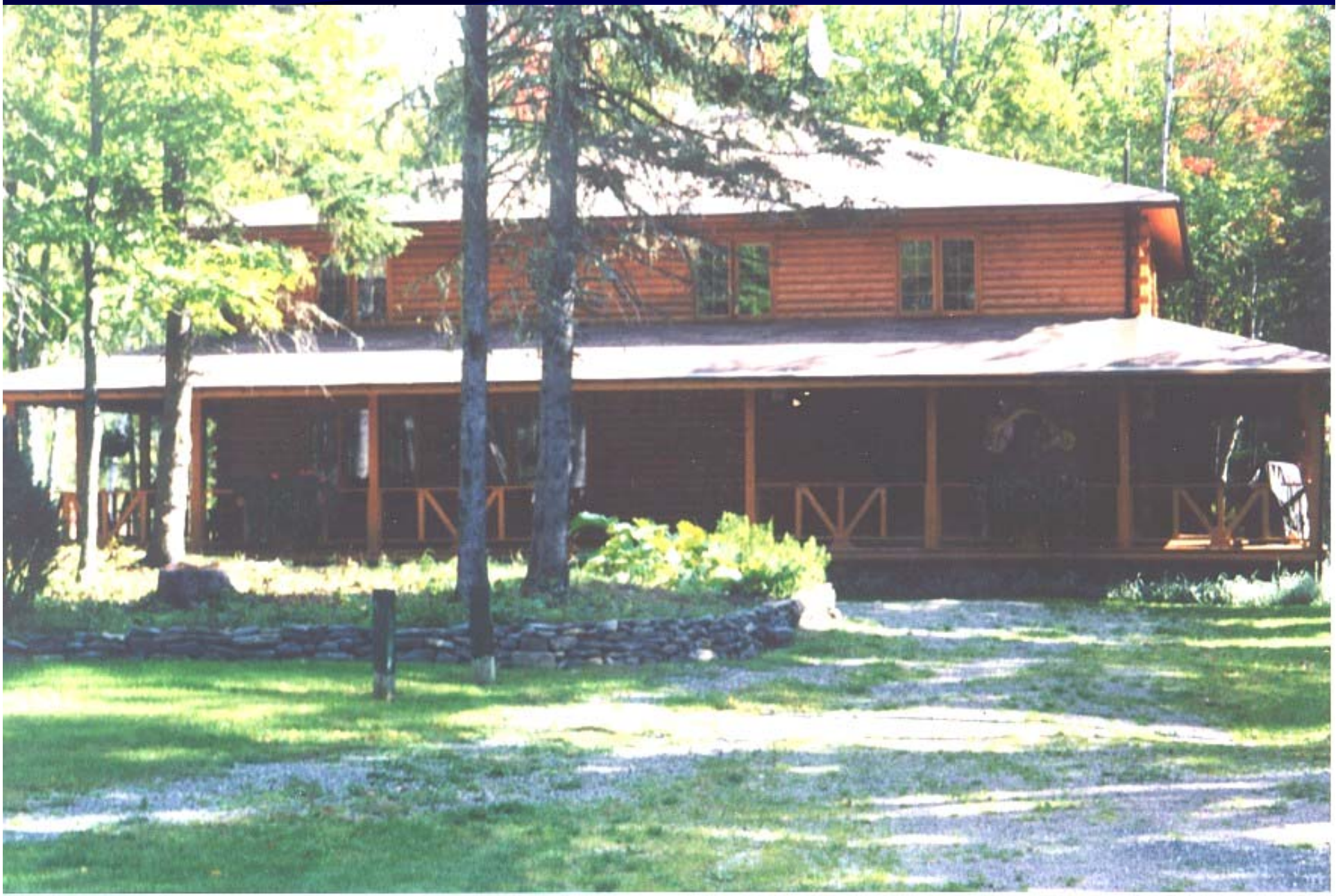
CONCLUSIONS

- Till is thin, although locally is up to 3m thick.
- Ice movement was in an east-southeast direction (090-160) in the western part of the area and east-northeast in the eastern part of the area (030-100).
- Pebbles in till reflect local bedrock.
- Boulder erratics from as far away as the Canadian Shield are scattered throughout the area.
- There are definite till geochemical signatures over different bedrock (e.g. elevated Ni, Co and Cr concentrations over parts of the Grog Brook Group in the Kedgwick and Menneval areas).

CONCLUSIONS

- Cu, Pb, and Zn, as well as Au and pathfinders are anomalous over the Patapedia and Legacy deposits.

- 50 to 100 till sample sites on a roughly 250 centred grid, in an area covering approximately 70 claims is sufficient to detect sulphide mineralization on the Patapedia property and provide data to direct further geochemical sampling and trenching.



Till Samplers?

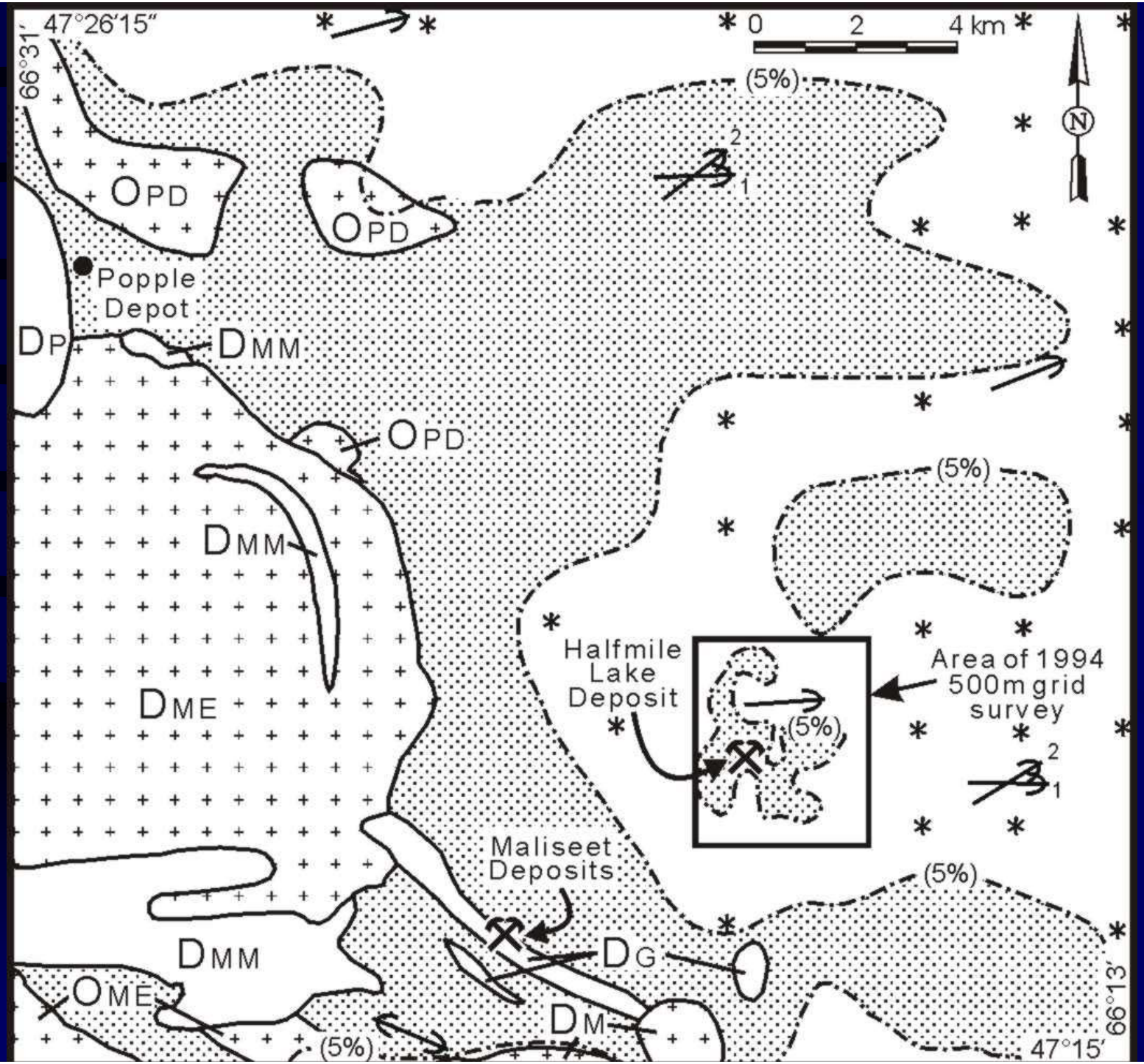
New Nouveau Brunswick CANADA

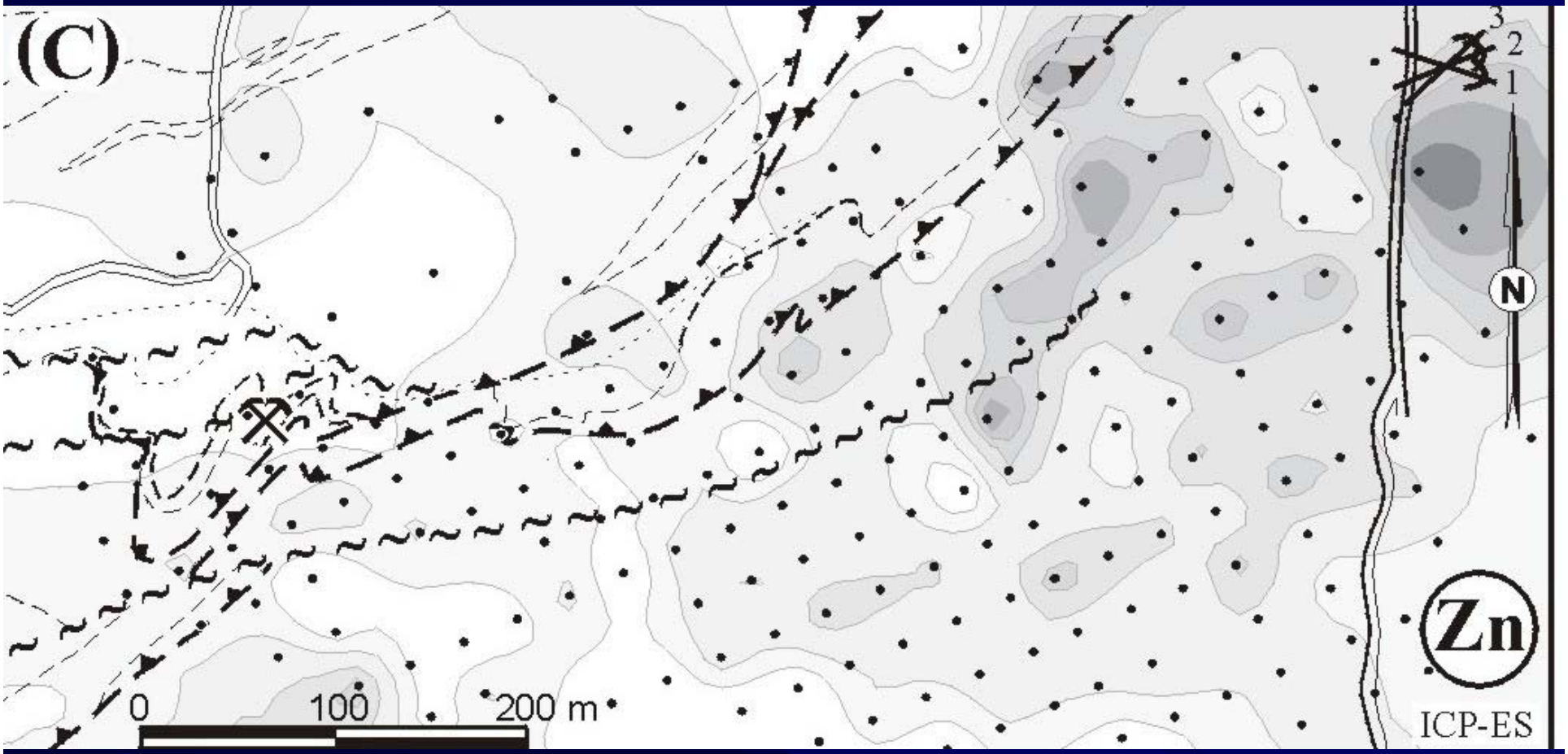
Geological Bridges in Eastern Canada
Ponts géologiques dans l'est du Canada

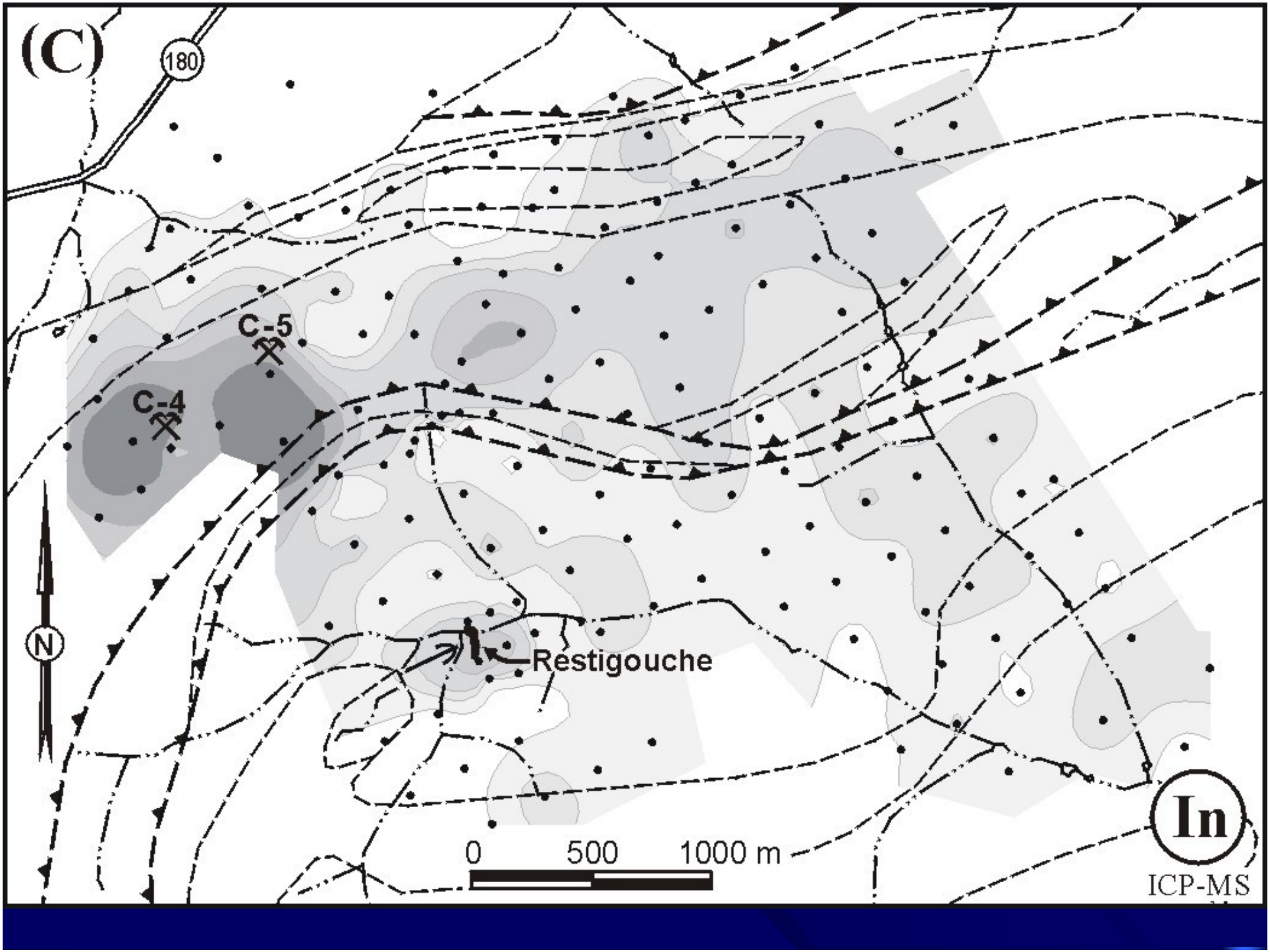
NATMAP
CARTNAT

NATMAP PRODUCTS

- MSc thesis and Open File Report - Popelogan and Charlo (21 O/15 & 16) area (Dickson 2001 & 2003)
- Terrain Classification and field data study - Gounamitz River (21 O/12) area - Arseneau 2003
- Paper McKenzie Gulch (Legacy Deposit) area 1998
- Open File - Till geochemistry of 21 O/11, 12, 13, & 14 map areas including Patapedia area
- Quaternary geology map of 21 O/11, 12, 13, & 14 map areas
- Synthesis paper - NATMAP study area


47°26'15"
66°31'
0 2 4 km
N
(5%)
2
1
OPD
OPD
Popple
Depot
DP
DMM
OPD
DMM
DME
(5%)
Halfmile
Lake
Deposit
Area of 1994
500m grid
survey
(5%)
2
1
Maliseet
Deposits
(5%)
DMM
DG
OME
DM
(5%)
66°13'
47°15'


(C)
3
2
1
N
Zn
ICP-ES
0
100
200 m


(C)
180
C-5
C-4
N
Restigouche
0
500
1000 m
In
ICP-MS