

CAPE BRETON
UNIVERSITY

Cheryl Bartlett

Canada Research Chair in Integrative Science
Department of Biology

Knowledge Inclusivity:



**“Two-Eyed Seeing”
for Science for the 21st Century**

Workshop on
Learning Communities as a Tool for Resource Management,
Halifax, NS, 4-5 November 2005 (pp. 70-76 in Proceedings)

ABSTRACT: Contemporary Canada should be attempting to include Aboriginal peoples' knowledges in the arenas of science research, education, and application. For the mainstream, however, this is largely unknown territory and efforts may easily falter or not even begin. Based on the author's participation in two on-going "learning communities" in Cape Breton, Nova Scotia, and towards the goal of sharing "lessons learned" in the spirit of helping others, the presentation will outline some insights re the "journey of inclusion" of Aboriginal knowledges alongside Western science. One learning community has come into existence around an innovative post-secondary science initiative (Integrative Science; www.integrativescience.ca) at Cape Breton University (an initiative led by academics and supported by First Nations' community); the second learning community has come into existence around a collaborative environmental planning initiative (CEPI) for the Bras d'Or Lakes ecosystem in Cape Breton, Nova Scotia (an initiative led by First Nations and supported by others including university). Mr. Albert Marshall, Mi'kmaq First Nation Elder from Eskasoni, NS, has coined the label "Two-Eyed Seeing" for efforts within these initiatives to bring Aboriginal and Western scientific knowledges together; the label points to the need to learn to see from the one eye with the strengths of Aboriginal peoples' knowledges and from the other eye with the strengths of Western science ... with the overall intent that we go forward together, learning from and with each other. The presentation will also highlight the strong resonance of "two-eyed seeing" with the "new commitment for Science for the 21st Century" envisioned by UNESCO and the 1999 World Conference on Science.

CAPE BRETON
UNIVERSITY



UNAMA'KI
INSTITUTE OF
NATURAL
RESOURCES

Knowledge Inclusivity:



“Two-Eyed Seeing”
for **Science** for the 21st Century
... **stories of our interactions**
with the land

CAPE BRETON UNIVERSITY

Cape Breton – Unama'ki



**UNAMA'KI
INSTITUTE OF
NATURAL
RESOURCES**



MI'KMA'KI

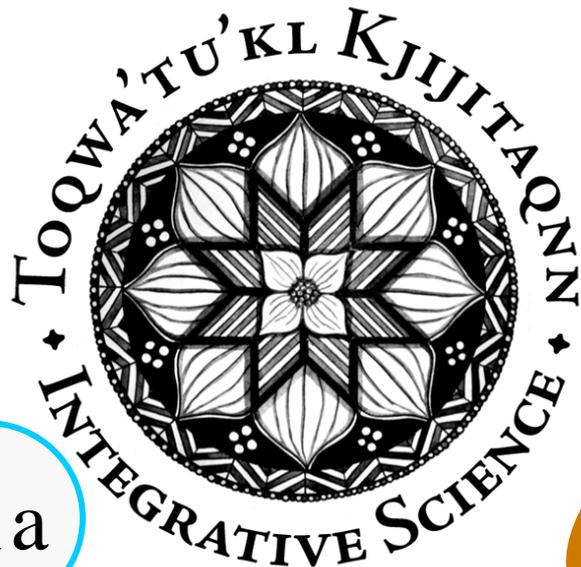
collaborative initiatives

MI'KMAQ ELDERS



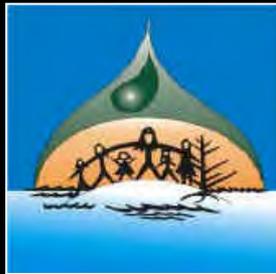
collaborative initiatives

CAPE BRETON
UNIVERSITY



#1a

post-secondary
science
education



#1b

health research
project

Bras d'Or Lake

CEPI

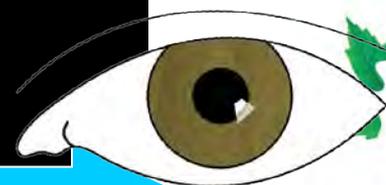
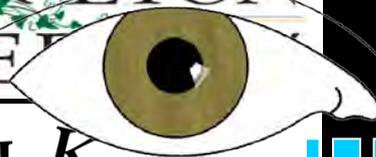
#2

environmental
planning initiative

collaborative initiatives

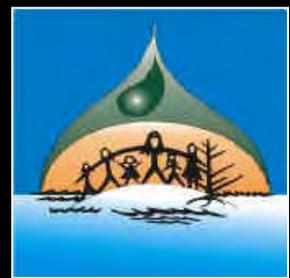
#1b

CAPE BRETON
UNIVERSITY



CIHR IRSC

health research
project



#1a

post-secondary
science
education



Bras d'Or Lake

CEPI

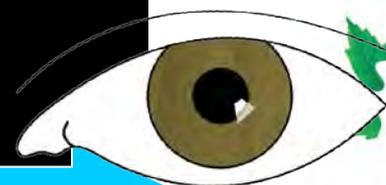
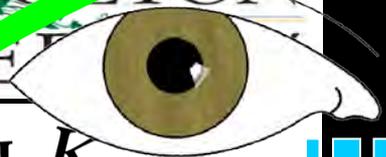
#2

environmental
planning initiative

collaborative initiatives

#1b

CAPE BRETON
UNIVERSITY



CIHR IRSC

health research
project



#1a

post-secondary
science
education



Bras...r...e
CEPI

#2

environmental
planning initiative



11 LESSONS LEARNED:

We need to learn to ...

- acknowledge we need each other
- acknowledge we are on a learning journey
- co-learn ... including how to do so:
 - simple integrative framework
- help institutions to help us “legitimize” TK in the minds of youth (and many others)
- work with “living agendas”
- use other “organic language”
- do ... in a creative “grow forward” manner

11 LESSONS LEARNED (cont'd):

We need to learn to ...

- think “knowledge gardening” more than knowledge translation or transfer
- weave back and forth between our knowledges, our stories
- navigate our weaving via awareness of “big patterns” (broad generalizing orientations)
- make our knowledges, our stories visual



two-eyed seeing

Indigenous

Western



**Albert Marshall, Mi'kmaq Elder
Eskasoni First Nation**

integrative framework

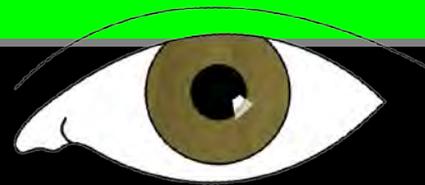
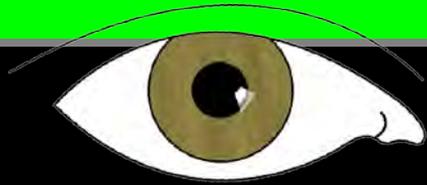


both Indigenous and Western, plus:

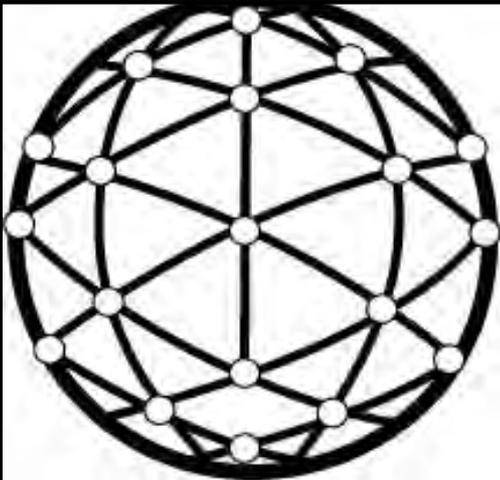
- role of me and you in “the knowing”
- our common ground
- our differences (and respect them)
- our journey ... forward & together

**NOT ... simply Western, plus
bits and pieces of Indigenous**

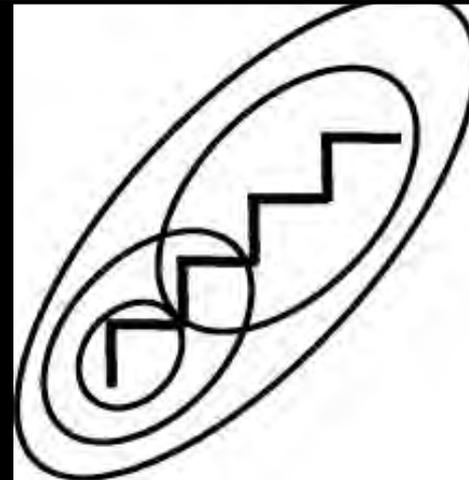
“two-eyed seeing”
how our world is



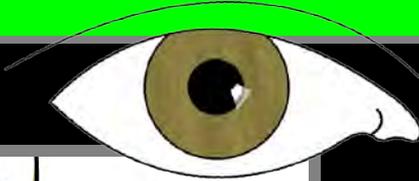
interconnected



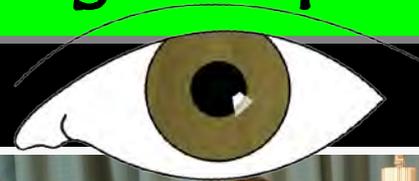
parts & wholes



“two-eyed seeing” our overall knowledge objectives

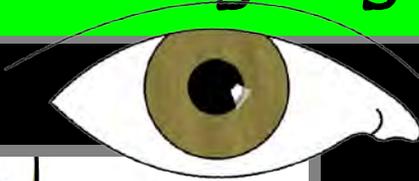


towards resonance
of understanding
within environment



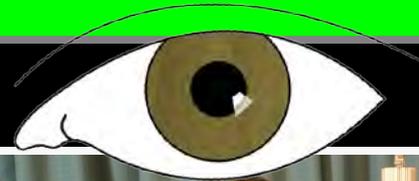
towards construction
of understanding
of environment

“two-eyed seeing”
our language & methodology



vigour

WEAVING

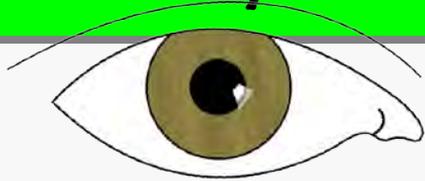


rigour

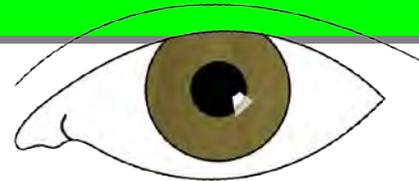
UN-WEAVING

“two-eyed seeing”

our key concepts & actions



- **respect**
- **relationship**
- **reverence**
- **reciprocity**
- **ritual**
- **repetition**
- **responsibility**



- **hypothesis**
(making & testing)
- **data collection**
- **data analysis**
- **model & theory
construction**

collaborative initiatives

#1a Indigenous

Western



The central dilemma of science education today is the teaching of science from only one cultural perspective, and in an incomplete and non-connected manner.

Gregory Cajete, PhD, Univ. of New Mexico

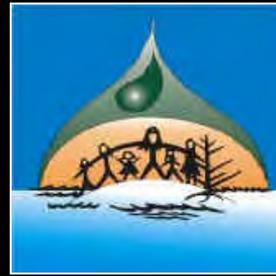
Toqwa'tu'kl Kijitaqnn Integrative Science



Indigenous

Western

“bringing our stories together”



The voice of our ancestors is in the land.







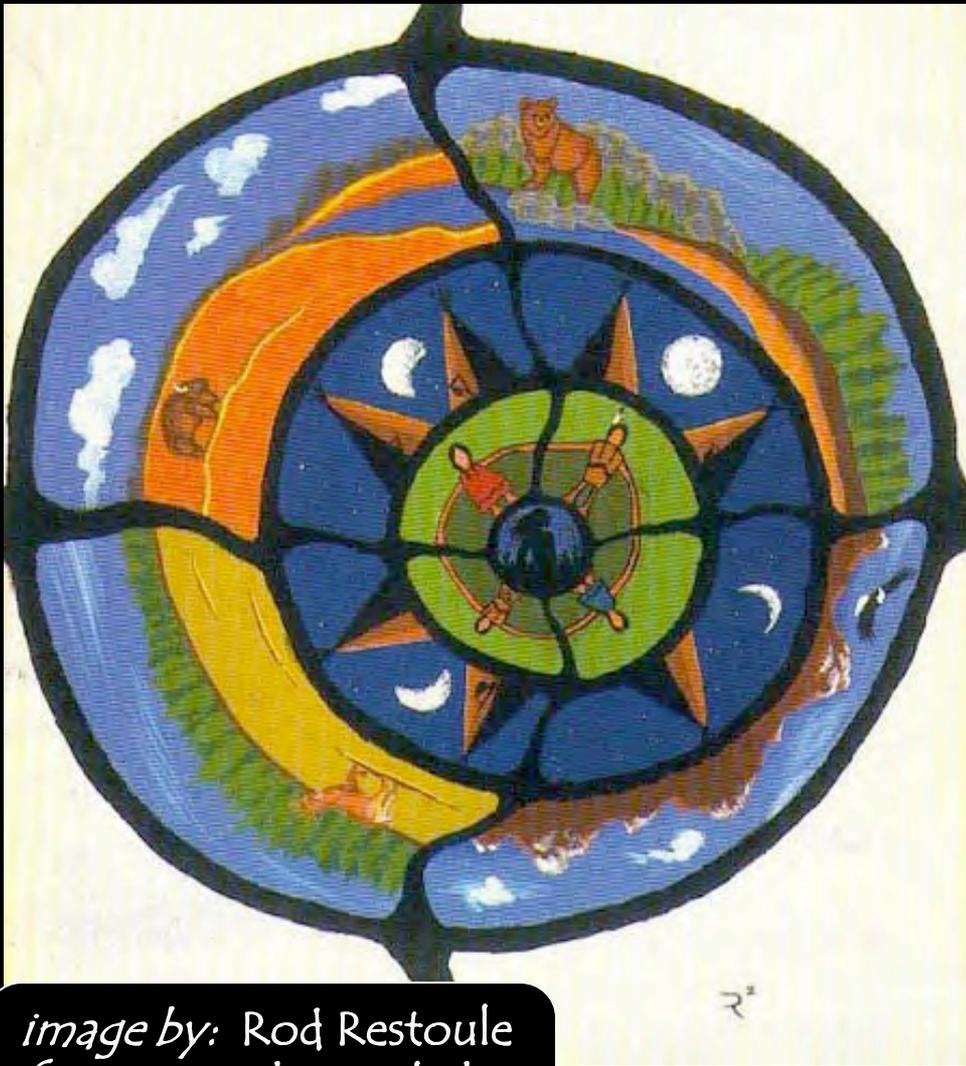
**We are
all inter-
connected.**

image from:
Mi'kmaq Family
and Children Services



Everything
we want
is here.

image from:
"Winds of Change"
by: Roy Thomas,
Ahnisnabae-born
Ojibwa artist; 1949-2004



We need to
stay connected
to the earth ...
... and be able
to work
with Nature ...
... not be a
“master over”.

*image by: Rod Restoule
from: Into the Daylight;
C. Morrissette, 1998*

Wjipenuk Etek Lnuimlkikno'ti

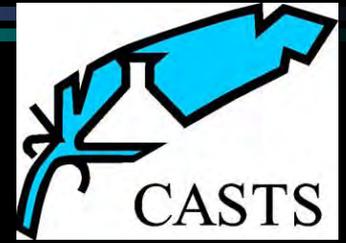
Spirit of the East



image by :
Basma Kavanagh



UNAMA'KI
INSTITUTE OF
NATURAL
RESOURCES



CASTS

CAPE BRETON
UNIVERSITY

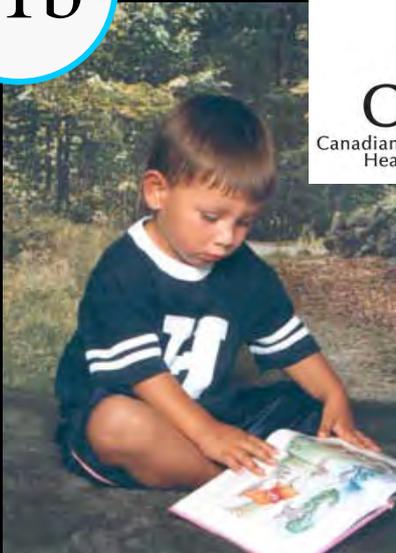
East (sunrise)
... a place of
beginnings and
enlightenment
... where new
knowledge can be
created or received
to bring about
harmony or right
relations.

collaborative initiatives

#1b



IAPH



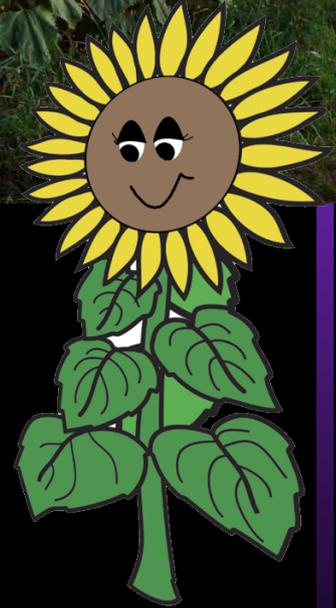
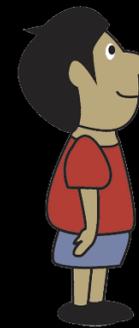
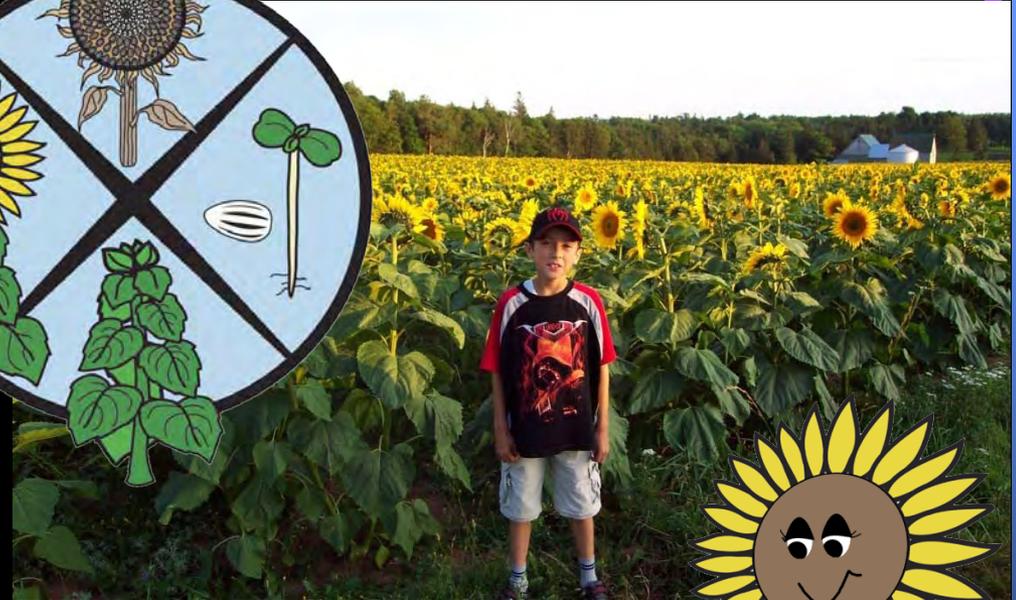
Aboriginal Community-Based Participatory Action Research



Integrative Health & Healing:

co-learning our way
to expanding wholeness
through restoration
of relationships with the land

healthy young ... need TLC



healthy young need stories & creativity



puppets to teach the “healing tense” found in the Mi’kmaq language





Nipuktuk Wejiaql A'tukuaqnn

FROM THE FORESTS COMES OUR STORY

puppets made from the forest



Jikoqs
Fomes fomentarius
BRACKET FUNGUS



Kuow
Pinus strobus
PINE NEEDLES



Maskwi
Betula papyrifera
BIRCH BARK



Wisqasaw
Pinus strobus
PINE CONE



Pukusip
Dicranum sp.
MOSS



Qqnn
TWIGS



Ulnetkul
MOSS



T'i'tikli
Bubo virginianus
GREAT HORNED OWL



Jikoqs – BRACKET FUNGUS: This hard, woody, slow growing bracket fungus once had a very special role to play in the life of the Mi'kmaq Nation. Jikoqs, Keeper of the Sacred Flame, was used to ensure that embers of the fire remained alive when the people moved to a new camp. The fungus was set on fire and then placed in a clamshell for protection. Jikoqs would burn slowly and thus keep the fire alive. At the new campsite, Jikoqs would be used to start a new campfire – this was in the time before we had modern matches. Similarly, to ensure that a fire could be restarted every morning at the same campsite, Jikoqs and a clamshell were used to safeguard an ember each night. The species of fungus used was possibly *Fomes fomentarius*, which is known in English as *tinder* many tiny holes (tinder polypore).

A small multicultural group of young people worked at the University College of Cape Breton during the summer of 2004 to make puppets for the characters in two Mi'kmaq legends: *How Rabbit Got His Long Ears* and *How Buffalo Was Conquered*. All puppets were made from natural materials easily collected



Nipuktuk Wejiaql A'tukuaqnn

FROM THE FORESTS COMES OUR STORY

Apl'ikmuj
Lepus americanus
SNOWSHOE HARE



Apl'ikmuj – Hare: gets very small in the winter, grows larger with the coming of winter because the first snows mask the trees when they are new for most still asleep. Hare summer coat of brown changes to a winter coat of white. Hare's winter coat is like the white winter snow and hare summer coat is like the brown summer earth and forest floor. These different colors camouflage hare making it difficult for predators to see hare in the environment. White wearing hare summer coats. Hare eats deciduous, evergreen, grasses, ferns, and flowers. In late winter coats, sheds bark and small rings of pine and spruce trees. Apl'ikmuj is a beloved character in many Mi'kmaq legends.



Kaqajulman
Clintonia borealis
BLUE BEAD LILY



Pukusp
DECAYING WOOD



Kawatk
Picea sp.
SPRUCE CONE



Stoqn
Alces betuleus
DEAD ELK



Wso'qmanasit
Cornus canadensis
BOWBERRY



Qqnn
TWIGS



Kuow
Pinus strobus
PINE NEEDLES



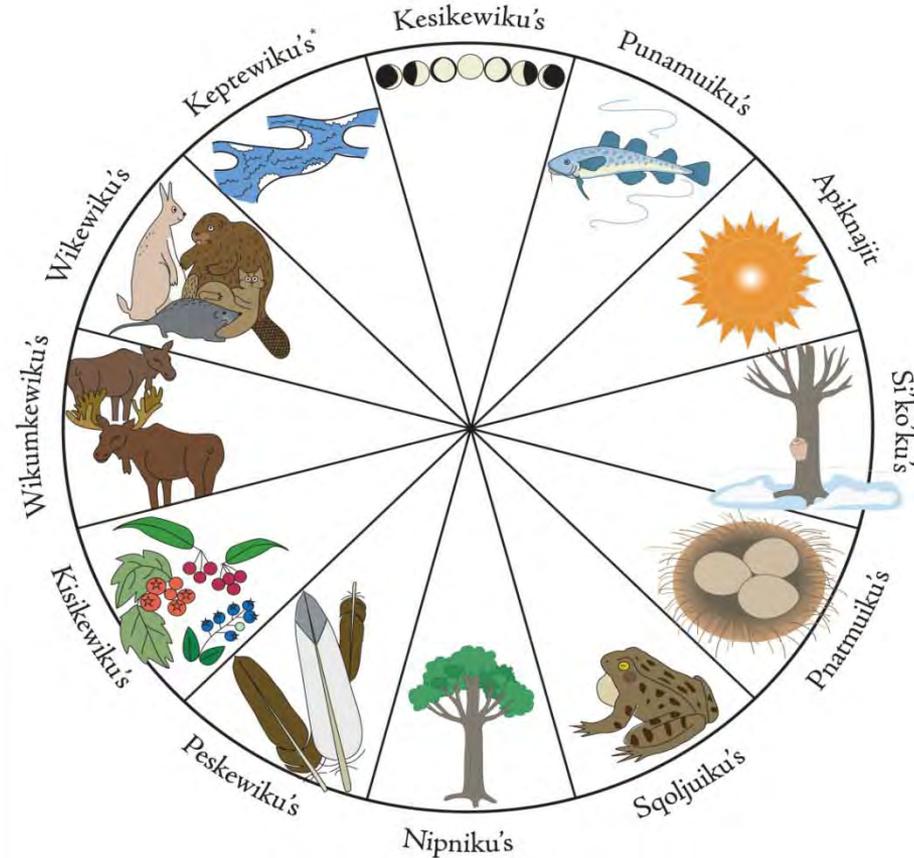
A small multicultural group of young people worked at the University College of Cape Breton during the summer of 2004 to make puppets for the characters in two Mi'kmaq legends: *How Rabbit Got His Long Ears* and *How Buffalo Was Conquered*. All puppets were made from natural materials easily collected in the forests of Nova Scotia (Cape Breton). The project was part of a large research effort to help people learn traditional Mi'kmaq and modern scientific understanding of our forests and ecosystems while creating awareness, especially as the relationship between our human world and the natural world is ever more of a close, interdependent and contentious. This large project is funded by the Canadian Institutes of Health Research - Institute of Aboriginal Peoples' Health.

For 3D Design (design) information contact: Matthew Marshall, 902-739-2200. For additional information contact: Integrative Science Program, University College of Cape Breton, 230 Blue 17000, Sydney, Nova Scotia, B1P 6L2. Or visit our website: www.uccb.ca





Mi'kmawe'k Tepknusetk

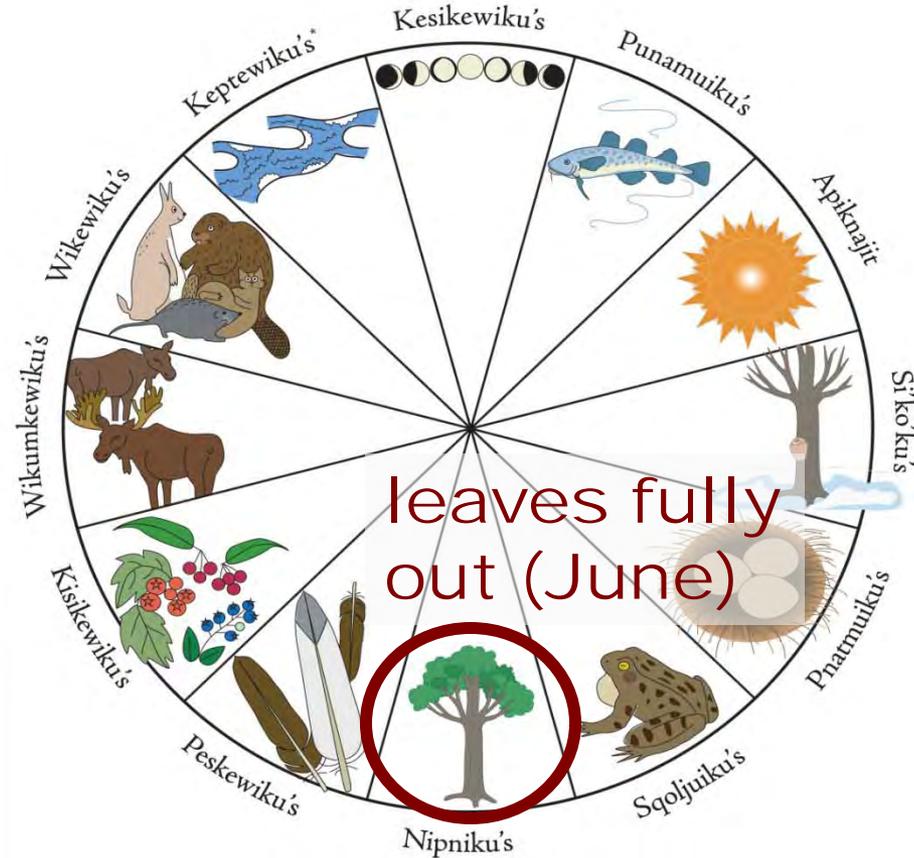


*Alternative – Kepti'kewiku's

Earth speaks:



Mi'kmawe'k Tepknusetk



*Alternative - Keptewiku's



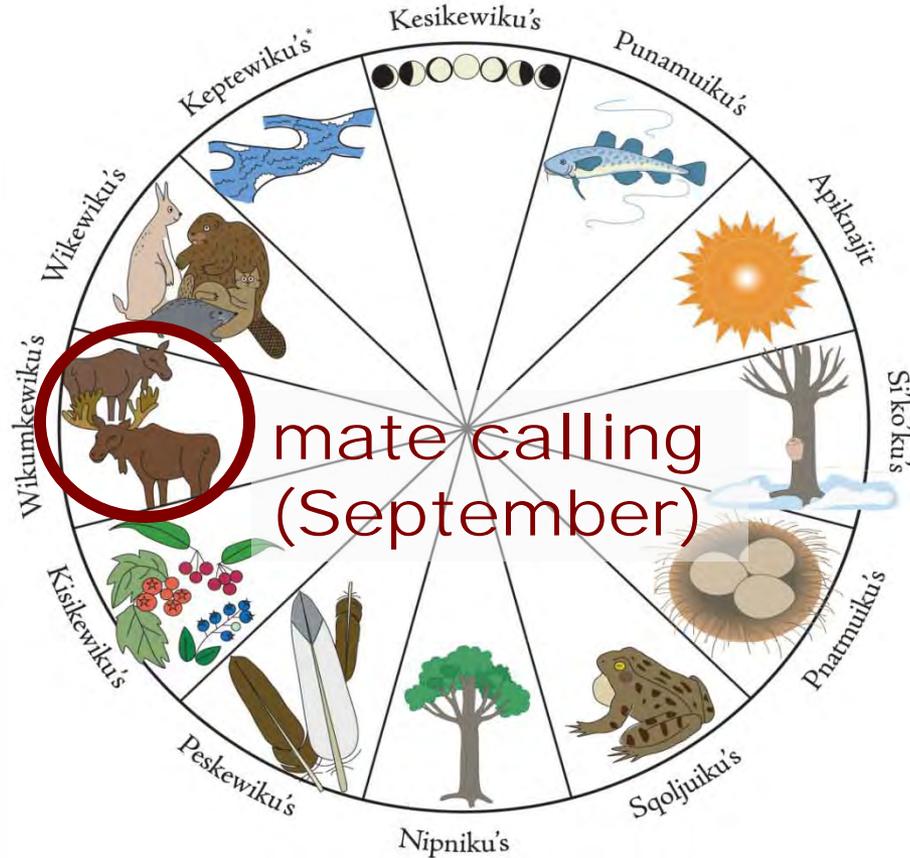
Earth speaks: forest time





Mi'kmawe'k Tepknusetk

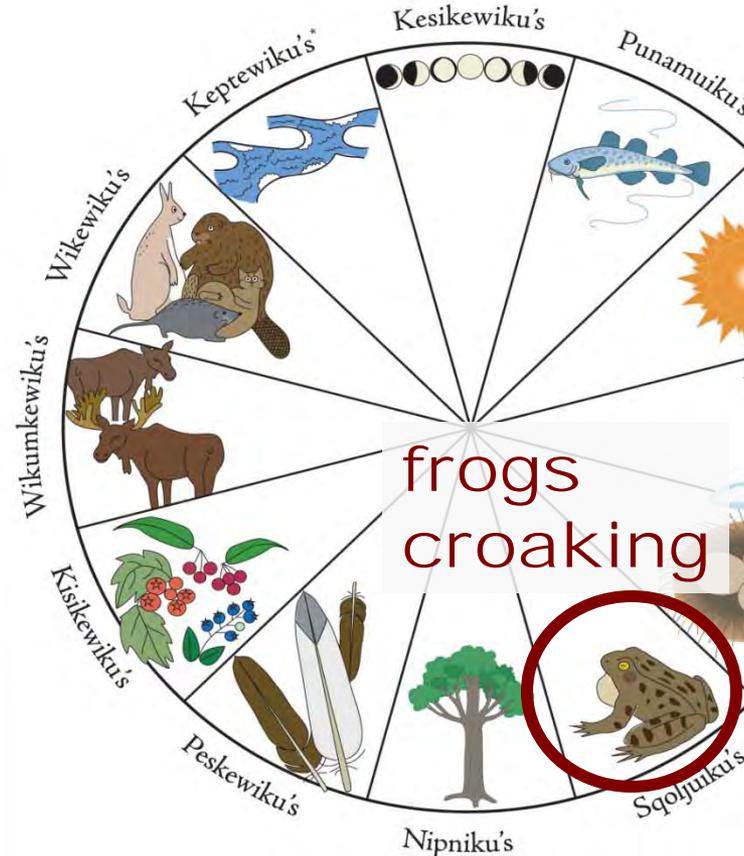
Earth speaks: animal time



*Alternative - Keptewiku's



Mi'kmawe'k Tepknusetk



*Alternative - Kepti'kewiku's



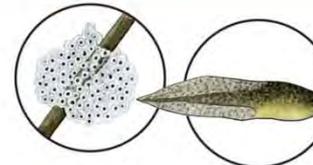
Earth speaks: health indicators

ECOSYSTEM HEALTH CONSCIOUSNESS Difference, Pattern, Variation

TOQWA'TU'KL KJIJITAQNN • INTEGRATIVE SCIENCE

Frogs of Unama'ki

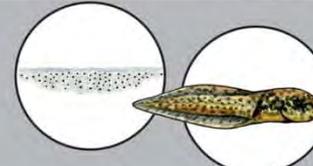
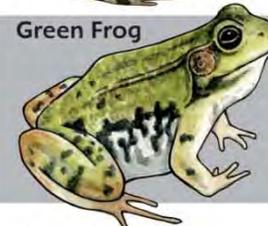
Mink Frog



Mink Frog • *Rana septentrionalis*
 Mink Frog is green with many dark markings and is 4 – 7 cm long. He gets his common name from his muaky odour; he smells like a mink. Mink Frogs song sounds like pieces of wood being tapped together ... TAB TAP! While other frogs live on both land and water, Mink Frog spends most of his life in the water. He prefers permanent bodies of water like ponds and lakes. Female Mink Frog lays 2000 to 4000 eggs in a round jelly mass. This jelly mass is attached to an underwater plant stem or submerged twig. Mink Frog eats dragonflies, damselflies, water beetles, aphids, minnows, leeches, snails, millipedes, and spiders.

MINK FROG

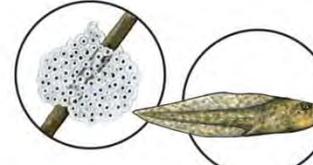
Green Frog



Green Frog • *Rana clamitans*
 Green Frog is green with grey or brown markings on her back and legs, and has a pale belly marked with dark streaks. Male Green Frog has a bright yellow throat and is 6 – 10 cm long. Green Frog's song sounds like a loose banjo string being plucked, or like a small pebble dropped into water ... UNGKI! Green Frog prefers to be close to water, and tends to live at the edge of rivers, ponds, lakes or streams. Female Green Frog lays 1800 to 4000 eggs in a loose jelly mass that floats on the surface of the water like a raft. Green Frog eats beetles, flies, caterpillars, grasshoppers, spiders, snails, slugs, waterbugs, butterflies and moths, and sometimes other small frogs.

GREEN FROG

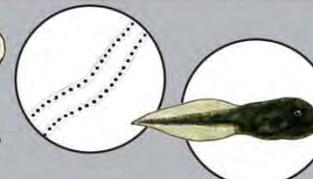
Pickerel Frog



Pickerel Frog • *Rana palustris*
 Pickerel Frog is light brown with many dark blotches on his back and legs. He is 4 – 7 cm long. Pickerel Frog's song sounds like somebody snoring, or like the sound of someone slowly pushing open a creaky door ... ARREP ARREP! Pickerel Frog lives on the shores of ponds or lakes, or on the banks of streams, often staying near permanent bodies of water at breeding time. However, he will also live in moist fields, bogs, or damp woods. Female Pickerel Frog lays her eggs in a round jelly mass attached to a plant or stick below the surface of the water. She can lay as many as 800 to 1800 eggs at a time. Pickerel Frog eats beetles, ants, spiders, caterpillars, sow bugs, mites, snails, true bugs, and many small water creatures.

PICKEREL FROG

Eastern American Toad



Eastern American Toad • *Bufo americanus*
 Toad is a plump creature with stubby toes and rough warty skin. He is usually brownish, with darker brown or black markings. Toad has a pale belly with dark spots that become more distinct at night. Toad can grow to be 5 – 11 cm long. Toad lives in many different places, for example, in the woods, near a swamp or lake, in a field, or even in your backyard! His song sounds like a long, high trilling sound ... TRRRR! Female Toad prefers temporary ponds for breeding. She lays 800 to 8000 eggs at a time in two long strings near the bottom of the pond or puddle. Toad eats many kinds of insects like caterpillars, earwigs, sow bugs, as well as slugs, earthworms, and millipedes.

AMERICAN TOAD

Northern Spring Peeper

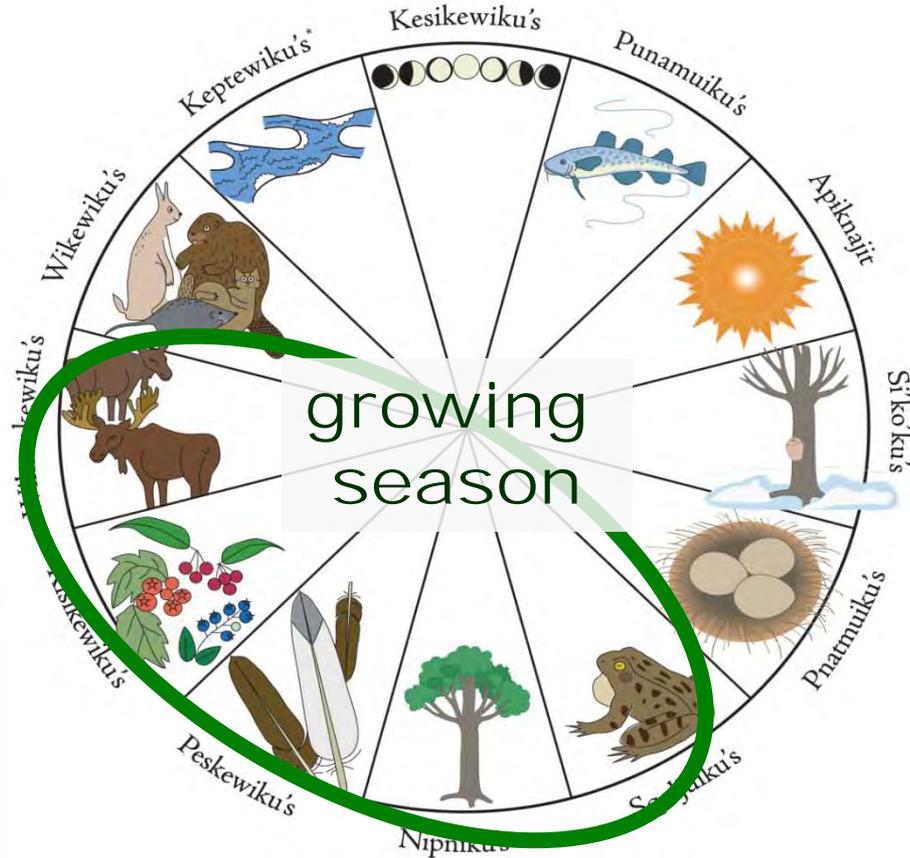


Northern Spring Peeper • *Pseudacris crucifer*
 Spring Peeper is our smallest frog; he grows to 2 – 4 cm long. We know that spring has arrived when we hear Spring Peeper singing at night. His song sounds like a high PEEEP! Spring Peeper lives in the woods near ponds, marshes or swamps. He is our only tree frog and can change the colour of his skin to blend in with his

SPRING

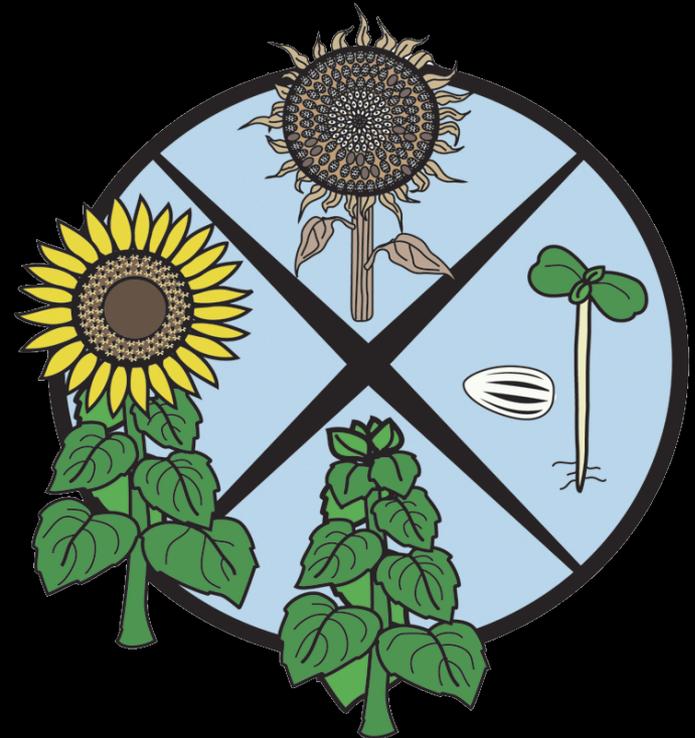


Mi'kmawe'k Tepknusetk



*Alternative - Keptewiku's

Earth speaks: voices of the land ... of health

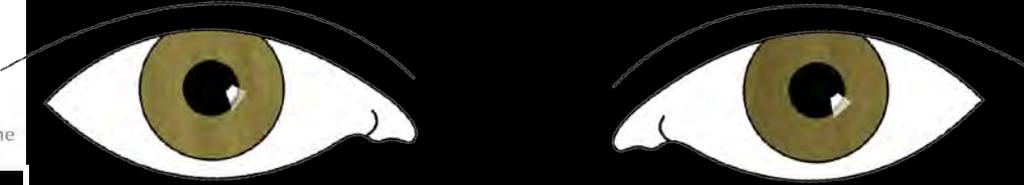




Canada Foundation for Innovation / Fondation canadienne pour l'innovation



Thank you



Royal Canadian Mounted Police / Gendarmerie royale du Canada