

CAPE BRETON  
UNIVERSITY

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Department of Biology

**Knowledge Inclusivity:**



**“Two-Eyed Seeing”  
for Science for the 21<sup>st</sup> 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](http://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 21<sup>st</sup> Century" envisioned by UNESCO and the 1999 World Conference on Science.

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INSTITUTE OF  
NATURAL  
RESOURCES

## Knowledge Inclusivity:



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

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## Cape Breton – Unama'ki



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**MI'KMA'KI**

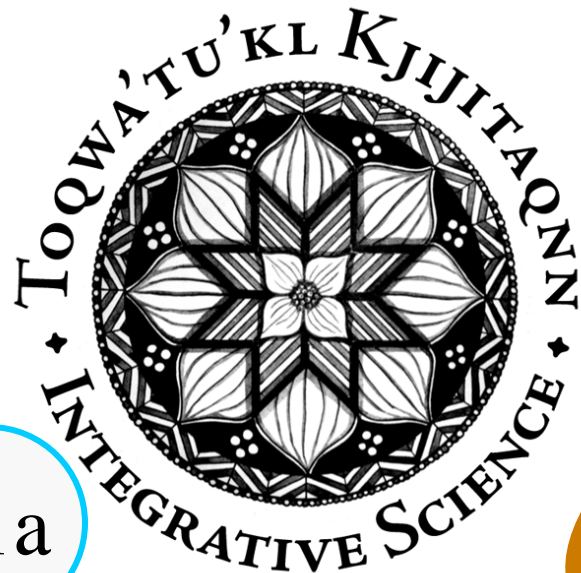
# collaborative initiatives

## MI'KMAQ ELDERS



# collaborative initiatives

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#1a

post-secondary  
science  
education



#1b

health research  
project

*Bras d'Or Lake*

CEPI

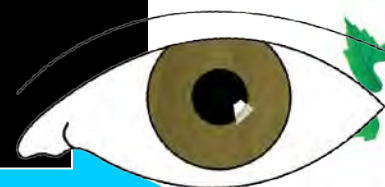
#2

environmental  
planning initiative

# collaborative initiatives

#1b

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CIHR IRSC

health research  
project



#1a

post-secondary  
science  
education



*Bras d'Or Lake*

CEPI

#2

environmental  
planning initiative

# collaborative initiatives

#1b



CIHR IRSC

health research project



Brasport Local

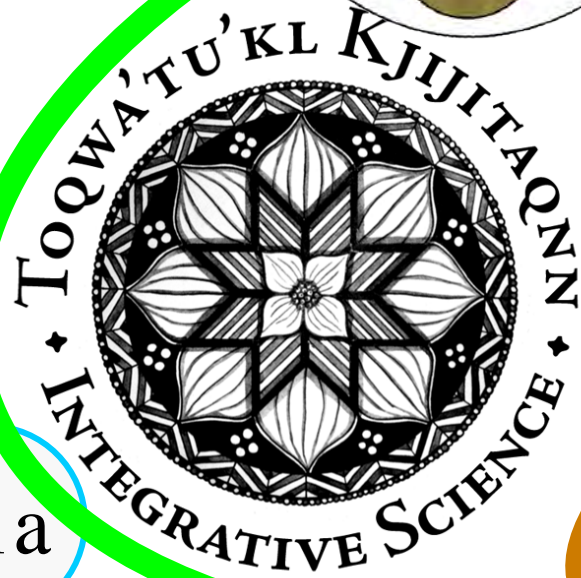
CEPI

environmental planning initiative

#2

#1a

post-secondary science education





# 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



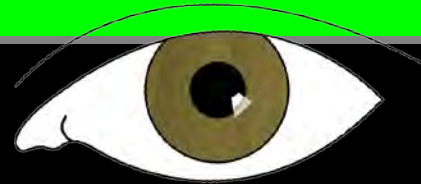
**both Indigenous and Western, plus:**

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

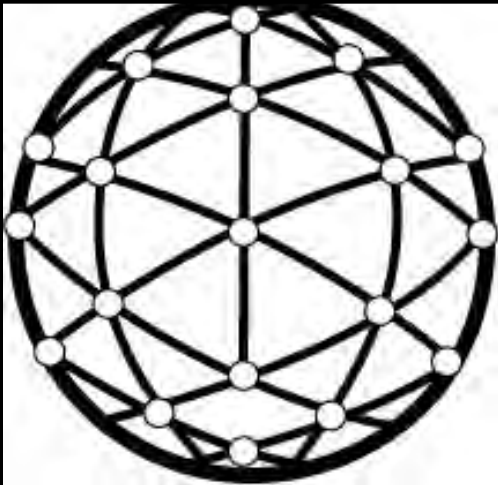
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**NOT ... simply Western, plus  
bits and pieces of Indigenous**

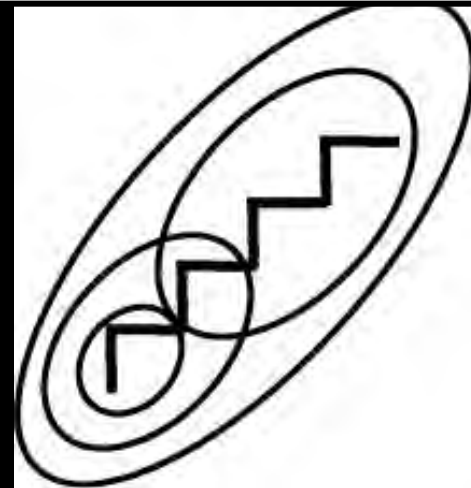
**“two-eyed seeing”**  
how our world is



**interconnected**



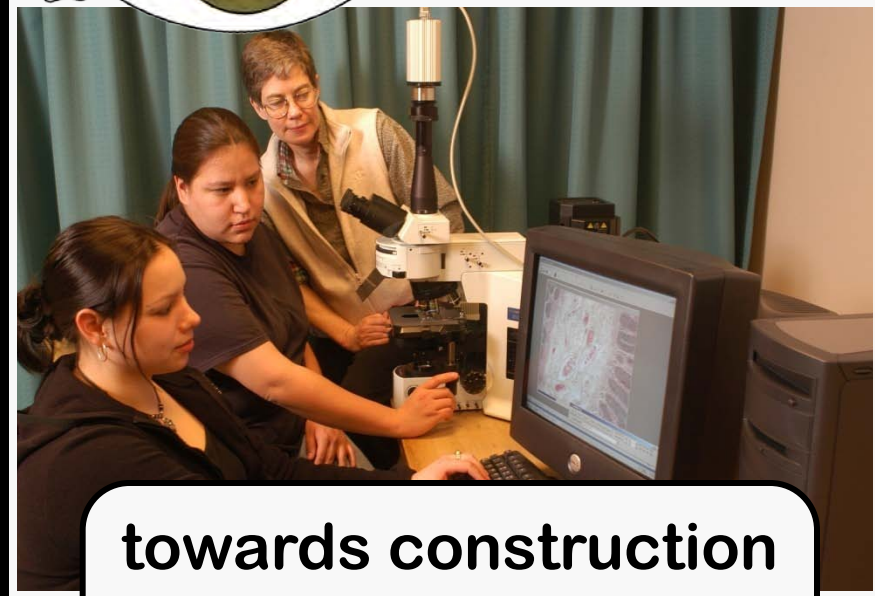
**parts & wholes**



# “two-eyed seeing” our overall knowledge objectives



towards resonance  
of understanding  
within environment



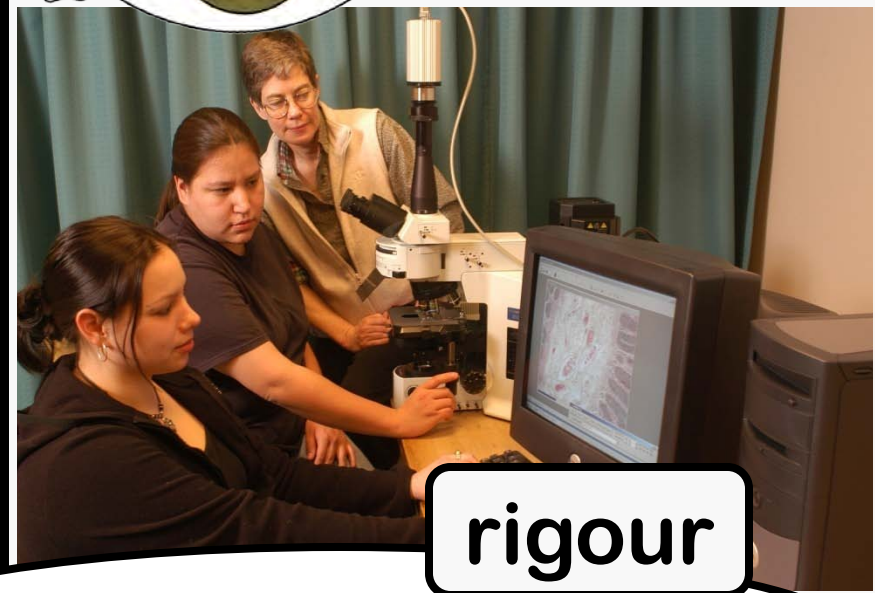
towards construction  
of understanding  
of environment

“two-eyed seeing”  
our language & methodology



vigour

**WEAVING**

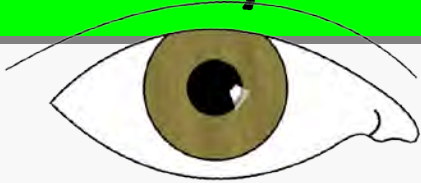


rigour

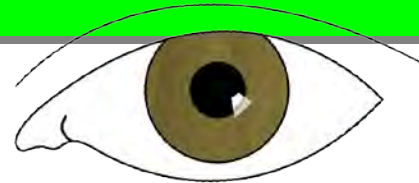
**UN-WEAVING**

# **“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.







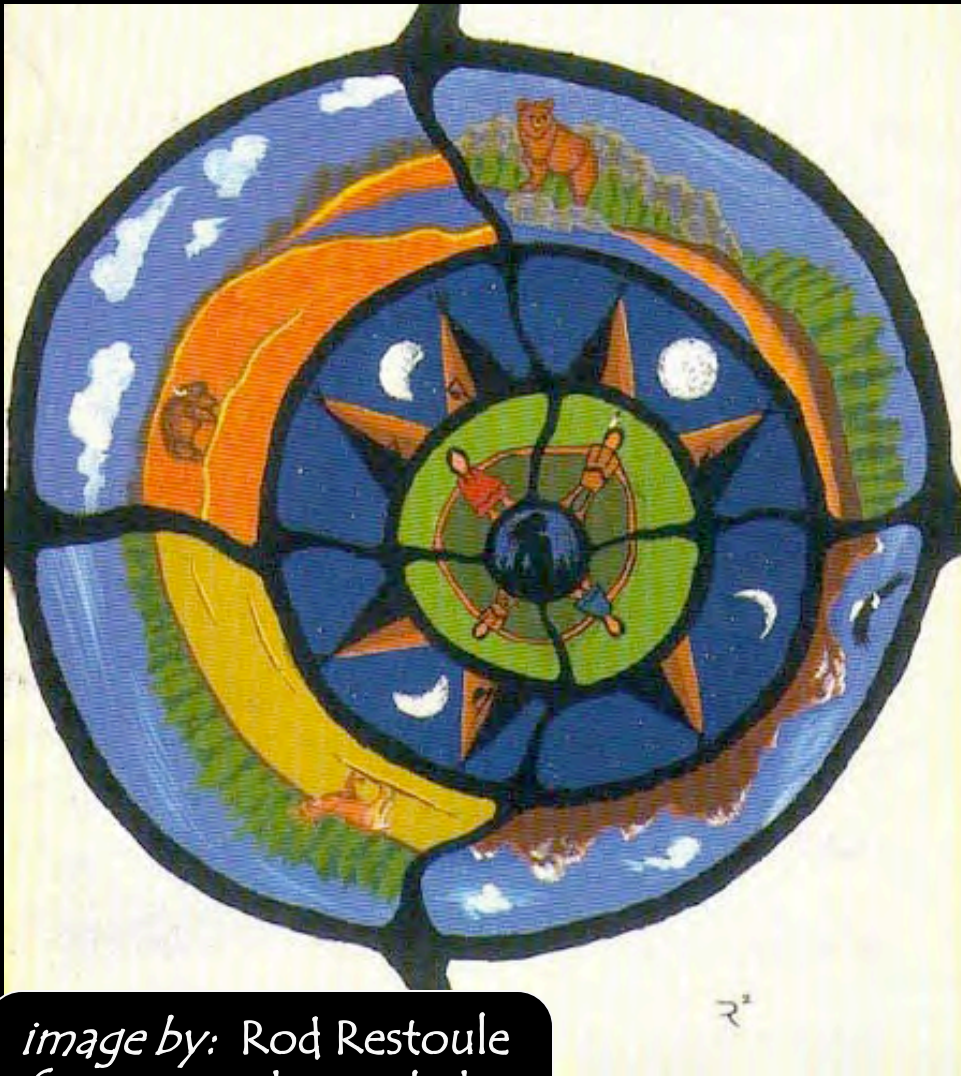
**We are  
all inter-  
connected.**

*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

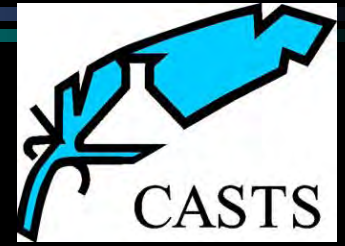
## Spirit of the East



*image by :*  
Basma Kavanagh



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CASTS

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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



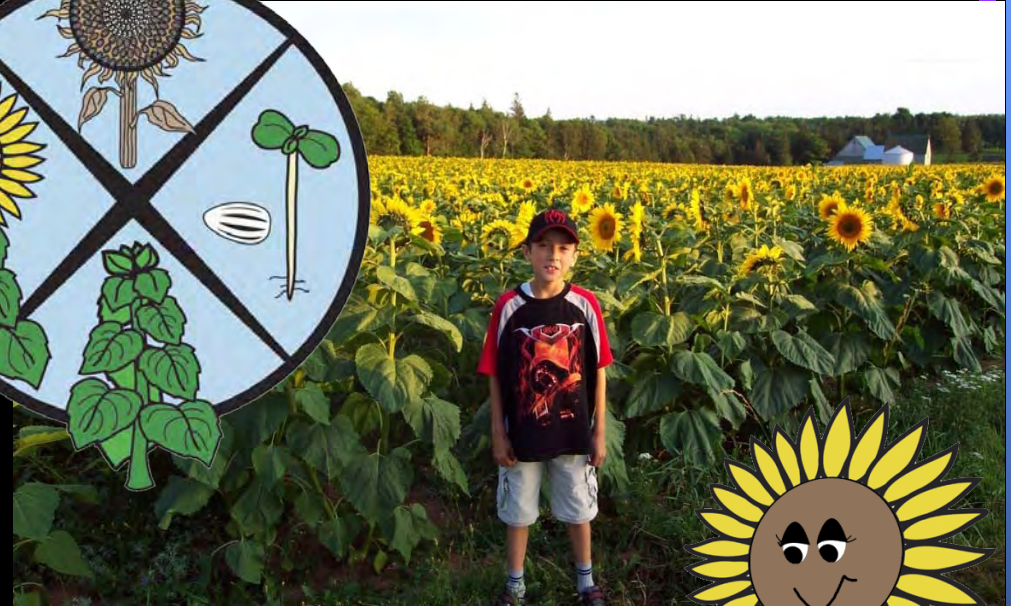
# Aboriginal Community-Based Participatory Action Research



## 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





# puppets made from the forest

## Nipuktuk Wejiaql A'tukuaqnn FROM THE FOREST COMES OUR STORY



**Jikoqs**  
*Fomes fomentarius*  
BRACKET FUNGUS



**Kuow**  
*Pinus strobus*  
PINE NEEDLES



**Maskwi**  
*Betula papyrifera*  
BIRCH BARK



**Wisqasaw**  
*Pinus strobus*  
PINE CONE



**Pukusip**  
*Dicranum sp.*  
Moss



**Oqnn**  
TWIGS



**Ulnetkul**

**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).



## Nipuktuk Wejiaql A'tukuaqnn FROM THE FOREST 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 mark the time when, just now for most still snows. 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 her in the environment. White wearing hare summer coat. Hare eats deciduous, evergreen, grasses, ferns, and flowers. In her winter coat, she eats bark and small twigs 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**  
*Alopecurus pratensis*  
DEAD GRASS



**Wso'qmanasit**  
*Cornus canadensis*  
HUCKLEBERRY



**Oqnn**  
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: *Haw Rabbit Got His Long Ears* and *Haw Bafflye Was Conquered*. All puppets were made from natural materials easily collected in the forests of Nova Scotia. The project was part of a larger research effort to help people learn about Mi'kmaq and modern scientific understanding of our forests and ecosystems while creating awareness, especially as the old-growth Mi'kmaq are becoming scarce. The project was funded by the Canadian Government of Health Research - Institute of Aboriginal Peoples' Health.

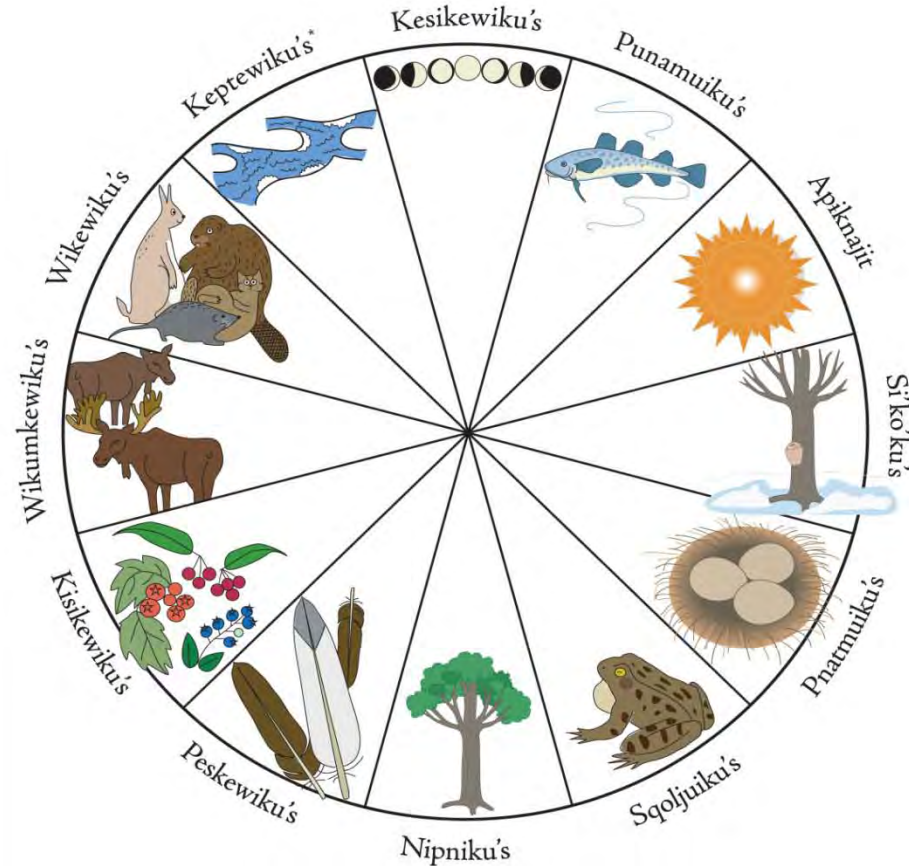
For Mi'kmaq language information contact: Marlene MacDonald, 902-739-2200. For additional information contact: Integrative Science Program, University College of Cape Breton, 230 Blue 17000, Sydney, Nova Scotia, B1P 6L2. Or visit our website: [www.uccb.ca](http://www.uccb.ca)



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# Mi'kmawe'k Tepknusetk

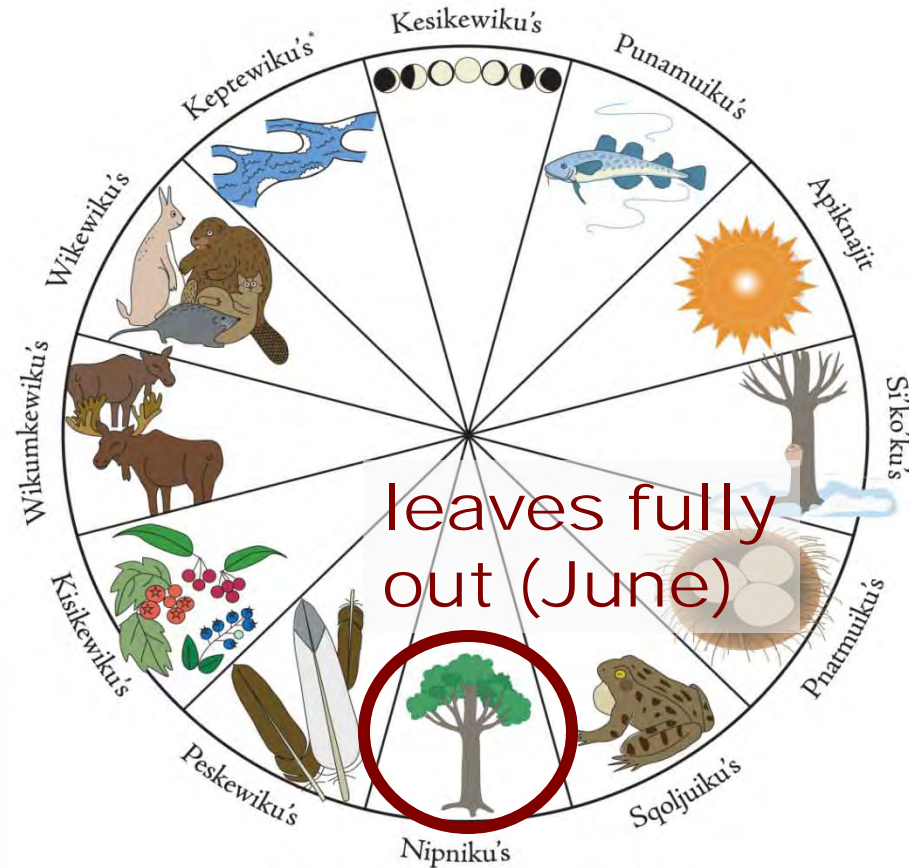


\*Alternative – Kepti'kewiku's

# Earth speaks:



# Mi'kmawe'k Tepknusetk



\*Alternative - Keptewiku's

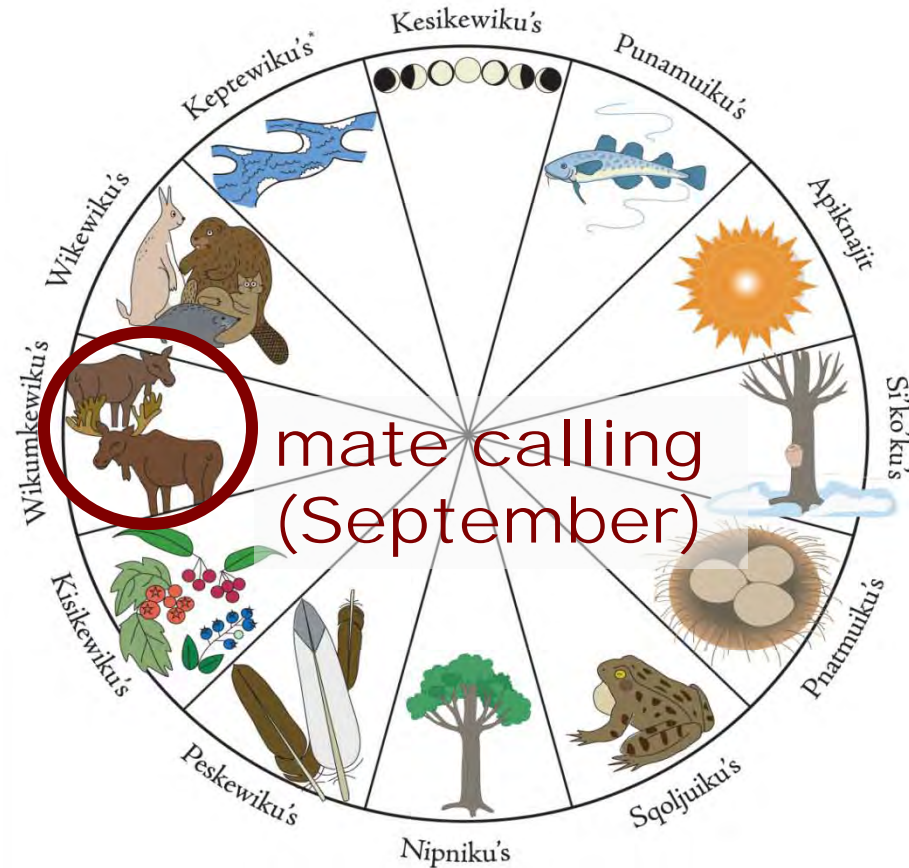
## Earth speaks: forest time







# Mi'kmawe'k Tepknusetk



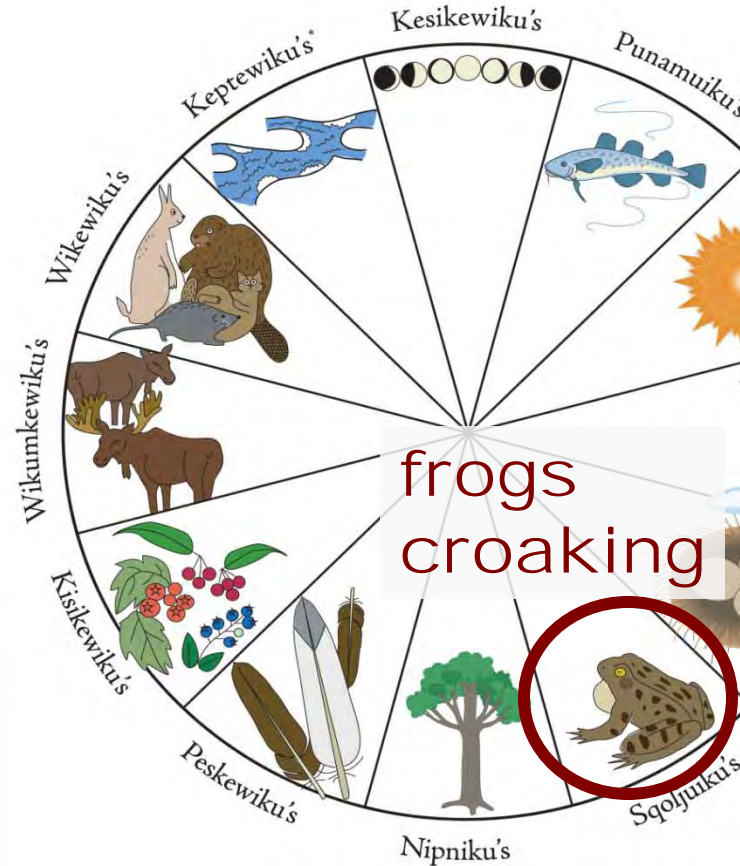
\*Alternative - Keptewiku's

## Earth speaks: animal time





# 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

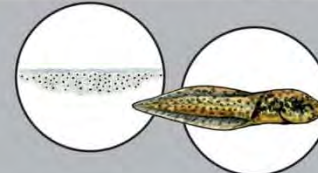
#### Mink Frog



**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

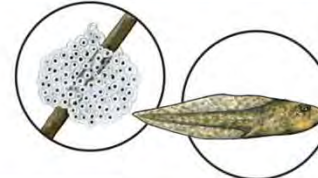
#### Green Frog



**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

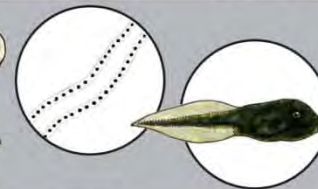
#### Pickerel Frog



**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

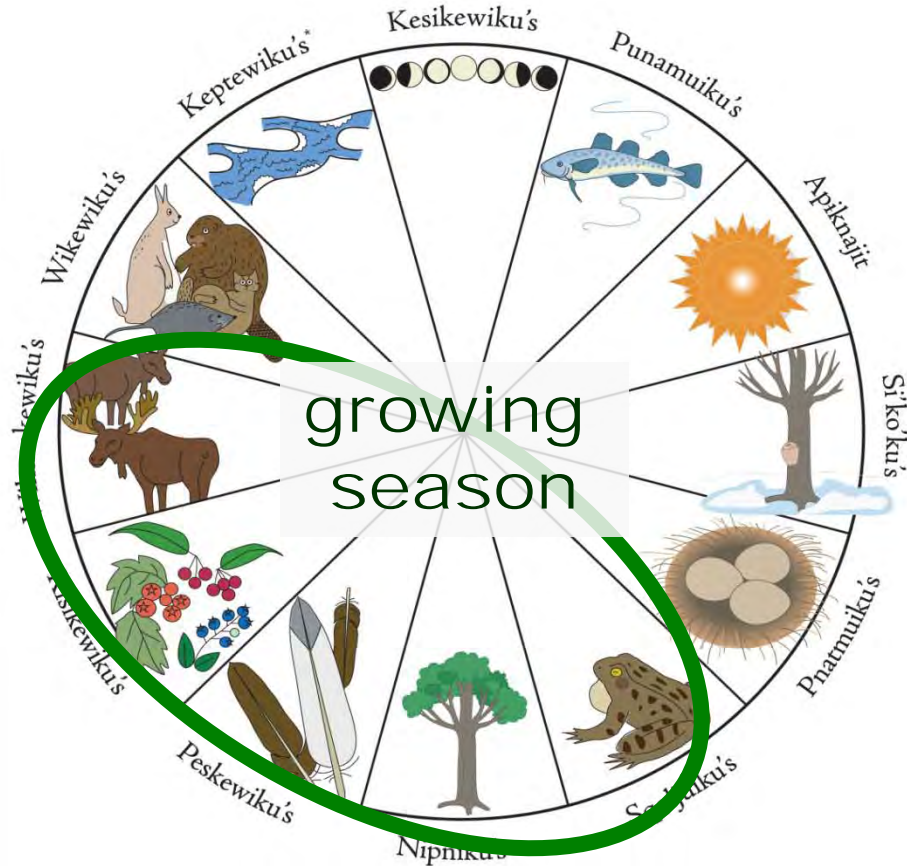


**Northern Spring Peeper • *Pseudacris crucifer***  
Spring Peeper is our smallest frog; he grows to 2 – 4 cm long. We know that spring has arrived when we hear Spring Peeper singing at night. His song sounds like a high PEEEP! Spring Peeper lives in the woods near ponds, marshes or swamps. He is our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

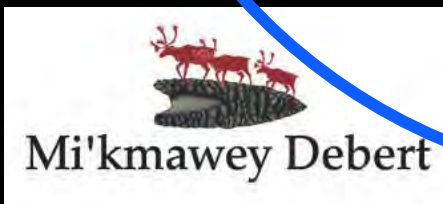




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# Thank you



Royal Canadian Mounted Police

Gendarmerie royale du Canada