

Integrative Science and Two-Eyed Seeing: Walking & Talking Together



Albert Marshall¹ and **Cheryl Bartlett²**

¹ Elder and HonDLitt, Eskasoni community, Mi'kmaq Nation

² Canada Research Chair in Integrative Science & Professor of Biology, CBU



albertdmarshall@ns.sympatico.ca cheryl_bartlett@cbu.ca www.integrativescience.ca

Walking & Talking Together

Outline of Presentation

- **Introduction: Integrative Science & TES**
- **Seven Lessons Learned**
 1. Acknowledge we need each other:
 - Co-Learning Journey
 2. Adopt a Guiding Principle:
 - Two-Eyed Seeing (TES)
 3. View “science” inclusive of two (or more) worldviews
 4. Grow forward: together, we heal
 5. Put our actions, values, and knowledges “out in front”
 - enter “ethical space” (*sensu* Willie Ermine)
 6. Use visuals
 7. Weave back and forth between our worldviews





Canada Research
Chairs

Chaires de recherche
du Canada

Canada
Canada

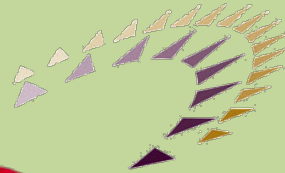


Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Thank you / Wela'liog

IAPH



Canada Foundation
for Innovation

Fondation canadienne
pour l'innovation

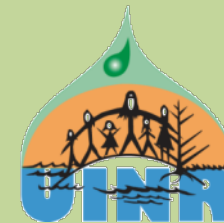


Membertou
Elementary

CIHR IRSC
Canadian Institutes of
Health Research Instituts de recherche
en santé du Canada



Mi'kmawey Debert



Eskasoni First Nation Detachment
Royal Canadian Mounted Police Gendarmerie royale
du Canada



Mi'kmaq College Institute
Mi'kmaq Espi Kina'matno'kuom

The support of various partners
and funding agencies
is gratefully acknowledged.



Mi'kmaq Elders & Students & Research Team





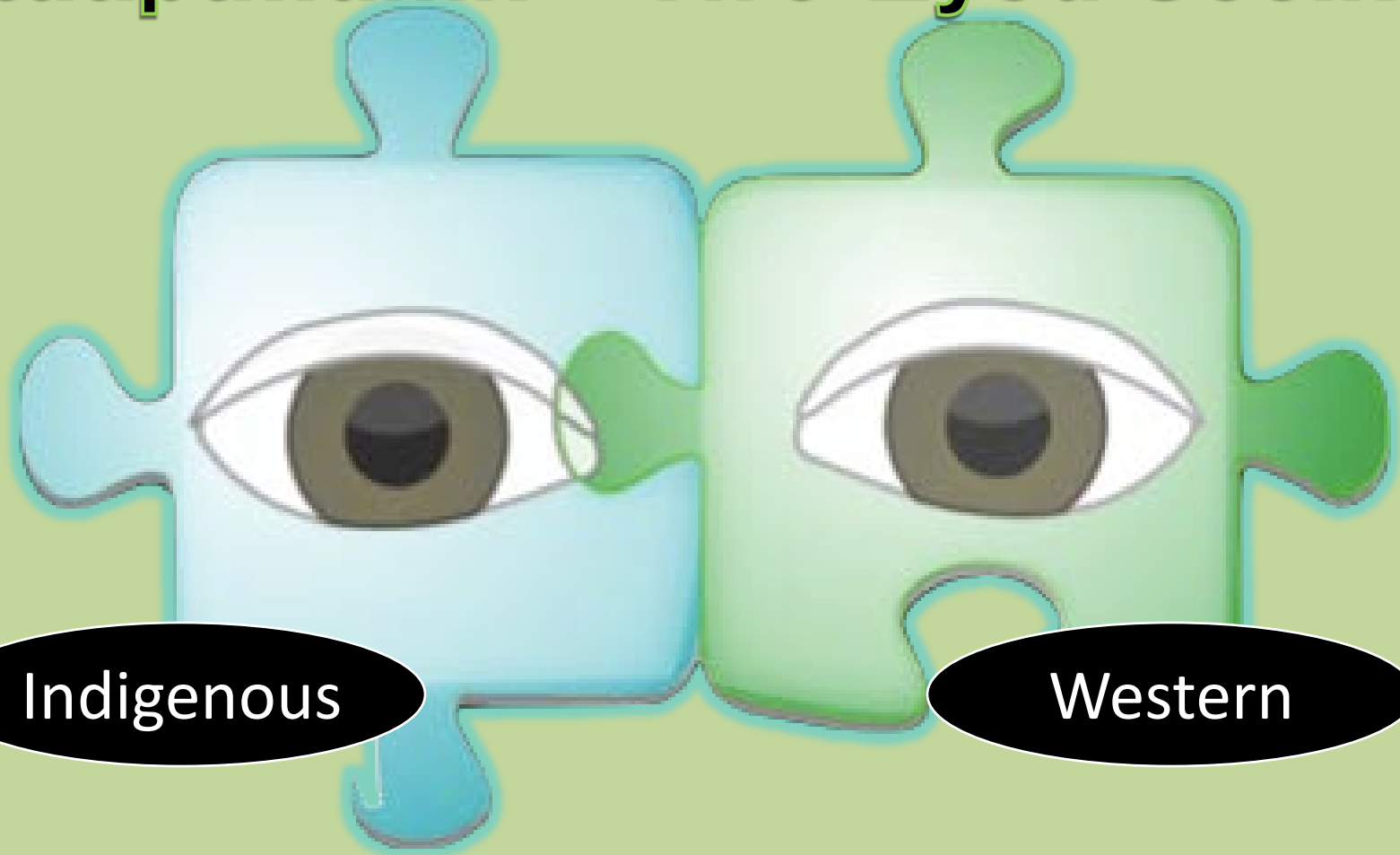
Toqwa'tu'kl Kijitaqnn
Integrative Science

Indigenous

Western

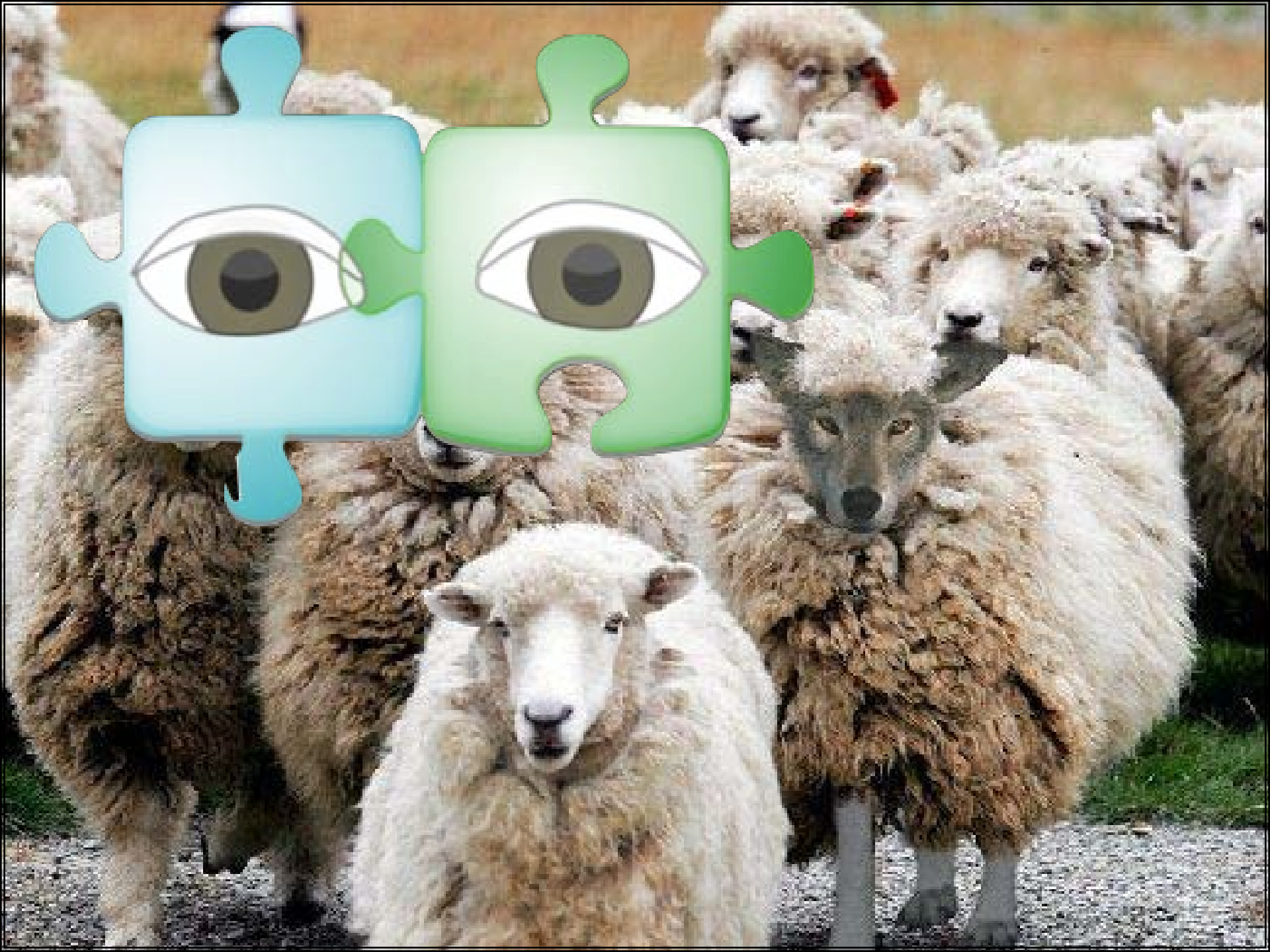
“bringing our worldviews together”

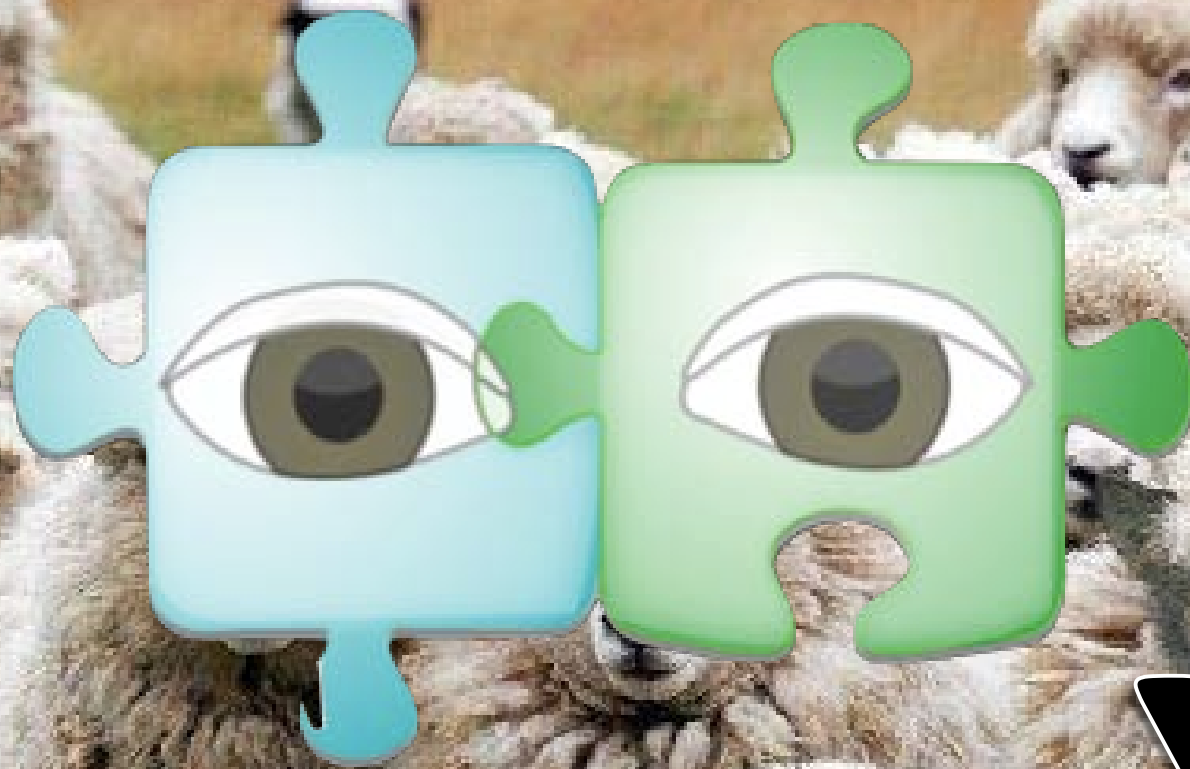
Etuaptmumk – Two-Eyed Seeing



Indigenous

Western





Learn to see and use
the strengths in
multiple worldviews



Is this all just philosophy?

Two-Eyed Seeing is not going to be salvation but rather through these things termed “philosophy” ...



... and, if only we would spend a few moments to determine if there are possibilities for change ... to hear the stories from cultures other than our own.

Traditional Knowledge was never meant to be static and stay in the past ... but rather we must bring it into the present ... so that everything becomes meaningful in our lives and communities.

(Elder Murdena Marshall)



LESSONS LEARNED

7

over 15+ years



LESSONS LEARNED

7



LESSONS LEARNED

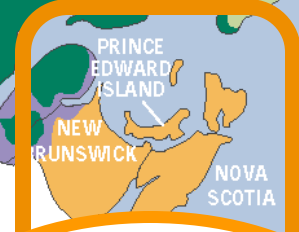
#1

1. **ACKNOWLEDGE
WE NEED
EACH OTHER ...**
co-learning journey

FOREST REGIONS of CANADA



FOREST REGIONS	PRINCIPAL TREE SPECIES
BOREAL - PREDOMINANTLY FOREST	White spruce, black spruce, balsam fir, jack pine, white birch, trembling aspen
BOREAL - FOREST AND BARREN	White spruce, black spruce, tamarack
BOREAL - FOREST AND GRASS	Trembling aspen, willow
SUBALPINE	Engelmann spruce, alpine fir, lodgepole pine
MONTANE	Douglas-fir, lodgepole pine, ponderosa pine, trembling aspen
COAST	Western red cedar, western hem lock, Sitka spruce, Douglas-fir
COLUMBIAN	Western red cedar, western hem lock, Douglas-fir
DECIDUOUS	Beech, maple, black walnut, hickory, oak
GREAT LAKES - ST. LAWRENCE	Red pine, eastern white pine, eastern hemlock, yellow birch, maple, oak
ACADIAN	Red spruce, balsam fir, maple, yellow birch
GRASSLANDS	Trembling aspen, willow, bur oak
TUNDRA	



Mi'kmaq Nation



**Lnu'k with holistic knowledge
have been here a long time.**

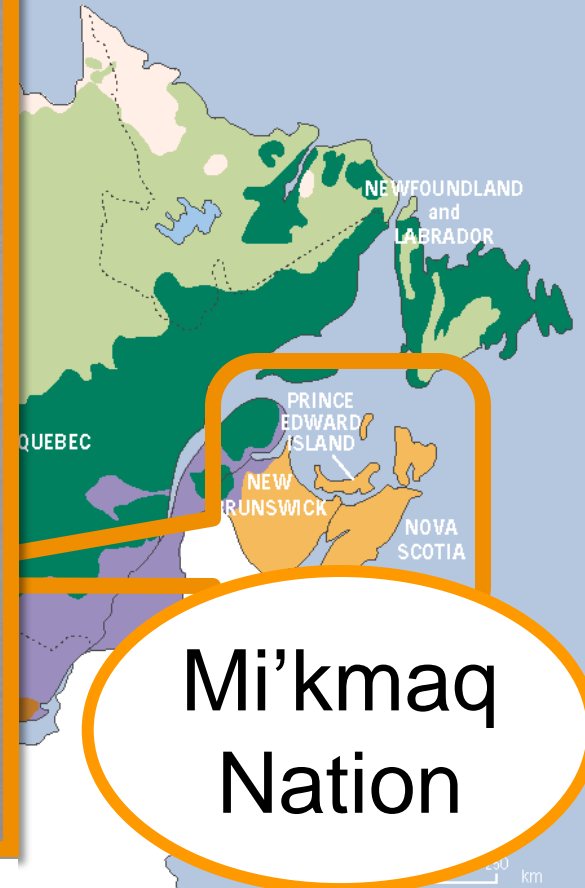


Extent of ice 11,000 years ago. People lived at the Debert site sometime between 11,000 and 10,000 years ago.

TUNDRA

Mi'kmawey Debert Hiking Trail Signage

FOREST REGIONS of CANADA



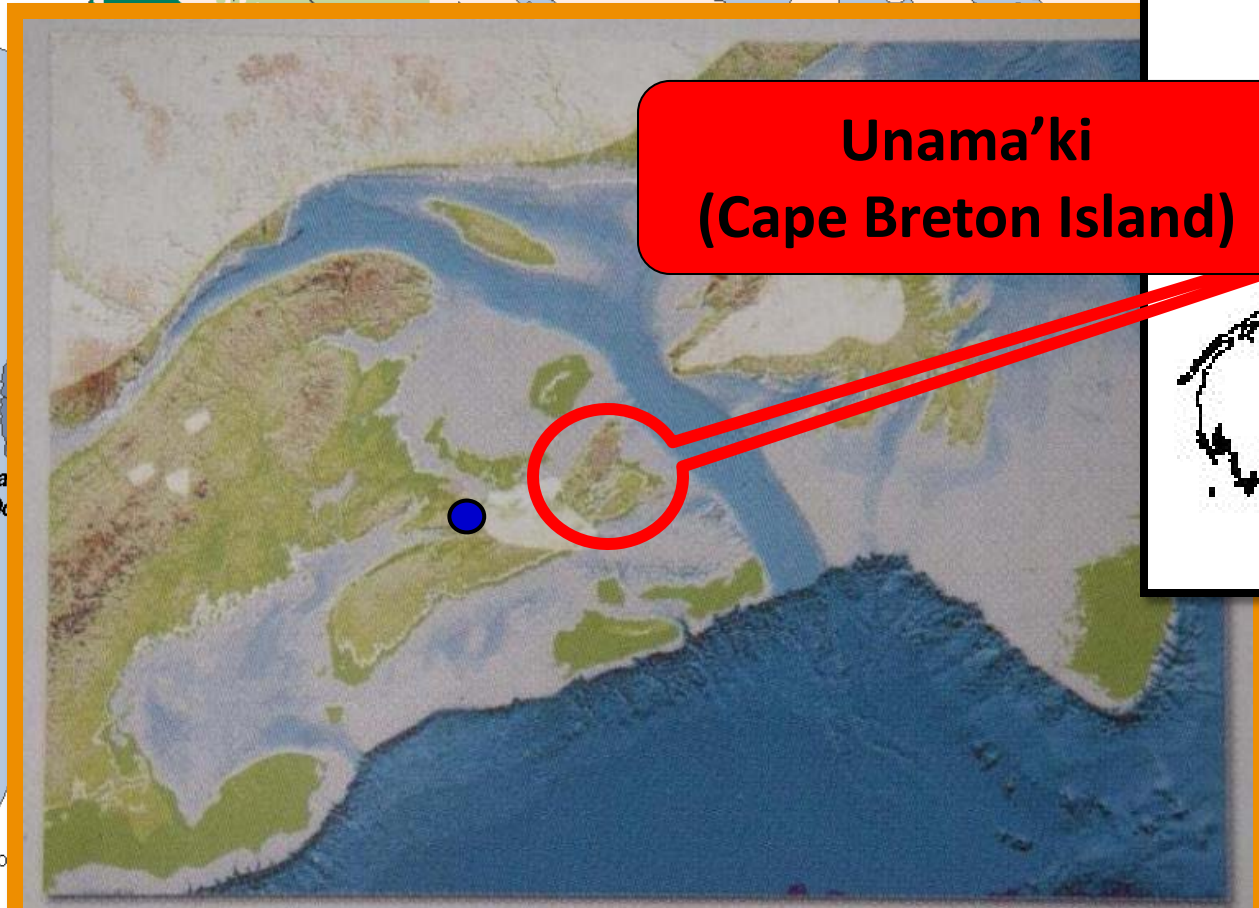
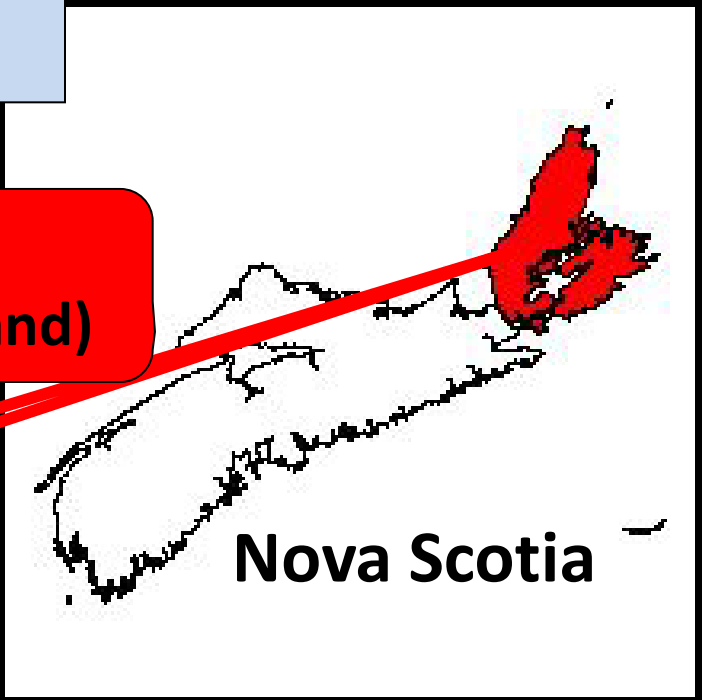
**Mi'kmaq
Nation**

100 km



**Lnu'k with holistic knowledge
have been here a long time.**

**Unama'ki
(Cape Breton Island)**



Extent of ice 11,000 years ago. People lived at the Debert site
sometime between 11,000 and 10,000 years ago.



TUNDRA

Mi'kmawey Debert Hiking Trail Signage

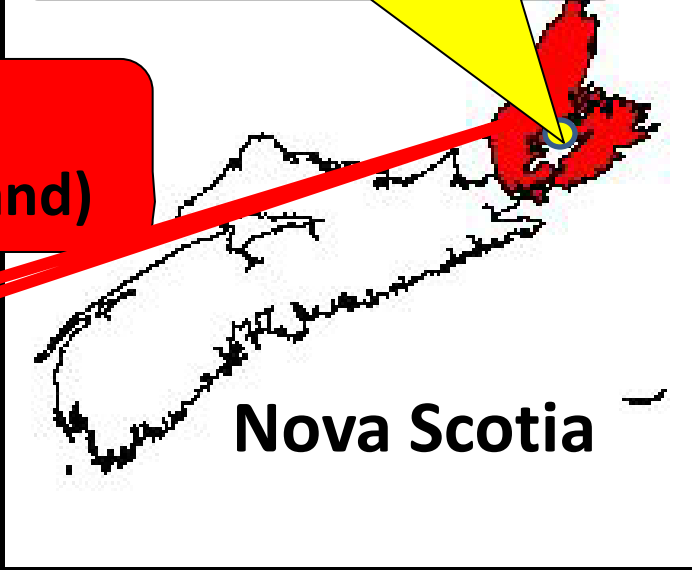


**Lnu'k with holistic knowledge
have been here a long time.**



**Unama'ki
(Cape Breton Island)**

Eskasoni First Nation



Nova Scotia

Extent of ice 11,000 years ago. People lived at the Debert site
sometime between 11,000 and 10,000 years ago.



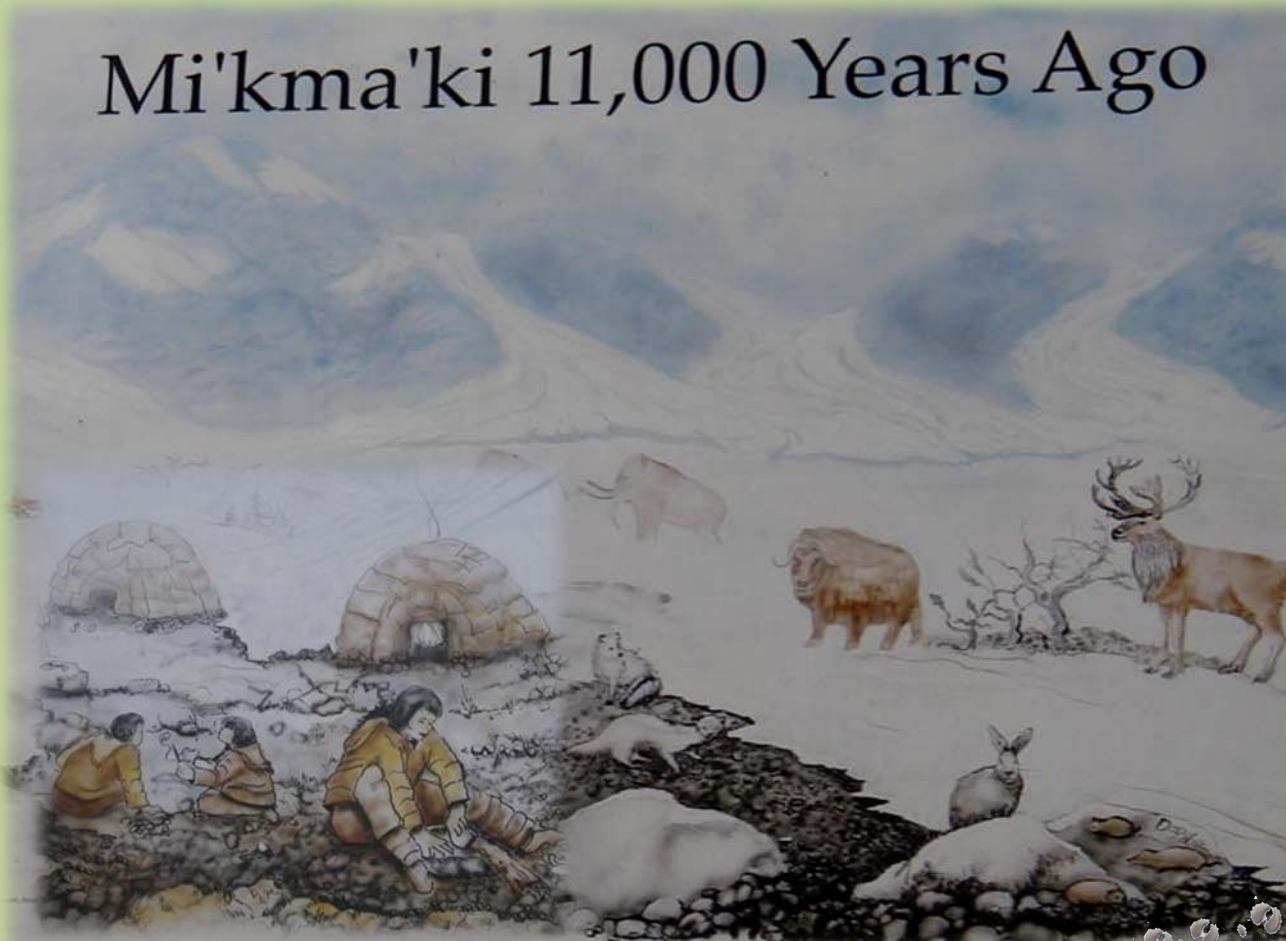
**Mi'kmaq
Nation**

TUNDRA

**Lnu'k with holistic knowledge
have been here a long time.**



Mi'kma'ki 11,000 Years Ago



Artwork by Dozay Christmas; Mi'kmawey Debert Hiking Trail Signage



**Lnu'k with holistic knowledge
have been here a long time.**



**“Traditional Knowledge was never meant to be static
and stay in the past ... but rather we must bring it into**

Mi'kma'ki today



**the present
... so that
everything
becomes
meaningful
in our lives
and in our
communities.”**

Mi'kmaq Elder
Murdena Marshall,
Eskasoni First Nation

Ta'ntelo'Iti'k (how we are)



Native American Prophecy

Only when the last tree has been cut down;
Only when the last river has been poisoned;
Only when the last fish has been caught;
Only then will you find that money cannot be eaten.

Mi'kma'ki



Nature has rights.

Humans have responsibilities.

Mi'kma'ki



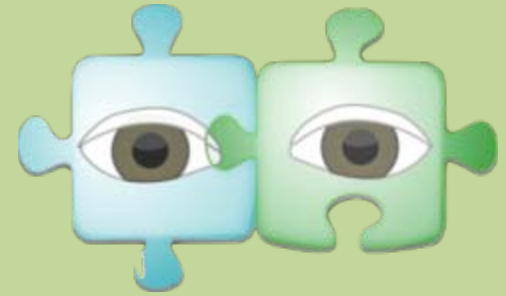
**We must use all
the skills that we
have to preserve
and protect our
Natural World.**



Netukulimk

“sustaining ourselves”

yes ... but really is a
much richer concept;
it is holistic.



<http://blog.silive.com/weather/2007/09/red-maple-tree.jpg>



<http://myanimalblog.files.wordpress.com/2008/03/g-bull-moose.jpg>



http://images.enature.com/fishes/fishes_1/fi0016_11.jpg



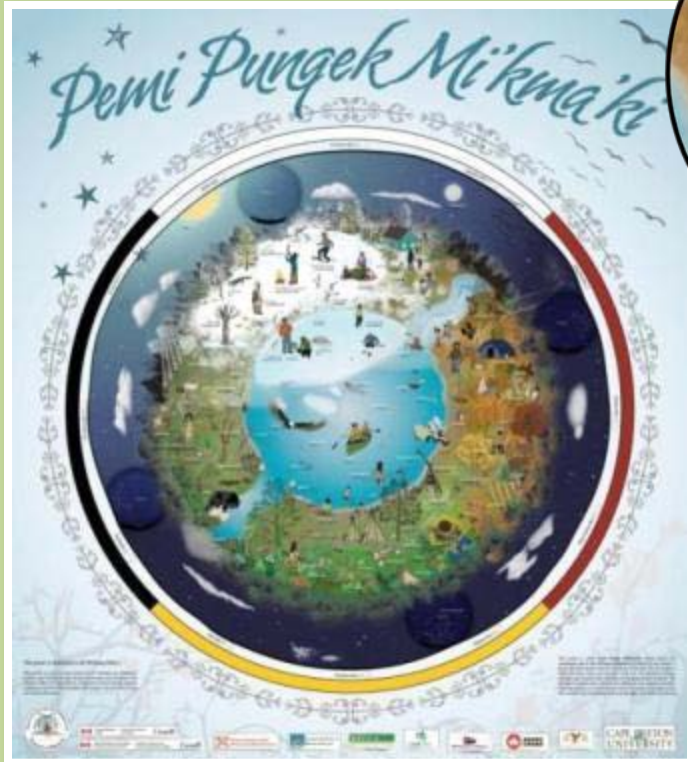
http://www.krisweb.com/krisshoopscot/krisdb/html/krisweb/aqualife/atlantic_salmon_asc_beland.jpg



Netukulimk

“sustaining ourselves”

yes ... but really is a much richer concept; it is holistic.



... takes you into a place where you are very conscious of how the human two-leggeds are interdependent and interconnective with the natural world ... this philosophy / ideology is so ingrained in your subconscious that you are constantly aware of not creating an imbalance ...

Netukulimk



Your consciousness is constantly being challenged with the physical part of you and the Guiding Principle is the spirit which creates in you this sense of balance which stops you from overharvesting or exploitation.



You are very cognizant of the fact that you have to make sure that your actions today do not compromise the next Seven Generations ... their opportunities and abilities to live in harmony with the natural world. There is this idea that you must always leave something after you, for someone else coming along.

“Co-Learning” ... our way of working collaboratively

Three Basic Ways*

that transdisciplinary research teams organize their collaboration in order to reach integration:

1. deliberation among experts
2. work by subgroup or individual
3. common group learning

**“Co-Learning”
= OUR WAY**

* Pohl, C., Kerkhoff, L., Hadorn, G.H., Bammer, G. 2008. Integration. *In: Hadorn, G.H., Hoffman-Riem, H., Biber-Klemm, S., Grossenbacher-Mansuy, W., Joye, D., Phol, C., Wiesmann, U., and Zemp, E. (eds), Handbook of Transdisciplinary Research. (pp. 411-424). Heidelberg, Germany: Springer.*



“Co-Learning” pioneered within Integrative Science research program at Cape Breton University in conjunction with Mi’kmaq Elders and educators ... our approach continues to evolve.



OUR APPROACH:

- **participatory, action, and praxis-based research:** within projects ... teach ourselves how ... use meaningful context
- **side by side:** Traditional Knowledge and mainstream knowledge
- **integrative:** respectful acknowledgement of distinct nature of each knowledge system (content not “merged”)
- **knowledge systems:** “big picture” understandings for ontologies, epistemologies, axiologies, and methodologies
- **appreciative:** recognize strengths in both knowledge systems
- **knowledge holders:** recognize it is human-to-human dialogue

“Co-Learning” pioneered within Integrative Science research program at Cape Breton University in conjunction with Mi’kmaq Elders and educators ... our approach continues to evolve.



Why say: “continues to evolve”?

ONE REASON: Newhouse (2004) indicates the work of grappling with each other’s cognitive universes and learning to see through the minds of others is the work of generations to come.

Newhouse, D. 2004. Indigenous knowledge in a multicultural world.
Native Studies Review 15(2): 139-154.

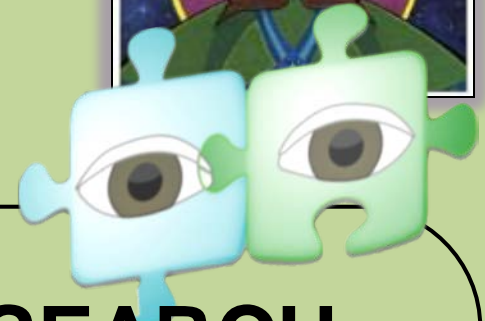
Co-Learning Journey

A shared understanding of how to talk together
This visual is based on the Medicine Wheel for Circle of Learning which is a commonly used Aboriginal teaching tool. The visual shows that within the discussion, all have a role to play. Each person has an opportunity to speak, to share, to teach, and to learn.



Each participant gains some new understandings of Mother Earth and her lessons for humans about health, healing and wholeness based on sharing, listening, and discussing.

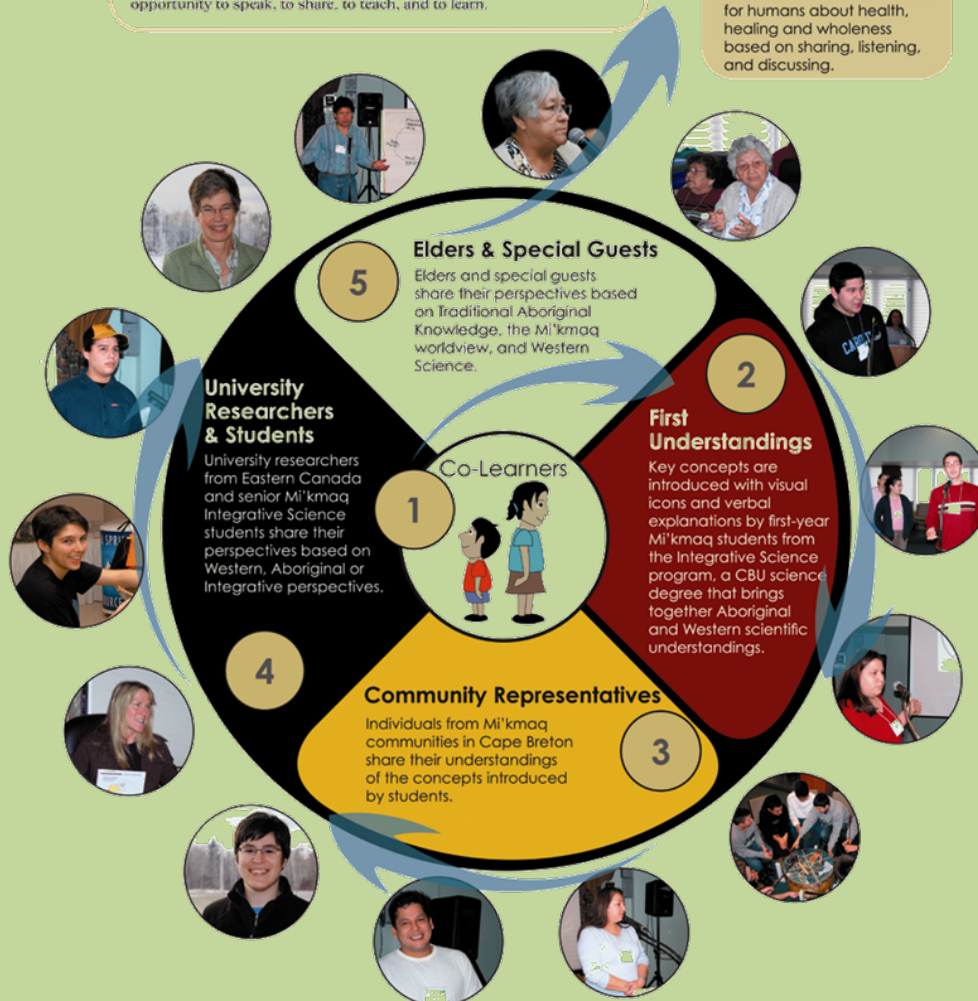
Two-Eyed Seeing



RESEARCH

- *integrative*
- *community-based*
- *participatory*
- *action*
- *appreciative*

methodologies

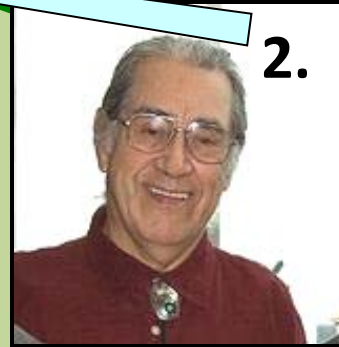


LESSONS LEARNED

#2

Two-Eyed Seeing

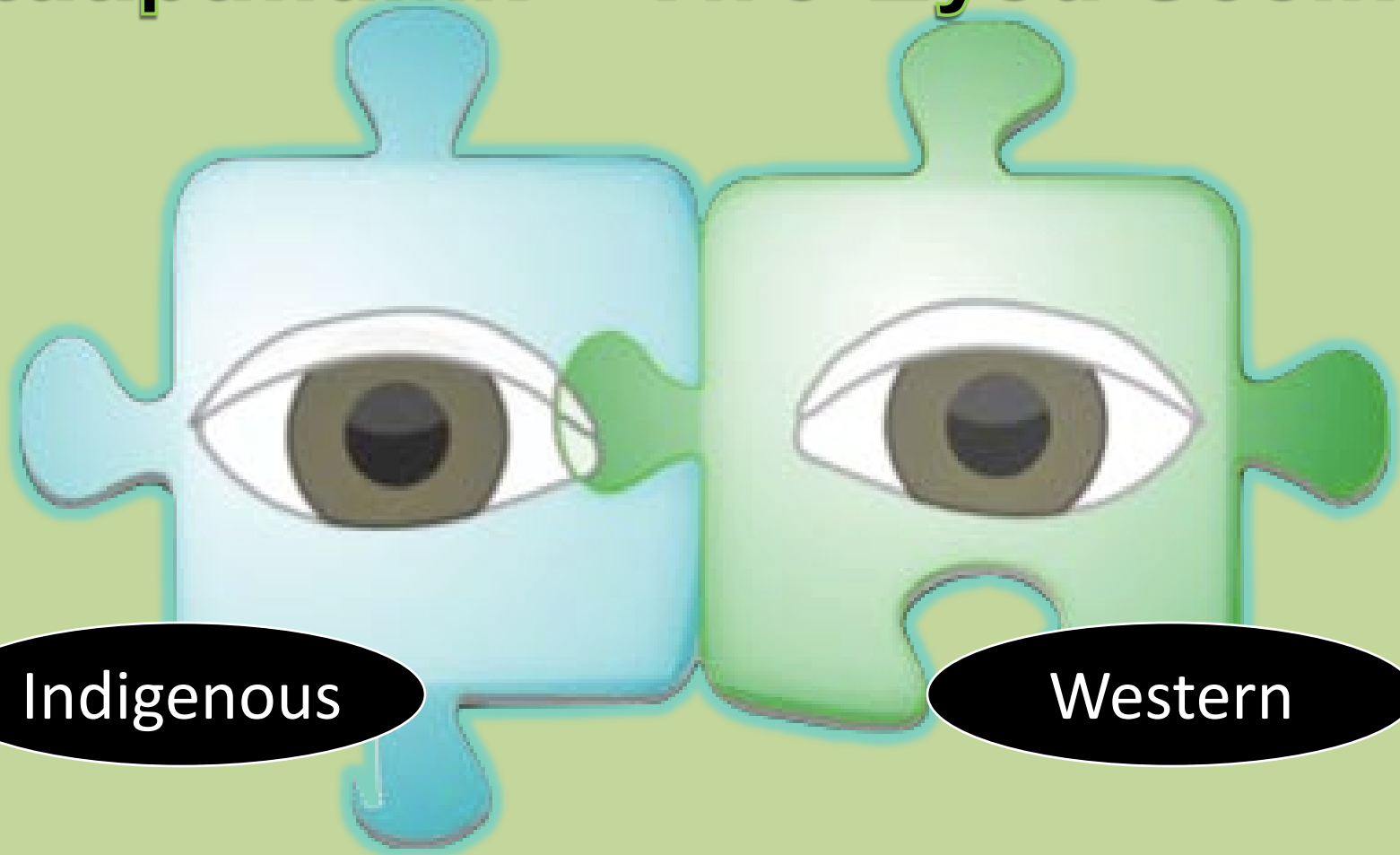
1. **ACKNOWLEDGE
WE NEED
EACH OTHER ...**
co-learning journey



Albert Marshall, Elder, Mi'kmaq Nation

understanding this Guiding Principle

Etuaptmumk – Two-Eyed Seeing

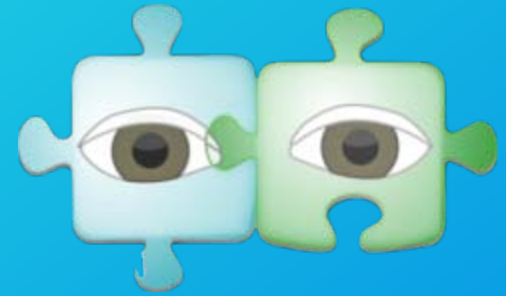


Indigenous

Western

Two-Eyed Seeing

Hard to convey as does not fit into any particular subject area or discipline ... is about life ... what you do, what kind of responsibilities you have ... is a Guiding Principle for how one lives while on Earth that covers all aspects of our lives: social, economic, environmental, etc.



Advantage:

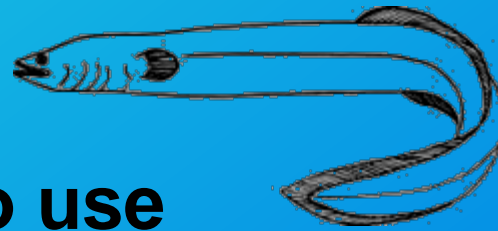
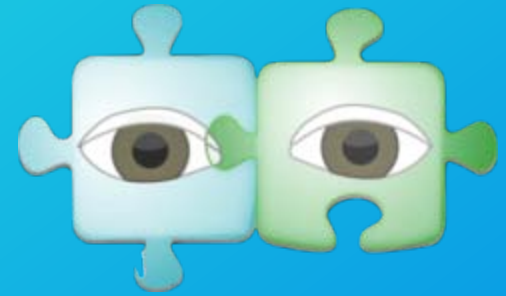
Because you are always fine tuning your mind into different places at once, you are always looking for another perspective and better way of doing things.

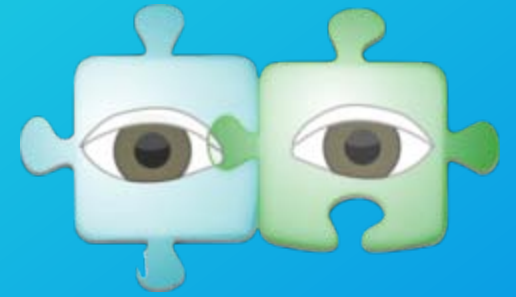


Two-Eyed Seeing

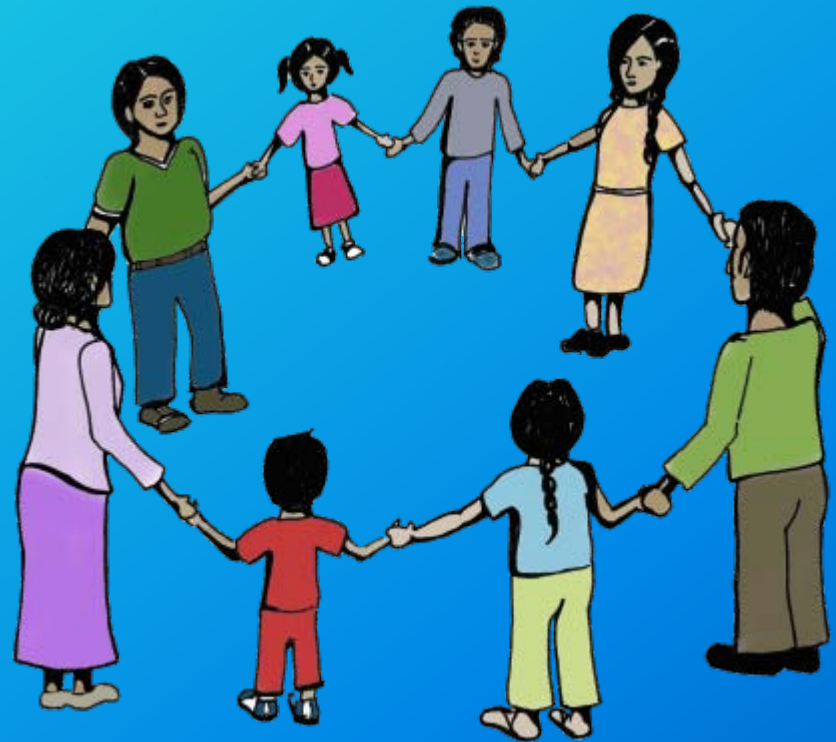
LEARN ... to see from one eye with the best in our Indigenous ways of knowing, and from the other eye with the best in the Western (or mainstream) ways of knowing ...

... and learn to use both these eyes together, for the benefit of all.

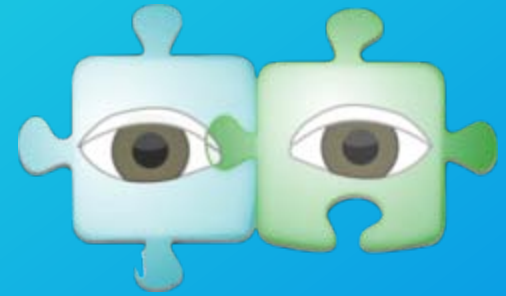




**It is not
enough to go
through life
with one
perspective;
we must
embrace
all the tools
we have ...**



Consciousness of Knowing

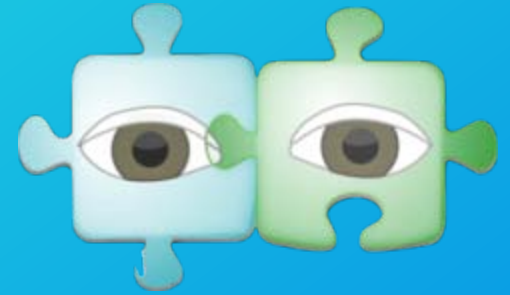


artist Basma Kavanagh

*... our interdependence
on each other and
on Mother Earth*

All people must learn
“Two-Eyed Seeing”
so that knowledge of the
physical is not separated
from wisdom
of the spiritual.

**Our language teaches us
that everything alive is
both physical and spiritual.**



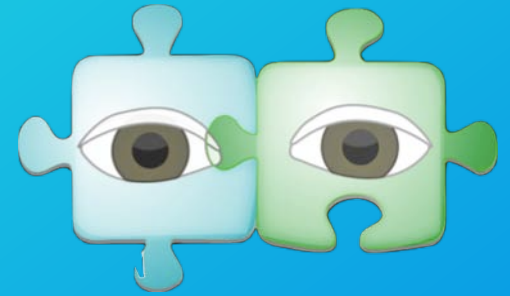
**The onus is on the
person to look at our
natural world with
two perspectives.**

**Modern science
sees objects,
but our language
teaches us to see
subjects.**



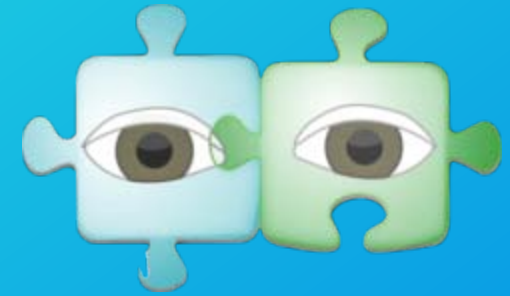
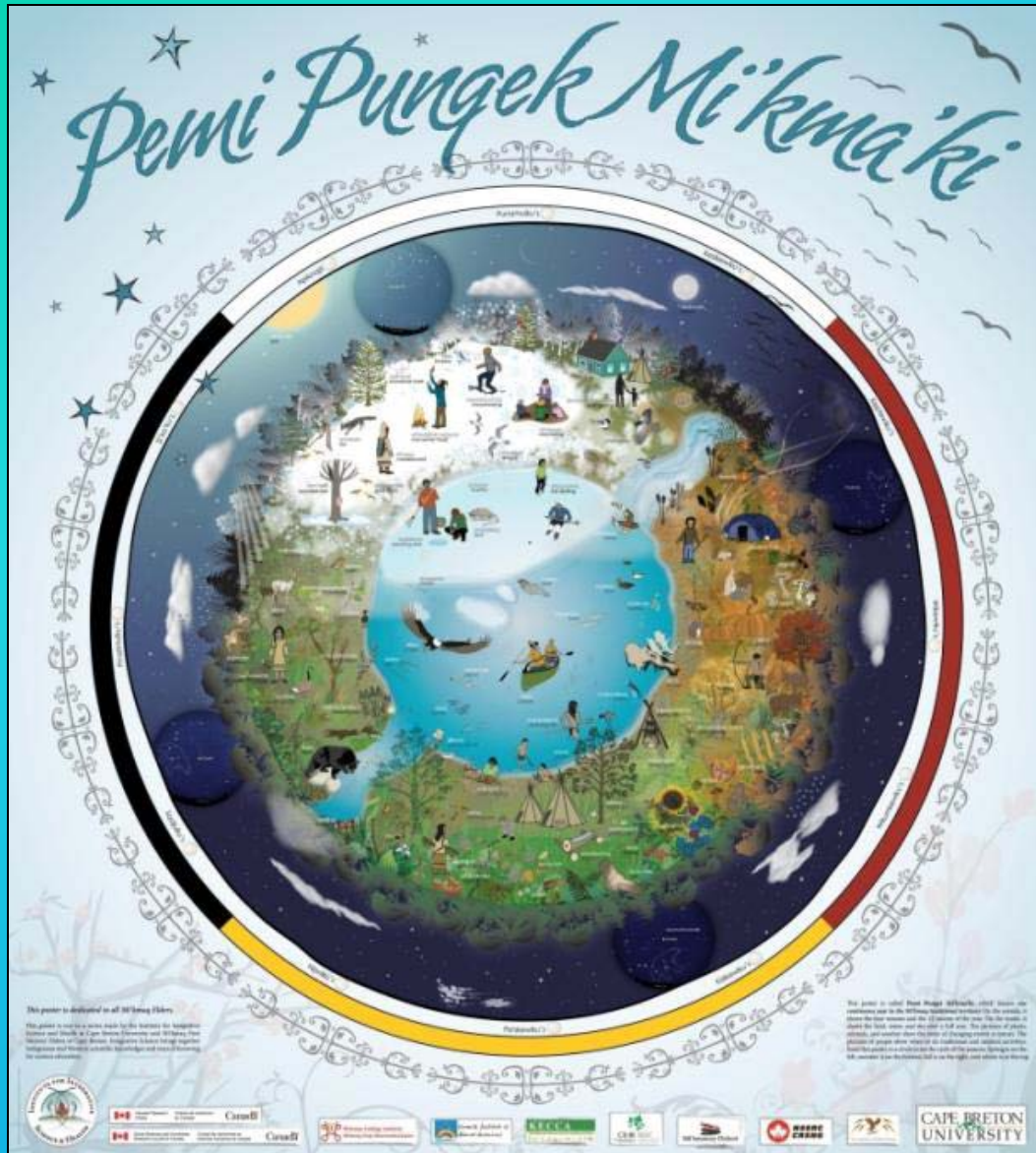
artist Basma Kavanagh

If rates of pollution exceed
the natural cleansing
capacity of our ecosystems ...

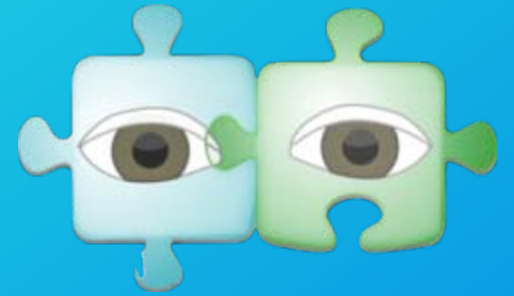


Artist
Basma
Kavanagh





If rates of consumption of resources exceed the carrying capacity of our ecosystems ...



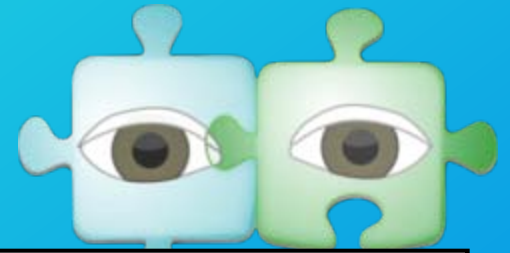
**Passenger
Pigeon**

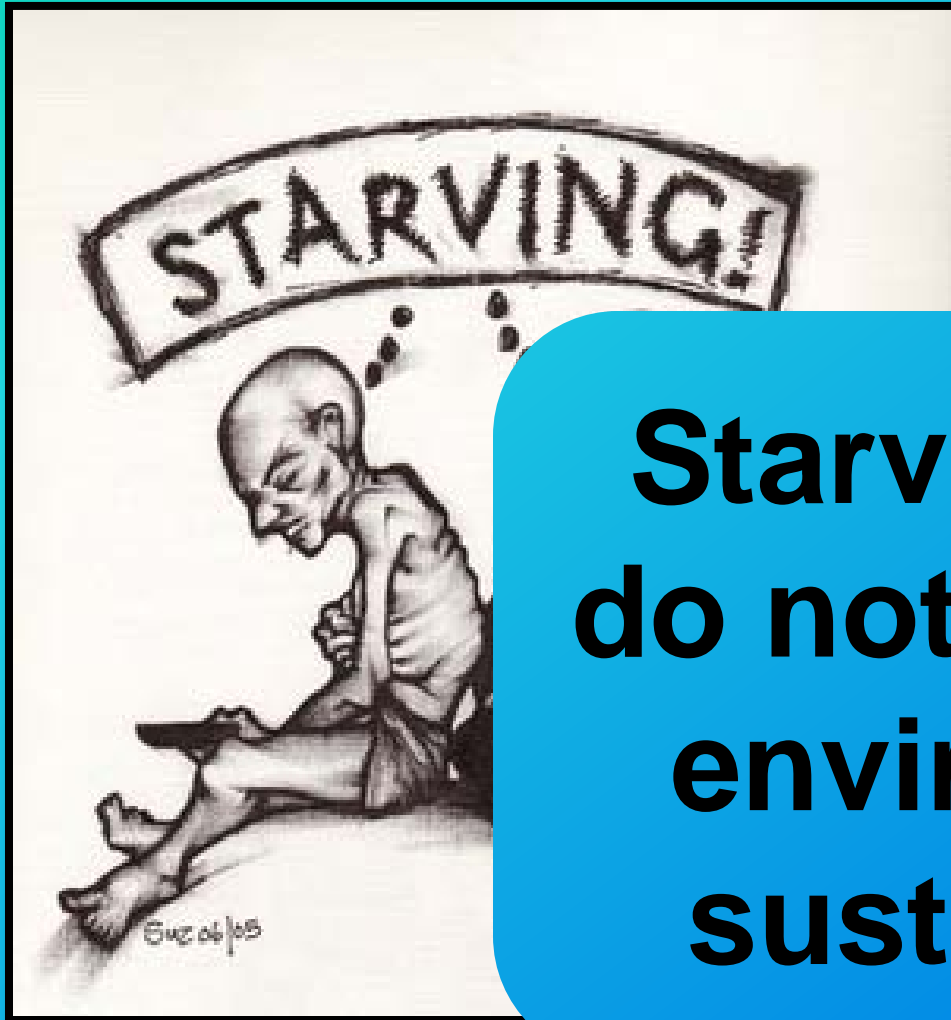
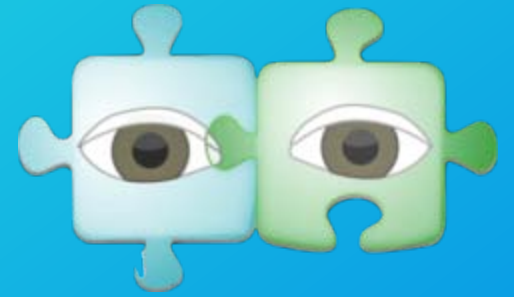


**Extinction
of any
species
is forever.**

**Everything
that we do
to our natural
world ...**

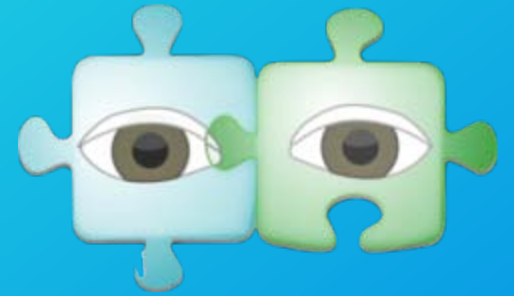
**... we also do
to ourselves**





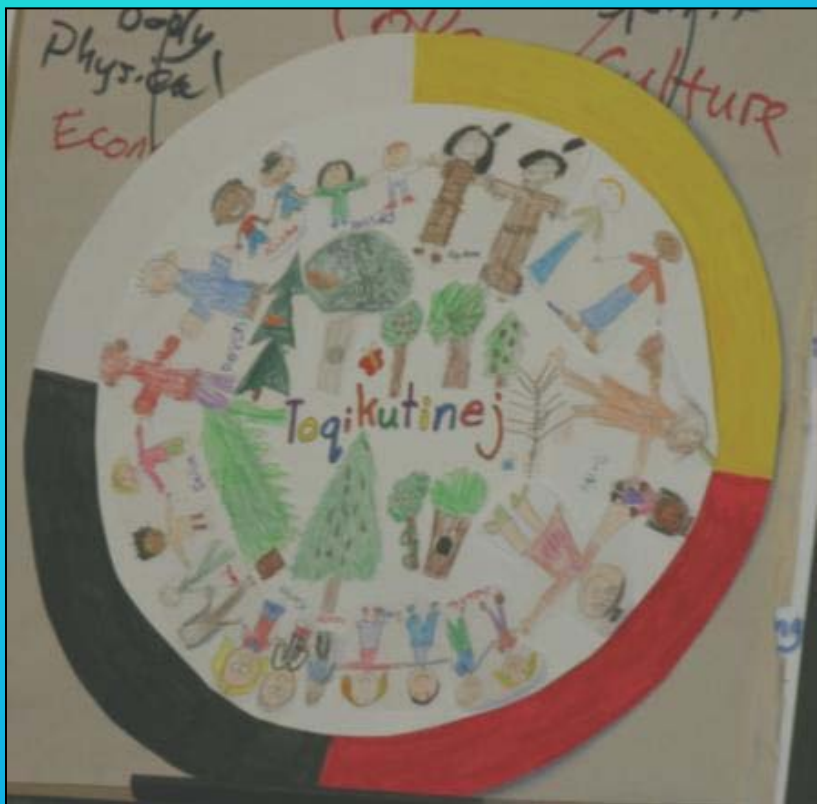
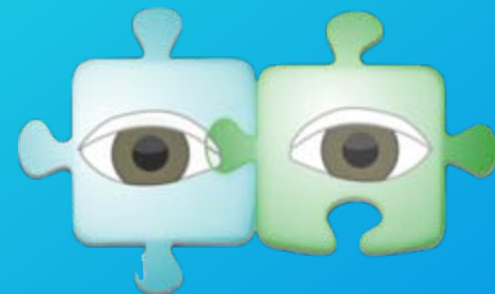
**Starving people
do not care about
environmental
sustainability.**

Our seasons follow the cycles of **Mother Earth** ...



... so that our children will always be reminded of the beauty of creation, and of our dependence on her.

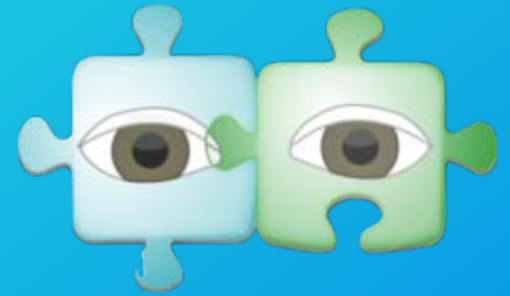
**Education to our young
has to be reflective of how to
maintain balance and harmony
with our natural world.**



artwork: Eskasoni Elementary School Children



artist Basma Kavanagh



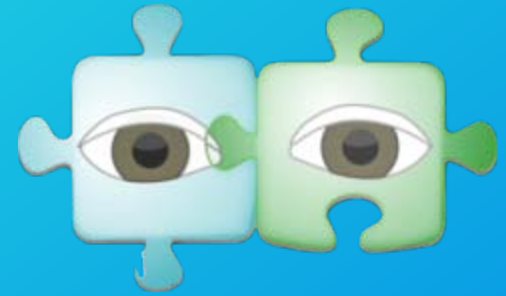
We must, through example, inspire our students to be critical in their thinking.



**Knowledge is not a tool
but rather it is a spirit.**

**It transforms the
holder. It also
reminds us that we
have responsibilities
to the spirit of that
knowledge.**

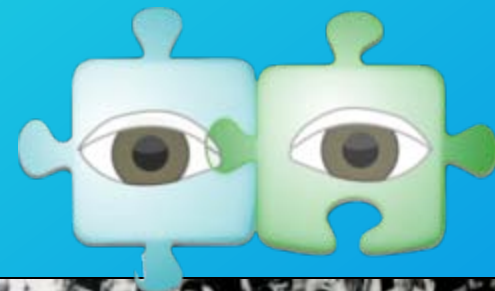
We must pass it on.



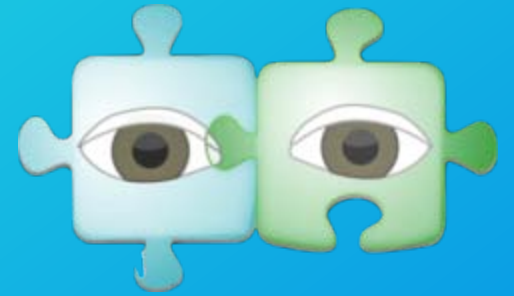
artist Basma Kavanagh

As Elders in Our Time

We seek to be a conduit for wisdom of our Ancestors. We seek to see with “Two-Eyes” ... to take the accomplishments of the white man’s ways further by blending it with the wisdom of our Ancestors.

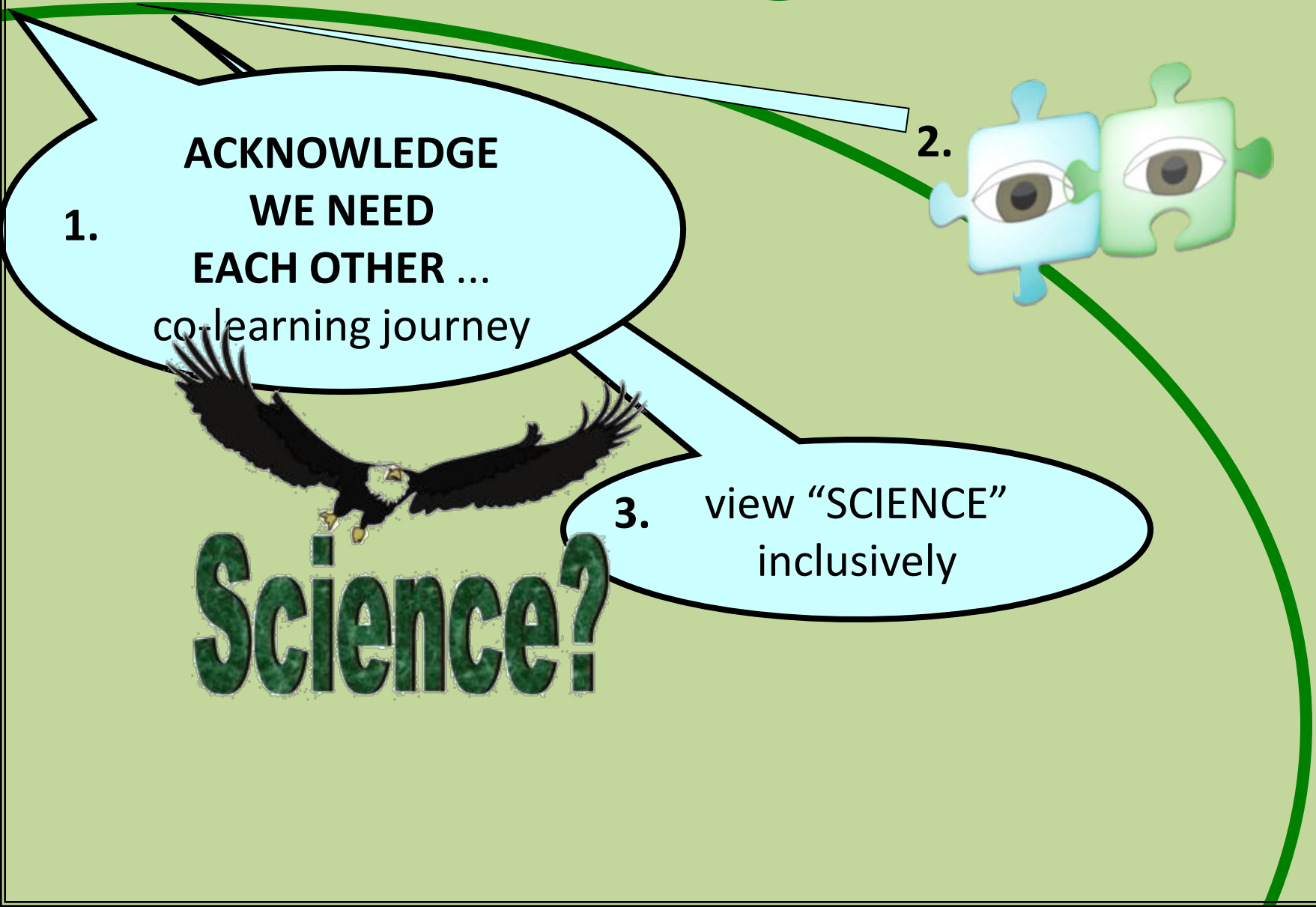


**Only humans have these
two consciousnesses ...**

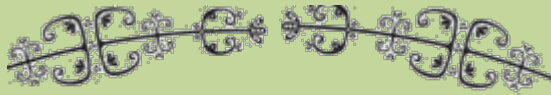


LESSONS LEARNED

#3



***Indigenous and Western
scientific knowledges are
based in observations
of the natural world.***

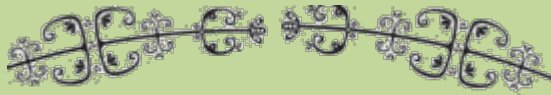


Science?



view "SCIENCE"
inclusively

*Indigenous and Western
scientific knowledges are
based in observations
of the natural world.*



stories of our interactions
with and within nature
... stories created and understood
using our diverse
pattern smarts

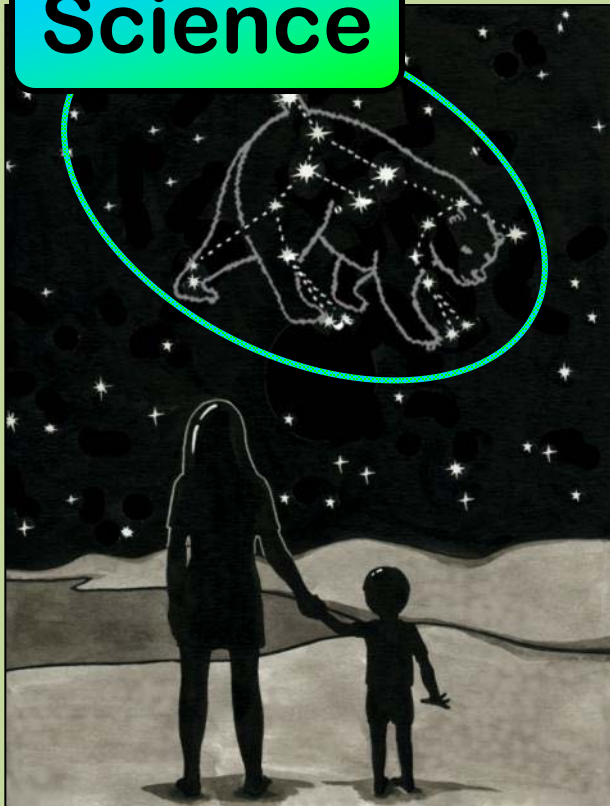
Science is dynamic,
pattern-based knowledge.

view "SCIENCE"
inclusively



stories of our interactions with and within nature

Science



pattern

- recognition
- transformation
- expression



- various **pattern smarts**
- various ways to connect the dots
- variety in our stories

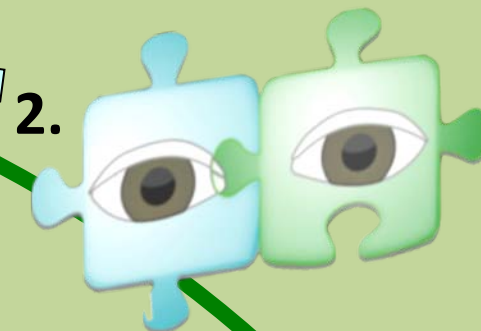
LESSONS LEARNED

#4

1. **ACKNOWLEDGE
WE NEED
EACH OTHER ...**
co-learning journey

4. **DO ... in a CREATIVE,
GROW FORWARD
WAY**

3. view "SCIENCE"
inclusively



Murdena Marshall, Elder, Mi'kmaq Nation

Together We Heal & Grow

seeing & acknowledging my deeds

“See, in the Mi’kmaq world, in all Native worlds, you have to give recognition to everything: misdeeds, good deeds, past deeds, you know? Anything. You have to give that acknowledgement. Everything that you do, you have to acknowledge it.”

5. put our *values + actions + knowledges* in front of us ...
like an object



Murdena Marshall, Elder, Mi’kmaq Nation

Together We Heal & Grow

seeing & acknowledging my deeds

“See, in the Mi’kmaq world, you have to give everything: misdeeds, good deeds, you know? Anything you give that acknowledgement that you do, you have to

I Got It From an Elder



Conversations
in Healing
Language

Iwama et al. 2007; Gaspereau Press Limited

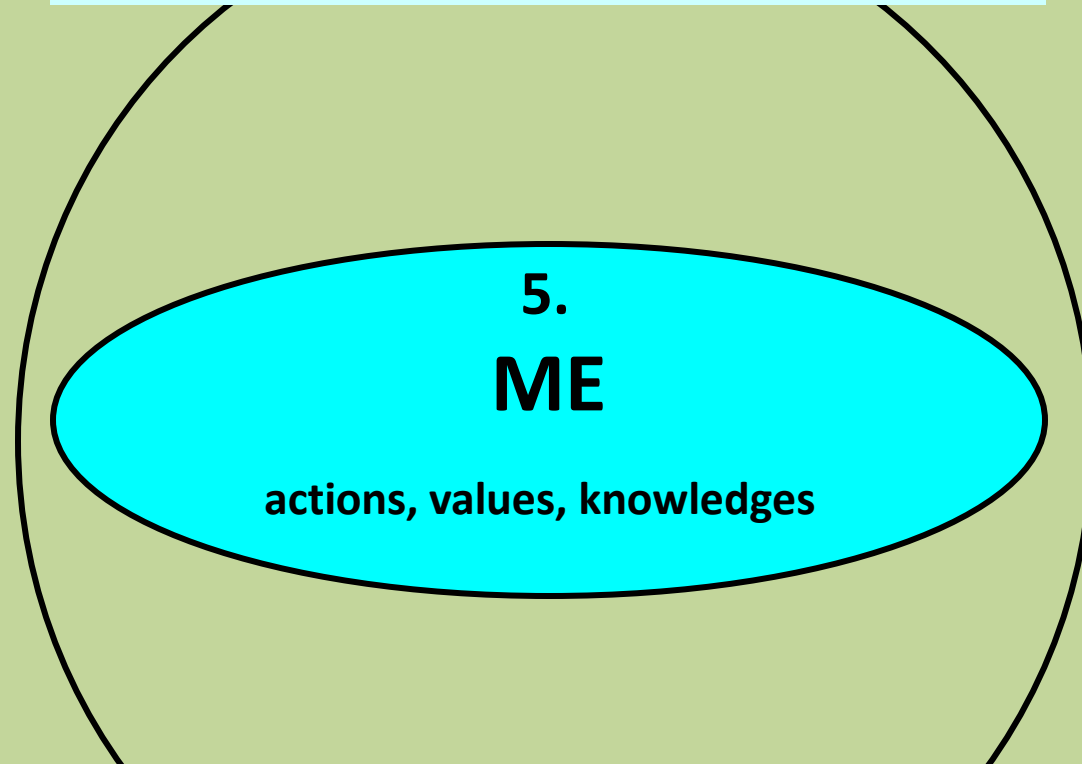
5. put our *values + actions + knowledges* in front of us ...
like an object



Murdena Marshall, Elder, Mi’kmaq Nation

Together We Heal & Grow
seeing & acknowledging my deeds

the “HEALING TENSE”

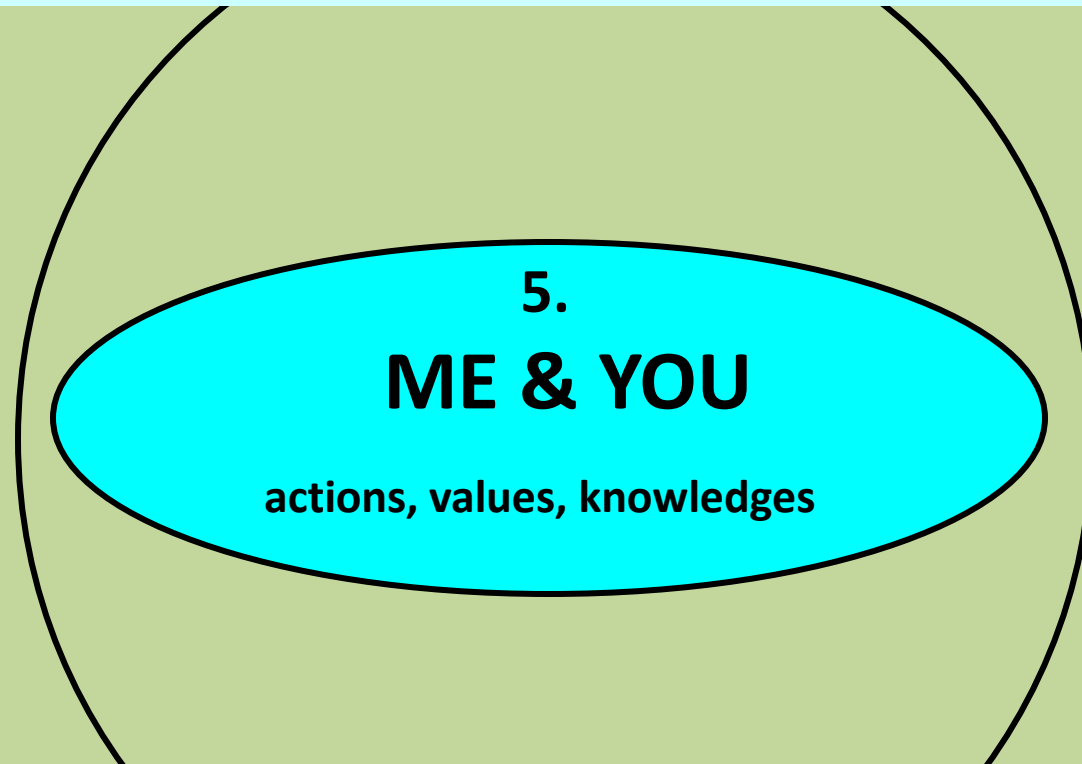


Murdena Marshall, Elder, Mi'kmaq Nation

Together We Heal & Grow

seeing & acknowledging my deeds

“together we heal & grow”



Murdena Marshall, Elder, Mi'kmaq Nation

Together We Heal & Grow
seeing & acknowledging my deeds

LESSONS LEARNED

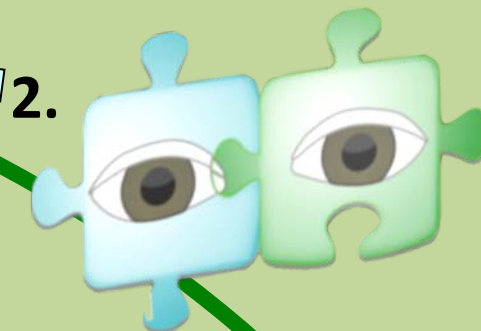
#5

1. **ACKNOWLEDGE
WE NEED
EACH OTHER ...**
co-learning journey

4. **DO ... in a CREATIVE,
GROW FORWARD
WAY**

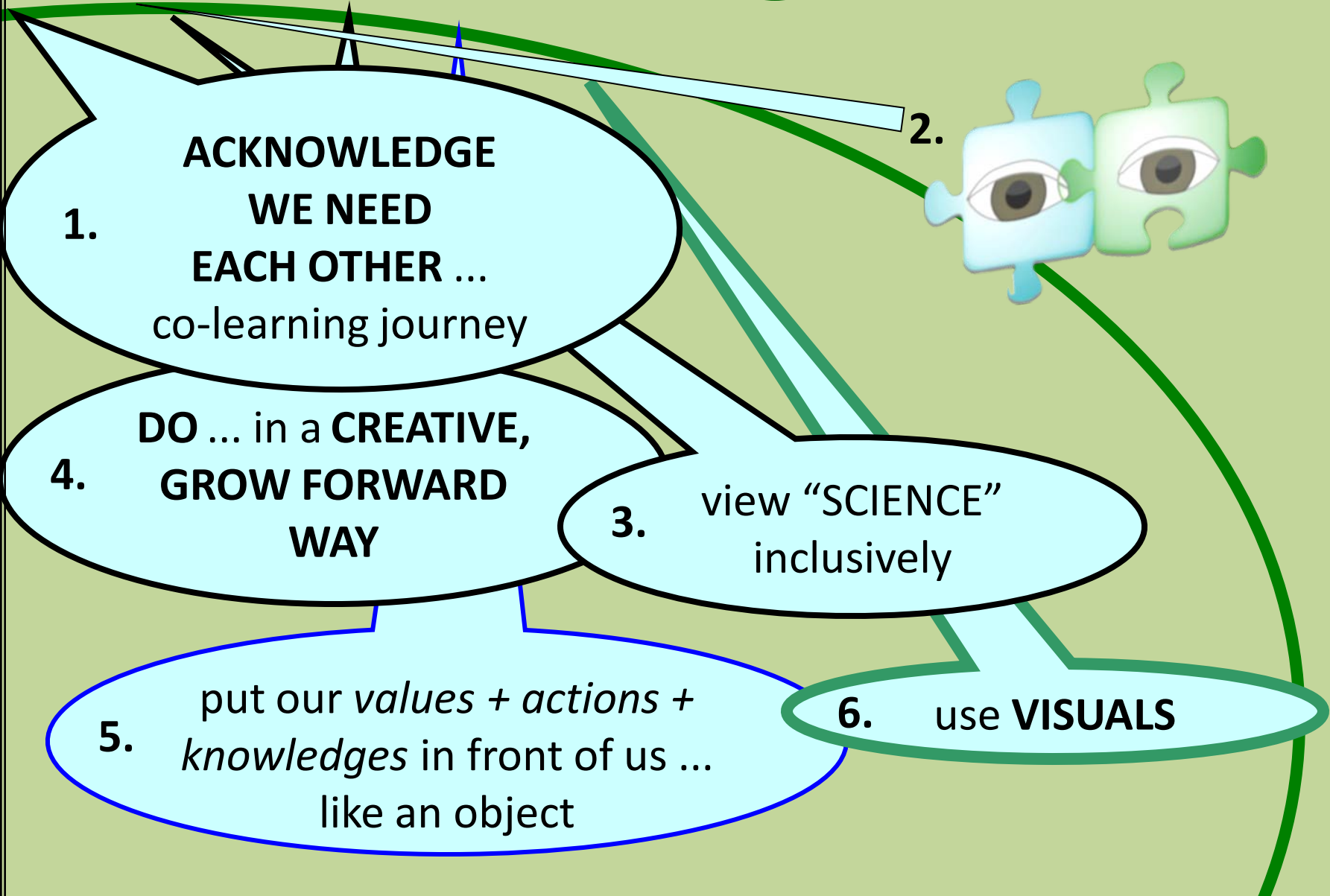
3. view "SCIENCE"
inclusively

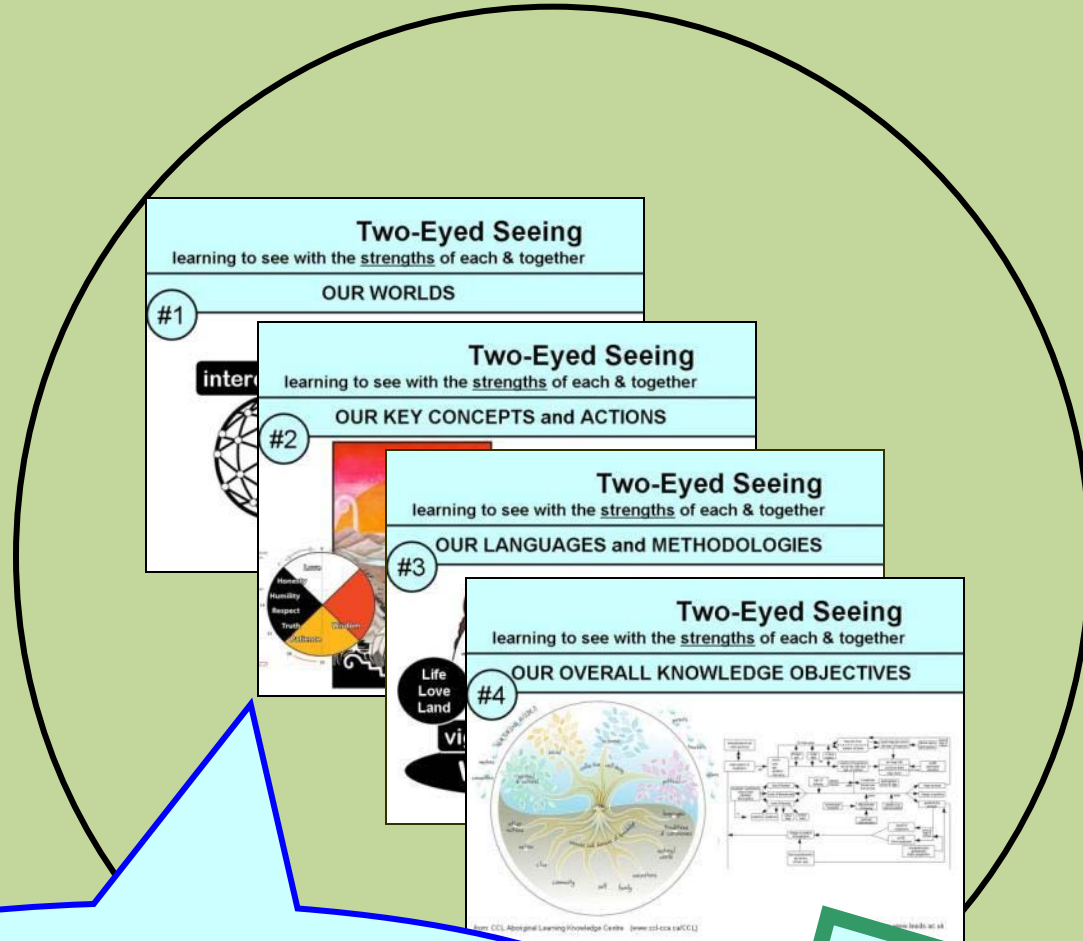
5. put our *values + actions +
knowledges* in front of us ...
like an object



LESSONS LEARNED

#6





5. put our *values + actions + knowledges* in front of us ...
like an object

6. use **VISUALS**

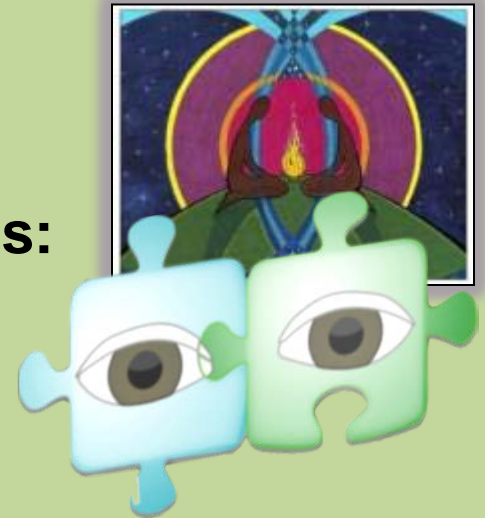
Challenges



Willie Ermine (2007)

**Fundamental question of cultural encounters is:
“How can we reconcile worldviews?”**

He suggests implementation of *ethical space* in which we make “a venue to step out of our allegiances, to detach from the cages of our mental worlds and assume a position where human-to-human dialogue can occur.”

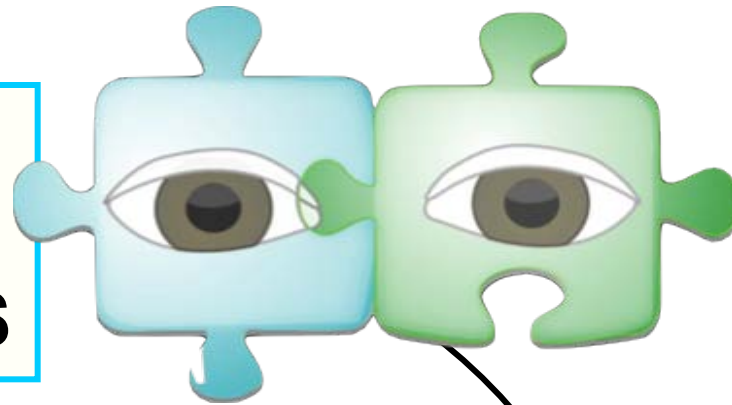


Ermine et al. (2004): Implementation of *ethical space* first requires an affirmation of its existence. It cannot exist without this affirmation.

Ermine, W. 2007. The ethical space of engagement. *Indigenous Law Journal* 6(1): 193-203.

Ermine, W., Sinclair, R., and Jeffrey, B. 2004. The ethics of research involving Indigenous peoples. Report of the Indigenous Peoples' Health Research Centre to the Interagency Advisory Panel on Research Ethics.

4 "BIG PICTURE" KNOWLEDGE UNDERSTANDINGS



Two-Eyed Seeing
learning to see with the strengths of each & together
OUR WORLDS

ontologies

Two-Eyed Seeing
learning to see with the strengths of each & together
OUR KEY CONCEPTS and ACTIONS

epistemologies

Two-Eyed Seeing
learning to see with the strengths of each & together
OUR LANGUAGES and METHODOLOGIES

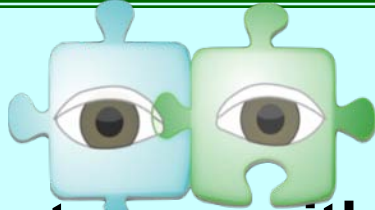
methodologies

Two-Eyed Seeing
learning to see with the strengths of each & together
OUR OVERALL KNOWLEDGE OBJECTIVES

goals

put our *values + actions*
+ *knowledges* in front of
us ... like an object

use **VISUALS**



Two-Eyed Seeing

learning to see with the strengths of each & together

OUR WORLDS

#1

BIG QUESTION

**What do we believe
the world or cosmos to be?
(ontology)**



Two-Eyed Seeing

learning to see with the strengths of each & together

OUR WORLDS

#1

BIG UNDERSTANDING ... IN WORDS

interconnective

beings ...
interconnective
and animate:

*spirit +
energy + matter*

with
CONSTANT CHANGE
within balance and wholeness

parts & wholes

objects ...
comprised of parts and
wholes characterized by
systems and emergences:

energy + matter

with
EVOLUTION



Two-Eyed Seeing

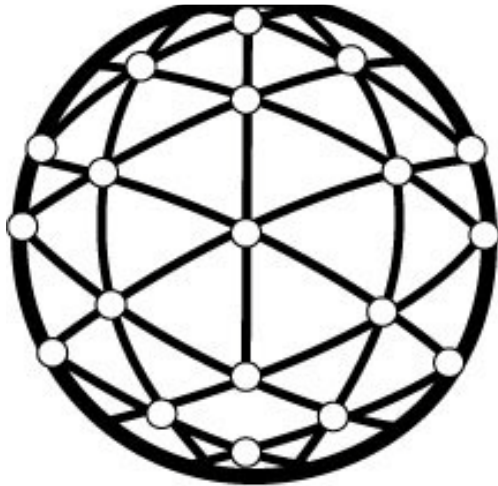
learning to see with the strengths of each & together

OUR WORLDS

#1

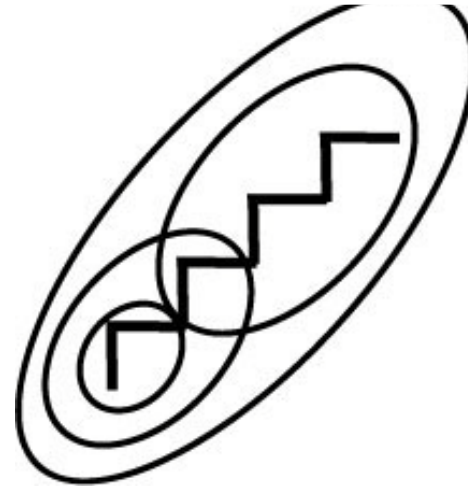
BIG UNDERSTANDING ... IN VISUALS

interconnective

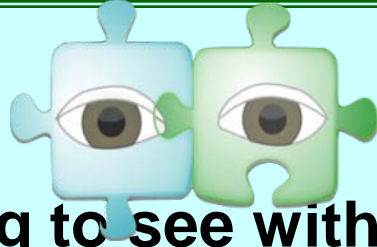


CONSTANT CHANGE
within balance and wholeness

parts & wholes



EVOLUTION



Two-Eyed Seeing

learning to see with the strengths of each & together

OUR KEY CONCEPTS and ACTIONS

#2

BIG QUESTION

**What do we value as
“ways of coming to know”
the cosmos?
(epistemology)**



Two-Eyed Seeing

learning to see with the strengths of each & together

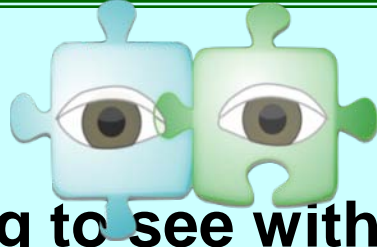
OUR KEY CONCEPTS and ACTIONS

#2

BIG UNDERSTANDING ... IN WORDS

- respect
- relationship
- reverence
- reciprocity
- ritual (ceremony)
- repetition
- responsibility

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



Two-Eyed Seeing

learning to see with the strengths of each & together

OUR KEY CONCEPTS and ACTIONS

#2

BIG UNDERSTANDING ... IN VISUALS

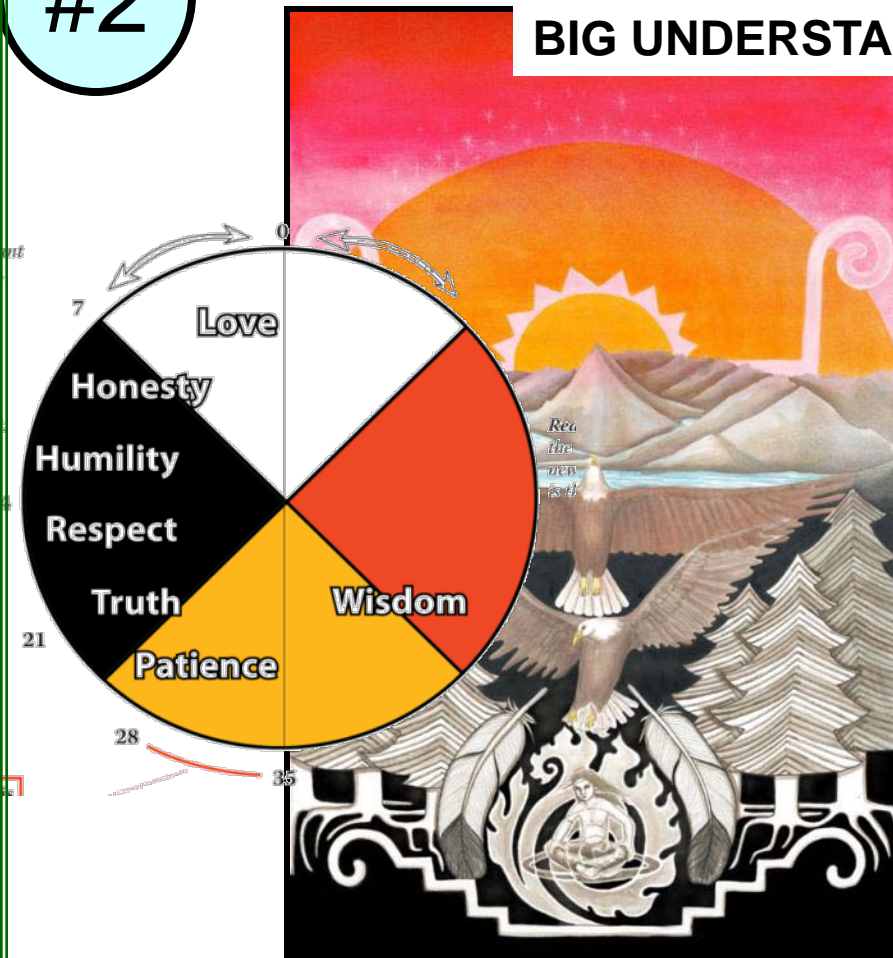


photo credit: NRC



Two-Eyed Seeing

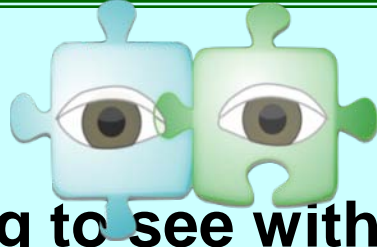
learning to see with the strengths of each & together

OUR LANGUAGES and METHODOLOGIES

#3

BIG QUESTION

**What can remind us
of the complexity within
our ways of knowing?**



Two-Eyed Seeing

learning to see with the strengths of each & together

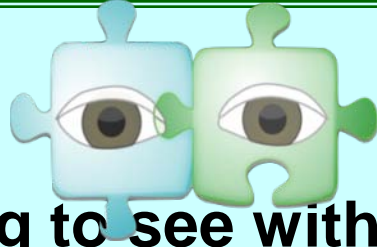
OUR LANGUAGES and METHODOLOGIES

#3

BIG UNDERSTANDING ... IN WORDS

weaving of patterns within nature's patterns via creative relationships and reciprocities among ***love, land, and life (vigour)*** that are constantly reinforced and nourished by Aboriginal languages

un-weaving of nature's patterns (especially via analytic logic and the use of instruments) to cognitively reconstruct them, especially using ***mathematical language (rigour)*** and computer models



Two-Eyed Seeing

learning to see with the strengths of each & together

OUR LANGUAGES and METHODOLOGIES

#3

BIG UNDERSTANDING ... IN WORDS

Life
Love
Land

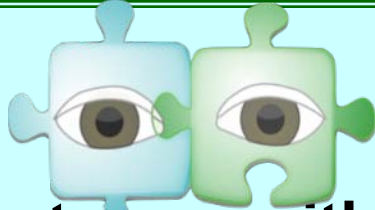
vigour

WEAVING

Math
&
Instruments

rigour

UN-WEAVING



Two-Eyed Seeing

learning to see with the strengths of each & together

OUR LANGUAGES and METHODOLOGIES

#3

BIG UNDERSTANDING ... IN VISUALS



Life
Love
Land

vigour

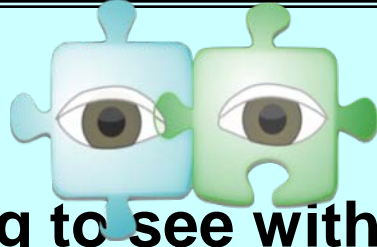
WEAVING



Math
&
Instruments

rigour

UN-WEAVING



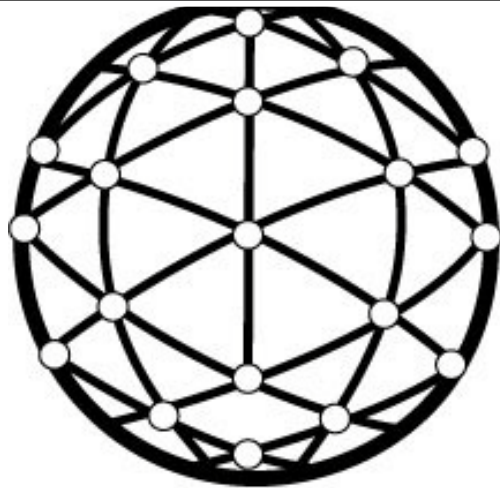
Two-Eyed Seeing

learning to see with the strengths of each & together

OUR WORLD VIEWS

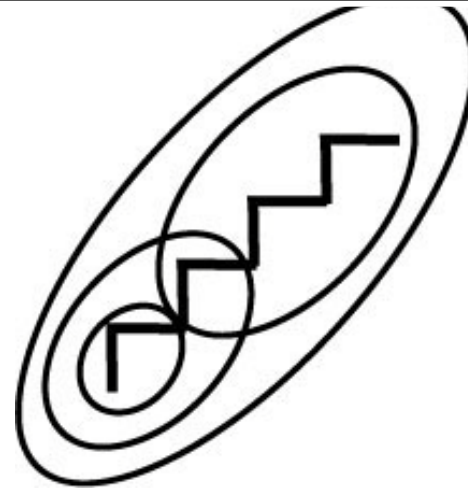
BIG UNDERSTANDING ... IN VISUALS

interconnective



CONSTANT CHANGE
within balance and wholeness

parts & wholes



EVOLUTION



The foundational basis for any relationship is an exchange of stories.

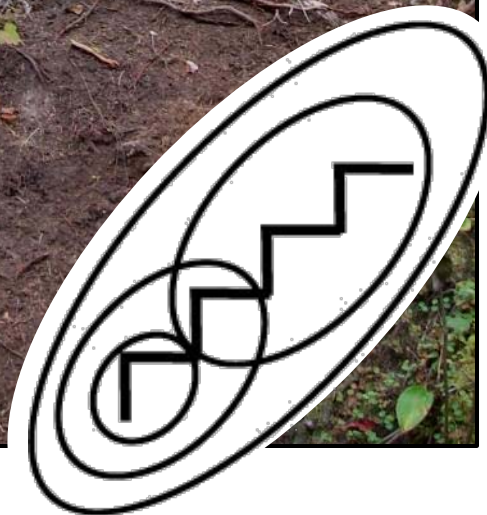
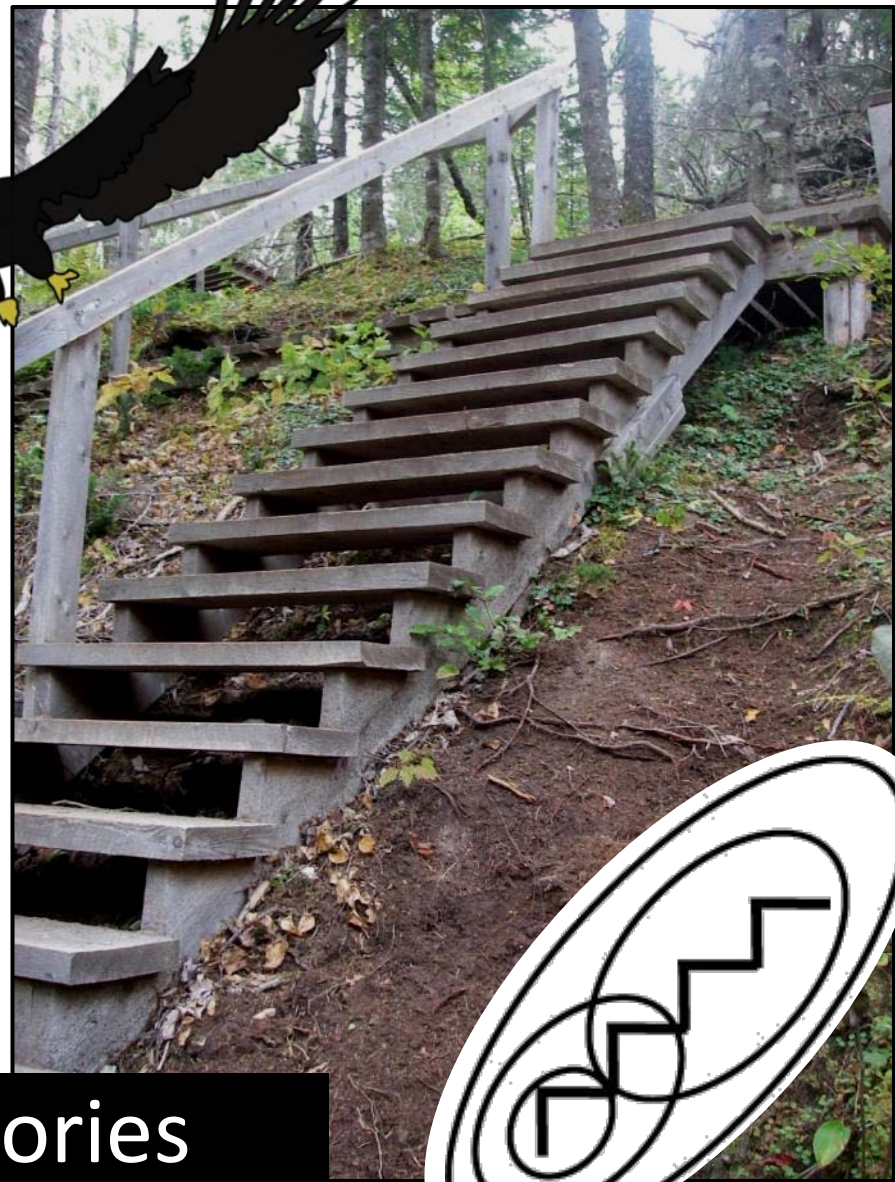
(Mi'kmaq Elder Albert Marshall)

Toqwa'tu'kl Kijitaqnn Integrative Science



our stories





our stories

stories of our interactions with and within nature

stories of our interactions with and within nature

Science

Science

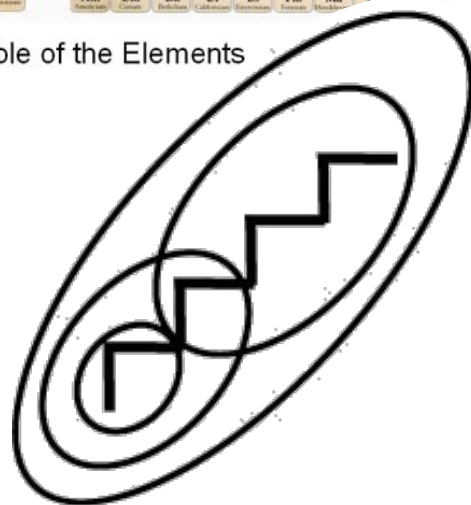


Life
Love
Land

Periodic Table of the Elements

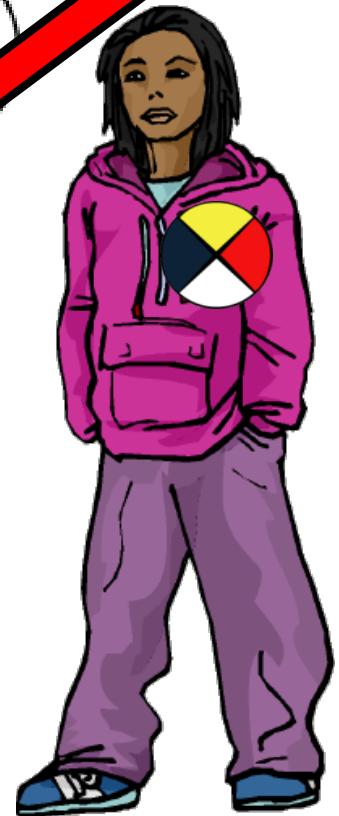
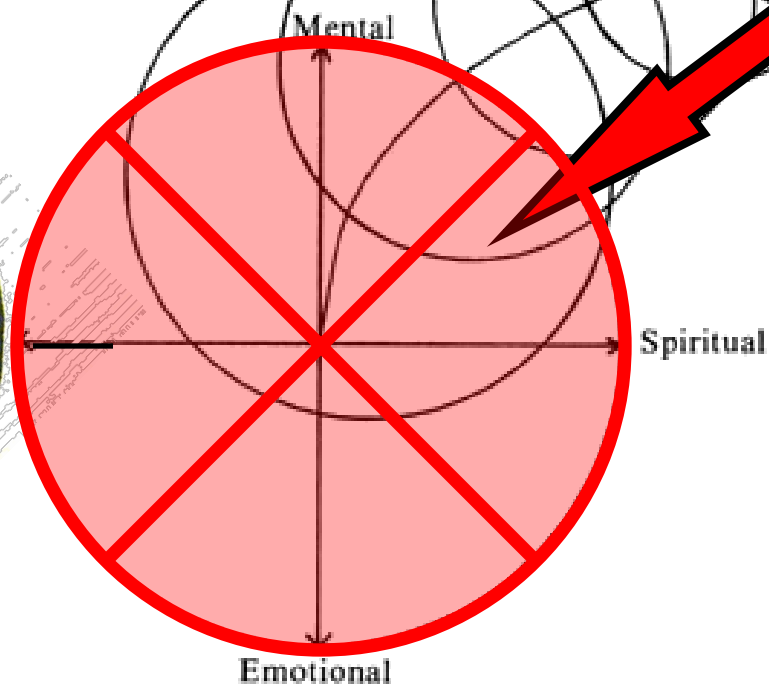
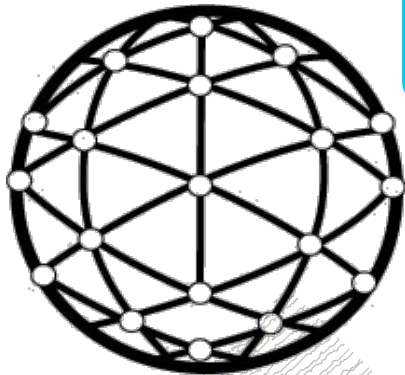


our stories



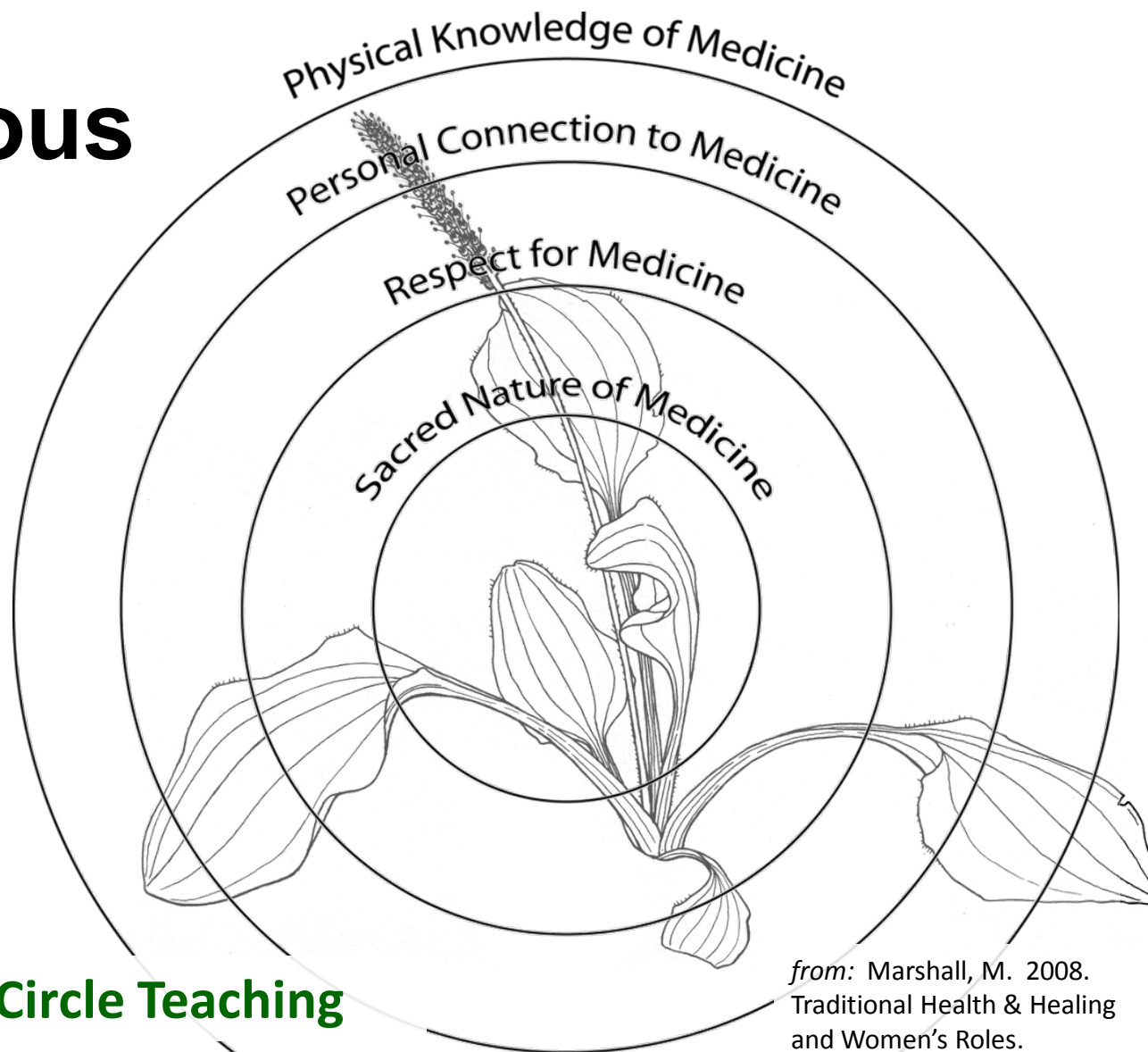
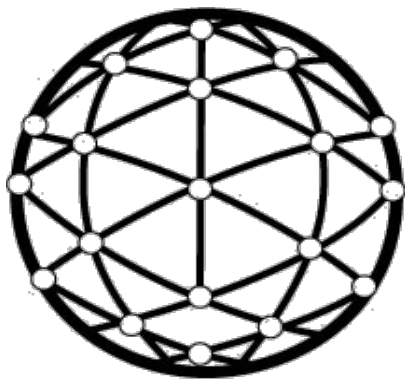
Vision 

SCIENCE stories of: interconnectiveness



my world is "all my relations" (subjects)

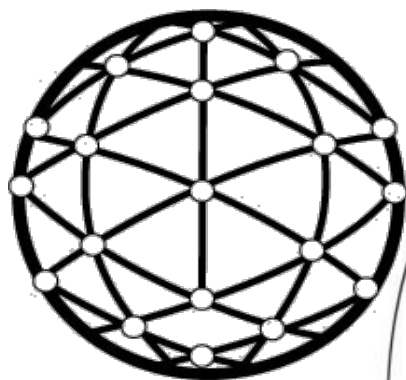
Indigenous Science



Sacred Circle Teaching

from: Marshall, M. 2008.
Traditional Health & Healing
and Women's Roles.
Workshop Module Materials.

Indigenous Science



Muin and the Seven Bird Hunters

a Mi'kmaq Night Sky Story

VERSIONS: MI'KMAQ & ENGLISH, ENGLISH, FRENCH



THE UNIVERSE
YOURS TO DISCOVER
INTERNATIONAL YEAR OF
ASTRONOMY
2009



CAPE BRETON
UNIVERSITY



©2009 MI'KMAW ELDERS



Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Canada



Canada Research
Chairs

Chaires de recherche
du Canada

Canada

THE UNIVERSE
YOURS TO DISCOVER



INTERNATIONAL YEAR OF
ASTRONOMY
2009

DVD

Indigenous Science



Life
Love
Land

Language



images from: Aboriginal organizations/artists, various sources

Indigenous Science



Life
Love
Land
Language

images from: Aboriginal organizations/artists, various sources

Indigenous Science



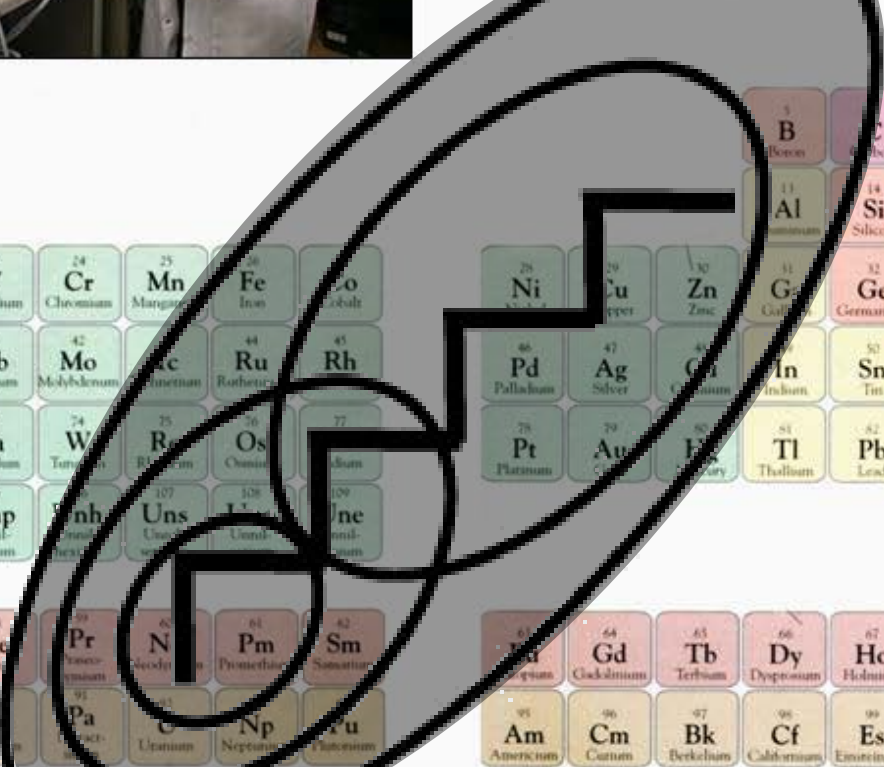
Life
Love
Land
Language

images from: Aboriginal organizations/artists, various sources

photo credit: NRC



Western Science

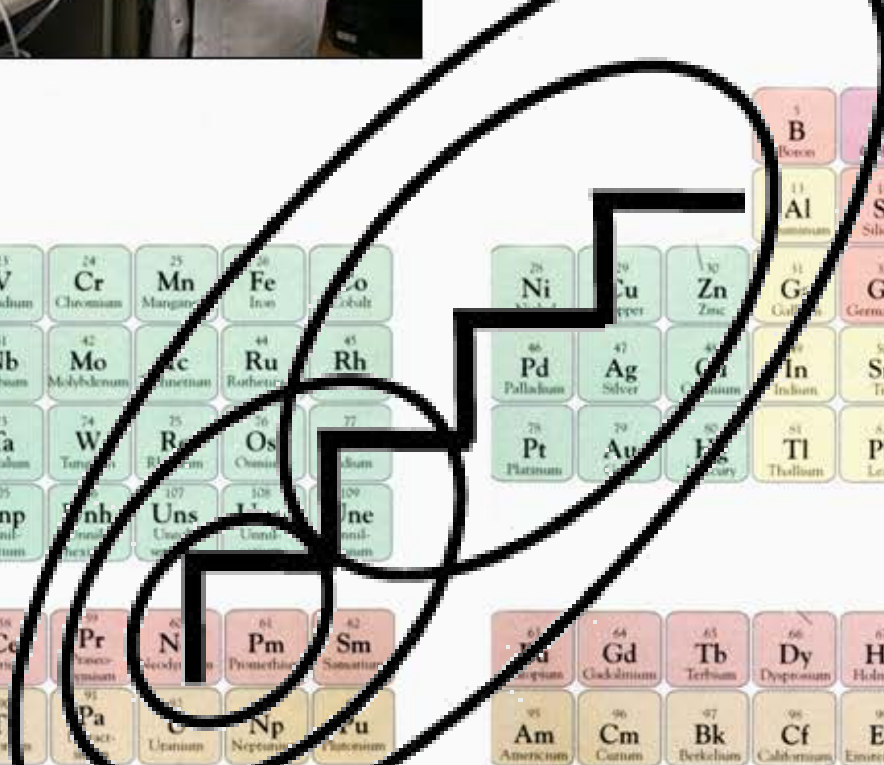


1 H Hydrogen																	2 He Helium
3 Li Lithium	4 Be Beryllium											5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium											13 Al Aluminum	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon
55 Cs Cesium	56 Ba Barium	57-71 Lanthanides	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon
87 Fr Francium	88 Ra Radium	89-103 Actinides	104 Unq Unnilquadium	105 Unp Unnilpentium	106 Unh Unnilhexium	107 Uns Unnilseptium	108 Uuo Unniloctium	109 Uuh Unnilennium	110 Uue Unnildecium	111 Uub Unnilbium	112 Uut Unniltrium	113 Uuh Unnilhassium	114 Uuq Unnilquadrium	115 Uup Unnilpentium	116 Uuq Unnilquadrium	117 Uuh Unnilhassium	118 Uuo Unniloctium
		52 La Lanthanum	54 Ce Cerium	57 Pr Praseodymium	58 Nd Neodymium	59 Pm Promethium	60 Sm Samarium	61 Eu Europium	62 Gd Gadolinium	63 Tb Terbium	64 Dy Dysprosium	65 Ho Holmium	66 Er Erbium	67 Tm Thulium	68 Yb Ytterbium	69 Lu Lutetium	
		89 Ac Actinium	90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium	

photo credit: NRC

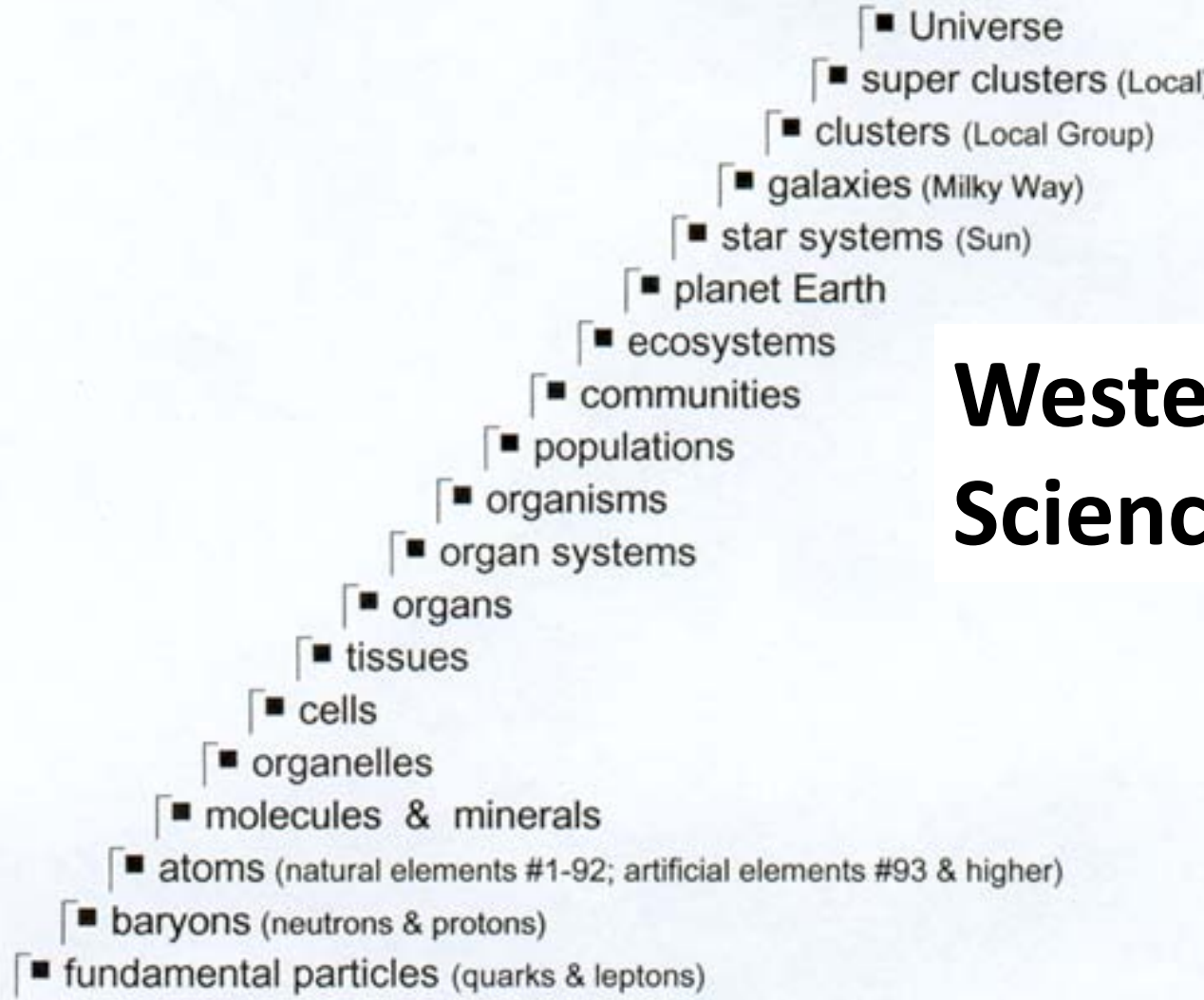


Western Science



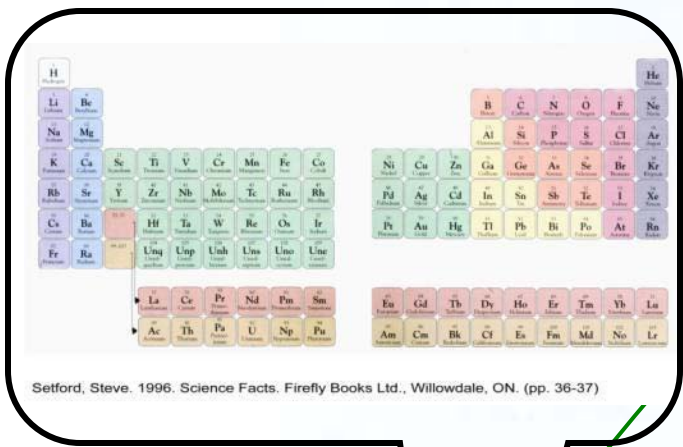
1 H Hydrogen																	2 He Helium
3 Li Lithium	4 Be Beryllium											5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium											13 Al Aluminum	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon
55 Cs Cesium	56 Ba Barium	57-71 Lanthanides	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon
87 Fr Francium	88 Ra Radium	89-103 Actinides	104 Unq Unnilquadium	105 Unp Unnilpentium	106 Unh Unnilhexium	107 Uns Unnilseptium	108 Uuo Unniloctium	109 Uuh Unnilennium	110 Uuq Unnilquadrium	111 Uub Unnilbium	112 Uut Unniltrium	113 Uuh Unnilhexium	114 Uuq Unnilquadrium	115 Uub Unnilbium	116 Uut Unniltrium	117 Uuh Unnilhexium	118 Uuo Unniloctium
			57 La Lanthanum	58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium
			89 Ac Actinium	90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium

Universe: Visible Matter (levels of organization - biology)



**Western
Science**

Universe: Visible Matter (levels of organization - biology)



Setford, Steve. 1996. Science Facts. Firefly Books Ltd., Willowdale, ON. (pp. 36-37)

- Universe
 - super clusters (Local)
 - clusters (Local Group)
 - galaxies (Milky Way)
 - star systems (Sun)
 - planet Earth
 - ecosystems
 - communities
 - populations
 - organisms
 - organ systems
 - organs
 - tissues
 - cells
 - organelles
 - molecules & minerals
 - atoms (natural elements #1-92; artificial elements #93 & higher)
 - baryons (neutrons & protons)
 - fundamental particles (quarks & leptons)

Western Science

stories of our interactions with and within nature

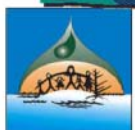
stories of our interactions with and within nature

Science

Science



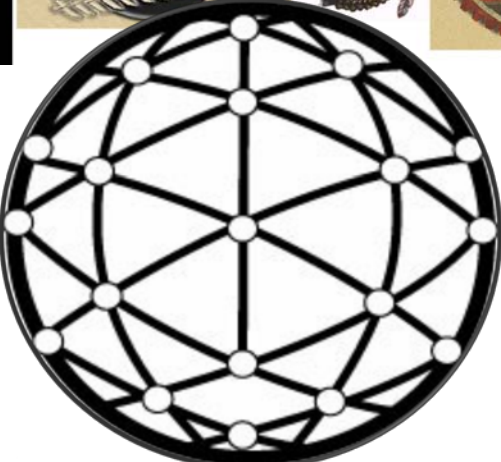
Life
Love
Land



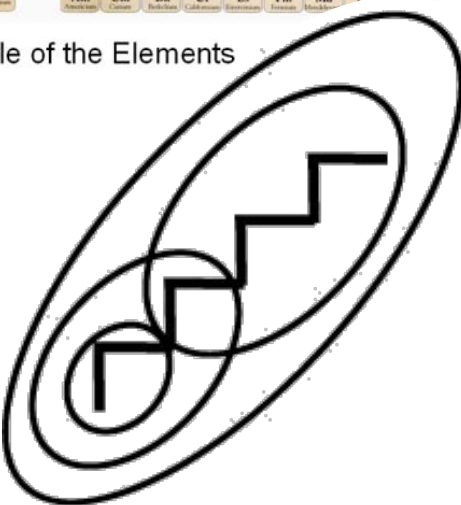
1	H																	2																																	
3	Li	4	Be																	5																															
11	Na	12	Mg	13	Al	14	Si	15	P	16	S	17	Cl	18	Ar	19	K	20	Ca	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe	27	Co	28	Ni	29	Cu	30	Zn	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr
37	Rb	38	Sr	39	Y	40	Zr	41	Nb	42	Mo	43	Tc	44	Ru	45	Rh	46	Pd	47	Ag	48	Cd	49	In	50	Sn	51	Sb	52	Te	53	I	54	Xe																
55	Cs	56	Ba	57	La	58	Ce	59	Pr	60	Nd	61	Pm	62	Sm	63	Eu	64	Gd	65	Tb	66	Dy	67	Ho	68	Er	69	Tm	70	Yb	71	Lu																		
87	Fr	88	Ra	89	Ac	90	Th	91	Pa	92	U	93	Np	94	Pu	95	Am	96	Cm	97	Bk	98	Cf	99	Es	100	Fm	101	Md	102	No	103	Lr																		

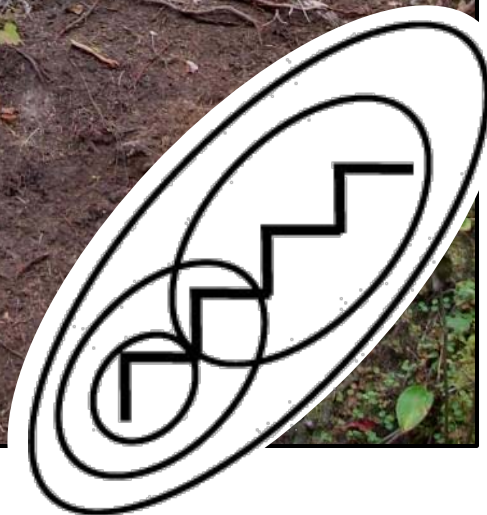
1	H																	2																																	
3	Li	4	Be																	5																															
11	Na	12	Mg	13	Al	14	Si	15	P	16	S	17	Cl	18	Ar	19	K	20	Ca	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe	27	Co	28	Ni	29	Cu	30	Zn	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr
37	Rb	38	Sr	39	Y	40	Zr	41	Nb	42	Mo	43	Tc	44	Ru	45	Rh	46	Pd	47	Ag	48	Cd	49	In	50	Sn	51	Sb	52	Te	53	I	54	Xe																
55	Cs	56	Ba	57	La	58	Ce	59	Pr	60	Nd	61	Pm	62	Sm	63	Eu	64	Gd	65	Tb	66	Dy	67	Ho	68	Er	69	Tm	70	Yb	71	Lu																		
87	Fr	88	Ra	89	Ac	90	Th	91	Pa	92	U	93	Np	94	Pu	95	Am	96	Cm	97	Bk	98	Cf	99	Es	100	Fm	101	Md	102	No	103	Lr																		

Periodic Table of the Elements

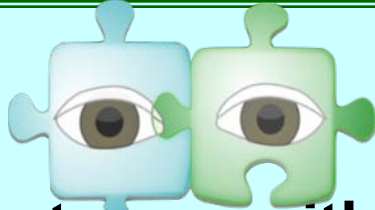


our stories





our stories



Two-Eyed Seeing

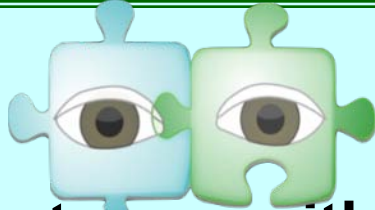
learning to see with the strengths of each & together

OUR OVERALL KNOWLEDGE OBJECTIVES

#4

BIG QUESTION

**What overall goals
do we have for
our ways of knowing?**



Two-Eyed Seeing

learning to see with the strengths of each & together

OUR OVERALL KNOWLEDGE OBJECTIVES

#4

BIG UNDERSTANDING ... IN WORDS

collective, living
knowledge to enable
nourishment of one's journey
within expanding sense of
"place, emergence and
participation" for collective
consciousness and
interconnectiveness

dynamic, testable,
published knowledge
independent of
personal experience
that can enable
prediction and control
(and "progress")



Two-Eyed Seeing

learning to see with the strengths of each & together

OUR OVERALL KNOWLEDGE OBJECTIVES

#4

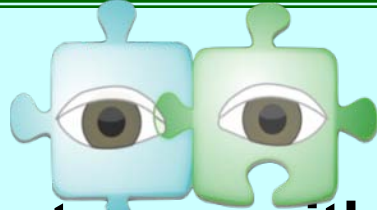
BIG UNDERSTANDING ... IN WORDS

collective, living
knowledge to enable
nourishment of one's journey
within expanding sense of
"place, emergence and
participation" for collective
consciousness and
interconnectiveness

dynamic, testable,
published knowledge
independent of
personal experience
that can enable
prediction and control
(and "progress")

**towards resonance of
understanding within environment**

**towards construction of
understanding of environment**



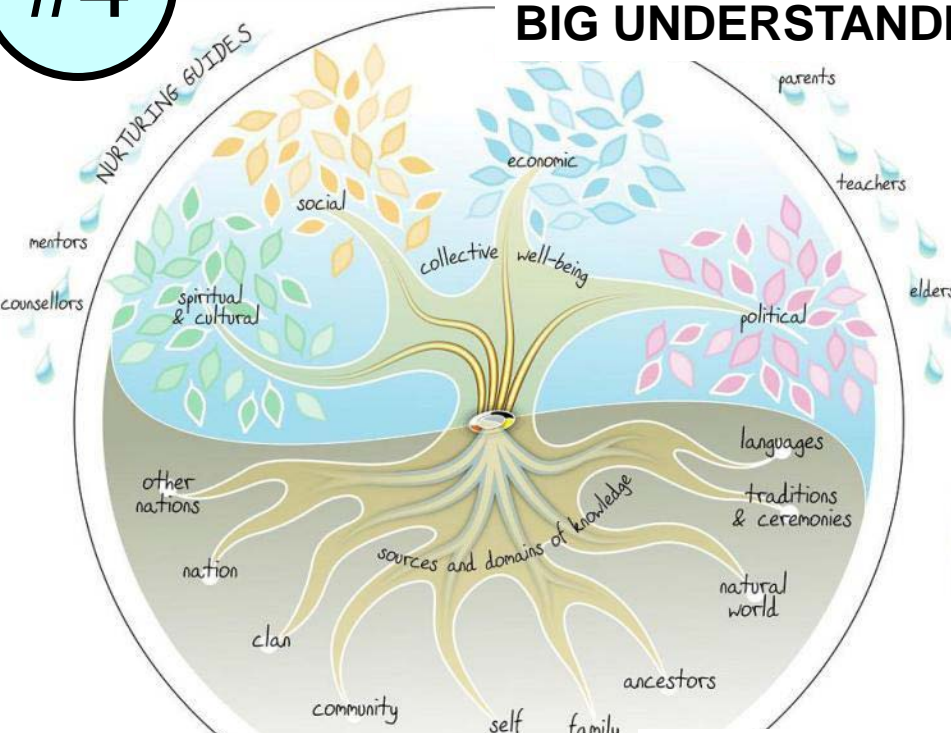
Two-Eyed Seeing

learning to see with the strengths of each & together

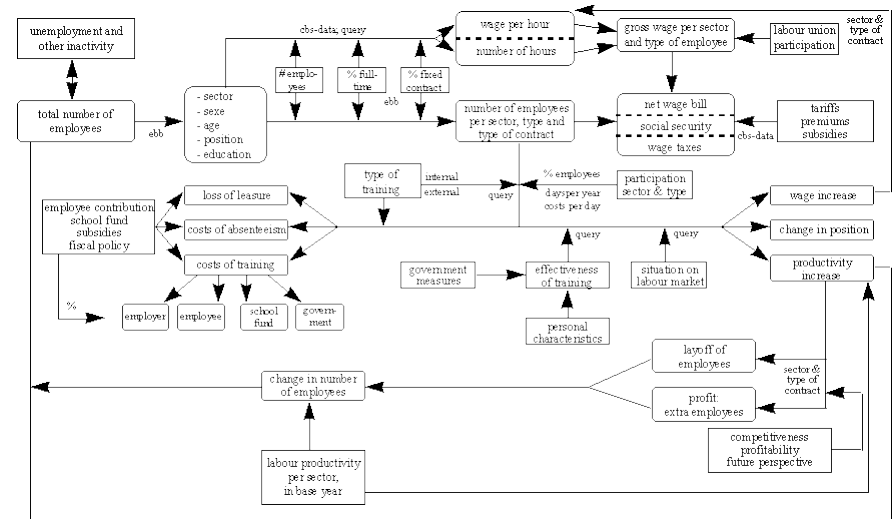
OUR OVERALL KNOWLEDGE OBJECTIVES

#4

BIG UNDERSTANDING ... IN VISUALS



from: CCL Aboriginal Learning Knowledge Centre (www.ccl-cca.ca/CCL)



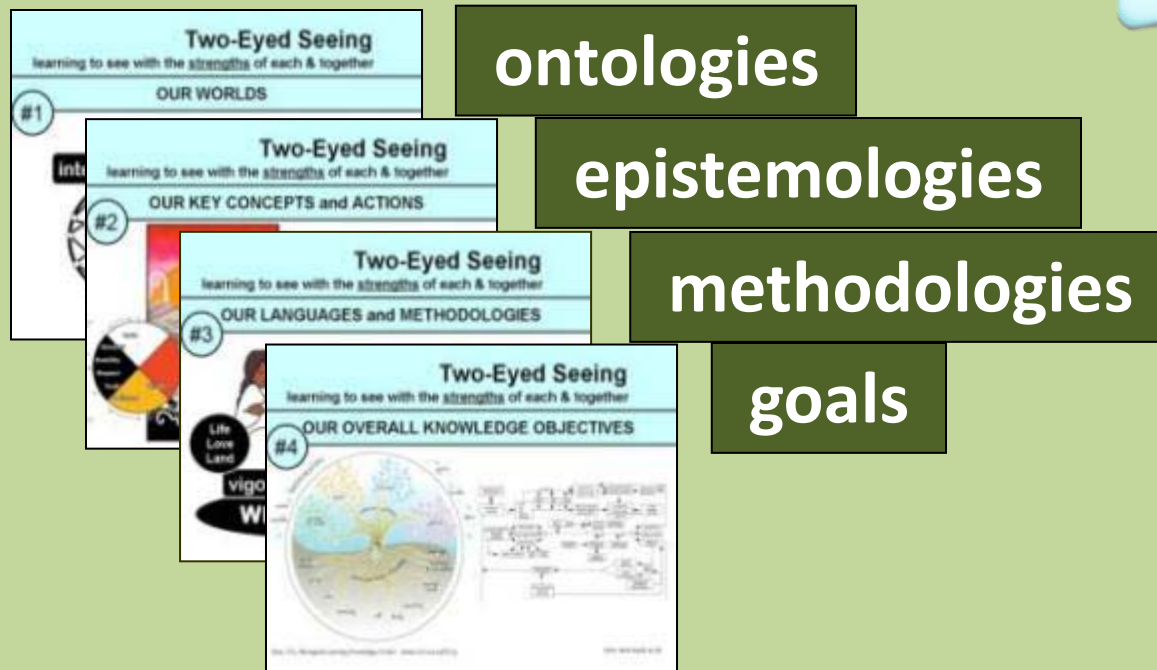
from: www.leads.ac.uk

towards resonance of understanding within environment

towards construction of understanding of environment

Four Big Patterns for Integrative Science & TES

recognize and affirm our need to enter ethical space ... and learn to take first steps



LESSONS LEARNED

#7

Two-Eyed Seeing
learning to see with the strengths of each & together

#1
OUR WORLDS

Two-Eyed Seeing
learning to see with the strengths of each & together

#2
OUR KEY CONCEPTS and ACTIONS

Two-Eyed Seeing
learning to see with the strengths of each & together

#3
OUR LANGUAGES and METHODOLOGIES

Two-Eyed Seeing
learning to see with the strengths of each & together

#4
OUR OVERALL KNOWLEDGE OBJECTIVES

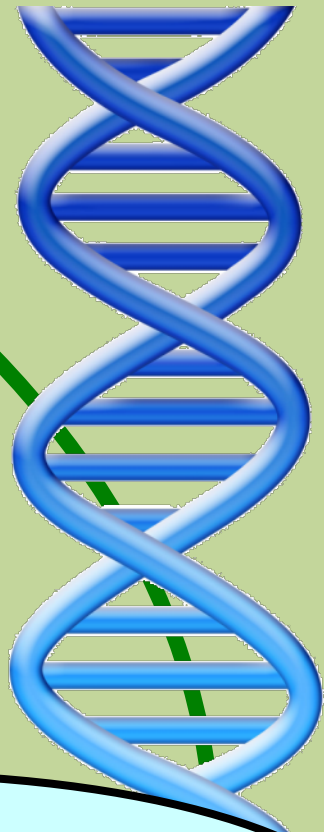
ontologies

epistemologies

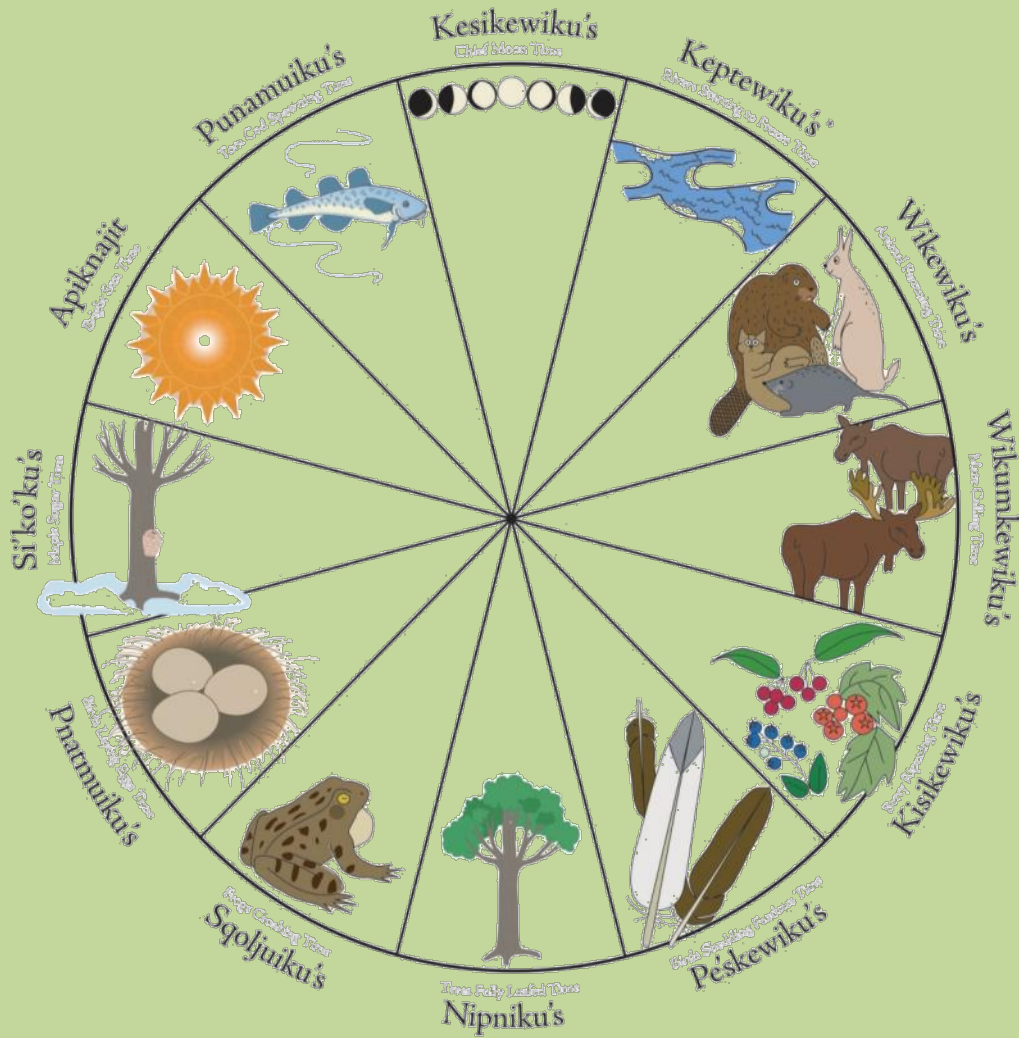
methodologies

goals

7. WEAVE
back & forth between
our worldviews



One Complete Year



2010

January							February							March								
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa		
					1	2			1	2	3	4	5	6			1	2	3	4	5	6
3	4	5	6	7	8	9	7	8	9	10	11	12	13	7	8	9	10	11	12	13		
10	11	12	13	14	15	16	14	15	16	17	18	19	20	14	15	16	17	18	19	20		
17	18	19	20	21	22	23	21	22	23	24	25	26	27	21	22	23	24	25	26	27		
24	25	26	27	28	29	30	28	28	29	30	31	28	29	30	31							
31																						

April							May							June							
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	
					1	2	3						1				1	2	3	4	5
4	5	6	7	8	9	10	2	3	4	5	6	7	8	6	7	8	9	10	11	12	
11	12	13	14	15	16	17	9	10	11	12	13	14	15	13	14	15	16	17	18	19	
18	19	20	21	22	23	24	16	17	18	19	20	21	22	20	21	22	23	24	25	26	
25	26	27	28	29	30	23	24	25	26	27	28	29	27	28	29	30					
							30	31													

July							August							September											
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa					
					1	2	3						1	2	3	4						1	2	3	4
4	5	6	7	8	9	10	8	9	10	11	12	13	14	5	6	7	8	9	10	11					
11	12	13	14	15	16	17	15	16	17	18	19	20	21	12	13	14	15	16	17	18					
18	19	20	21	22	23	24	22	23	24	25	26	27	28	19	20	21	22	23	24	25					
25	26	27	28	29	30	31	29	30	31	26	27	28	29	30											

October							November							December										
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa				
					1	2						1	2	3	4						1	2	3	4
3	4	5	6	7	8	9	7	8	9	10	11	12	13	5	6	7	8	9	10	11				
10	11	12	13	14	15	16	14	15	16	17	18	19	20	12	13	14	15	16	17	18				
17	18	19	20	21	22	23	21	22	23	24	25	26	27	19	20	21	22	23	24	25				
24	25	26	27	28	29	30	28	29	30	26	27	28	29	30	31									
31																								

One Complete Year



2010

January							February							March								
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa		
					1	2			1	2	3	4	5	6			1	2	3	4	5	6
3	4	5	6	7	8	9	7	8	9	10	11	12	13	7	8	9	10	11	12	13		
10	11	12	13	14	15	16	14	15	16	17	18	19	20	14	15	16	17	18	19	20		
17	18	19	20	21	22	23	21	22	23	24	25	26	27	21	22	23	24	25	26	27		
24	25	26	27	28	29	30	28	28	29	30	31	28	29	30	31							
31																						

April							May							June							
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	
					1	2	3						1			1	2	3	4	5	
4	5	6	7	8	9	10	2	3	4	5	6	7	8	6	7	8	9	10	11	12	
11	12	13	14	15	16	17	9	10	11	12	13	14	15	13	14	15	16	17	18	19	
18	19	20	21	22	23	24	16	17	18	19	20	21	22	20	21	22	23	24	25	26	
25	26	27	28	29	30	23	24	25	26	27	28	29	27	28	29	30					
							30	31													

July							August							September									
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa			
					1	2	3			1	2	3	4	5	6	7				1	2	3	4
4	5	6	7	8	9	10	8	9	10	11	12	13	14	5	6	7	8	9	10	11			
11	12	13	14	15	16	17	15	16	17	18	19	20	21	12	13	14	15	16	17	18			
18	19	20	21	22	23	24	22	23	24	25	26	27	28	19	20	21	22	23	24	25			
25	26	27	28	29	30	31	29	30	31	26	27	28	29	30									

October							November							December						
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
					1	2			1	2	3	4	5	6			1	2	3	4
3	4	5	6	7	8	9	7	8	9	10	11	12	13	5	6	7	8	9	10	11
10	11	12	13	14	15	16	14	15	16	17	18	19	20	12	13	14	15	16	17	18
17	18	19	20	21	22	23	21	22	23	24	25	26	27	19	20	21	22	23	24	25
24	25	26	27	28	29	30	28	29	30	26	27	28	29	30	31					
31																				

Netukulimk

7 basic or fundamental LESSONS LEARNED

1. **ACKNOWLEDGE
WE NEED
EACH OTHER ...**
co-learning journey

4. **DO ... in a CREATIVE,
GROW FORWARD
WAY**

5. put our *values + actions +
knowledges* in front of us ...
like an object

3. view "SCIENCE"
inclusively

6. use **VISUALS**

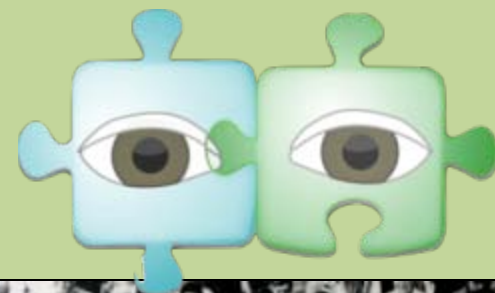
7. **WEAVE**
back & forth between
our worldviews



As Elders in Our Time

We seek to be a conduit for wisdom of our Ancestors.

We seek to see with “Two-Eyes” ... to take the accomplishments of the white man’s ways further by blending it with the wisdom of our Ancestors.





Wela'liog
Thank you



Canada Research
Chairs

Chaires de recherche
du Canada

Canada
Canada

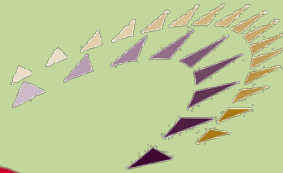


Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Thank you / Wela'liog

IAPH



Canada Foundation
for Innovation

Fondation canadienne
pour l'innovation



Membertou
Elementary

CIHR IRSC
Canadian Institutes of
Health Research Instituts de recherche
en santé du Canada



Mi'kmawey Debert



Mermaid Theatre
of Nova Scotia



Eskasoni First Nation Detachment
Royal Canadian Mounted Police Gendarmerie royale
du Canada



Mi'kmaq College Institute
Mi'kmaq Espi Kina'matno'kuom

The support of various partners
and funding agencies
is gratefully acknowledged.

Subject: Cultural Awareness training / SARA ATK session - 2.5 day
Location: 2nd Floor boardrooms, 401 Burrard
Start: Mon 01/03/2010 8:30 AM
End: Wed 03/03/2010 12:00 PM

Day 1 - "Working Effectively With Aboriginal Peoples" (8:30 - 4:00 Boardroom D, 2nd Floor RHQ)

An experienced trainer from Indigenous Corporate Training will come and deliver the full day training session. Although not mentioned in the attached document, I have requested that SARA-specific information be incorporated into the session.



Agenda and
purpose of the Cult..

Day 2 - DFO-SARA ATK session (9:00 - 3:30 Boardroom C, 2nd Floor RHQ)

The morning will include presentations on "Integrative Science" and the "Two-Eyed Seeing" by Dr. Cheryl Bartlett and Mik'maq Elder Albert Marshall from the Integrative Science program at Cape Breton University.

Dr. Cheryl Barlett holds the Tier 1 Canada Research Chair in Integrative Science for the concept pioneered at CBU by which Aboriginal and Western worldviews in science and education are brought together for the benefit of all people. "Integrative Science introduces Aboriginal understandings of nature into the post-secondary science curriculum, and it recognizes the differences and common ground between both views".

Integrative Science brings together scientific knowledges and ways of knowing from Indigenous and Western world views to provide science education. This "bringing knowledges together" is known as Toqwa'tu'kl Kjjitaqnn in the Mi'kmaq language and as "Two-Eyed Seeing" in the words of Mi'kmaq Elder Albert Marshall. "Two-Eyed Seeing" is more than a label ... it is a powerful reminder of the Integrative Science program's visionary goal of learning to see from our one eye with the strengths of Indigenous knowledges and from our other eye with the strengths of mainstream scientific knowledges...and to use these together for the benefit of all.



Bios - Albert
Marshall and Che...

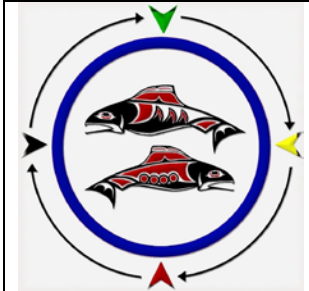
Melinda Lontoc-Roy (DFO-NCR, Aboriginal Policy & Governance) will provide an update on the development of the "DFO-SARA ATK Guidance" document that was introduced to us last summer. The remainder of the afternoon will be spent looking at specific sections of the document and providing our comments and input. The draft changes daily, so I'm sure this isn't the most up-to-date version but it will give you an idea of its contents.



ATK Guidelines
vDec09.doc (216...

Day 3 - DFO-SARA ATK session cont'd (9:00 - noon Boardroom C, 2nd Floor RHQ)

Continuation of Day 2 discussions.



Upper Fraser Fisheries Conservation Alliance

**CFR AFSAR Forum 2
UPPER FRASER FISHERIES CONSERVATION ALLIANCE
March 4th, 2010
RAMADA INN, Cranbrook Room
Prince George, BC
9.00 am – 4.00 pm
Lunch Provided**

Objectives

1. Summarize Project To Date
2. Review Community thoughts on ATK incorporation into SARA/recovery plans
3. Discussion of the DRAFT ATK Protocol Template

1. Introductions
2. Project Update/Overview
 - Summary of Working Session (February 12th)
 - Summary of Literature Review
 - Summary of AFSAR CFR Practical Work
3. Louvi Nurse Presentation
 - PowerPoint - Aboriginal Traditional Knowledge in SARA Implementation: An Overview of the Interim Operational Guidance Document
 - DRAFT 1 - Aboriginal Traditional Knowledge in *Species at Risk Act* Implementation - Interim Operational Guidance Document
 - Question/Answer Period

HEALTH BREAK

4. Elder Albert Marshall/Dr. Cheryl Bartlett Presentation
 - *“Integrative Science and Two-Eyed Seeing: Talking and Walking Together”*.
 - Question/Answer Period

LUNCH BREAK

5. Pamela Perreault
 - Use and Sharing of ATK
 - Question/Answer Period

HEALTH BREAK

6. CFR Presentations (Summary of Information collected)
 - Randy Billyboy - Tsilhqot'in National Government
 - Juanita Alec – Nazko First Nation
 - Andrew Meshue – Williams Lake Indian Band
 - Albert George – Saik'uz First Nation
 - Christina Ciesielski – Carrier Sekani Tribal Council
 - Cheryl Pierre – Tl'azt'en First Nation
 - Carl Frederick – Lheidli T'enneh
7. Discussion Period
 - Protocol Template Draft
 - Community/Elder comments