

AN INTRODUCTION TO THE ECOLOGY AND GEOLOGY OF THE NORTH HERO NATURE AREAS.

THE NATURE AREAS PROVIDE AN INCREDIBLE VARIETY OF NATURE'S BEST

Eleven HABITATS and one MICRO-HABITAT, or the natural places where animals and plants live together are found in North Hero in our Five Nature Areas.

The interpretive information which I use to identify each HABITAT at Pelots is paired with a bird which would be a way to remember each one. I have included at least one bird for each HABITAT. I also include pictures of two easy ways to identify trees- their bark and leaves.

Before looking at the HABITATS, consider thinking of the Nature Areas in an ecological way.

Chip Porter, 2025

PLEASE NOTE:

- Technical terms are ***ITALICIZED, CAPITALIZED AND UNDERLINED.***
- Throughout the first section of these pages, Geological time is vastly simplified. Also, the geological time being considered is only for the world of living plants and animals:
 - **Just the Ocean.**
 - **Before Dinosaurs.**
 - **Extinction just before dinosaurs.**
 - **The Age Of Dinosaurs.**
 - **Extinction ending some of the dinosaurs.**
 - **After Dinosaurs.**

Photo Credits:

Photographs of individual Birds are from Cornell; <https://ebird.org/explore>

Photographs of Trees are from Verginia Tech; <https://dendro.cnre.vt.edu/dendrology/main.htm>

Other photographs are ones I have taken or are credited.

NATURE IS A MULTISENSORY EXPERIENCE



SYNTHETIC THINKING:
ECOLOGY IS SYNTHETIC THINKING

Ecology is about the whole. A ***MOSAIC*** of life. A ***MOSAIC*** is a picture made up of little pieces called ***TESSERAE***. To appreciate the whole, you have to view the small pieces, the ***TESSERAE***, as part of the ***MOSAIC***. ***SYNTHETIC THINKING*** is bringing it all together,

SYNTHETIC THINKING:

1. *INTERDEPENDENCE* is when:

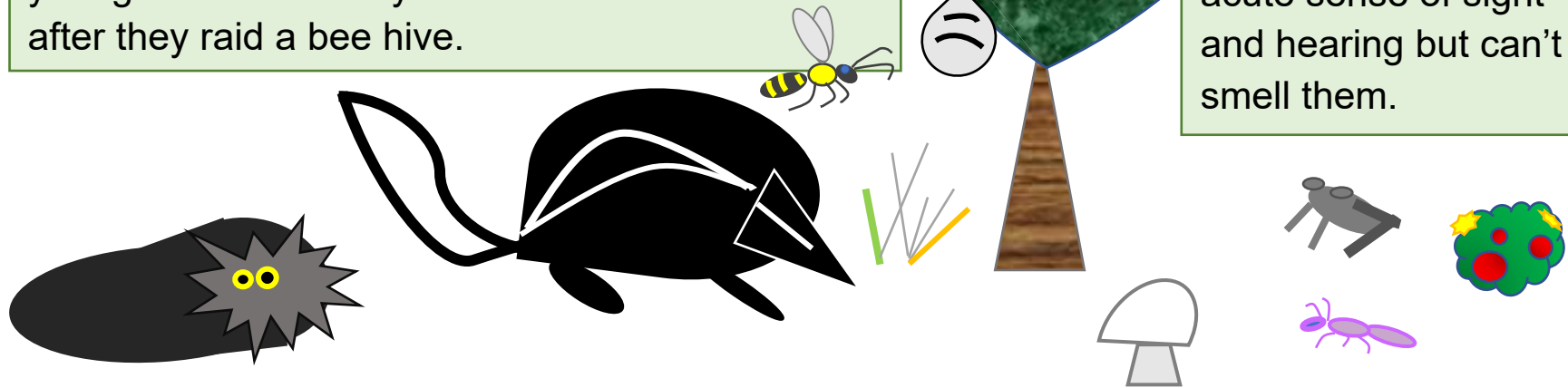
- **Organisms rely on each other.**
- **They are connected to one another.**
- **Changes in one population can affect others. Changes can have different causes:**
 - **WEATHER-** Spiny turtle nest flooding and egg mortality.
 - **CLIMATE-** Northward spread of (EECV) the mosquito born encephalitis virus.
 - **OVERPOPULATION-** Forest destruction from too many deer.
 - **DISEASE-** Emerald ash borer.
 - **HABITAT DESTRUCTION-** Meadows to housing developments.
 - **VOLCANOES-** Extinction just before the dinosaurs; 1800 and Froze to Death
 - **METEOR STRIKES-** Extinction which caused the end of most of the dinosaurs.
 - **HUMANS-** Extinction caused by humans. (aka The Sixth Extinction).

The Forest- Skunk Lunchbox

Skunks eat everything. They eat other mammals, insects, amphibians and worms. They eat plant leaves, roots, berries, fruit, and nuts. They also eat fungi, or mushrooms.

Skunks love honey. Mothers may teach their young to smear honey on themselves to eat later after they raid a bee hive.

Skunks' predators are owls. Owls have an acute sense of sight and hearing but can't smell them.



Skunks burrow dens in and under dead fallen trees.

Forest Floor

Soil

Skunks dig up the forest floor looking for food. This helps grow mushrooms.

NORTH HERO NATURE AREA *HABITATS*

- **WETLANDS**

- **Floodplain Forest**
- **Lakeside Floodplain Forest**
- **Vernal Pool**
- **Swale**
- **Swamp**
- **Marsh**

- **UPLAND MEADOWS**

- **FORESTS**

- **Cedar**
- **Mixed**
- **Maple**

- **LAKE**

- **Bay**
- **Broad Lake**

- **CLIFFS**

- **All five Nature Areas in North Hero provide a variety of experiences.**
- **I will focus on the eleven of the twelve *HABITATS* found at the Pelots Area. The vernal pool *MICRO-HABITAT* is only found at Camp Ingalls Butternut Hill.**
- **Because of the variety of habitats, Pelots has been designated as a premier birding hot spot with over 130 species identified.**

Five North Hero Nature Areas: Twelve Habitats

All five Areas offer
an interesting and exciting variety.



**North Hero
State Park** ○



**Foot Path on the
Island Line** ○



**Pelots Nature
Area** ○



**Camp Ingalls
Butternut Hill
Nature Area** ○

**Knight's Point
State Park** ○

FLOODPLAIN Forest- Spring lake inundation.

Lakeside FLOODPLAIN Forest- Spring lake inundation. The shale dam at shore holds water. THE FLOW OF WATER IS MAINLY FROM THE LAKE.

Floodplain Forest at Pelots



Lakeside Floodplain Forest at Ingalls



Courtesy of Lake Champlain Land Trust



Silver Maples



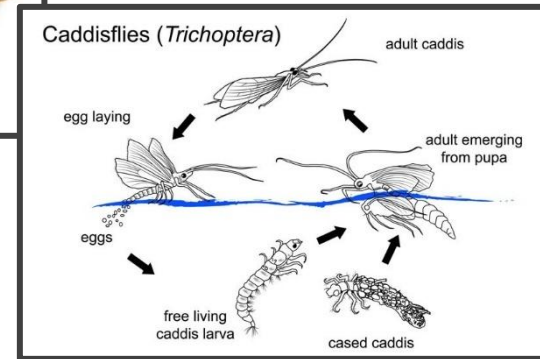
**You may find:
Mergansers
Silver Maples
Leopard Frogs
Swamp Iris**

There is a large Floodplain Forest at the North Hero State Park.

**VERNAL Pool- Spring pool. WATER DOES NOT FLOW THROUGH.
It is dry the rest of the year. No fish are present.**



Courtesy of BayNature.org



Courtesy of Friends of the St. Clair River



Courtesy of Vermont Center for Ecostudies

**You may find:
Salamander
Frogs
Caddis Flies
Fairy Shrimp**

SWALE Low wetlands from **SURFACE WATER RUNOFF WHICH OFTEN DOES NOT FLOW THROUGH.**



**You may find:
Willow
Turkey
Rabbits**

SWAMP- Wet lands with **SURFACE WATER WHICH CONSTANTLY FLOWS THROUGH.** **SWAMPS** adjacent to the Lake are subject to spring inundation.



Red Maple



Courtesy Vermont Fish and Wildlife

You may find:
Heron
Otter
Red Maples
Snapping Turtles
Water Lilies

Marsh Wetland areas which are **FOUND BETWEEN A SWAMP AND THE LAKE.**



You may find:
Redwing
Blackbirds
Beaver
Cattails
Beaver

**Upland MEADOWS OPEN FIELDS with grasses, wild flowers and shrubs.
Pelots also has apple trees.**



Courtesy of New York Times



Poplar

**You may find:
Orioles
Tree swallows
Poplar
Voles
Red fox**

Cedar Forest- Mature dense cedar trees.



**You may find:
Cedar
Chickadee
Grouse
Raccoon**

Mixed Forests- Mature maple, oak, hickory trees. Invasive disease and insects have killed most ash trees as well as the elm and chestnut trees.



Courtesy of Vermont Reptile and Amphibian Atlas



Where did this erratic come from?

You may find:
Bluejay
Oak, Maple, and
Hickory
Toads
Trout Lilies

Maple Sugarbush- Sugar maples.



**You may find:
Sugar maple
Woodpeckers
Deer**

Bay- Shallow protected inlet.



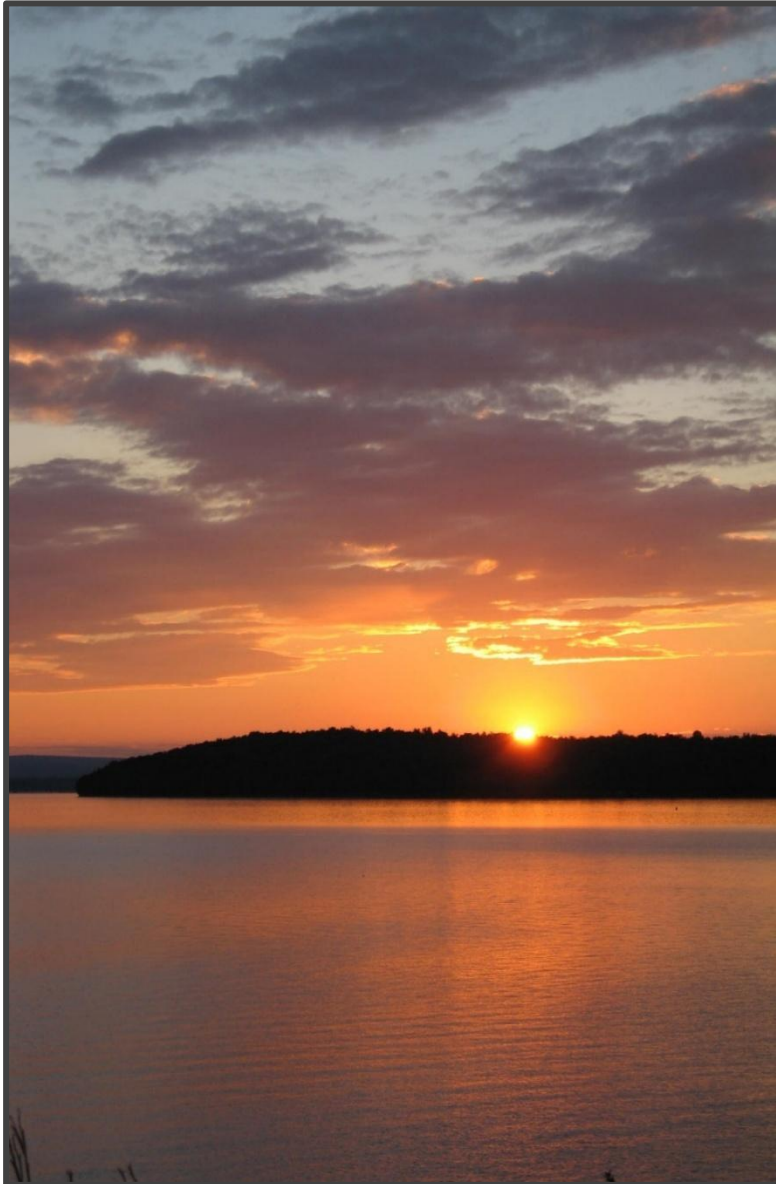
There is a very interesting beach walk along the bay at Knight's Point.



**You may find:
Osprey
Turtles
Painted Turtle
Northern pike**



Broad Lake- Open water.



- You may find:**
- Eagle**
 - Osprey**
 - Ring billed gull**
 - Smelt**
 - Bass**

Three Interesting Lake Champlain Wonders.

- **CYANOBACTERIA**

CYANOBACTERIA is a bacteria found in Lake Champlain, as well as all over the world. It contains cyanide which is a poison, especially for children playing in the lake when the cyanobacteria is present. It is often mistakenly called blue green algae.

CYANOBACTERIA over the long span of geological time is responsible for creating much of the Oxygen in the atmosphere we breathe.

- **LAKE INVERSIONS**

Twice a year, Lake Champlain has two INVERSIONS or turn overs, top to bottom, bottom to top. This is the result of water on the bottom rising to the surface in Spring or in Fall, with the water on the top sinking to the bottom. This is important because it replenishes the oxygen in the water needed by plants and fish.

When surface water becomes denser than the colder water at the bottom, it sinks. Unlike most other substances which become denser when they cool, colder water including ice is less dense than water at 39° F. The coldest, least dense water sits at the surface, and freezes. In early Spring as Lake warms, the water at the bottom rises to the top, and the top layer sinks.

- **LAKE SEICHE**

The SEICHE (say sh) is an underwater current. It is created by the wind forcing the surface water in the wind direction. The water below the surface rebounds and flows back.

Wind can sometimes raise the lake level by more than twelve inches.

Cliffs- Tall vertical shale land forms.



You may find: Ravens, Swallows, Kingfishers, Cedars

These cliffs at Pelots are not accessible except by boat. The cliffs at Butternut Hill have elegant stone steps down to the beach, with incredible views of the broad lake and the Adirondacks.

Spring Time Glory- Wild flowers.

For a short time in the spring time, the woods trails are lined with flowers. They are sometimes referred to as ephemerals- lasting for a very short time.



WILD FLOWER SCOURGE!

Garlic Mustard was brought from Europe as an herb. It overpowers native plants for light, water, and nutrients. It's roots system produce chemicals that prevent growth of other plants. The only control is to pull it out by the roots before it goes to seed.

GEOLOGY

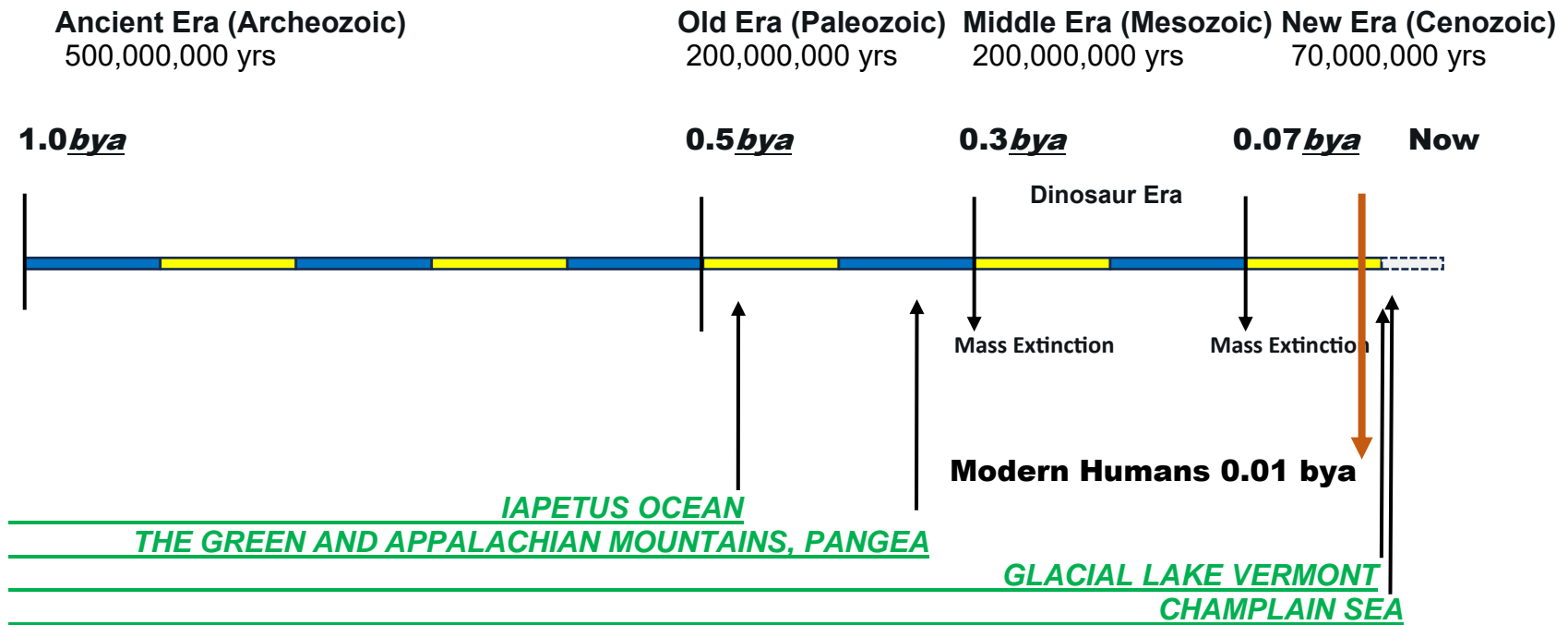
- **The Earth is very, very, very old.** The Earth is 4.5 billion years ago, or 4.5 bya. The geology in North Hero that we can see is only from the last one half a billion years.
- **Land moves.** There are sea creature fossils on top of Mt. Everest.
- **There are sea creature fossils in the Lake Champlain Valley.**
 - They are from the IAPETUS OCEAN reef 0.5 billion or 500,000,000, or .05 bya years ago
 - They are from the CHAMPLAIN SEA 10,000 years ago, or .0001 bya.
- **Land, plants, and animals EVOLVE or change or go extinct.**

Four geological events in the Lake Champlain Valley:

- **North Hero was on the shore of the IAPETUS OCEAN.**
The IAPETUS OCEAN will become the Atlantic Ocean. On the shore, plants and animals are buried by runoff from the Adirondack Mountains. 0.5 bya
- **The Green and Appalachian Mountains are created.**
PANGEA occurred when all the continents crashed together to become a single continent. The ocean floor was pushed up between them. 0.3 bya
- **Glacial Lake Vermont was formed from the fresh Glacial melt water.**
The glacier covered most of North America. Lake Vermont was contained by an ice dam near the St. Lawrence which broke suddenly. Glacial Lake Vermont was almost 300 feet higher than Lake Champlain. .0001 bya .
- **Champlain Sea formed when the Ocean flowed in where the Glacier had been.**
When the glacial lake dam broke, a salt water inlet was formed. It went from the Atlantic Ocean to Lake Ontario and as far south as Rutland. The weight of the glacier made Champlain Sea lower than the Lake today. The Lake is “rebounding” from the weight, and is still rising today. .0001 bya.

GEOLOGICAL TIME LINE OF GEOLOGICAL ERAS:

In this much-simplified version, the last one billion years are divided into ten units. Each is approximated to be 100,000,000 billion years, or 0.1 *bya*.



North Hero was on the shore of the IAPETUS OCEAN.

The IAPETUS OCEAN will eventually become the Atlantic Ocean. On the shore, plants and animals are buried by runoff from the Adirondack Mountains. 0.5 bya



Trilobite fossil. Trilobites are a part of a group of animals that includes insects, spiders and shrimp. Fossils can easily be found in some beach shale in North Hero, but not on all beaches.



The Green and Appalachian Mountains are created.

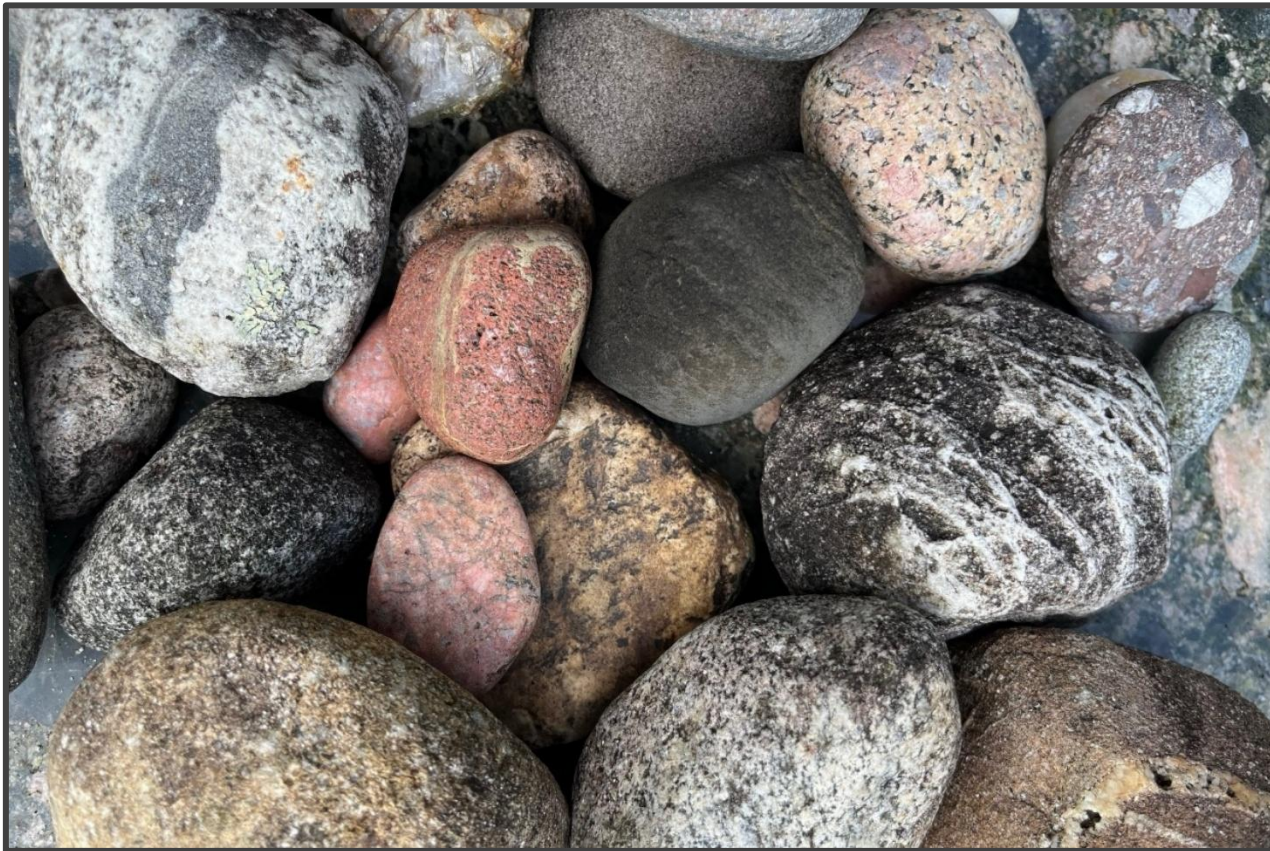
PANGEA was formed when all the continents crashed together to become a single continent. 0.3 bya



The Green and Appalachian Mountains originated from lava at the bottom of the IAPETUS Ocean. When the continents merged to form PANGEA, the mountain range became part of the new continent. When the continents broke up, part extends from Georgia to New Brunswick, Canada. Another part is in Scotland and the end of the range is in Norway.

Glacial Lake Vermont was formed from the fresh Glacier melted.

The glacier covered most of North America. Lake Vermont was contained by an ice dam near the St. Lawrence which broke suddenly. Glacial Lake Vermont was almost 300 feet higher than Lake Champlain.



GLACIAL ERRATICS-

Rocks carried far from its origin by the Glacier and deposited in the woods, in fields and on the shores of North Hero.

Glaciers removed all evidence of dinosaurs and before dinosaurs that were most certainly here before the Glacier.

Champlain Sea formed when the Ocean flowed in where the Glacier had been.

When the Glacial Lake dam broke, a salt water inlet was formed. It went from the Atlantic Ocean to Lake Ontario and as far south as Rutland. .0001bya.



Courtesy of Vermont Public



Courtesy of CrowsPath

A beluga whale fossil at UVM. It was found in Charlotte and lived in the Champlain Sea. Live whales can be seen off the Gaspé Peninsula Gulf of St. Lawrence, Canada today.

The weight of the glacier depressed the Champlain basin. When the glacier melted, Sea water rushed into the low area. The Lake is still “rebounding” or rising today; about 1 1/4 inches every ten years.

The Labyrinth Trail; A special trail.

The Labyrinth Trail at the Pelots Nature Area was designed using the Golden Ratio.



The Golden Ratio a mathematical relationship.

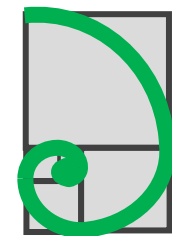
$$\phi = \frac{1 + \sqrt{5}}{2}$$

It shows the relative size between two or more values. 0, 1, 1, 2, 3, 5, 8, 13... used in the Pelots Labyrinth.

The Golden Ratio describes many natural forms, such as the nautilus shown from the Goodsell Ridge Fossil Preserve in Isle La Motte.



Isle La Motte Fossil
Courtesy of Lake Champlain Land Trust



A geometric representation of the Golden Ratio

The spiral used in the labyrinth is an ancient symbol found in many different cultures and religious traditions. Christians, Jews, Muslims, Hindus, Buddhists, Taoists, and secularists. Labyrinths spiral walks can be used for reflection.

The Town of North Hero is fortunate to have our Nature Areas.

The Pelots Nature area lands is on land created by a Revolutionary War “Bounty Land Grant”. This payment awarded to Revolutionary soldiers by Governor Thomas Chittenden in 1779. This parcel was granted to the Town and has been held by the Town since.

Many years ago, Helen Murdock promoted the idea of Town recreation. Irving Blackwell and Gordon Lowe were instrumental in purchasing Camp Ingalls from the 4H. Doug Tudhope envisioned a wild life corridor. I was privileged to work with Doug to encourage this. Linked natural areas now include protected wetlands and conservation of critical habitats. A unique Consortium of the Town, the TNC, LCLT, and the State of Vermont preserve these lands. It was made possible by the generosity of several individuals. It is maintained by funding from the State of Vermont, and the Town’s people of North Hero.

In 2015, Pelots was named a “PREMIER FOREST” by the Vermont County Foresters. A “PREMIER FOREST” is a high honor. It was given in recognition of the leadership that Mary Jo McCarthy and I provided to conserve the land, provide interpretive education and outreach, artwork, and develop access to the Nature Area.

Especial thanks to North Hero Library and the Library Director, Caroline Korejko.

This presentation was written and created by Chip Porter, Vermont Master Naturalist, with Ann Porter, editor.

Conclusion: SYNTHETIC THINKING ABOUT RAVNENS

A couple of years ago in early Spring, but after Ice Out, the ravens who had nested in the Cliffs at Pelots in late winter were making a great commotion. Well ravens make a lot of noise, but this went on for some time. We tried peering over the cliff face but couldn't see the cause. We got our canoe out and paddled down under the Cliffs. There still were floes which brushed the boat. The sky was mist grey and the light wind brought a welcome lake smell of moisture after the long, time of dry arctic air.

Along the cliff face we could see a family of ravens all circling about. Even though at other times of the year when ravens are seen in pairs or singly unlike crows, ravens are social animals. Pairs often go out scouting for food for their clan which is made up of several Families. Young ravens stay with their parents for several years and associate with their clan. Young ravens are taught an extensive vocabulary. The adults introduce them to Family and Kinship associations. Ravens learn to cooperate in scavenging, hunting, and sharing food with the clan. They become familiar with the clans' large geographic range. The young also learn tool making. Young ravens also hang out with other young ravens. But that day, the parents and family with several new fledges and several adolescents were flying around the cliff and talking all at once. All but one.

The one raven was scaling the cliff- up, down, across. It was using its beak, wings, and claws in an amazing feat of rock face climbing. The sheen of its raven black coat contrasted to the black ancient shale. It became immediately clear what was happening. The parents and siblings were exhorting the sole remaining unfledged raven to fly. The calls varied between what seemed to be the raven version of 'Do it!' to 'We did it, you can do it too!' From the perspective of the unfledged, we could understand why it was taking a lot of courage. Those are tall cliffs.

We watched for a long while, but eventually wanting to quit while we were ahead and still dry, we left. Later that afternoon, we walked by the cliffs. The young ravens were perched up in the trees talking loudly about the event or some sibling disputation. Perhaps the two who had taken up a position of silent sentinels were the parents, exhausted by the whole thing.

Interspecies intelligence is hard to fathom but the more we learn, the more we become receptive to evidence to reasonably conclude that we share a commonality of sentience with them.