How to develop and deliver an interpretive walking tour in your region: A guide for SAM communities in Newfoundland and Labrador

SAM Geocaching event in Come By Chance, Fall 2013

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Stewardship Association of Municipalities Inc.

Contents

Introduction

SAM Information

The Stewardship Association of Municipalities (SAM) is a non-profit organization representing all of the the municipalities in Newfoundland and Labrador (NL) who have made a formal commitment to conservation by signing an agreement to protect wetlands, species at risk habitat, or important coastal areas in or near their communities.

Purpose

The objective of this document is to offer a guide for a person providing an interpretive tour in a SAM community. The user can draw on the relevant information in this booklet to complement their existing knowledge of the area to provide education for various audiences.

Acknowledgements

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I would like to thank Danielle Fequet (Ducks Unlimited Canada) and Jonathan Sharpe (Wildlife Division) for their guidance throughout this project. Furthermore, the following people should be recognized for their contribution and feedback for various parts of the text, species selection and design; Andrus Votik, André Arsenault, Claudia Hanel, Ducks Unlimited Canada, Mac Pitcher, Robert Leblanc and all of the materials listed under Additional Resources.

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How to use this guide

This guide is divided into several sections:

Planning – basic information on how to start planning a walking tour.

Interpretation – ideas on how to deliver a walking tour.

Activity Ideas - activities to compliment a walking tour.

Biological Background - information to increase the tour guides' biology knowledge.

Additional Resources - more resources to review such as field guides, websites, and lists of environmental resources.

Appendix – specific information regarding habitat and basic guides to help identify the most common plants and wildlife in this province. These guides are divided into three sections: forest, wetland, and coastal habitat types. The information in the guides was referenced from the documents listed in the additional resources section. Pre-existing materials such as aquatic invertebrate guides are also attached.

Throughout this document there are references to particular species (e.g. plants and animals). If the species mentioned are found in the guide section of the Newfoundland and Labrador chapter, the species name is coloured according to the habitat type it is generally found in as follows: **forest**, **wetland**, and **coastal.**

An inventory of education activities and materials has been gathered into a digitial folder called SEED – *Stewardship Education Engagement Database*. Contact a SAM representative to get access to this collection. Many of the ideas discussed in this manual are expanded upon within SEED.

Planning

Planning a nature event is an ambitious and rewarding project. Below are suggestions to follow when organizing an event to help make it a success.

Site Preparation

First, obtain permission to use the area. Make the land owner or land manager aware of the specific activities that will happen on their land. Walk the entire area and scan the vicinity for actual risks (e.g. broken boardwalk boards) and perceived risks (e.g. falling into water). Note the time it takes to walk the trail or the area the event will be covering and note the terrain. Make the necessary changes to the original plan to account for a particular demographic, such as young children or seniors. Also, find out what facilities are nearby that the group can use such as parking spaces, garbage bins, gazebos, and washrooms.

Prepare Participants

Before the event, provide the audience with the following information:

- Event location details (meeting location, end location, terrain, difficulty, etc.)
- Items to bring (water bottle, binoculars)
- Duration of the event (start and end time)
- Appropriate clothing (dress for the weather)
- Target age (if your event is targeted to minors make sure you have parental permission and make sure there are enough adults to help)
- Potential risks and hazards (rough terrain, loose boards, etc.)

Research

Each SAM community has a **Habitat Conservation Plan** that outlines the policy put in place to protect the town's wildlife habitat and provides an understanding of what exactly SAM is trying to protect. This material can be the basis of the walking tour.

For instance, if one goal of the conservation plan is to protect a particular species of bird, it would be important to mention on the walk reasons to protect the bird, the habitat type, and life history of the bird. From that conversation, discussing habitat enhancements taken would be a logical topic to elaborate on measures conducted to protect the bird. Such actions could include putting up nesting boxes, boardwalks and other physical structures, development plans, and so forth.

Becoming familiar with the local history of the wildlife area is a crucial step in preparing for an interpretive walk. Furthermore, local naturalists and environmental organizations in the area can provide specific information or could partner with the event. If it is not possible to contact anyone specifically, there are many online resources that you could review for wildlife examples in your community (See the **Additional Resources** section).

Interpretation Ideas

Ultimately, the goal of the nature walk is to raise awareness of the stewardship agreement and engage members of the community in conservation activities. It is important to make eye contact, keep it interactive, be flexible, and use a variety of learning techniques.

Keep it Interactive

Ask the participants questions to gauge their level of knowledge and let them feel involved during the activity. Furthermore, compare and contrast particular organisms and habitats to practice identifying, classifying, teaching naming systems, and key characteristics. Example of exploratory questions and compare and contrast questions are in the **Additional Resources** section. Use a funny story or joke to convey some of the messages.

Be Flexible

During the tour it may become apparent that the original content planned is not suitable for your group. Ask the participants what they want to learn and incorporate their questions into the activity to make it worthwhile and interesting to them. Also, the weather can change drastically or site conditions can become hazardous without notice which could cause the event to be cut short, or a new location (such as inside), may have to be figured out on the spot. A good idea is to have a back-up plan in case of bad weather.

Use All Senses

Instead of directly telling participants the facts you want to convey, make use of all five senses to demonstrate your concepts.

Sight: Show the group what you are talking about. Take them to specific sites if possible.

Touch: Let the audience feel objects in their environment such as moisture in the soil, and plant texture. However, don't disturb species at risk, and their habitat. If at a park check the rules before removing or picking anything.

Smell: Let participants smell the various fragrances of the flowers, bark, and so on.

Taste: Become familiar and confident with the edible and poisonous plants in the area. Show the group a few examples and let them taste the different berries if it is not a species at risk. Be very careful with edibles; do not encourage a group of children to eat anything unless their parents are there.

Hear: Get the participants to listen to different sounds of birds and other animals in the area. When the group hears a bird or squirrel, let them listen and see if they can pick out the calls later.

Activity Idea: Compare **black spruce** (*Picea mariana*) and **balsam fir** (*Abies balsamea*) trees. Show a twig from both species; let the participants roll the needs in their hand. Black spruce needles typically have edges while the balsam fir needs feel flat. Show the resin blister on a balsam fir trunk and pop one. Allow the participants to smell the plants such as twigs from yellow birch, or **dogberry** flowers.

Bring Teaching Tools

Pictures, audio files/speakers, field guides, hand lens/magnifying glass, and binoculars are great items to take on your walk. Useful **pictures** could include an organism you may not get to see on your trip but lives in that particular habitat or a different stage of its life cycle that the participants may see when they visit another time. Furthermore, **audio files and speakers** are great to have to show them the different bird and amphibian calls. **Field guides** can show the audience how to identify organisms on their own and the tour guide can learn new ones as well. A **hand lens or magnifying glass** could be used to show the group smaller details such as plant, fungi, or invertebrate characteristics. To recognize features or animals at a distance, use **binoculars** or a **scope.**

Activity Ideas

There are many different activities you could include during your interpretive walk. Below are some suggestions that may work in your community.

Clean–up

A clean–up day in the area is a simple activity to organize and allows participants to become stewards in their own community. The basic materials you need are gloves; garbage bags and a plan for what to do with the garbage that gets collected. There are various ways to conduct this activity. Following the walk and clean-up, a BBQ is a good idea to thank the community for coming out and cleaning up.

Scavenger Hunt

A scavenger hunt could be a competitive or non-competitive activity to engage participants. This event requires more planning then a general walking tour. This event could consist of hidden clues about the community's stewardship agreement and wildlife habitat along the trail. It could be a contest where the team who finds all the clues first wins or could be delivered as a walking tour where the guide reads the clue and the participants discuss the topic in a group. A **geocache hunt** is a variation of a scavenger hunt where participants use a GPS (geographic positioning system) to track down the clues (caches) during the activity.

A non–competitive **geocache event** was held in Come By Chance in the fall of 2013. GPS units were provided to participants with instructions. The groups used the GPS to find the cache (clues/treasures) that were hidden along the walking trail. Each cache had a letter and the participants had to unscramble the letters at the end to complete the activity. Activity notes are found in the SAM SEED database.

Birding

Provide participants with binoculars and or let them bring their own. Ensure that each person knows how to focus their binoculars and when a bird is spotted, make notes as a group of its physical and behavioural characteristics. These could include bird songs, calls, colours, size, or nesting habitat. Show the group how to use a field guide to help identify a bird. If possible, invite an expert to lead this event or set up a "scope" to view areas that are frequently visited by birds. Participants could make note of the birds and other wildlife they find and submit their observations to the various online databases (see **Additional Resources** for examples). For more information on birding, see the **Bird Basics** section.

Action Projects

Participants could work together and enhance the habitat for wildlife and visitors. Activities could include building nest shelters/boxes, boardwalks, gazebos, native tree planting, and invasive species removal.

Biological Background

The biological background you provide to your audience depends on many factors such as participants' ages, interests, location, time of year, and so forth. The following sections contain relevant information from field guides and nature books from the **Additional Resources** section.

Below are general biology topics to help you understand and deliver your nature tour.

Naming

Scientists give every different organism a unique **scientific name**. This name is composed of two parts using Latin grammar to eliminate confusion of an organisms name across the globe. For many organisms, such as mammals and birds, it is okay to refer to them using common names. However, for most, it is poor practice, particularly in plant identification. Common names are not unique and are ambiguous, unlike scientific names. For instance, what people recognize as a **Blue Jay** in Newfoundland would be the same in British Columbia. However, most people in Canada call ***Cornus canadensis***, **Bunchberry** while many people in the province call it **Crackerberry**.

A scientific name refers to an organism's genus and species. **Species** is the most specific rank usually defined as an organism capable of interbreeding and producing fertile offspring, while genus is a broader category of an organism's species. For example, wood and green frogs belong to the genus *Rana*. Note that scientific names are unique while individual species and genus can be the same for instance, ***Clintonia borealis*** and ***Linnaea borealis*** are two different plants.

One of the broadest ways to categorize living organisms is by kingdom. Scientists are constantly changing the groupings, but there are commonly 6 different recognized kingdoms: Animalia, Plantae, Fungi, Protista, Archaea, and Bacteria. Each kingdom can be further subdivided by phylum then class, order, family, genus, and species. For instance, the scientific classification for humans is Animalia, Chordata, Mammalia, Primates, Hominidae, Hominini, *Homo*, *H. sapiens*.

Activity Idea: Help the group learn one new scientific name.

Activity Idea: The following phase can help remember how organisms are categorized "**K**ing **P**hillip **c**ame **o**ver **f**or **g**ood **s**oup. The first letter of each word is the same as the first letter in the scientific classification discussed above.

Classroom Idea: Lesson 3, Specialization and natural selection and Lesson 4: Who am I? from Ducks Unlimited Wetland Ecosystems Resources. See the SAM SEED Database or http://www.ducks.ca/education/for-educators/resources/

Biomes, Ecosystems, and Habitats

Biomes are regional groups of specific plant and animals that are best adapted to that particular environment. The environmental factors that define a biome are usually climate, geology, vegetation, and soils. There are terrestrial (land) and aquatic biomes. Terrestrial biome examples are rainforests, temperate deciduous forests, boreal or Taiga forests, grasslands, savannas, deserts, and tundras.

Ecosystems refer to abiotic (non-living) components such as rocks, air, soil and biotic (living) components such as fungi, animals, plants that are interconnected in a system. The term habitat refers more specifically to where organisms live.

Biodiversity

Biodiversity has many definitions. Most people only think of this term as meaning having lots of different species in a given area. However, it is important to think about the populations of each species as well and the variation of life at a smaller scale (genetic) or larger scale (ecosystem). Biodiversity can be negatively affected by species loss or invasive exotic species.

Activity Idea: Discuss with the group food web examples. For instance ask the group what a particular organism eats and what eats it. Then elaborate on the implications of what would happen if every one of those organisms were removed from this ecosystem. (The predators would not have any food and the prey populations would go up.) Furthermore, explain why it is necessary for an ecosystem to contain a variety of organisms in case this did happen.

Many species are designated as **species at risk** at either a federal or provincial level. There are 5 categories of species at risk under federal jurisdiction. The federal governments' species at risk public registry defines the ranks as

- **Extinct**: a wildlife species that no longer exists
- **Extirpated:** a wildlife species that no longer exists in the wild in Canada, but exists elsewhere in the wild
- **Endangered**: a wildlife species that is facing imminent extirpation or extinction
- **Threatened**: a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction
- **Special concern**: a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

In Newfoundland and Labrador there is an "Endangered Species Act" to provide special protection for plants and animal species considered to be endangered, threatened or vulnerable (special concern) in the province. The provincial wildlife division enforces this act. Presently there are 35 species, subspecies and populations listed under the Act; however, this number can fluctuate as new research is completed and populations recover.

Activity Idea: Find out if there are any species at risk in your community. If there are, find out ways you can help populations recover. If not, discuss ways to prevent any species from becoming at risk.

In contrast to native species found in the province, there are **invasive exotic species** as well. Invasive exotic species out compete the native organisms for resources. Japanese knotweed (*Fallopia japonica*) is considered one of the most invasive species in the world and is a native plant to parts of Asia. Japanese knotweed was introduced to North America and Europe, and is found growing throughout this province.

It grows in a variety of habitats, commonly in open areas, road sides, moist, and wetland regions. This plant resembles bamboo and is often transplanted due to aesthetic appeal and hardy characteristics. However, it can spread very rapidly through its underground stem system (rhizome) that sprouts roots. It can damage concrete foundations and roads.

Activity Idea: Plant native species, remove invasive ones, or monitor particular species. Consult a wildlife professional for guidance.

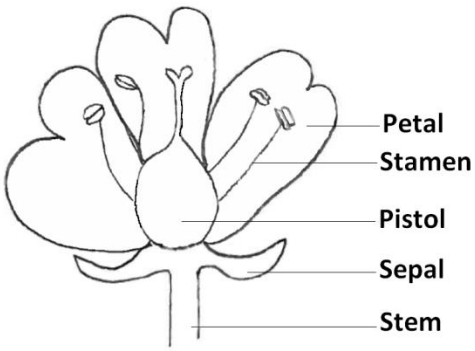
Activity Idea: Explain to the group the consequences of removing and relocating an organism. The organism may not survive or could take over their new habitat.

Plant Basics

Terrestrial plants are considered **vascular** plants if they have an extensive system of tubes that transport water and nutrients. Such plants include seedless vascular plants such as pterophytes, ferns, and their relatives; gymnosperms, conifers; and flowering plants known as angiosperms. Plants that lack these tubes are considered **nonvascular**, and include bryophytes such as mosses, liverworts, and hornworts.

Wild Flowers

Wild flowers are angiosperms. The seeds of these plants develop in chambers called ovaries within a flower and then mature into a fruit such as a berry. Flowering plants are often divided into groups: dicotyledons (2-leaved seedlings) and monocotyledons (1 –leaved seedlings). Monocotyledons usually have parallel veined leaves, fibrous root systems and floral parts usually in multiples of threes. Examples of monocots are grasses, sedges, rushes, lilies, and orchids. Dicoctyledons usually have netlike veins on the leaves, usually a taproot, and typically have floral parts in multiples of four or five.



A flower is composed of many intricate parts often missed with observation of just human eyes. Often the most obvious part of the flower is the petals. The petals often guide pollinators such as bees to the male parts (stamen) and to the female parts (pistol) of the flower. Attached to the flower stalk are modified leaves called sepals. Sepals protect the flower before flowering season.

Activity Idea: Often, sepals and petals are hard to differentiate when the flower is in bloom. Look at a flowering ***Cornus canadensis*** (commonly known as **Crackerberry** in NL) plant and ask what colour and how many the petals there are. Most will answer the large four white petals, however those are the bracts, specialized leaves protecting reproductive flower parts! The petals are actually quite small, creamy white in colour, and occur in between the bracts.

Grasses, Sedges, and Rushes

Grasses, sedges, and rushes are examples of monocots (see above for description). These plants can be very difficult to identify. Generally, sedges have triangular or square solid stems, rushes have round solid stem, and grasses have a cylindrical or slightly flattened hollow stem.

Trees and Shrubs

Each field guide suggests a different way to identify a plant. Todd Boland in his field guide, *Trees & Shrubs of Newfoundland and Labrador*, divides trees /shrubs into two categories, **coniferous** and **deciduous**. Deciduous trees are generally broad-leaf hardwood trees that lose their leaves in the fall and winter. Examples of deciduous trees are maples (*Acer* spp.), **birch** (***Betula*** spp.) and trembling aspen (*Populus tremuloides*). Coniferous trees, often referred to as evergreen or cone- bearing species, have needle like leaves that do not fall off during the winter. Cone-bearing species are gymnosperms (from the Greek *gymnos*, naked, and *sperm*, seed). Gymnosperms seeds are not enclosed in chambers like angiosperms (flowering plants). Examples of coniferous trees in Newfoundland are spruce (*Picea* spp.), pine (*Pinus* spp.) and **fir species** (***Abies* spp.).** However some coniferous trees are deciduous trees. For example, **tamarack/larch** (***Larix laricina***) have needle shaped leaves that the fall off during the winter months.

Activity Idea: Compare **black spruce (*Picea mariana*)** and **balsam fir (*Abies balsamea*)** trees. Show a twig from both species; let the participants roll the needles in their hand. Black spruce needles typically have edges while the balsam fir needles feel flat. Show the resin blister on a balsam fir trunk and pop one. Allow the participants to smell the plants such as twigs from yellow birch, or **dogberry** flowers.

Broad-leaf type

Furthermore, a deciduous tree/shrub (broad-leaved) can further divided by single/**simple** leaves (white birch, *Betula papyrifera*), on each stem, or **compound** , with small leaflets combined to form a larger leaf (e.g. **American mountain ash**, ***Sorbus americana***).

Photograph showing ***Sorbus* spp.** compound leaf.

Photo: John Maunder

Activity Idea: Show your group a **dogberry (*Sorbus* spp.)** shrub and ask them to identify the leaf. Show them that the leaf is a compound leaf made of leaflets (small leaves).

Leaf arrangement

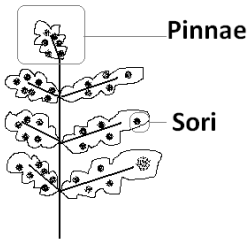
There are three different types of leaf arrangements: opposite, alternate or whorled. Opposite arrangements are when a pair of leaves are divided by the branch in the middle such as maple species (Acer spp.). Alternate arrangement include **birch** species (***Betula* spp.**), where the leaves alternate on either side of the branch. Whorled arrangements contain at least three leaves that grow around the stem at the same point, such as sheep laurel (*Kalmia angustifolia).*

Alternate arrangement	Opposite arrangement	Whorled arrangement
		

Fern and Fern Allies

Ferns belong to the group of seedless vascular plants called pterophytes. These plants are able to reproduce through spores rather than by seeds like most other flowering plants. These plants undergo two different developmental stages before a new recognized fern is displayed. The spores contain the sexual phase of the fern's life and the "leafy" stage producing these spores. Ferns are recognized by their green leaves and stalk called a **frond**.

To identify a frond it is important to look at how the frond is divided and the shape of the leaflets (pinnae). The subdivision of one pinnae is called a pinnule. Often the spores are found in **sori** under the fronds pinnae or as a different looking fertile fronds that are typically long structures next to the sterile fronds (i.e. **Cinnamon fern**).



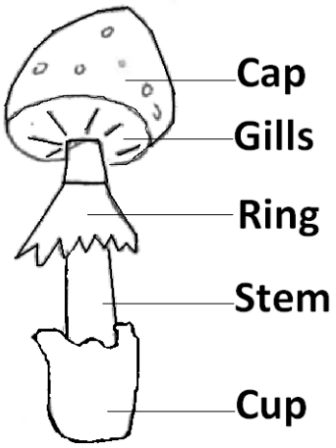
Activity Idea: Use a hand lens to show the ferns sori.

Fungi Basics

Organisms that belong to the Kingdom Fungi cannot make their own food like plants. Fungi absorb their nutrients using a network of tiny individual filaments called hyphae which collectively are named mycelium. Fungi have different roles in ecosystems such as decomposers (saprophytes) that break down dead organic material, parasites that absorb nutrients from living hosts, or mutualists where the fungi and the host both benefit by providing either nutrients, minerals, and or sugar to one another. These roles are often referred to as a mycorrhizal relationship and are commonly associated with a particular species of plants.

Mushrooms

Mushrooms are the reproductive part of some species of fungi and release spores instead of seeds. Identifying mushrooms can be a difficult task. Important mushroom characteristics to make note of during identification are the shape and colour of the cap, gills, stalk, ring (see below), spore print (described in most field guides), habitat, or substrate. Many mushrooms are poisonous, so do not eat unless you are certain of the species.



Developing mushrooms are covered by two veils; one that covers the entire mushroom and one that covers the gills. As the mushroom is growing the veils break and often disappear. Remaining veil tissues are useful in identification. For instance, remnants may be found as flakes or warts on the cap or tissue around the stalk, often called a ring.

Mushrooms are often grouped by the appearance of the structures found under its cap. Common groups are gilled-lined surface, boletes-spongy surface, and toothed-spiny surface.

Activity Idea: It is estimated that Newfoundland and Labrador has approximately 2000-8000 mushroom species. Thus, it is helpful to get an experienced mushroomer to teach you about mushrooms. Contact NL foray for potential help.

Lichens
Lichens contain two organisms; a fungus and a photosynthetic microorganism (an organism that obtains energy from the sun, such as a green algae or cyanobacteria). Lichens are usually named after the fungus. It is believed that lichens are an important indicator of air quality. Some lichens are more sensitive to air pollution then others. For instance, foliose lichens, (leafy appearance) have more surfaces exposed to the air than crustose lichens (paint-like appearance). Lichens do not disappear in the winter, thus they are exposed to the elements all year long which allow the organism to easily accumulate toxins in their body called a thallus. In addition to the body (thallus) types previously discussed (foliose and crustose), lichens can be classified as filamentous (hair-like), fruticose (branched), and squamulose (scale-like). Sometimes, lichens reproduce asexually through soredia structures via wind dispersal or isidia, outgrowths of the thallus that break off. Many lichens reproduce sexually through spore-producing structures called apothecia, perithecia and pycnidia.

Invertebrate and Vertebrate Basics

Invertebrates are animals (Kingdom Animalia) that do not have a backbone, while animals that have one are considered vertebrates. Examples of familiar invertebrates are dragonflies, mussels, beetles, worms, etc. Some invertebrates are herbivores, omnivores, carnivores, and decomposers, thus they are an important component of their ecosystem. Vertebrates are animals that do have a backbone, such as amphibians, birds, and mammals.

Lepidopterans
Butterflies, skippers, and moths are all examples of invertebrates and belong to the Lepidoptera order. These organisms all have modified hairs called scales covering their bodies and wings, and a proboscis, an elongated mouthpart appendage for feeding through a suction mechanism. Butterflies and skippers are diurnal, active during the day, while butterfly's hold their wings vertically at rest and have a clubbed antennae, while skippers have a hooked antennae and hold their forewings separate from their hindwings. Moths are nocturnal, and their antennae are threadlike, similar to feathers, and they keep their wings horizontal when resting.

These insects all undergo **metamorphosis,** a process where the animal transitions from one body structure to another. This group of organisms begin their lives as eggs and hatch into larvae (larva is singular), commonly known as caterpillars. Larvae continue to develop and sequence through a number of stages called instars. After this phase, larvae develop into pupae which usually attach to vegetation or burrows underground. A moth's pupa form is referred to as a cocoon, where the pupa is enclosed in a silk case while butterfly's pupa form a hard skin referred to as a chrysalis. During this stage, the organism is maturing into its adult body structure as a butterfly, skipper, or moth. Depending on the weather conditions and species, Lepidopterans will go through multiple generations before the winter.
During the winter in Canada, Lepidopterans are often in a dormant state in any one of their life stages. However, most adults do not survive because of cold temperatures. Many, however, migrate to warmer areas such as the southern United States and Mexico, such as the monarch butterfly. Monarchs depend on habitats found in Canada, the United States, and Mexico, thus all three countries joined together to develop the "North American Monarch Conservation Plan", which outlines goals and actions to conserve monarch habitats and flyways.

Odonates

Dragonflies and damselflies are also invertebrates that belong to the Odonata order. Adult dragonfly eyes often touch, or nearly touch, and their wings are open or horizontally when resting, while adult damselfly eyes are fully separated and their wings are held together or vertical when resting.

Odonates mate in flight, and are often seen flying in tandem. After mating, the female lays her eggs in vegetation, over open water, and sometimes into the water itself. Unlike Lepidopterans, these organisms do not have a pupal or larval stage. The eggs develop into a nymph stage. They hatch from their eggs as nymphs which are just a small version of mature nymphs. The nymphs are characterized by a labium, a lower lip that is specialized to capture prey for food. Damselfly nymphs are longer and slender and have three long, tail-like gills, while dragonfly nymphs are smaller and broader, with no external gills. They molt several times, getting larger each time until they are mature nymphs. Dragonfly nymphs can grow to large sizes for an insect (up to 5 cm in length). Mature nymphs will crawl up the stem of a suitable water plant, out of the water and change from an aquatic immature insect into an adult insect. The adult odonate emerges from the skin of the larva; this discarded skin is called the *exuvia* and can be seen still clinging to stems long after being discarded. The body and wings of the dragonfly grow rapidly as it pumps fluids to them. After a while (it can be more than two hours) the adult will be ready to fly. It will hunt and often eat on the wing, and most importantly, it will look for a mate. The odonate life cycle may take between 1–5 years to complete depending on the species. However, the adult stage only lasts a few weeks.

Activity Idea: When examining dragonfly habitat, explain to the group that the vegetation around the wetland is used by the odonate nymphs to develop into an adult. Walking on that vegetation is not only a safety hazard, it is disrupting dragonfly and damselfly habitat.

Arthropods

Crabs, lobsters, insects, and spiders belong to the phylum Arthopoda which contains about 90 % of all known animal species. This phylum is characterized by a partly segmented body, a hard exoskeleton shell made of chalk or protein, antennae, eyes, and mouthparts. The exoskeleton does not stretch, thus the arthropod continuously molts (sheds and replaces) their old exoskeleton as it grows into an adult.

Hymenopterans

Ants, sawflies, bees, and wasps belong to the Hymentoptera order within the Arthopoda phylum and go through complete metamorphosis (egg, larvae, pupae, and adult stage).These organisms are characterized by the series of hooks that connect their hind wings to their fore wings throughout at least one phase in their life cycle. Furthermore, many species in this order are important for pollination.

Annelids

Annelids are invertebrates that are segmented by rings around their body such as earthworms, leeches, and marine worms that belong to the phylum Annelida. Many of the marine worms are polychaetes that have long bristles (chaetae) on the sides of most of their segments. These invertebrates can swim rapidly using there parapodia (side-flaps) that move back and forth like paddles. Annelids are an important part of the food chain. Many organisms prey upon these creatures, such as birds, shrews, larger invertebrates, and fish. The diet of many annelids is helpful for soil quality. Annelids loosen the soil to help aerate it, accelerating decomposition of organic matter that other organisms use for growth.

Molluscs
Snails, clams, and squids belong to the phylum Mollusca. These organisms typically have one or more outer shells made of calcium carbonate and a muscular foot. Some forms have an internal shell instead, such as squids. These organisms feed off a variety of things. For instance, clams generally feed on phytoplankton, while snails feed on plants, algae, and/ or small invertebrates.

Activity Idea: Critter Dipping from Ducks Unlimited Project Webfoot program is a great activity to show a group about aquatic invertebrates. See the SAM SEED Database for the lesson plan.

Amphibian Basics

Amphibian Introduction
Amphibians belong to the kingdom Animalia. Examples of amphibians are frogs, toads, newts, and caecilians. The word amphibian is from the Greek words "Amphi" meaning "both" and the word "bio' meaning "life". Thus, they live their life in both aquatic and terrestrial habitats. Typically, adult amphibians lay eggs in water or wet environments which hatch into larvae or tadpoles. Some amphibians have external gills, such as salamanders, while others have internal gills used for oxygen intake from the water. As amphibians grow (metamorphosis), they gradually lose their gills and develop an adaptation to breathe using their moist skin. It is important to note that people should not touch amphibians because any residue (sunscreen, soap, etc.) on someone's hand can become absorbed into the amphibians' body when the organism breaths.

Amphibians in Newfoundland and Labrador
There are eight amphibian species present in this province. The amphibians found on the island (Newfoundland) are all exotic; **American toad (*Bufo americanus*)**, mink frog (*Rana septentrionalis*), **green frog** (***Rana clamitans***), and wood frog (*Rana sylvantica*). The following frogs are native to Labrador: two-lined Salamander (*Eurycea bislineata*), blue-spotted salamander (*Ambystoma laterale*), American toad, mink frog, wood frog, Northern leopard frog (*Rana pipie*ns), and spring peeper (*Hyla crucifer*).

Amphibian Facts
-Some amphibians in the world are adapted to live only in an aquatic or terrestrial environment, not needing both habitats to survive.
-Generally adults are carnivores, feeding off slow moving prey.
-Great indicator of quality of the environment because they are sensitive to changes in ecosystems.
- Amphibians in Newfoundland and Labrador hibernate in the winter.
-Salamanders are nocturnal (active at night). They are found in Labrador but not on the island.

Mammal Basics

Mammals are animals that do not lay eggs, such as moose, rabbits and bats. Many of the mammals found in Newfoundland have been introduced for fur farming and food.

Activity Idea: Finding animals in action is difficult. Have a look on the ground for evidence of wildlife such as animal tracks or scats. See the appendix for Project Wild Activity: Tracks! for an activity idea.

Bird Basics

Birding (bird-watching) is a recreational hobby enjoyed by naturalists of all skill levels. Most birders recommend a good pair of binoculars, a bird field guide, a camera, and/or a notebook and pencil to record the findings.

Questions to ask when identifying the bird:

- **What could the bird be and what could it not be?**

- **What habitat is the bird in?**

Identifying the habitat of the bird will eliminate many possibilities. Some basic habitat types to consider in Newfoundland and Labrador are wetlands, forests, urban, coastal, barrens, and arctic. Furthermore, when using a field guide, look at the range map for any potential species. The range map usually shows where the bird spends each season. On a rare occasion, a bird may fly off course, thus it is important take a picture of the bird if possible and record the date, location and weather.

- **What is the size of the bird?**

A common question that most birders ask when identifying an unknown bird is: "Does the bird look as big as **robin** or as small as a **sparrow**?" (or another familiar bird). This simple question can be answered by the most basic birder and can help eliminate an abundant of potential birds in the area.

- **What are the distinguishing features of the bird?**

Does the bird have a crest on the top of its head like a **cedar waxwing** or **blue jay**?
Does it have a particular colour pattern such a cap or stripes?

- **How is the bird behaving?**

Is the bird soaring, perching, or hopping in the undergrowth?

- **What is the bird eating?**

Is the bird eating flies, seeds, plants in the water, or invertebrates in mud?
Ducks are often put into two feeding categories: divers or dabblers. **Divers** are heavier, thus require a longer running time to take off and dive deep in the water for food such as the **common goldeneye**. **Dabblers** tend to feed at the water's surface, dabbling for insects or plants and often stick their tails in the air when searching food, called tipping, such as mallards or black ducks.

Activity Idea: If you spot a diver, count the number of seconds the duck stays under water.

- **What colour is the bird?**

This can be a very ambiguous question. Some birds of the same species are different colours depending on the birds' age, sex or the season. For instance, generally, male ducks (drakes) are more colourful then the female ducks (hens). Drakes are more brightly coloured to attract a mate while the females are generally less colourful to camouflage with their habitat to protect their young or eggs. Often, male plumage is different during the non-breeding season, called **eclipse**.

Activity Idea: Take a picture along of a pair ducks side by side and ask the participants which one is the male and female and why they think that?

When assessing the colour of the bird, look for field marks and flash marks on the birds. Field marks include the colour of the feathers around the birds' eyes, wings, tail, chest, and rump. Flash marks are markings that are only shown when the bird is in flight such as the yellow under wings of a **Northern flicker**.

- **What shape is the bird?**

Body:

Birds are often put into categories based on their shape. This characteristic is important when identifying birds are flying and you can only see their silhouette. For instance, hawks and eagles have a large wing span, while woodpeckers have long chisel-like bills, large heads, and long tail feathers.

Tail:

Is the tail forked, rounded, fan-shaped, wedge-shaped, pointed, notched, square, short, etc.

Bills and Beaks:

Is the bill cone-shaped, needle-like or hooked? Bills are shaped depending on what the bird eats. The American crow has a generalized beak shape because they eat a variety of food while finches have a cone-shaped beak to open seeds.

- **What sound is the bird making?**

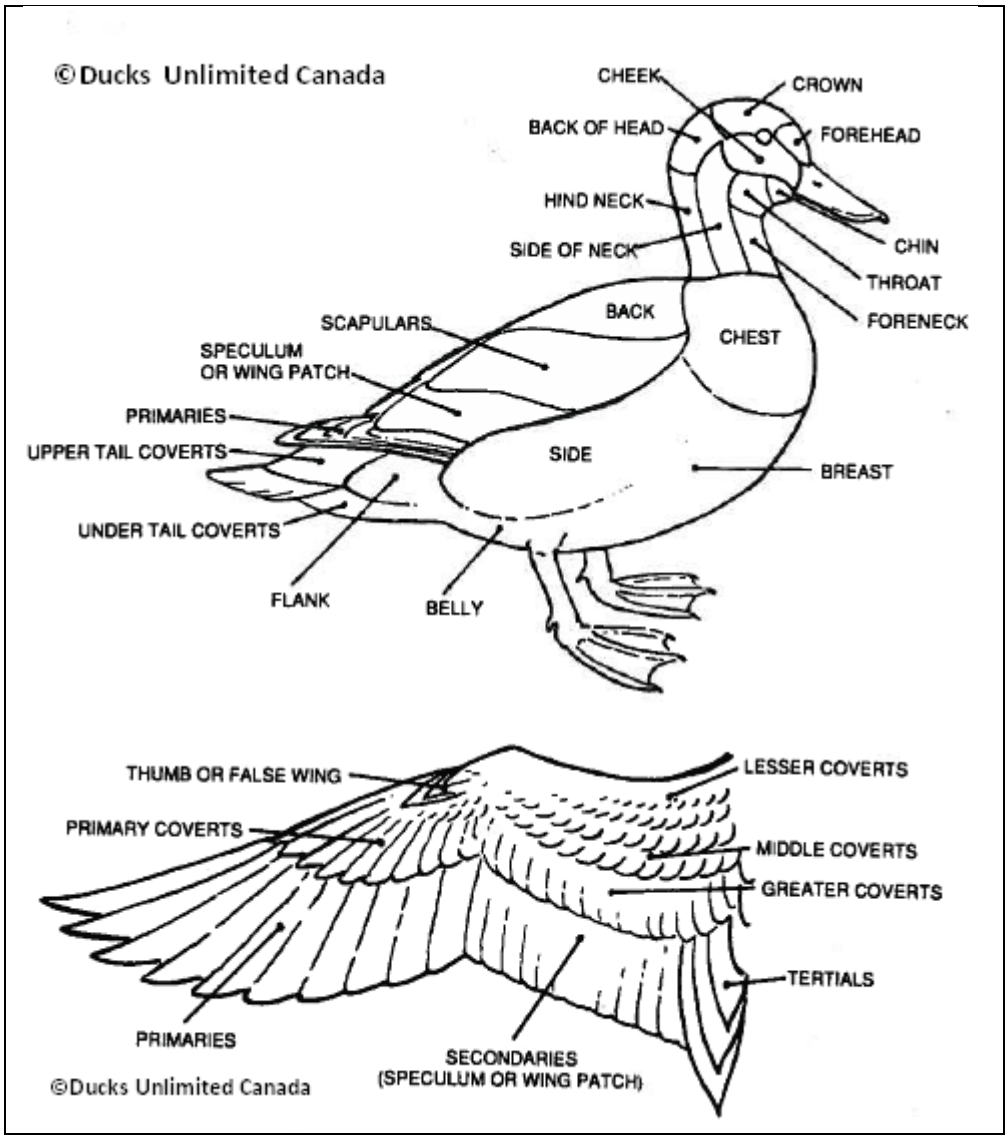
Often listening to the bird songs, calls, and drumming is the best or only way to identify some birds. Consider the rhythm, pitch, repetition, and tone when learning and identifying bird calls. Many birders use memory technique to recognize bird calls. Some examples:

Barred Owls: "Who cooks for you all?"

Black-capped chickadee: "chickadee-dee-dee" or "cheeseburger"

Yellow warbler: "sweet, sweet, sweet, I'm so very sweet"

Features to help identify a duck and its wings.



Additional Resources

Field Guides

Birds

Burrows, R. (2002). ***Birds of Atlantic Canada***. Edmonton, AB: Lone Pine Publishing.

Weidensaul, S. (1998). ***National Audobon Society, First field guide: birds***. New York, NY: Scholastic Inc.

Warkentin, I. (2009). ***Birds of Newfoundland***. Portugal Cove-St. Philip's, NL: Boulder Publications.

Fungi

Knopf, A.A. (2011). National ***Audobon Society: Field guide to North American Mushrooms.*** Toronto, ON: Random House of Canada Limited.

Voitk, A. (2007). ***A little illustrated book of common mushrooms of Newfoundland and Labrador***. Rocky Harbour, NL: Gros Morne Co-operating Association.

Invertebrates

Erbland M. (2011). ***Island insects: A photographic potpourri of Newfoundland 'Bugs'- Digital edition.*** Retrieved from http://www.justphotos.ca/islandinsects/.

Morris, R.F. (1980). ***Butterflies and moths of Newfoundland and Labrador: The Macrolepidoptera***. Hull, QC: Canada Government Publishing Centre.

Thorp, J.H. & Rogers. D. (2011). ***Freshwater Invertebrates of North America***. Oxford, UK: Elsevier Inc.

Plants

Boland, T. (2011). ***Trees and shrubs of Newfoundland and Labrador: Field guide***. Portugual Cove-St. Philip's, NL: Boulder Publications.

Ryan, G.A. (1995). ***Native trees and shrubs of Newfoundland and Labrador***. St. John's , NL: Newfoundland Forest Service, Department of Nature Resources, Government of Newfoundland and Labrador.

Scott, P.J. & Black, D. ***Wildflowers of Newfoundland and Labrador***. Portugal Cover-St.Philip's, NL: Boulder Publications.

Titford, B., & Titford, J. (1995). ***A Travellers' Guide to wild flowers of Newfoundland and Canada***. St. John's, NL: Flora Frames.

Marsh

Ducks Unlimited Canada (n.d.). ***Marsh world*** (2nd ed.) Brandon, MB: Leech printing.

Coastal

Collins, M. (1993). ***Life on the Newfoundland seashore: Seaweeds, invertebrates and fish***. St. John's NF: Jesperson Press Limited.

General

Kelligrews Ecological Enhancement Program (KEEP). ***A collection of visual field guides for the environmental of Newfoundland and Labrador.*** Conception Bay South, NL.

Mann, H.(1996). ***Nature Guide for the Pasadena Nordic ski club trails***. Pasadena, NL: Pasadena Nordic Ski Club.

McCloskey, E., & Kennedy, G. (2012) ***Nature guide to Atlantic Canada***. Edmonton, AB: Lone Pine Publishing.

Websites

Birds

Ebirds – www.ebird.org
Record the birds you see, keep track of your bird lists, explore dynamic maps and graphs, share sightings, contribute to science and conservation.

Nature

NL Nature- www.nlnature.com
Atlas of wildlife in Newfoundland and Labrador based on observations by residents and tourists.

Nature Watch- www.naturewatch.com
Series of ecological monitoring programs that encourage you to become a citizen scientist. (Frog, ice, plant, and worm Watch)

Other

Geocaching- www.geocaching.com
Official geocaching website.

Plants

Digital Flora of Newfoundland and Labrador -www.digitalnaturalhistory.com/flora.htm
An image dossier of most of the almost 2000 Newfoundland and Labrador vascular plant species

Education Resources

Wetland Conservation www.ducks.ca/education/for-educators/resources/
Curriculum based resources such as teacher guides, student journals, and activity sheets.

Project Wild http://cwf-fcf.org/en/discover-wildlife/education/for-educators/project-wild.html
The guide features 121 complete lesson plans about wildlife and the environment that can each be adapted for any age, grade or subject.

Project Zero http://cwf-fcf.org/en/discover-wildlife/education/for-educators/below-zero.html
Educational program designed to promote understanding of wildlife under winter conditions.

WaterScapes – See the SAM SEED Database for EHJV (Eastern Habitat Joint Venture)
Newfoundland and Labrador specific activity guide to wetland stewardship.

Wild About Wetlands - See the SAM SEED Database for EHJV (Eastern Habitat Joint Venture)
Lesson plans with curriculum links for Newfoundland and Labrador secondary students on wetland ecosystems.

Relevant Newfoundland and Labrador Environmental Organizations

Below is a list of environmental organizations separated by region (Eastern, Central, Western, Labador) that may be of interest. These organizations may be able to offer support for your event.

Province

Conservation Corps Newfoundland and Labrador
www.cpawsnl.org
nlcoordinator@cpaws.org
(709)726-5800
Department of Environment and Conservation
www.env.gov.nl.ca/env/index.html
1-800-563-6181
Ducks Unlimited Canada
www.ducks.ca
du_newfoundland@ducks.ca
Foray NL
info@nl.mushrooms.ca
Nature Conservancy
hwww.natureconservancy.ca/en/
Randal.Greene@natureconservancy.ca
Newfoundland and Labrador Environment Network
www.nlen.ca/
nlen.ed@gmail.com
Nature Newfoundland and Labrador
www.naturenl.ca/
naturenl@naturenl.ca

Eastern

Environmental Education Commission
www.brotherbrennancentre.ca
(709)753-1060
K.E.E.P. Kelligrews Ecological Enhancement Program
www.envision.ca/members/templates/template6.asp?ID=6489
kelligrewseep@yahoo.ca
MUN Botantical Gardern
http://www.mun.ca/botgarden/index.php
(709) 864-8590
NAACAP
www.naacap.ca/
info@naacap
Salmonier Nature Park
www.env.gov.nl.ca/env/faq/snp/index.html
The Suncor Energy Fluvarium
www.fluvarium.ca/
(709) 754-FISH (3474) or (709) 722- DUCK (3825)

Western

ACAP Humber Arm
Twitter @ ACAPHumberArm
(709) 637- 2883

Humber Natural History Society
www.hnhs.ca/
info@hnhs.ca
Western Environmental Center
www.wecnl.wordpress.com
info@wecnl.ca

Labrador
Central Labrador Environmental Action Network
www.clean-labrador.org
lab.acap@nf.aibn.com
Grand Riverkeeper Labrador, Inc.
refbnfl@yahoo.ca
www.grandriverkeeperlabrador.ca

Sample Questions

Below are suggested questions to get the listeners engaged during the tour:
What is a wetland?
What are the different types of wetlands?
What type of wetland is this?
What organisms live here?
    What animals live here?
        What mammals?
        What amphibians?
        What invertebrates?
        What birds?
    What plants?
Are wetlands/this ecosystem important to protect?
Why do we want to protect them?
What services does this ecosystem provide for us?
What does the word stewardship mean?
What can we do to protect this ecosystem?
What are you going to do to protect this area?
Who should we get involved?
Should we keep snags(dead standing trees)?
Should we take _____(organism name) home?Why not?
What are the different types of bird habitats?
How can we identify different birds?
What is a species at risk? How can we protect them?

Sample Compare and Contrast Topics

- balsam fir (*Abies balsamea*) and black spruce (*Picea mariana*)
- chipmunk and squirrel
- caribou and moose
- butterfly and moth
- damselfly and dragonfly
- coniferous and deciduous forests
- diver and dabbler

Appendix

Newfoundland and Labrador belongs to two biomes: **taiga (Boreal forest)** and **tundra**. The **tundra** biome covers Arctic areas including Northern Labrador. This biome is characterized by long, cold winters and short, warm summers with little precipitation. About one metre below the soil, there is a permanent frozen layer called permafrost, preventing water to easily drain through the rest of the soil, creating shallow water pools and restricting plant root growth. The **boreal forest biome** is found south of the tundra, and is distributed across North America, Europe and Asia including Newfoundland and southern parts of Labrador. It is the largest biome, characterized by moderately warm summers and long, cold, and dry winters. Soils are usually acidic, nutrient poor usually lacking nitrogen and phosphorous. This biome is dominated by coniferous forests, with **balsam fir** (***Abies balsamea***), and **black spruce** (***Picea mariana***) stands in this provinces forests with wetland habitats particularly bogs. Furthermore, coastal areas of this province contain intertidal, pelagic, and marine benthic zones resulting with different organisms from different habitats compared to the terrestrial biomes.

These guides divide Newfoundland and Labrador into three basic habitat types: forests, wetlands, and coastal areas.