Grand Lake Meadows
A Provincially Significant Wetland
TEACHER KIT
Grade 6-8
Contents

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To the Teacher

Welcome to the Grand Lake Meadows Wetland Education Program for Grade 6-8. In this binder you will find paper copies of information contained on the accompanying CD. You will be able to use this binder to guide your class through the activities we have developed for this program. The CD contains all of the activity sheets so you are able to print and photocopy multiple copies for your students. We have also included information that will be useful in teaching your students about wetland areas in the Grand Lake region. The slide presentation can be shown to your students on a laptop/LCD projector system.

This program was developed through the Grand Lake Meadows Project Management Committee representing various non-government and government organizations concerned with wetland conservation in the area. For further information regarding this education program or wetland conservation issues in Grand Lake please contact:

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EVALUATION FORM

Please take a moment to fill in this evaluation form
Thank You

Return to: Todd Byers NBDNRE, Fish and Wildlife Branch, P.O. Box 6000, Fredericton, N.B. E3B 5H1. Fax: 453-6699

Teacher: _______________________________________________

School and grade level: _______________________________________________________

Did you use the kit to deliver the program or did an instructor come to the school? _______________________________________________________

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<thead>
<tr>
<th>Content and Instruction</th>
<th>Excellent</th>
<th>Above Average</th>
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<th>Below Average</th>
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Your Comments
(Include anything you would like to see added to this program)
**Introduction and Learning Concepts:**

At this age students develop greater skills in abstract and creative thinking. They can also understand the interplay of environmental and human systems in greater depth. Learning can focus on investigating natural systems and engaging the students in discussion regarding connectivity between nature and humans.

The Grand Lake Meadows Grade 6-8 program concentrates on exploring wetland animal adaptations and biodiversity. This session also illustrates that wetland wildlife has played an important role in the history of the Grand Lake area. This program will support curriculum focusing on ecosystem sustainability.
Wetlands are one of the most bio-diverse habitats in the world, second only to rain forests in the number of species they support.

Wetlands are one of our most threatened ecosystems and conservation is critical to sustaining the health of our planet.

In New Brunswick we have lost over 50% of our freshwater wetlands and 65% of our salt marshes that were here prior to early European settlement.

Grand Lake Meadows has been designated a "Provincially Significant Wetland" by the New Brunswick government. This designation highlights the fact that Grand Lake Meadows is one of the most important pieces of freshwater wetland we have in the Province.
Wetlands are simply defined as "an area that is covered by water for all or part of the year".

Wetlands are also characterized by "hydric" soils which are soils that are continuously saturated with water. Wetlands are also characterized by aquatic plants that can tolerate continuously saturated conditions. Plants such as water lilies, cattails and willow and other wet ground species all indicate the presence of a wetland.
Grand Lake Meadows has been designated a Provincially Significant Wetland because it is the largest freshwater wetland complex in the Province making it one of the most important pieces of wildlife habitat we have. It is also one of the largest freshwater wetlands in the Maritimes.

The area is 3000 ha (7413 ac) in size. To put that into visual terms 3000 ha means that 5,674 football fields would fit into an area that size.
The area extends from McGowans Corner in the west and Fulton Island in the north, east to Jemseg and south to where the Jemseg and St. John rivers join.

The new bridge and piece of highway that crossed through the Meadows is highlighted by the pink dashed line.

Grand Lake is the largest in NB (18,135 ha; 44,810 ac) and because of its size acts as a heat sink that has a moderating influence on the climate of the region. The lake absorbs and stores heat in the summer and releases it in the fall. Consequently this region has one of the longest frost free periods in NB and some of the hottest summer temperatures.
Within the Meadows are a variety of wetland types

Shrub wetlands are the most common accounting for half of the wetland area in the complex. Shrub wetlands are dominated by shrubby vegetation such as sweet gale.

Permanently flooded emergent marsh accounts for 24% of wetland habitat at the site and is dominated by soft stemmed wetland plants such as sedges and buckbean.

Floodplain forest is also significant in the area (20%). This type of forest is fairly unique to NB. These areas are dominated by mature deciduous hardwoods such as silver maple, American elm and ash.

Grand Lake Meadows also contains seasonally flooded wetlands and numerous oxbows, sloughs and bogans that provide open water habitat.
Grand Lake Meadows has a number of important values and functions.

Natural values of the site include wildlife habitat and habitat for rare species.

The area also has historical significance. The Jemseg archaeological site is one of the most important archaeological finds in New Brunswick providing artifacts over 2000 years old. Traditionally the area has been used for subsistence purposes. First Nations camped in the area to hunt, fish and gather medicinal and food plants. European settlers also used the wetlands of Grand Lake to obtain food and fur for trade. Recreational opportunities for fishing, hunting and trapping are still an important value of the site.
One of the most important functions of Grand Lake Meadows is minimizing flood damage during the spring freshet. Most of the soils in Grand Lake Meadows are peat soils that act as a sponge soaking up excess flood water. The enormous size of this wetland complex combined with the water absorbing properties of the soils hold much of the excess spring flood water and release it slowly as the river recedes.

This sponge capability of wetland soils also helps improve water quality in the St. John River. As the water sits on top of wetland areas alluvial silts in the river deposit out of the water onto the wetland areas. In fact this silt deposition actually helps maintain high productivity in freshwater emergent marshes in the area. Wetland plants are also efficient at removing excess nutrients from water such as nitrates from agricultural run off. Thus wetland areas are important in maintaining water quality.
One of the most important values of Grand Lake Meadows is the wildlife habitat it provides throughout the year.

In the Spring, breeding waterfowl use the seasonal wetlands. The first species to arrive in the area include the black duck and common goldeneye. Canada Geese also use the site as a stopover during migration. These area provide important invertebrate foods for breeding hens that need protein and calcium for egg laying. Amphibians such as spring peepers also use these seasonal areas.

Moose use shrubby hummocks close to the water to birth their calves. These hummocks provide safe birthing areas since predators such as coyote cannot travel to these sites.

The area also provides important spring spawning habitat for a number of fish species including perch, alewife and chain pickerel.
Grand Lake Meadows provides excellent breeding habitat for birds, amphibians, reptiles and mammals. Breeding waterfowl such as the wood duck are common. Other breeding waterfowl species in the area include ring-necked ducks, blue-winged teal, black ducks, mallards and common goldeneye.

Other marsh birds such as snipe nest in the area. Osprey nest in large snag trees are on artificial platforms and feed in open water areas. The amount of open water habitat in the area provides breeding sites for common loons. Species such as the belted kingfisher are found nesting in the floodplain forest area. There are also numerous songbirds nesting in floodplain forest habitat such as tree swallows and flycatchers. Owls and a number of hawk species such as the northern harrier are found in the region. Many amphibians such as bullfrogs and green frogs are found in permanent marsh areas. Several amphibian and reptile species such as the pickerel frog use pools in the floodplain forest.

There are numerous furbearers and small mammal species in the area ranging from little brown bat to coyote.
In the fall Grand Lake Meadows provides extremely important staging habitat for migrating waterfowl. Large numbers of scaup, ring-necked ducks, goldeneye and black ducks use the area to feed and rest during migration.

Moose feed on aquatic plants in late summer and early fall to provide them with important nutrients to build up fat reserves for the winter.

Furbearers such as raccoons, mink, muskrat, fox and coyote can be found in the area since there is abundant food available for these species in summer and fall.

Porcupines are common throughout the floodplain forest region at this time of the year and are often found feeding on bark of hardwood trees.
Grand Lake Meadows provides valuable wintering habitat for resident wildlife. The muskrat uses freshwater emergent marsh to build huts and store food for the winter.

The floodplain forest provides wintering habitat in the form of shelter and food to large mammals such as the moose and coyote.

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Grand Lake Meadows contains several rare species. The area supports a number of rare plants such as the buttonbush. Ash Swamp is the only known location in NB where false nettle can still be found.

The area is also significant for the number of rare species it supports. One of the most notable inhabitants is the Yellow Rail - Grand Lake Meadows supports the largest concentrations of yellow rail found in NB to date and is only one of a handful of sites where this species can be found in the Maritimes. The yellow rail is a shy secretive bird that is seldom seen but can be easily recognized by it's distinctive call that sounds like two small pebbles clicking together.
From a natural perspective you have seen how the Meadows change over the seasons. These natural changes are also reflected in the cultural values of the site. In examining the cultural features of the area it soon becomes clear that Grand Lake Meadows was extremely important for subsistence. First Nation communities (Wolastoq’kew - People of the beautiful river) in the region gathered at locations around Grand Lake to fish, hunt and gather plants.

The first English trading post on the St. John River was established at the mouth of the Jemseg River in 1659. This trading post became the site of Fort Jemseg in 1667. Early French settlers abandoned the area in 1702 when the war between England and France was resumed. French Acadians returned to Maugerville in 1718 followed by English settlers in the late 1700’s. Early use of the site for subsistence focused on the fur trade, agriculture later became important and agricultural land in this region is still prized for its fertility.

Fiddleheads are still an important spring food source. Gaspereau swim up the river in the Spring to spawning sites in the marshes and provide an important spring fishery.
Fishing of other species such as chain pickerel and eel has been a traditional activity in the region throughout the summer.

Black ash was once abundant throughout the floodplain forest and is still present today. This tree species was used by First Nations for their basket making industry. Ash was pounded into thin strips and woven into baskets.

Early records from Fort Jemseg identify egging as an important food source in the spring and summer. Waterfowl eggs, particularly Canada geese were collected by soldiers. Canada geese were also collected during their summer molt period when they were unable to fly.

Today the area provides important summer recreational opportunities for canoeists, kayakers, boaters, fishermen and birdwatchers.
One of the most important cultural activities occurring in the region during the fall is hunting. Both First Nations communities and European settlers depended on the fall hunt to provide much of their winter meat.

Waterfowl and moose were the primary focus of the fall hunt. Other species hunted in the region included deer and small game birds such as grouse.
One of the most important activities occurring in this region in the 1700's was the fur trade. Prior to agriculture the primary industry of the area was the fur market. Many people derived their living from this occupation. Furs were traded for goods and also brought direct economic benefits to the area. One of the most abundant furbearers trapped in the area was the muskrat. Other abundant species in old trapping records include, otter, mink, fox, bobcat and fisher.

Ice fishing for smelt, perch, and pickerel provided a winter food source. Ice fishing is still extremely popular in the region and Grand Lake provides some of the best ice-fishing opportunities in NB.
Although Grand Lake Meadows is important, unfortunately like all wetlands it is continuously threatened. One of the most controversial threats was the new highway and the construction of a new bridge and section of highway through Grand Lake Meadows. Concerns were based on environmental reasons such as habitat loss, siltation of fish habitat and impact on rare species. Substantial concerns were also raised about the impacts on the historical importance of the site, particularly the Jemseg archeological area.

Other threats include heavy boat traffic, forest harvest ATV use in marsh areas, agricultural development and recreational development (cottages).
A variety of organizations have been working together to ensure that Grand Lake Meadows is conserved. Much of the area has been purchased and secured under the Eastern Habitat Joint Venture. The Eastern Habitat Joint Venture is comprised of non-government and government organizations including NBDNRE, the Canadian Wildlife Service, Ducks Unlimited Canada, Wildlife Habitat Canada and the Nature Conservancy of Canada working together to further wetland conservation efforts in NB. Ducks Unlimited has a number of managed marshes in the area that provide permanent brood-rearing habitat for waterfowl. Ducks Unlimited also has a nest box program that provides alternate nesting habitat for wood ducks, common goldeneye and hooded merganser. The Province of NB has adopted a Wetlands Policy that will afford greater protective measures to wetlands.

Grand Lake Meadows is important to all of us and therefore we should all be concerned with wetland conservation in this region. From birdwatching to duck hunting the Meadows is a unique area where we can all enjoy interacting with nature.
Background:
At this age students are able to explore the concepts of adaptations and food webs and how wetland wildlife interacts with their environment.

This session provides Grade 6-8 students with information that will enable them to:

- Explore animal adaptations for obtaining food.
- Build a food chain/web based on the animal characteristics they have observed.
- Have a better understanding of how wetland animals are adapted to life in a wetland.

Preparation (15 min.):
Introduce your students to Grand Lake Meadows by showing or printing copies of the slide presentations. Focus on the values and functions of these wetlands. Discuss the concept of adaptation and primary producer (plants), consumer (primary and secondary) and types of wetland animals that would fit into this category.

Activity (30 min.):
Provide your students with a copy of the Marsh Munchers work sheet. Ask them to work in pairs. Provide each pair of students with an item from the Grand Lake Meadows teachers' resource kit. Ask them to examine the item and tell them they have 15 min to answer the questions on the work sheet about their item. Then ask each pair of students to come to the front of the class, show the other students their item and present the information on their work sheet.
Wrap Up (15 min. - could also be used as homework):

Wrap up the session by building a Grand Lake Meadows food web on the student sheets. Specifically discuss the items that were examined and where these animals fit into a food web based on what we learned from their adaptations. Also ask how these items were connected to a wetland.

Extensions:

- Create a poster expressing opinions about wetland wildlife or wetland wildlife from Grand Lake Meadows.

- Write an essay on the role of wetlands and rivers in the region in the settlement of local communities.
Marsh Munchers!
Student Work Sheet

For each specimen answer the following questions:

1. Describe the specimen (example - write down the animal part - using correct terms such as skull, pelt):

2. We think this animal is (name the animal):

3. We think this animal is a (answer with a check mark):
   - Primary consumer (herbivore)
   - Secondary consumer (carnivore)
   - Secondary consumer (omnivore)

4. How is this animal adapted to life in the Grand Lake Meadows ecosystem?
Grand Lake Meadows Food Web

Fill in the blank spaces with the animal names at the bottom of the sheet.

- **Hint: I am an aquatic mammal**
  - MUSKRAT

- **Hint: I am a Carnivore**
  - COYOTE

- **Hint: I am an insect**
  - WATER BOATMAN

- **Hint: Waterfowl**
  - BLACK DUCK

- **Hint: Amphibian**
  - BULLFROG

- **Hint: I like eggs!**
  - RACCOON

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WATER BOATMAN; RACCOON; BULLFROG; COYOTE; MUSKRAT; BLACK DUCK