

# **Appendix A**

**STSE**

### *Important Notes*

1. These STSE modules are intended for teacher reference. Each is designed to target specific outcomes within Grade 7 Science. It should be noted that the activities associated with each module are NOT mandatory. They are suggested activities to be used at the discretion of the teacher.
2. These STSE modules and the associated supplements can be found at  
  
[www.gov.nl.ca/edu/sp/sci\\_gr7curguide.htm](http://www.gov.nl.ca/edu/sp/sci_gr7curguide.htm)

## The Two Centimetre Forest

### Outcomes:

1. Describe how our need for a continuous supply of wood resulted in the development of silvaculture practice. (112-3)
2. Make informed decisions about forest harvesting techniques taking into account the environmental advantages and disadvantages. (113-9)
3. Provide examples of how our understanding of boreal forest ecology has influenced our harvesting practices identifying the positive effects of these practices. (111-1, 113-1)
4. Identify various science- and technology-based careers related to forest management and harvesting. (112-9)

### Introduction

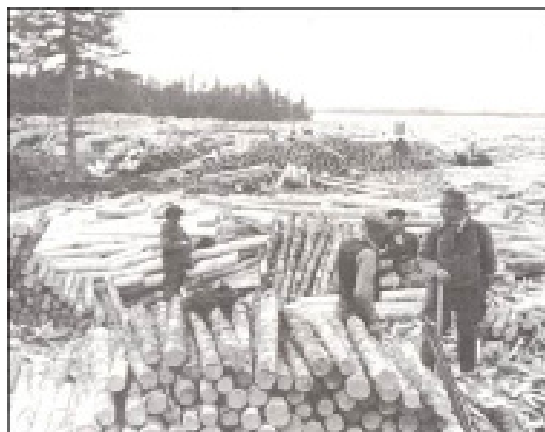
After a hard day at school, it's good to go home and relax, put your feet up on the coffee table and haul out your favorite comic book.

It may be raining or snowing outside, but you live in a sturdy home with a solid roof over your head. But have you ever stopped to wonder how that comic book got into your hands? How about the coffee table or the warm and cozy home you live in? All of these things, and many other products we use everyday, are made from wood.



Wood is one of the most versatile products on our planet. We can burn it, bend it, cut it, carve it, paint it, or glue it. It offers incredible strength for its weight, it's renewable, and we have lots of it!

In this module we will explore aspects of the relationship between our people and our forests. We will learn about the economic and cultural value of our forests, our forest type, and the process of forest harvesting in Newfoundland and Labrador. There is a lot more involved than you may think!



### What's so important about wood?

In Newfoundland and Labrador, we place strong emphasis on our fishing heritage. But for as long as we have been harvesting fish, we have been harvesting wood as well. More than 80 communities in Newfoundland and Labrador owe their existence to the forest industry.

Our forests hold tremendous economic value. The forest industry generates more than \$800 million each year and creates thousands of direct and indirect jobs. Using wood from our forests, companies manufacture many products including lumber, newsprint, moldings, furniture, flooring, and cupboards.

While our forests have strong economic value they also have tremendous cultural value. Archeological evidence has verified the importance of the forest to the Maritime Archaic, Paleo-Eskimo and Beothuck Indians, as well as today's First Nations people. Countless generations of Newfoundlanders and Labradorians still "head out to the cabin" in the woods to hunt, fish, bird watch, pick berries, and enjoy nature.

Our forests are also home to many species of plants and animals, creating an important bond between our forest ecosystem and these species. Without proper care of our forests, many of these plant and animal species would not exist, and our cultural and natural landscape would be altered.

### The largest ecosystem on Earth

Our forests are part of the boreal forest ecosystem. The boreal forest makes up about one-third of this planet's total forest area. Running through Canada,



The most common tree type in the boreal forest is the conifer; cone bearing evergreen trees with needle-shaped leaves. Conifers are well-adapted to the harsh climate and thin, acidic soils that are found in this ecosystem.

Large numbers of bodies of water are also characteristic of the boreal forest. Bogs, fens, marshes, shallow lakes, rivers and wetlands are mixed in among the forest landscape and hold large volumes of water. Winters are often long and severe, while summers are short and often warm.

### Forests of Newfoundland and Labrador

The boreal forests of Newfoundland and Labrador are relatively small and consist primarily of black spruce (*Picea mariana*) and balsam fir (*Abies balsamea*) intermixed with other conifers and deciduous trees.

Black spruce is the most abundant tree in Labrador and the second most abundant on the island. This



species is common on both wet and dry environments and is very tolerant of our unfavorable soil conditions.

Repeated fires have established black spruce across much of central Newfoundland. The nature of its cones, which pop

open when heated, gives this species a competitive edge on burned sites.

Black spruce also grows well on fertile sites, but it is a poor competitor among faster growing trees.

Balsam fir forms about two-thirds of the forests on the Island and one-third of the forests in Labrador. The forests of the Island's west coast commonly consist of pure stands of balsam fir that prefers moist, well-drained soils. This species can attain heights of 20-24 meters at the age of 70-100 years on the best sites.

Deciduous trees are found on the Island in areas where there are better quality soils, especially the deep river valleys of the Western Long Range Mountains and the Humber and Red Indian Lake watersheds. White birch (*Betula papyrifera*) and trembling aspen (*Populus tremuloides*) are characteristic species. These trees, commonly called hardwoods, can attain heights of 22 meters at the age of 80 years.

## Forest harvesting in Newfoundland and Labrador

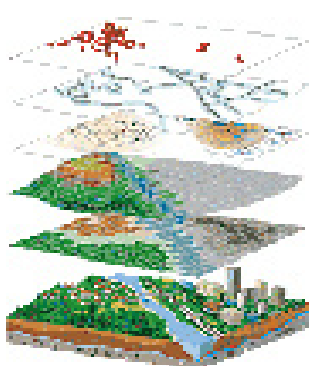
### *Planning*

Forestry harvesting techniques have come a long way since the days of the early loggers, when forest workers put a chain saw over their backs and headed out to harvest the forest's most productive areas.

Today, most of the people who work in the province's forestry sector are highly educated, skilled and trained individuals. Forest harvesting techniques are now technologically advanced, with a commitment to protect and sustain the environment. Planning shows harvesters what areas to cut. Older trees are cut first, giving younger, developing trees an opportunity to grow.

Before logging companies harvest any forest in the province an ecosystem inventory is completed. The inventory is essential in the planning process for harvesting timber because it provides information on the height, species, age and productivity of the forest. Information on wildlife habitat and abundance, soils, ground vegetation and other features are also collected. This information is used with computer models to determine the impacts that harvesting will have on the local ecosystem.

Forests are dynamic ecosystems. Natural forest disturbances such as forest fires, blow down of trees



due to wind, and insect infestation all occur. Through proper planning, foresters can now harvest areas to "mimic" the look of a naturally occurring event.

Many communities in our province are located within the timber limits of harvesting companies. Protecting essential natural resources such as water sheds and viewscapes for the tourism sector is of huge importance to many residents.

Proper planning ensures a buffer zone is left in place to protect water resources against erosion and other factors that may cause negative effects when harvesting. Proper planning also ensures that cut areas are hidden from view in most communities, thus protecting the beauty and features of the surrounding landscape.

### *Road Access*

In many cases, road construction, not cutting, has the potential to have the most severe impact on the forest environment.

To gain access to the forest, hundreds of kilometers of access roads are built every year. These roads must be built in adherence to strict environmental guidelines. Roads are often constructed in areas where they will have the most positive impact for all parties involved. This includes forest operators, recreational users, and local flora (plants) and fauna (animals). For example a road may bypass a sensitive wetland ecosystem instead of going through it.

Roads and ditches are constructed to strict guidelines when it comes to slope. If the roads and associated ditches are too steep, severe erosion may occur.

### *Harvesting*

Loggers no longer venture into the woods with axes and bucksaws. Tree harvesting has become a specialized science. In most areas of the province, large, computerized mechanical harvesters cut trees. Machines called skidders are then used to haul the trees out once they are cut by the harvesters.



One of the main concerns with harvesting was the damage the machines tires caused while traveling to the harvest site and operating in the harvesting area. Thin tires would sink into the soft

soil and leave deep ruts that would severely impact the local landscape and take years to return to their natural state.

Many skidders and harvesters are now equipped with wide floatation tires to prevent rutting and damage to the forest floor. Floatation tires look similar to those on an all-terrain vehicle, except the tires are as tall as a fully grown person! Air pressure in these tires is low so that weight is distributed across a wide area, preventing deep ruts from occurring in the soil. This type of tire also ensures seedlings and other growth is not damaged when skidders run over them. Seedlings are not crushed or damaged, but spring back up with no permanent damage.

Silviculture is specialized work that also occurs during harvesting. Silviculture workers remove certain types of trees (older or diseased, for example) from a harvest area. This gives the remaining trees in the area more room to breathe, meaning they are able to get more water, sunlight and nutrients from the soil. Replanting trees is also a part of silviculture.

Before harvesting, foresters have to think of what was already living in the forest before we showed up to harvest the wood. A wide assortment of flora (plants) and fauna (animals) flourished in the area long before humans arrived to the harvest the timber. Strict regulations are followed to ensure wildlife is considered when harvesting timber.

Buffer zones are maintained around rivers and streams. This ensures that the critical aquatic habitat is not disturbed during harvesting. The buffer zone prevents erosion and runoff, increased water temperatures, lack of proper camouflage, and loss of breeding areas.

Some forested areas are set aside as “protected areas” because they are home for special or rare wildlife. Forest companies do not harvest in areas classified as protected areas. This ensures that critical plant and animal habitat is protected. An example is the Main River area and the Little Grand Lake reserve. Both are excellent habitat for the Newfoundland marten.

### The two-centimeter tall forest



When you think of the term *clear-cut*, images of vast mowed-down forests often come to mind. Public perception is often that this type of

forestry is the result of poor management and destroys both the visual and natural landscape.

But if you look at the science behind “clearcutting,” you will see that it is an effective forest management process that actually mimics natural events such as forest fires and insect infestations.

There is a great amount of science involved in selecting what type of trees to cut, where to cut them, and the type of clearcutting to be involved.

There is a misconception that clear cutting is the same as deforestation. This is not the case. Deforestation is the practice of removing the forest with no intention of regenerating the trees on that area. Usually this involves clearing land for urban expansion or agricultural development. This may occur on a very small scale in Newfoundland and Labrador as some communities grow and expand. Clear cutting in Newfoundland and Labrador is a way of both harvesting and regenerating the forest.

A clear-cut may seem like a dead and barren wasteland. Visually it may appear that all the trees in the area have been harvested. But take a walk through this area and examine the ground. There will be many tree seedlings of spruce, fir, pine and other species – a two-centimeter tall forest. Removing the older trees gives these younger seedlings better access to sunlight and water and gives them the ability to grow and expand. A complete forest ecosystem still remains on a smaller scale until succession regenerates a new, thriving forest.

Foresters don’t abandon an area after it is harvested. Trained professionals closely monitor the area for many years to keep a close eye on the succession process.



They monitor tree growth, new plant and animal species and other traits.

What about the habitat lost as a result of clear cutting? In some cases, animals may be displaced by clear cutting, but planning ensures the clear-cut is of suitable size so displaced animals will not have far to travel to find a new habitat. Clear cutting is done on a much smaller and localized scale than it used to be.

Clear-cuts often attract a whole new array of animal species. These areas tend to be small and open, and attract many sun-loving plants and tree species. As the trees and plants in the clear-cut grow, shrub and alder species more adapted to a shaded forest will slowly replace the sun lovers.

Clear-cut areas basically do not add or increase animal species. They change what species live and thrive in the area, according to their age, and what they need in terms of living habitat. A new clear-cut may not be a particularly good area for a squirrel, chipmunk, or a Newfoundland pine marten, but it does provide excellent habitat for bear, moose, and young rabbits. As a clear-cut ages and grows, it provides varied structure and food sources suitable for different animals' habitat and food needs.

Clearcutting is ugly at first. Few people would rather stand in a clear cut area than in a lush, boreal forest ecosystem surrounded by fir and spruce. But the ugliness of a clear cut passes, usually sooner than expected! In three to four years, succession has filled in the clearings, the area has lost its brown, disturbed appearance, and the hillside is green in the summer and in the fall, awash in color. In six to 10 years, the young trees are free to grow above the bramble and smaller shrub like trees. In 10 to 14 years, the young stand of 8- to 10-metre tall trees is again a pleasant place to walk through. Finally, in 35 to 40 years, the growing trees are once again a valuable timber crop and animal habitat.

## Conclusion

The Province of Newfoundland and Labrador has a rich and vibrant culture and the forests of our province are a part of the cultural fabric. Our cultural identity, although highly shaped by the sea, has also been shaped by the forests that cover our landscape. Can you imagine Newfoundland and Labrador being the same without logging, hunting, camping and fishing in our forests?

The forest industry makes a huge contribution to our economy and our province. But many people are still under the misconception that forest harvesting is a “primitive” operation, and environmental impacts are not considered.

In this module we have shown today's foresters are indeed specialized workers and forestry is a technological field. Foresters undergo specialized training in their field and have a sound grasp on environmental issues concerning their profession.

Humans and the forest have had close interaction for thousands of years. The importance of this relationship is often left unnoticed. The human relationship with the forests has often been seen in a negative light, but with recent advances in technology, the relationship between humans and the forests has never been stronger

## Questions

1. Identify 3 biotic and 3 abiotic factors that are characteristic of the boreal forest
2. Why does black spruce dominate in previously burned areas?
3. What is the importance of completing an ecosystem inventory?
4. How has today's forest industry advanced technologically?
5. Identify some jobs created as a result of the forest industry in Newfoundland? Can you think of more than 10?

6. What are the advantages/disadvantages of clear cutting a section of forest?
7. Interactions occur between humans and the forest ecosystem; some of these are positive while others are negative. State 2 positive interactions and 2 negative interactions between humans and the forest ecosystem.
8. Construct a food chain of plants and animals found in the boreal forest.
9. In the two-centimeter forest, young seedlings have better access to sunlight and water. Why is this important for the growth and development of the forest?
10. Describe how a clear-cut changes over time.
11. Explain why the term “regeneration harvesting” might be a better term to use than “clear cutting”.

## Extensions

1. Research an animal that lives in the boreal forest and create a poster or power point presentation.
2. Visit a recent forest fire or clear cut area. Observe what changes have occurred. Bring a camera and re-visit the site at the end of the year. Keep a record of changes.
3. Ask a NL Forest or Wildlife Conservation Officer or someone else involved with the forest industry to visit your class. Ask them to talk about their jobs and the connection they have to the forest.
4. Research how road construction, in logging operations, can have a negative impact on the forest ecosystem.
5. Conduct research on the harvesting practices and equipment used by logging companies today. How do these practices and equipment reduce the environmental impact logging has on an ecosystem?

6. Investigate the different types of protected areas in Newfoundland and Labrador. What are the criteria for becoming a protected area? Are all protected areas managed and protected in the same way?

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