

4.0 Discuss some effects of disturbances on the forest.

4.1 Describe common disturbances that occur in the Boreal forest.

Disturbances are normal to the life of the forest. Forests are very resilient (able to bounce back) from disturbances and will quickly have some sort of vegetation growing naturally on the site within a year or two of a disturbance. Disturbances common to the Boreal forest include fire, windthrow, clearcut and other harvest types, flooding, tornado damage, insect and disease outbreak, hail, freezing rain and hurricanes. All of these disturbances occur over a variety of area sizes and variety of damage to the concerned area. Most of the disturbances that are caused by weather are generally climate-driven, such as hurricanes out East or tornadoes in the West. If a flood occurs on the forest site and is temporary (3 – 4 days), then the trees are usually able to survive if there wasn't any mechanical damage to the trees. If flooding occurred during the dormant season, then there is a greater chance of the tree's survival.

4.2 Discuss some harvesting techniques used in the forest.

In forestry, the means of harvesting the wood (manual, mechanical, tree length, whole tree, etc) is important, but what is more significant is the harvesting method. The harvesting method is the approach used to get the merchantable wood harvested while considering the future stand post-harvest. We will discuss some of these methods along with some pros and cons.

Seed tree method is a system whereby most trees are harvested, with a few remaining phenotypically-superior trees left on the site to provide seeds for the forest to regenerate naturally. These trees would/should be located throughout the site to provide uniform seeding-in. (A good rule of thumb is that 2H (twice the tree height) is suitable for natural seeding-in.)

Advantages:

- * This is a cheaper method for forest renewal
- * Proven adaptability to the site by the seed trees
- * Opportunity to leave a couple of different species on site
- * Generally better genetics from the higher quality seed trees

Disadvantages:

- * Sometimes difficult to identify good seed trees or are not ideally-located for natural seeding.
- * The trees have to be able to produce seeds (old enough, healthy enough)
- * The seed trees are usually the most valuable trees on the site and there would be lots of pressure to cut them
- * What to do with the seed trees after the seed trees have performed their function
- * The harvested site has to be ideally-suited for natural seeding to occur, such as not too much slash, provision of a good mineral soil seedbed, etc.
- * More suited for shade intolerant species.

Shelterwood method – is a harvesting system which harvests a portion of the stand providing shelter to an understory crop. This method provides a shelter to the understory until it reaches a large enough size to be grown without any shelter or nursing effects.

As the crop gets older, more of the stand is removed. Once the understory is tall enough, the overstory or shelterwood is finally removed.

Advantages

- * Can encourage species of different shade tolerant levels on a site
- * Very little erosion due to the site always having something growing on the site
- * Most mortality on a forest site occurs when the trees are very young and susceptible

Disadvantages

- * Requires much knowledge of “leave” trees and open spaces for the sheltered trees
- * More expensive harvesting because every time a forest is visited to be harvested, it requires equipment transportation, more road maintenance, less volume per visit, etc.

Selection harvest – this is a method where only certain trees are selected to be harvested from a site. Those are usually the biggest and best trees on the site.

Advantages

- * Always a crop on the site so there is very little erosion.
- * Harvests can take place every few years because there are always trees growing into the larger size classes.
- * The stand can be multi-aged and have multiple species
- * Multi-specied/multi-aged classes are very resistant to insect build-up and also any insect outbreak.
- * Good for high-valued trees with a good management regime.

Disadvantages

- * The trees that are producing the seeds aren't always the best genetics because trees with the best genetics get harvested as soon as they can, maybe before they've produced seed.
- * “Harvesting the best and leaving the rest” is more of a “high-grading” approach and is not looked upon favorably in forestry circles.
- * Return visits every few years are expensive
- * Favors shade tolerant species for reproduction, even though some species producing the seeds may be shade intolerant, which means that the shade intolerants won't reproduce this way.

Clearcutting – is the method of choice for most of Canada's forests. Clearcutting is a system where all the trees are cut on an assigned area. Most provinces have legislation that limits the size of clearcuts and requires a certain amount of residual trees to be left on a site; actually, making it a modified clearcut. These residual trees are for the benefit of wildlife and also to mimic what a natural disturbance will do in the forest.

Advantages

- * Clearcutting enables aerial seeding
- * Enables shade intolerants such as Trembling aspen and Jack pine to grow on the harvested site with minimal input.
- * Mimics nature as a natural disturbance pattern
- * Enables a plantation to be established very readily
- * Easier management when all species are of the one age and species
- * Most economical means of harvesting available
- * Larger areas for site preparation and planting makes it cheaper per hectare for these operations
- * Less road maintenance costs

Disadvantages

- * May be some erosion (less now with retention trees) when there isn't a crop on the site
- * Not viewed very positively by the public
- * The forest quickly changes so the wildlife component quickly changes (some leave while others come into this forest)
- * Clearcutting is not completely understood by the public.

All of these systems have advantages and disadvantages. In areas where one tree is worth a lot of money (such as thousands of dollars) then it's worthwhile to selectively harvest – as practiced in some parts of southern Ontario and British Columbia. In our province, each tree is not worth much money, which makes it more economical to harvest many trees at the one time. The seed tree and shelterwood methods see very little use in Canada. Also, before most stands are harvested, there is a site visit to see if there is the future crop of the stand in the understory or if it needs to be planted. Most methods of harvesting try to encourage natural regeneration where it's possible. One downfall of natural regeneration (compared to planting) is that it usually comes back too thick and may need to be thinned out later in life. The major advantage of natural regeneration is the genetics of the seed have proven successful to the site. In various parts of Canada, some plantation species have known parentage (strong genetic traits with desirable characteristics) and are able to perform very well in plantations and increase the yields from typical forests of up to 50% on some plantations have been recorded in the past.

4.3 Describe some characteristics common to plants that come in after a disturbance.

The plants that come in after a disturbance vary greatly with the type of disturbance, intensity of disturbance, and size of area. For example, if we had one tree blow over in a storm and fall to the ground exposing mineral soil and creating a hole in the crown canopy, this hole would provide just a little light on the forest floor and we would get very few species to grow naturally there. The species would be shade tolerant, like exposed mineral soil and germinate on the exposed soil which could be a balsam fir or better-suited to a white spruce. The described situation would not be of benefit to areas that have been clearcut or burnt over which provided lots of light to the forest floor. Worthwhile mentioning is the intensity of the disturbance – the more damage to the forest site, the fewer species able to come back naturally. For example, if a

fire burnt off all the vegetation layer and organic matter, then, initially this would limit some reproduction to mosses or some lesser types of vegetation.

Plant succession is the orderly process of one plant community gradually or rapidly replacing another. This process occurs after a disturbance and from developmental changes in the ecosystem itself.

In general terms, we usually call the first species to come in after a disturbance pioneers and these are generally short-lived, shade intolerants that reproduce very quickly and can adapt to a variety of site qualities.

The second class of species to come in, and usually follow the pioneers is called the colonizers and these species usually take over the site. These species have a mixture of shade intolerants and shade tolerant and are often species that are classified as longer-lived.

The colonizers usually give way to the climax species which are characterized as longer-lived, shade tolerant and later in life producing seed. Climax species are the last species on the site and will usually regenerate itself. In the absence of a disturbance, a climax forest will regenerate itself because it can have its own seedlings in its understory because they are generally shade tolerant. Also, climax forests don't have to modify their environment very much, which is quite different from the pioneers and colonizers who come into the site and sometimes make it more habitable for subsequent vegetation.

4.4 Discuss seed viability and seeds in the forest floor.

When discussing seeds, viable means able to germinate. The length of time a seed remains viable is important for regeneration purposes. For example, trembling aspen seeds are viable for only 2 – 3 weeks after they have dropped in the spring. If the seeds don't germinate in this 2 – 3 week window, then the seeds are not viable. White spruce seeds can remain viable for 20 – 30 years and longer; especially when stored properly. Pin cherry seeds can remain viable for over a hundred years. Pin cherry is often called a pioneer species and, because its seeds are viable for a long time, it can come in after a disturbance if the right conditions are there for the seed to germinate.

There are a variety of seeds on the forest floor that have accumulated over time – studies have shown ranges of 30 seeds/m² up to 3000 seeds/m². This indicates that there are lots of seeds in the forest floor (of different viability lengths) just waiting to germinate. Different disturbance types may cause different seeds to germinate and reproduce on a site.

4.5 Identify reasons why a forest site may not be naturally regenerated.

As you walk through the woods sometime; you might come across a forest clearing that doesn't have any regeneration on the site. This can occur for any one (or more) of the three reasons identified below. These reasons are commonly called the three (S).

1. Insufficient seed Source – no seeds available in the area.
2. Insufficient Seedbed – the site is not able to grow or support a plant.
3. Insufficient Space to grow – there could be slash, blowdown or something prohibiting growth of a seedling.