



# WOOD YOU CAN FEEL GOOD ABOUT

## 2019 STATE OF THE FOREST REPORT



**WOODLANDS**  
SINCE 1882



Southern NB Woodlands - Myranda Talbot, one of 124 student tree planters saving for their education.

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Log Driving on the Saint John River, NB

## SUSTAINABILITY IS OUR BUSINESS

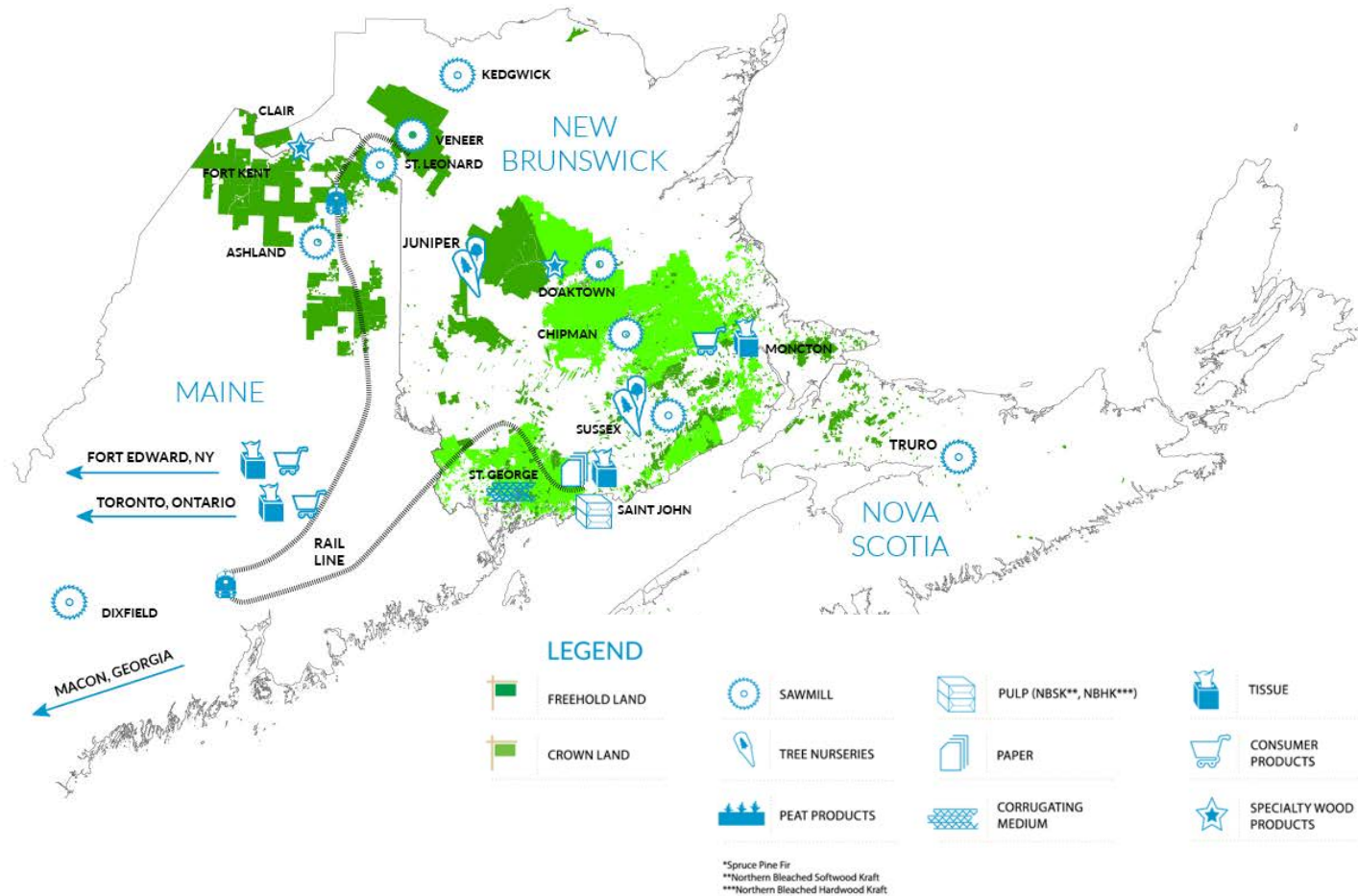
At J.D. Irving Limited, our Woodlands Division has a diverse team of nearly 2,000 dedicated people from across New Brunswick, Maine and Nova Scotia. Our team is made up of 400 full-time Woodlands employees and includes more than 300 summer students and seasonal employees. Key to our success are 435 professional contractor partners, whose small businesses employ more than 800 machine operators, truck drivers and manual thinning saw operators in rural communities across the region.

Our team is passionate about supplying our customers with quality wood products today, tomorrow and for generations to come. We do this by investing in a healthy, diverse, and growing forest. We consistently invest in our infrastructure, new and improved technology, scientific research, our employees and the communities where we live and operate. Since 1882, our standard has been excellence and we go above and beyond to deliver on that standard everyday.



JDI FOREST PRODUCTS TO 30 COUNTRIES AROUND THE WORLD

## MAP OF OPERATIONS



## SECURE SUPPLY - FROM SEED TO SHELF

A vertically integrated forestry business adding value to serve customers around the world

For over 135 years, J.D. Irving, Limited has been building and enhancing our reputation as a responsible steward of natural resources in North America, which is critical to our success.

Continual forest renewal is at the root of our business, and the heart of our value chain. At J.D. Irving, Limited, we manage and continuously re-invest in every part of our vertically integrated forestry business – from seed to shelf.

Vertical integration starts with the land, wood supply, the tree nurseries, silviculture, contractor logging, sawmills, pulp, paper, packaging, and tissue mills. From there, we transport our products by road, rail, and sea. We take great pride in sustainably managing this value chain, exceeding the expectations of our stakeholders and customers in every facet of our business.



# SECURING AND GROWING THE WOOD SUPPLY

Deersdale, NB

## SECURE & STABLE SUPPLY

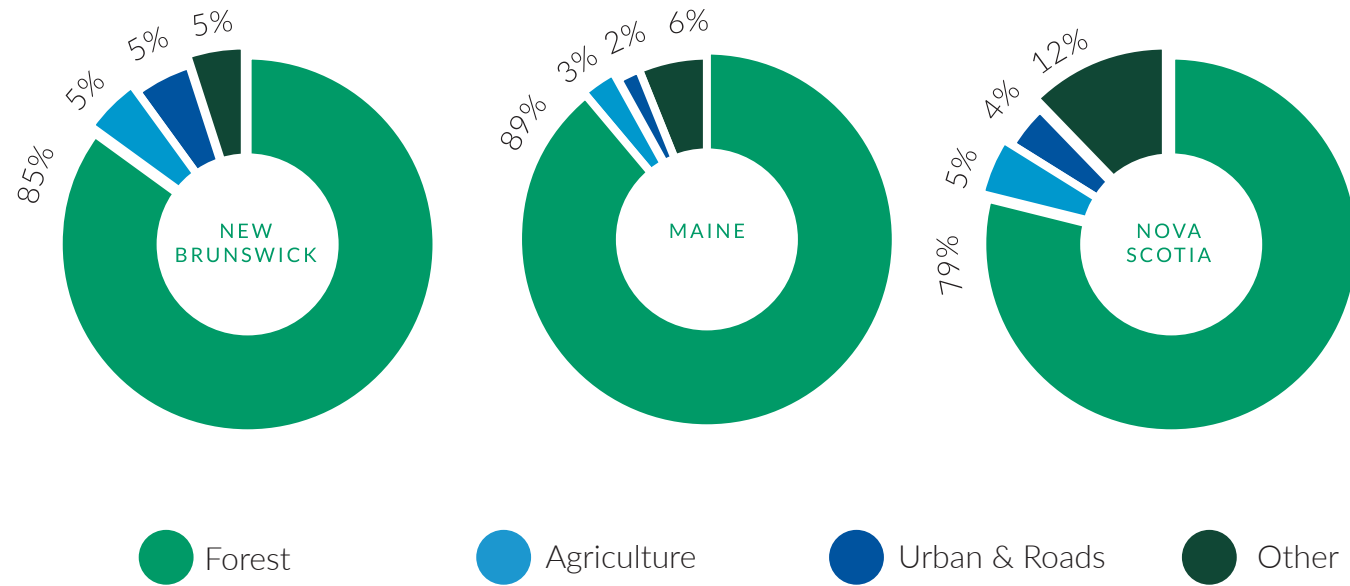


Figure 1.

## ABUNDANT FORESTS – STABLE AND SECURE TENURE

We rely on the forest for everything we do. Our operations in New Brunswick (NB), Maine (ME) and Nova Scotia (NS) are surrounded by an abundance of forest lands. The communities where we live and work are some of the most forest-dependent in North America.

As the second largest private timberland owner in North America, J.D. Irving, Limited owns and manages 1.3 million hectares (3.2 million acres) of freehold timberland and manages 1.1 million hectares (2.6 million acres) of government-owned Crown Land in New Brunswick.

Our freehold lands provide the highest level of long-term security of our wood supply. We have managed Crown licensed lands in New Brunswick since 1982 and have a 25-year evergreen forest management and wood supply agreement with the province. In addition, we receive additional wood supply from other Crown lands with long term tenure associated with our manufacturing operations.

About 30% of our wood supply comes from other private land sources – mainly small local private landowners - providing essential markets and adding value to the rural economy.

## JDI LANDS TOTAL UNDER MANAGEMENT: 2,376,695Ha/5,870,437Acs

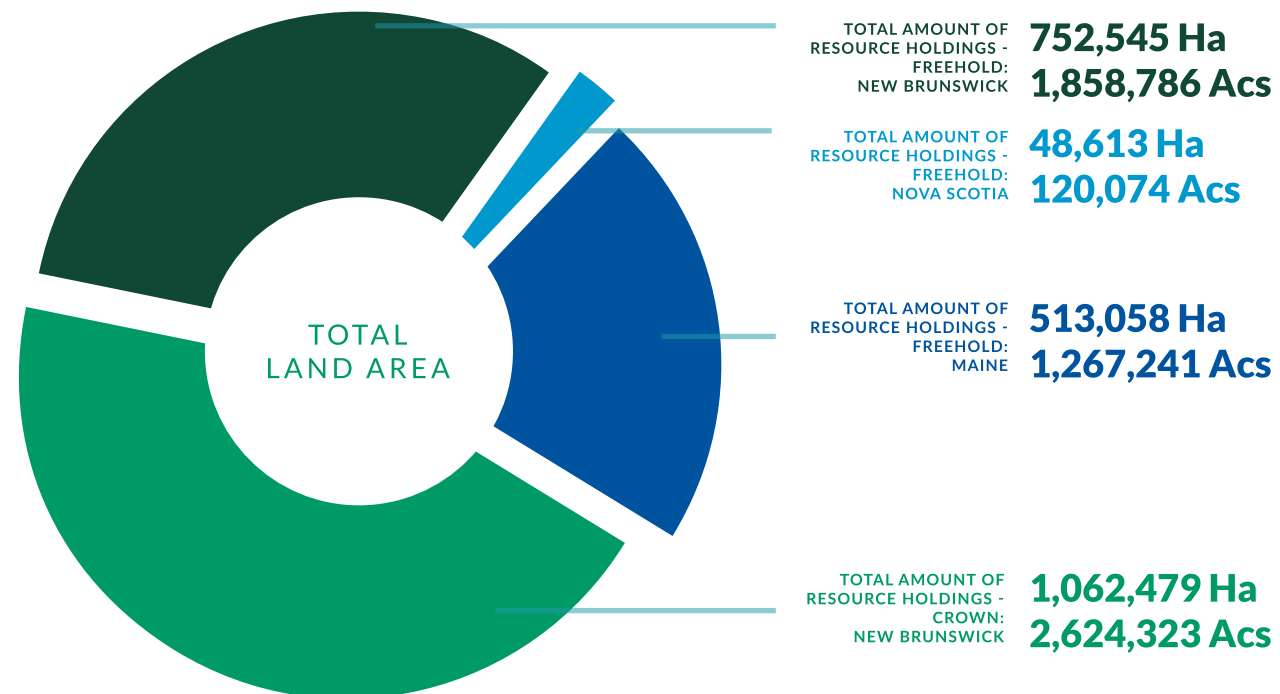


Figure 2.



Figure 3.

# HEALTHY AND DIVERSE FORESTS FOR TODAY AND FOR GENERATIONS TO COME

## Planning 80 years ahead for healthy forests

Securing the value chain today means managing the harvesting, delivering, buying, selling and trading of wood products - focused on improving efficiency, improving quality and on-time delivery.

Securing the wood supply for generations to come is about ensuring that every 5 years we create a new plan, 80 years into the future. Our long-term plans balance the long and short term supply of softwood and hardwood volumes by species and products, provide for conservation needs, wildlife habitat and carbon storage.

The outcome of this approach is win-win: an increasing wood supply and an increasing area for the conservation of other important values.

By revisiting the long term plan every 5 years we can maintain the flexibility to adapt to new technology, new scientific discoveries and the changing climate.

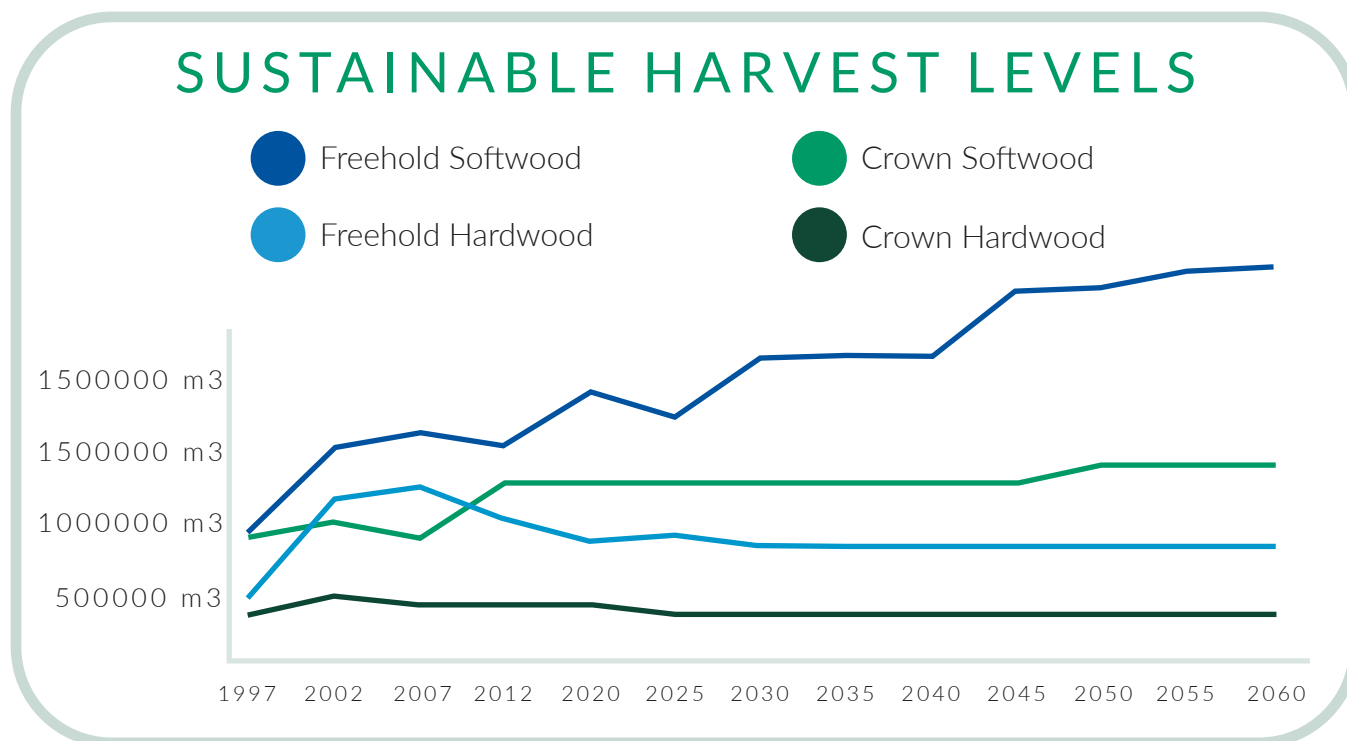


Figure 4.

**EVERY 5 YEARS**

We plan for the next 80 years

**THERE IS 3X**

The amount of Conservation forest area on NB JDI Crown License 7 since 1982 is an increase of 326%

**2.9 times** increase in Freehold by 2060

Increased Freehold Harvest level by the year 2060 since 1997

**1.3 times** increase in Crown Supply by 2060

Increased harvest level of NB JDI Crown License 7 we manage by 2060 since 1982

## % LANDBASE HARVESTED

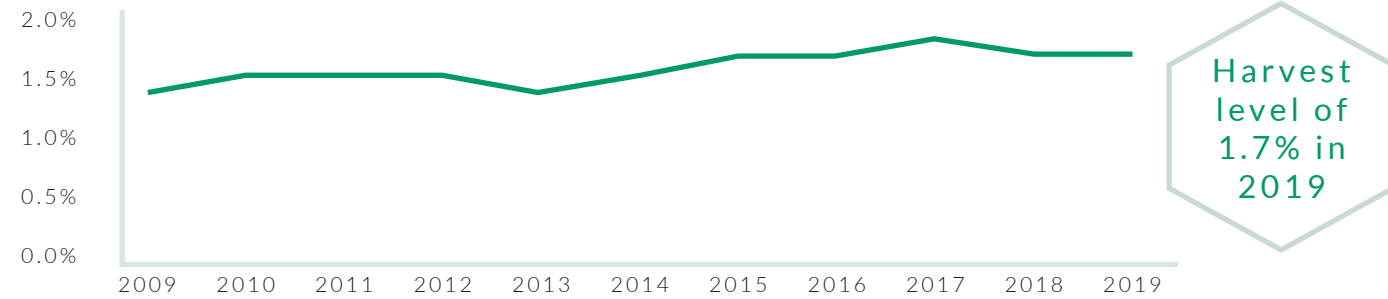


Figure 5.

## CROWN LAND GROWTH & HARVEST RATE

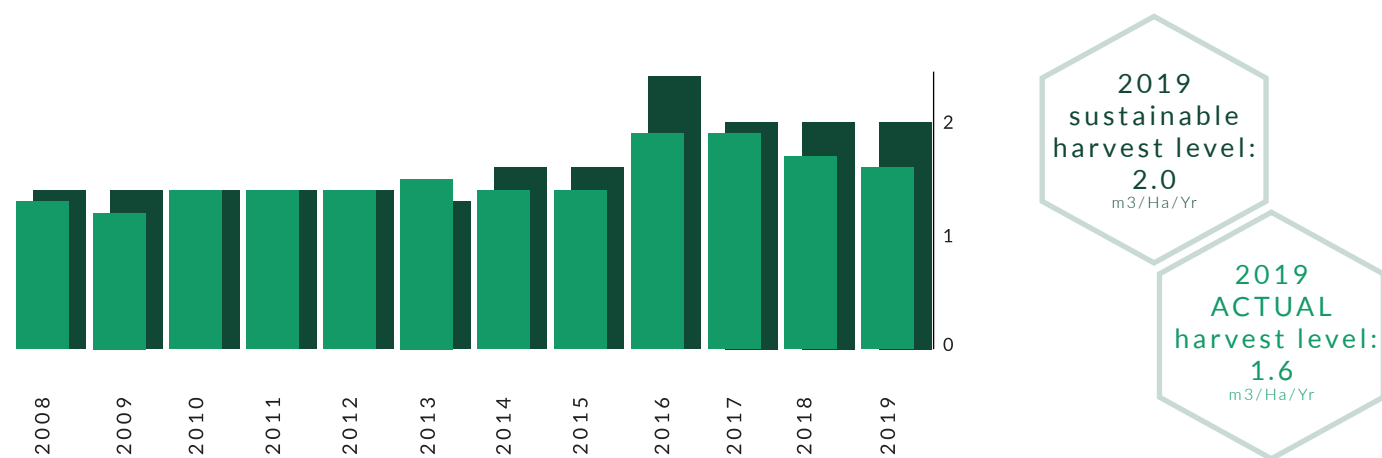


Figure 6.

## FREEHOLD LAND GROWTH & HARVEST RATE

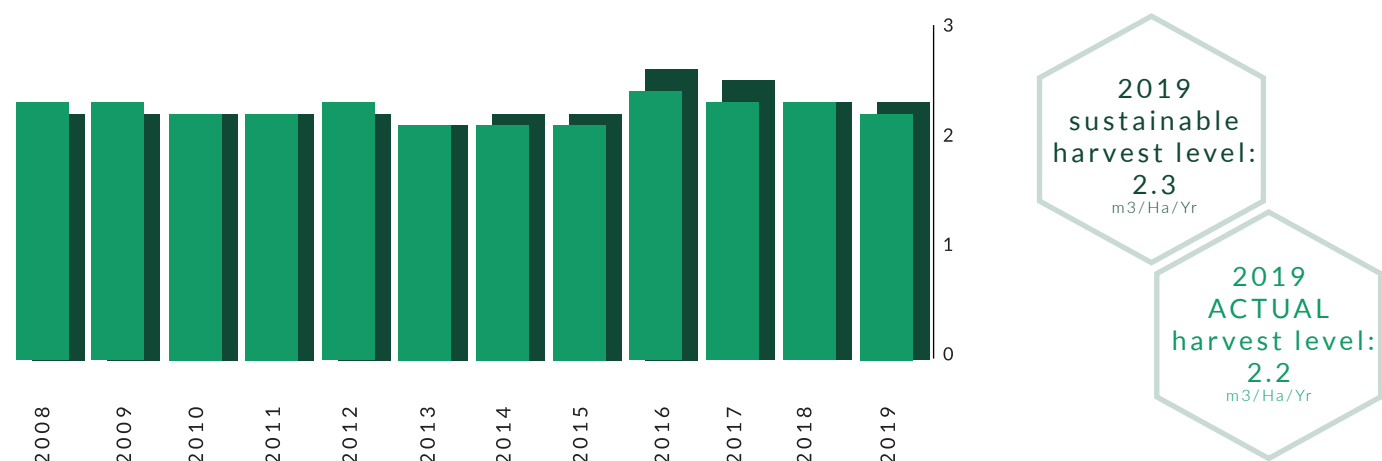


Figure 7.

ACTUAL HARVEST LEVELS M3/HA/YR      SUSTAINABLE HARVEST LEVELS M3/HA/YR



Southern NB Woodlands - Myranda Talbot, Ryan Reay, Godfred Yao Agbovi, Rellley Sullivan, Kristin Wilson

# GROWING MORE WOOD THAN WE HARVEST - ALWAYS

Harvesting less than 2% of the landbase annually

By harvesting 1.7% of the landbase annually, it will take on average, 60 years before harvested areas are ready to be harvested again. This average rotation length is matched to the natural life cycle of the forests in our region.

Our foresters carefully measure forest growth and harvest rate to ensure we are always growing more wood than we harvest. This way, we ensure that we never run out of trees.





# GROWING OUR CUSTOMERS' BUSINESS MEANS GROWING OUR WOOD SUPPLY

## WOOD SUPPLY DASHBOARD: NB, NS & ME

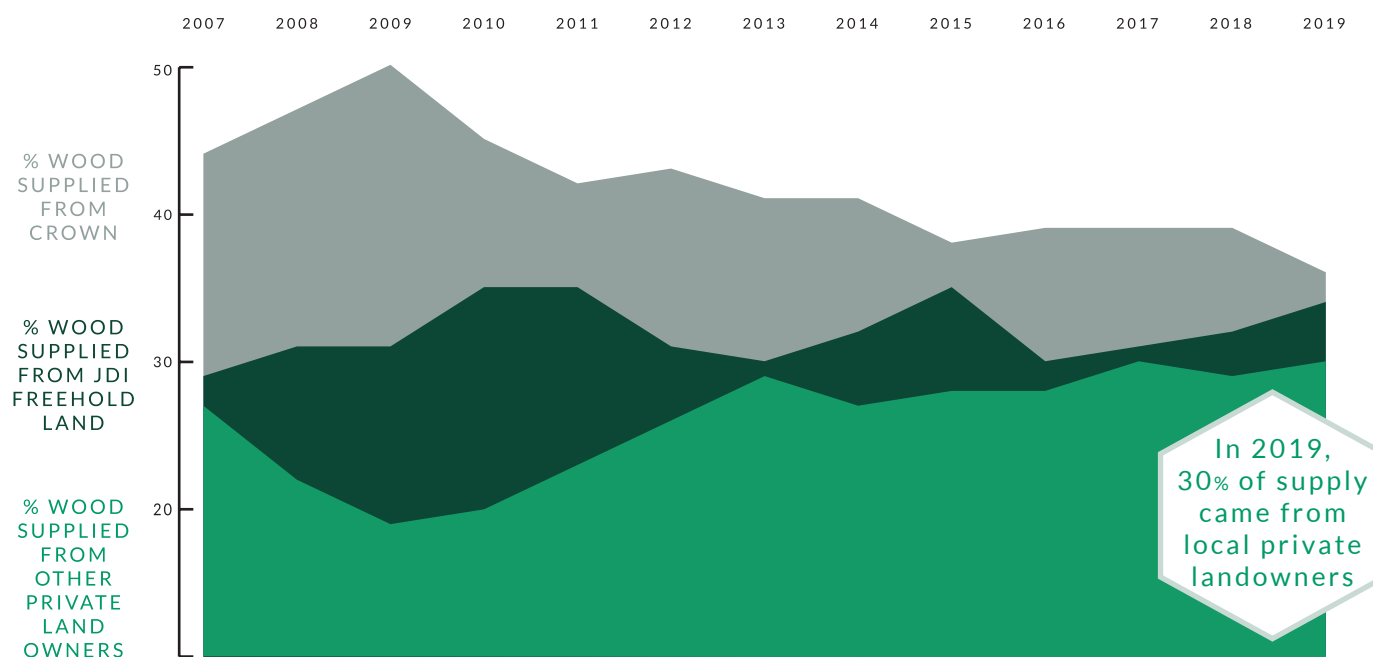


Figure 8.



Our wood supply is growing. A growing wood supply secures capital investments to grow our manufacturing base across the value chain.

A larger manufacturing base is a benefit to all landowners. Since 2007 our reliance on the wood supply from local, private landowners has steadily increased. Local wood purchases help to secure vibrant local communities, which is a key to our success.



**PLANT TREES.  
LOTS OF THEM.**



Billionth Tree Planting (2018) - Sussex, NB - J.K. Irving, Robert Irving, Jim Irving

## WHY WE PLANT TREES:

### 4x the Volume 4x The Carbon

Planted stands produce 4x more volume than naturally regenerated softwood stands. This means more volume for our customers, 4x more carbon stored, and that we can harvest the wood on one hectare that would otherwise needed to be harvested on four. This intensive approach on less than 25% of the lands we own or manage means more wood and improved flexibility in land use. It is a win/win.

### PLANTING IS DONE ON LESS THAN 25% OF THE HARVESTED AREA TOTALING 10,596Ha/26,172 Acs PLANTED IN 2019

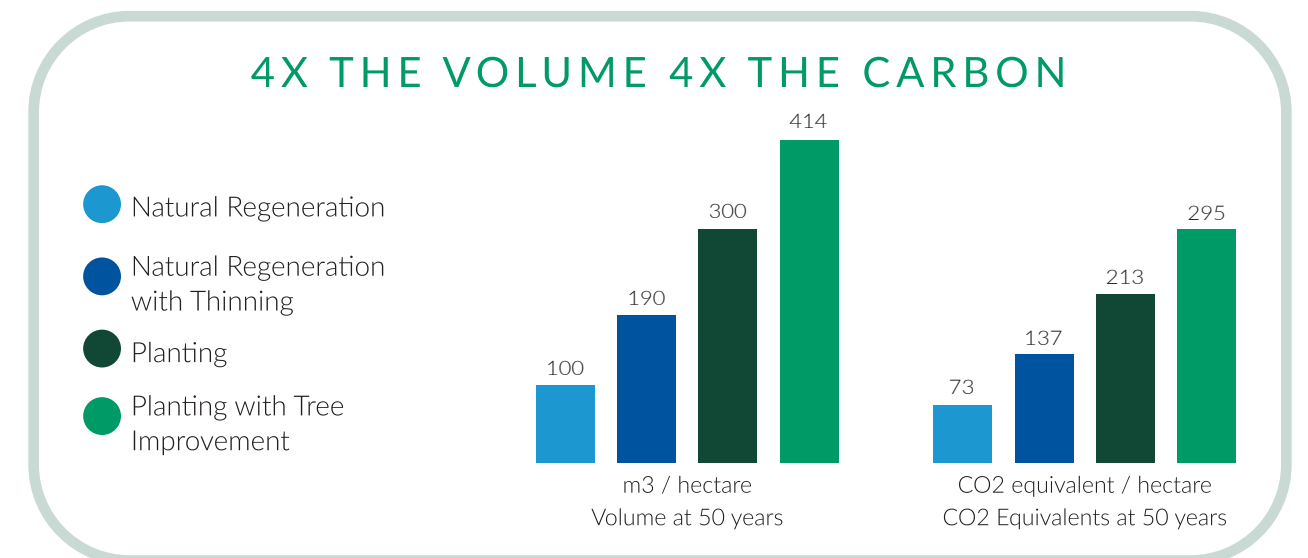


Figure 9.



### JUNIPER TREE NURSERY

One of the most modern tree nurseries in North America, with the capacity to produce over 24 million high quality seedlings. This facility has six large free span greenhouses, equipped with automatic fertilizing and irrigation equipment, and supported by fourteen outdoor holding areas with blackout systems.



### PARKINDALE SEED ORCHARD:

Our 100 Hectare/247 Acre seed orchard in Parkindale, NB. began producing seed in the late 1980's. In 2019 – the first ever top graft was completed. This technique involves grafting the top of mature trees to speed flowering, the trial is aimed at reducing the breeding cycle by at least 3 years.



### MARITIME INNOVATION CENTER / SUSSEX LAB:

This laboratory was established to expand and commercialize research and discovery.

The center of excellence is focused on cutting-edge research to propagate and grow healthier, larger trees from local species that adapt to changing climate and resist disease.



Juniper, NB

## IF YOU'RE GOING TO PLANT TREES – PLANT THE BEST

For over 40 years, we've focused on world-first patents that have led to naturally stronger and more resilient trees

We're invested in growing the best trees for tomorrow in our state-of-the-art Center of Excellence in Sussex NB that focuses on growing healthier, larger trees from local species that adapt to changing climate and resist disease. We've developed new award-winning methods of increasing insect and disease tolerance in our planted trees. As a result, we have nine patents granted or pending.



Oxford, NS - Ben Lane (10 Years of Service)

## CARING FOR THE NEW FOREST

Every step of the way

Foresters have many tools to regenerate the forest. The art and science of regenerating trees is known as silviculture and includes managing species, genetics, light, moisture, and nutrients available for optimum tree growth.

Today, we are harvesting the trees that someone else took the time to care for more than 40 years ago. We owe the same care to the future generations as we plant trees today. That is why our foresters manage each step of the process – to ensure it's done right.



Saint Leonard, NB



Maine Woodlands



Southern NB Woodlands



Maine Woodlands



Central NB Woodlands



Central NB Woodlands

**SPECIES SELECTION**

– Healthy forests for the future require matching the right species to the right site. Technology helps foresters gain understanding of soil moisture and nutrients to help get this most important decision right.

**SITE PREPARATION** –

Mechanical site preparation creates a better microsite for each planted tree. The goals of site preparation are to increase warmth, reduce excessive moisture and remove competing vegetation.

**TREE PLANTING** -

Occurs between late April and September. Each seedling is planted on the best microsite by a tree planter while ensuring the proper spacing.

**EARLY COMPETITION CONTROL** –

Typically within one growing season, planted areas become well stocked with plants adapted to full sunlight - short lived herbaceous species like raspberries, but also pin cherry, poplars and white birch. The most effective way to manage early competition is with the use of herbicides.

**PLANTATION CLEANING** –

Between the ages of 8 and 12, about 1/3 of the planted area is over-dense with natural regeneration. Brush saws are used to ensure the correct density and natural regeneration is left to fill in empty spaces.

**PRE-COMMERCIAL THINNING (PCT)** –

If the area was planned for natural regeneration, PCT is done between the ages of 8 and 15. Using brush saws, the best trees are retained and the density is reduced to meet the site specific plan.

2019 INVESTMENTS ON ALL LANDS

10,297 ha / 25,434 acs

10,596 ha / 26,172 acs

17,213 ha / 42,516 acs

8,420 ha / 20,797 acs

910 ha / 2,248 acs

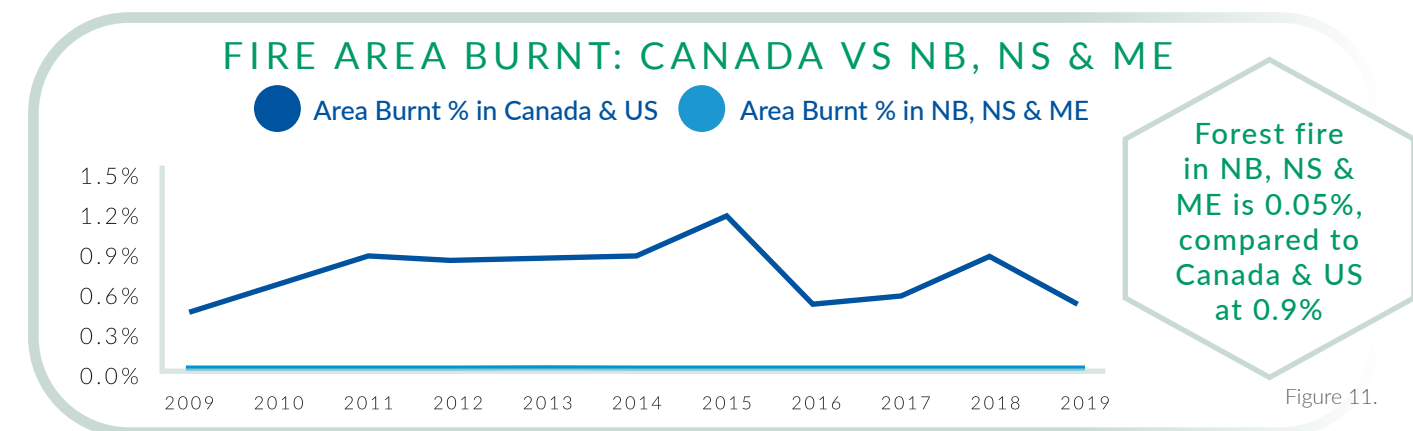
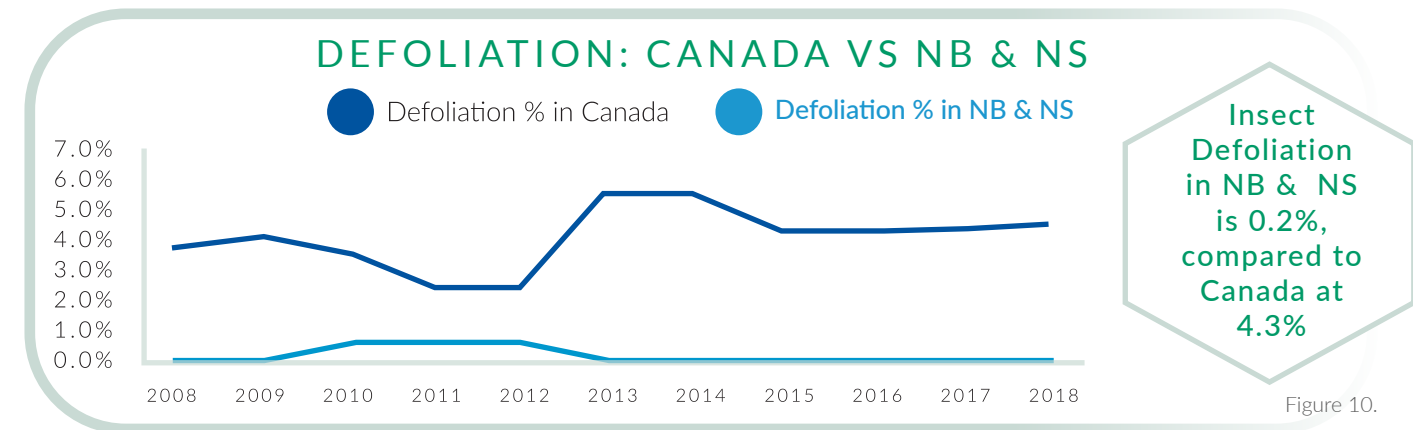


# PROTECTING OUR FORESTS FROM THREATS

Growing and managing healthy and productive forests takes time and committed investment. Allowing for natural threats such as fire and insects to destroy the hard work our team invests in maintaining a healthy forest doesn't make sense.

Fire and insect pests like the spruce budworm are a natural part of the forest and have been responsible for destroying and regenerating the forest for thousands of years. In recent times, this region has the best results in Canada/USA for suppressing fire and insect outbreaks.

Our commitment to forest protection secures the wood supply for our customers, habitat diversity and keeps carbon stored in trees and wood products.





Juniper, NB - Morrie Jewell (33 Years of Service)

## PROTECTING OUR WOOD SUPPLY FROM THE THREAT OF FOREST FIRES

Fighting Fires aggressively with highly trained teams, investing in infrastructure.

Investments in the forest need to be protected from the threat of forest fires. The climate is changing, with potential for hotter and drier periods of the summer in the region.

J.D. Irving, Limited maintains an extensive fleet of our own aircraft, airstrips, fire trucks, fire pumps, hose and trained employees to respond immediately to forest fires. And we are investing in new equipment, training and to deal with local labour shortages.

All our Irving Woodlands staff have a top priority to fight forest fires aggressively, while providing for safety first!

### WE MAINTAIN OUR OWN JDI FIRE FIGHTING RESOURCES



4 FIXED WING AIR TANKERS



1 SPOTTER PLANE



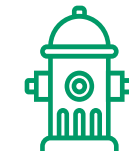
2 HELICOPTERS



7 AIRSTRIPS



38 FIRE TRUCKS



47 PUMP UNITS



360,000+ FEET OF HOSE

### WE INVESTED 5000 HOURS INTO TRAINED PERSONNEL IN 2019





Rimouski Area, Quebec

# PROTECTING OUR FORESTS FROM THE THREAT OF INSECT OUTBREAKS

## Healthy Forest Partnership

Insect pests like spruce budworm are a natural, but devastating pest in our region. Recognizing that large scale spray programs for spruce budworm would not be fiscally or socially feasible, a new approach was required. In 2013 the Healthy Forest Partnership was formed between the federal and provincial governments, universities and industry to try the newly formed idea of the Early Intervention Strategy (EIS). Following the lead of researchers at the Canadian Forest Service, the premise for EIS is monitoring, detection and targeted treatment of low-level budworm populations with an attempt to stop an outbreak from getting out of control. While aerial application of insecticides is

required, the products have significantly improved since the last outbreak.

Unlike products used in the past, these new products are not toxic to humans, mammals, birds, fish, or other insects species like bees and spiders. Since 2013, the research partnership has found early success and continues to implement and experiment with EIS. For more information check out [www.healthyforestpartnership.ca](http://www.healthyforestpartnership.ca)

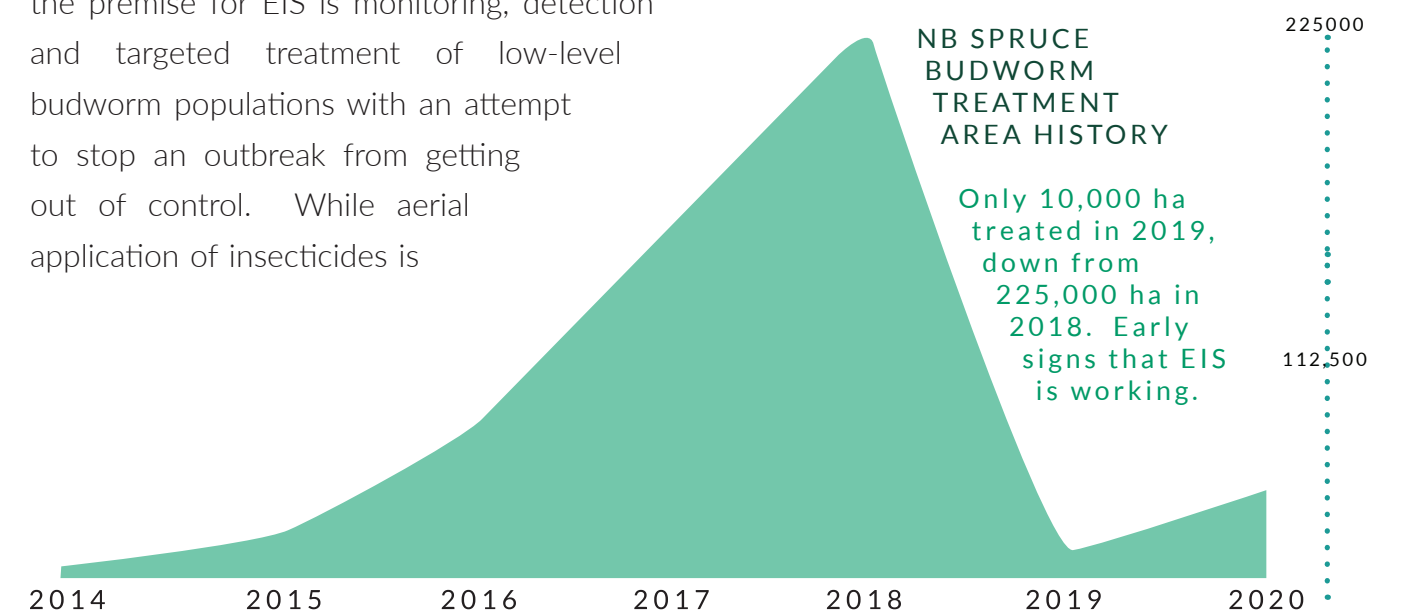
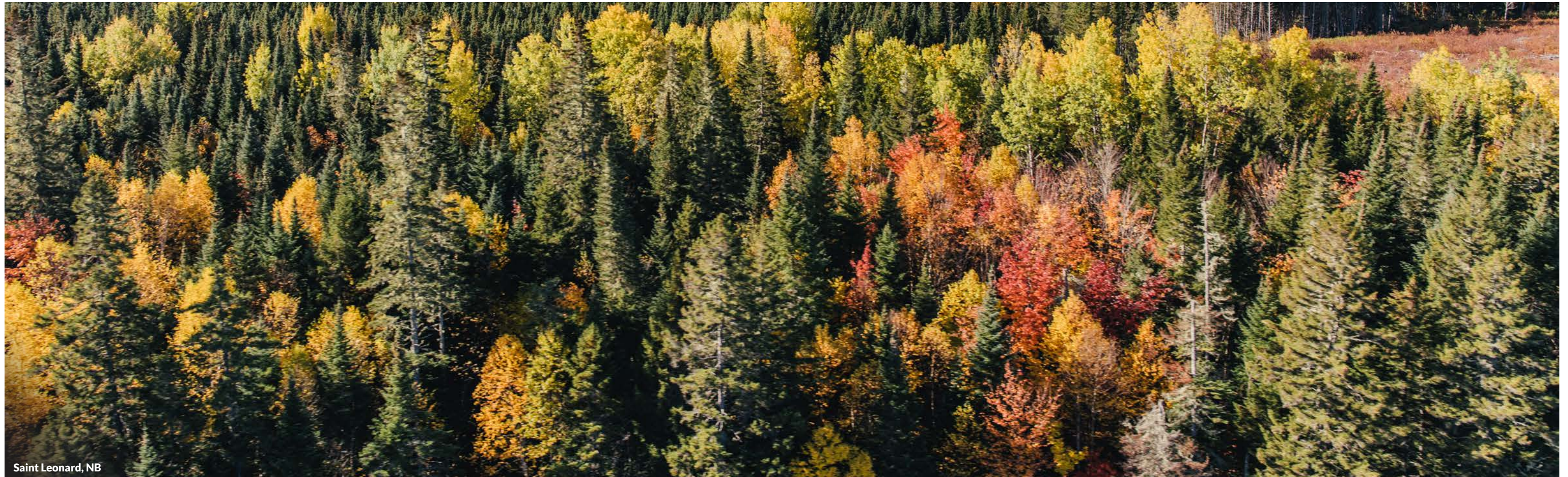


Figure 12.



# THE LIFECYCLE OF A TREE



Saint Leonard, NB

# FORESTS ARE CONSTANTLY CHANGING – AND SO ARE WE

Forests have always been in a constant state of change. Individual trees grow and die or whole landscapes are immediately impacted by insect outbreaks (spruce budworm), blowdown or forest fire. These disturbances create the diverse patchwork quilt of species and ages in the Acadian Forest – a patch of pure softwood in a valley, a patch of hardwood on a ridge and mixed forest in between. Repeated, over and over.

In the past, landscape-scale natural disturbances created larger, even-aged patches of trees. These disturbances are especially common in softwood dominated stands. Today, with the control of natural disturbances, foresters use clear-cutting to regenerate larger, even aged patches.

Some hardwoods, like sugar maple, beech, and yellow birch and some softwoods like white pine, hemlock, and cedar, have regenerated in the shade and are ready to grow tall when an older tree

## SPECIES RESILIENT TO FIRE & NOT IMPACTED BY SPRUCE BUDWORM

Regenerate when one tree falls down and another takes it's place, equaling multi-age stands



Sugar Maple, Beech, Yellow Birch White Pine, Hemlock, Cedar

**SUITABLE FOR SELECT CUTTING**

## SPECIES THAT REGENERATE AFTER A MAJOR DISTURBANCE

Regenerate after large disturbances resulting in even aged stands. They require full sunlight to grow.



Spruce/Fir, Jack Pine White Birch, Red Maple, Poplar

**SUITABLE FOR CLEAR CUTTING**

Figure 13.

falls down. These disturbances generally create multi-aged stands of trees. Foresters use select cutting techniques to regenerate these multi-aged patches. Other hardwoods like white birch, red maple, and poplar require full sunlight to grow and regenerate naturally with clear-cutting.

In all cases, growing trees are continually competing with other trees for sunlight, water and nutrients. This competition causes the strong to live and the weak to die and is a force constantly at work to change the forest.

## CHANGES IN NB FOREST COMPOSITION SINCE 1958

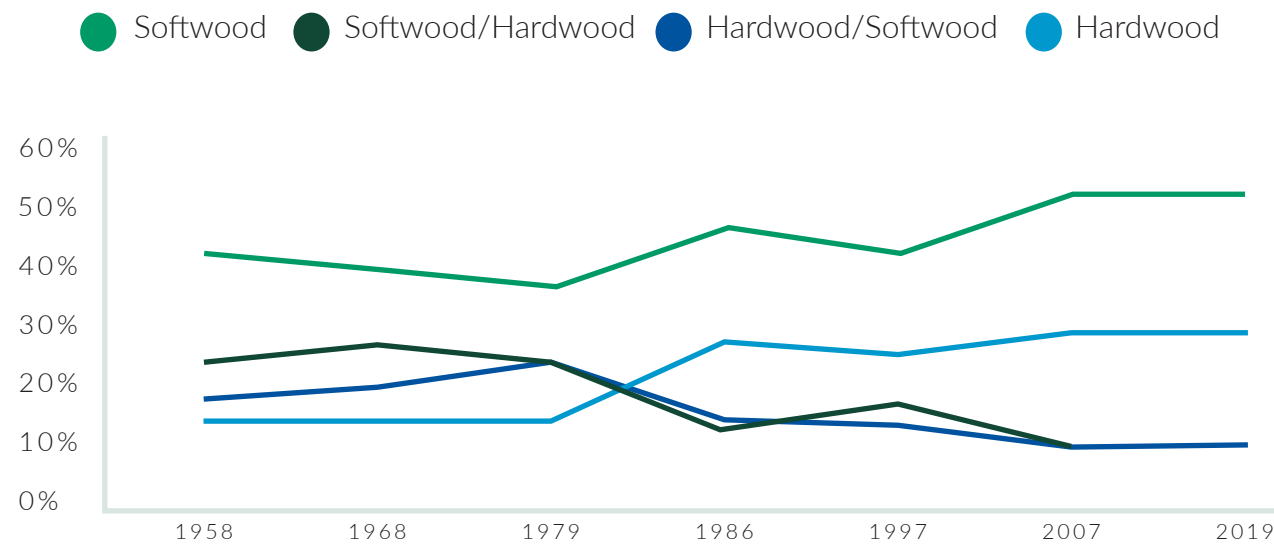


Figure 14.

# FOREST COMPOSITION

Unchanged since the 1950's...

The forest species composition is relatively unchanged in the region. Historically, an abundance of softwood dominated patches was a natural advantage – it still is. Mixed woods are always in transition – some converting to pure softwood, some converting to pure hardwood. This has occurred both naturally and with human intervention. From the forest landscape perspective, the forests remain mixed and diverse.

Tree age distribution has changed as well. From previous spruce budworm outbreaks, the age of the forest 40 years ago was skewed older. Now, the age classes are more evenly distributed, creating more stability in both wood supply and wildlife habitat. As well, due to increased conserved areas, there are more over-mature forests today than 40 years ago for the wildlife species that require older forests.

## CHANGE IN NB FOREST AGE SINCE 1986

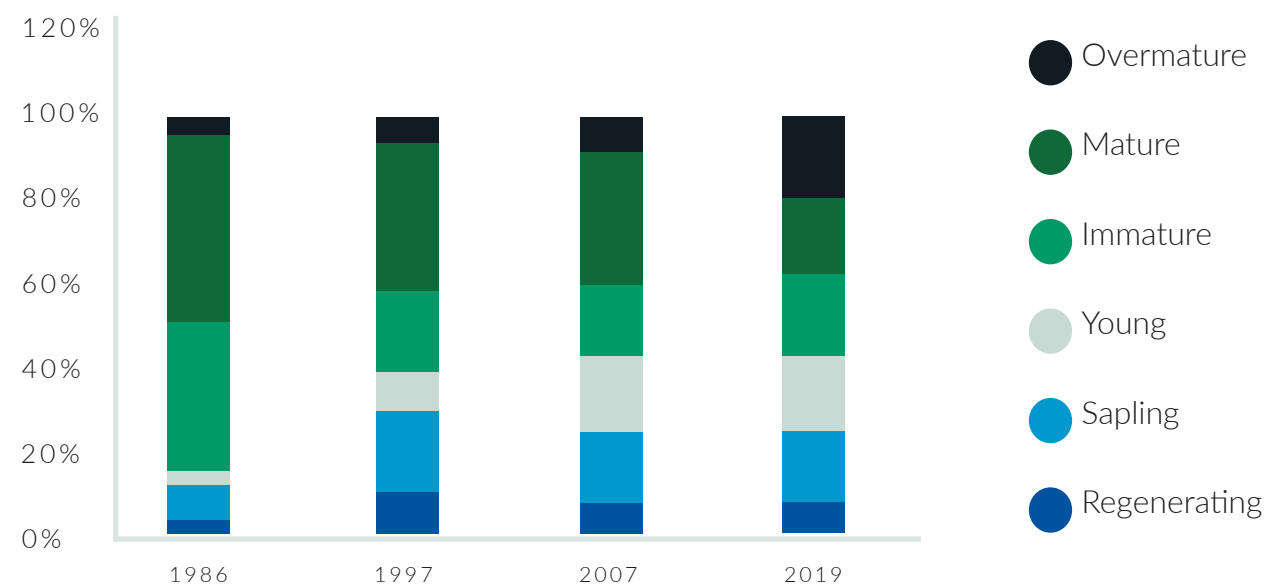
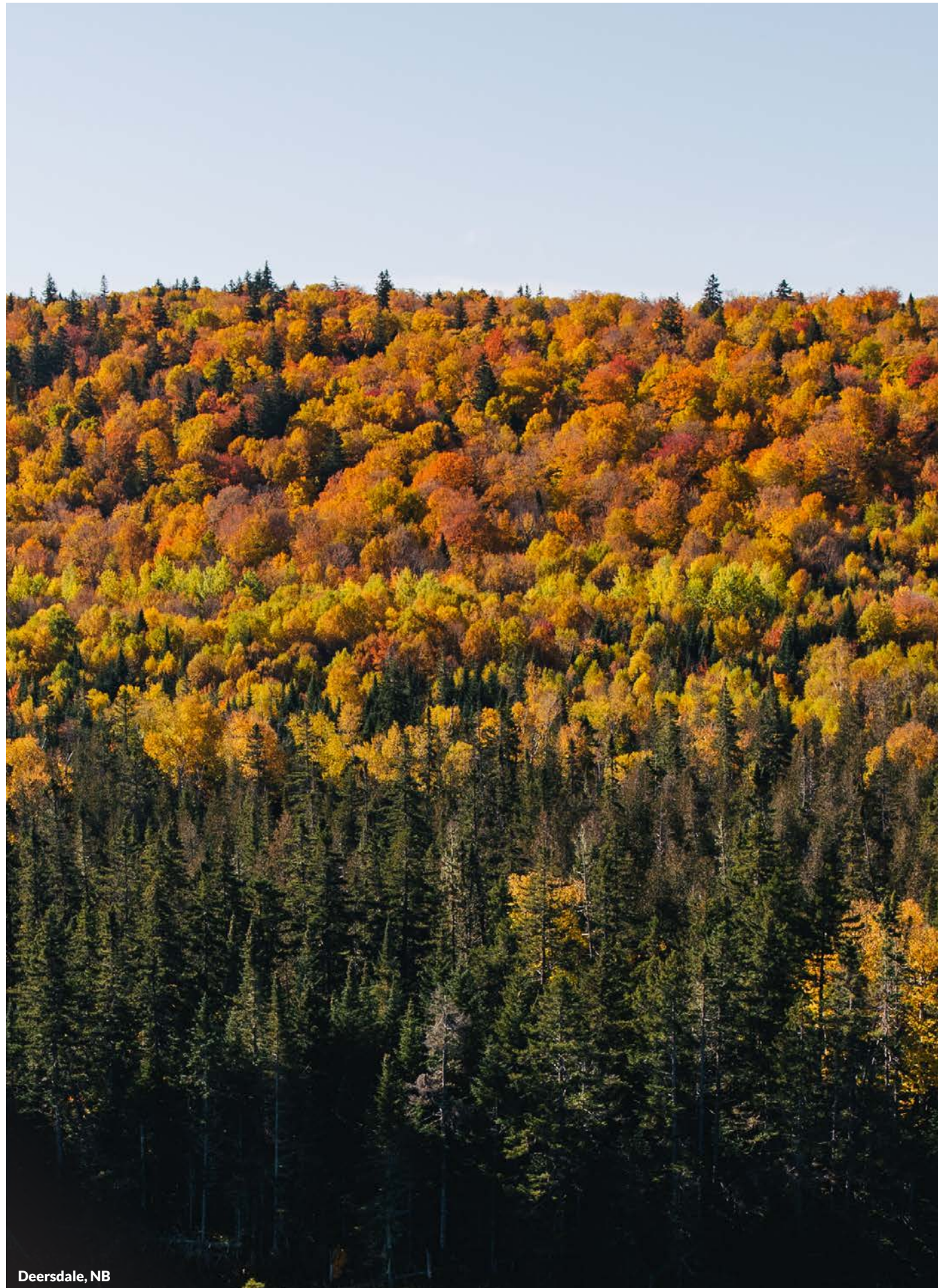


Figure 15.



Deersdale, NB

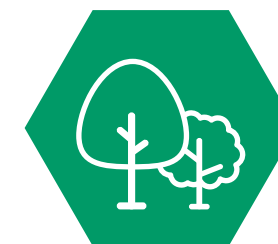
# A VIRTUOUS AND NEVER ENDING CYCLE OF GROWTH

## Natural Regeneration

75% of harvested areas on the lands we own or manage are regenerated naturally to hardwoods, mixed woods or softwood. Hardwood trees regenerate from seeds, stumps and roots and do not need to be planted for successful establishment of the next generation of trees. Selection harvesting in hardwood stands and white pine is specifically designed to provide seed and the right amount of light to nurture the next generation of trees under the shelter of the older generation.



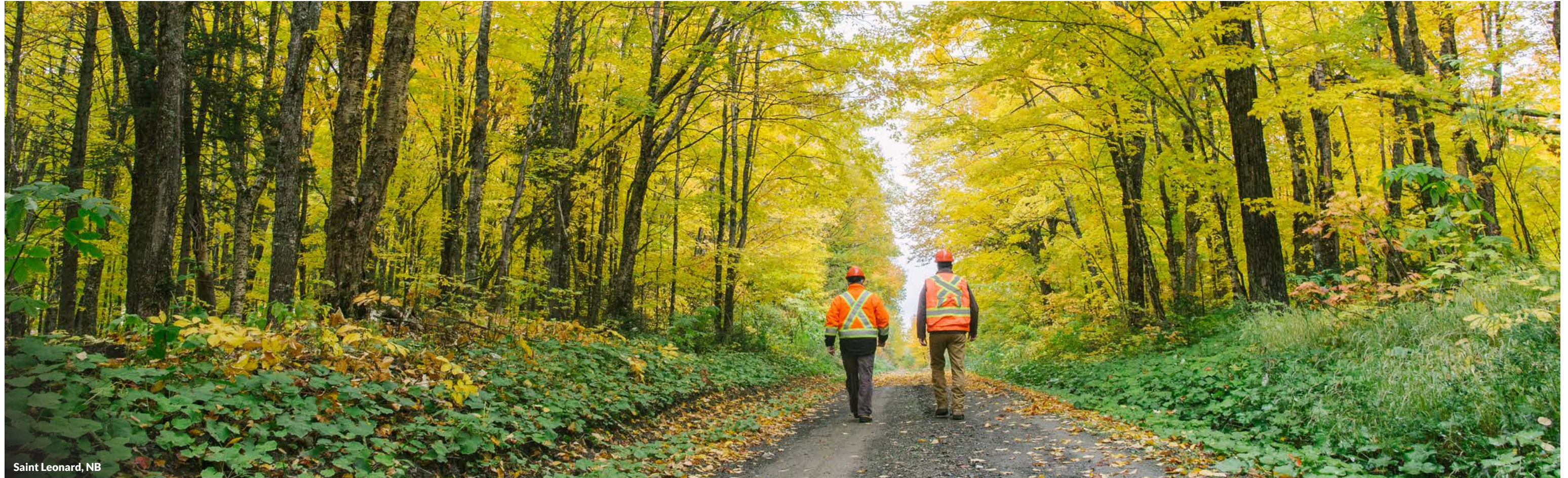
There is more hardwood growing today than 50 years ago



The lands we own or manage in the Acadian Forest contain a unique blend of 32 native species of hardwood and softwood trees



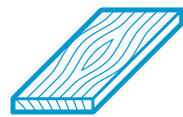
75% of harvested areas regenerate naturally to softwood, mixed woods and hardwood



Saint Leonard, NB

SPRUCE/  
FIR/JACK  
PINE

**71%**



CONSTRUCTION LUMBER



PULP



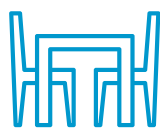
PAPER

WHITE  
PINE

**2%**



APPEARANCE GRADE  
LUMBER



FURNITURE



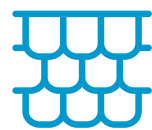
WINDOWS

CEDAR

**2%**



FENCING



SHINGLES

BIRCH/  
POPLAR

**12%**



CORRUGATED MEDIUM



BOXES

MAPLE

**13%**



TISSUE

## WE USE WHAT THE FOREST NATURALLY PROVIDES

100% of the tree - no waste

Our business is built around what the forest naturally provides. So what does that mean?

Our operations are strategically placed, in close proximity to where the species of trees they rely on naturally grow. This ensures a diversity of forests and forest products now, and for generations to come.

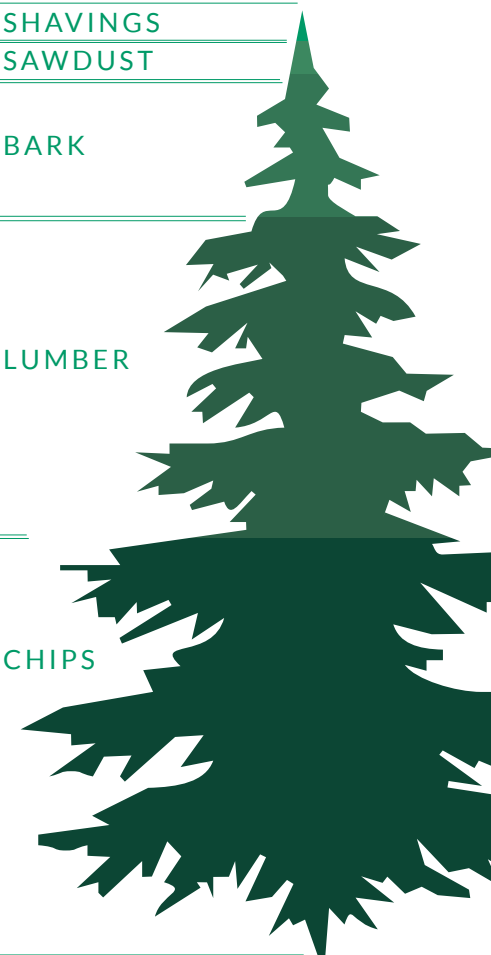
We're also committed to reducing waste and we use 100% of the tree.

3% SHAVINGS  
4% SAWDUST

15% BARK

34% LUMBER

44% CHIPS





# PLAN. HARVEST. REPEAT.

## Custom harvesting for long-term healthy forests

Harvesting decisions made by foresters are science-based. Natural disturbance patterns, soils, current and future species, tree quality, age, wildlife habitat and social values like aesthetics are considered. In addition, regulatory requirements for the protection of watercourses, wetlands, and species at risk are followed. Our foresters use best practices to avoid soil disturbance, protect rare plants, and special habitats such as: bear dens, vernal pools, stick nests, etc.

## % OF AREA CLEARCUT

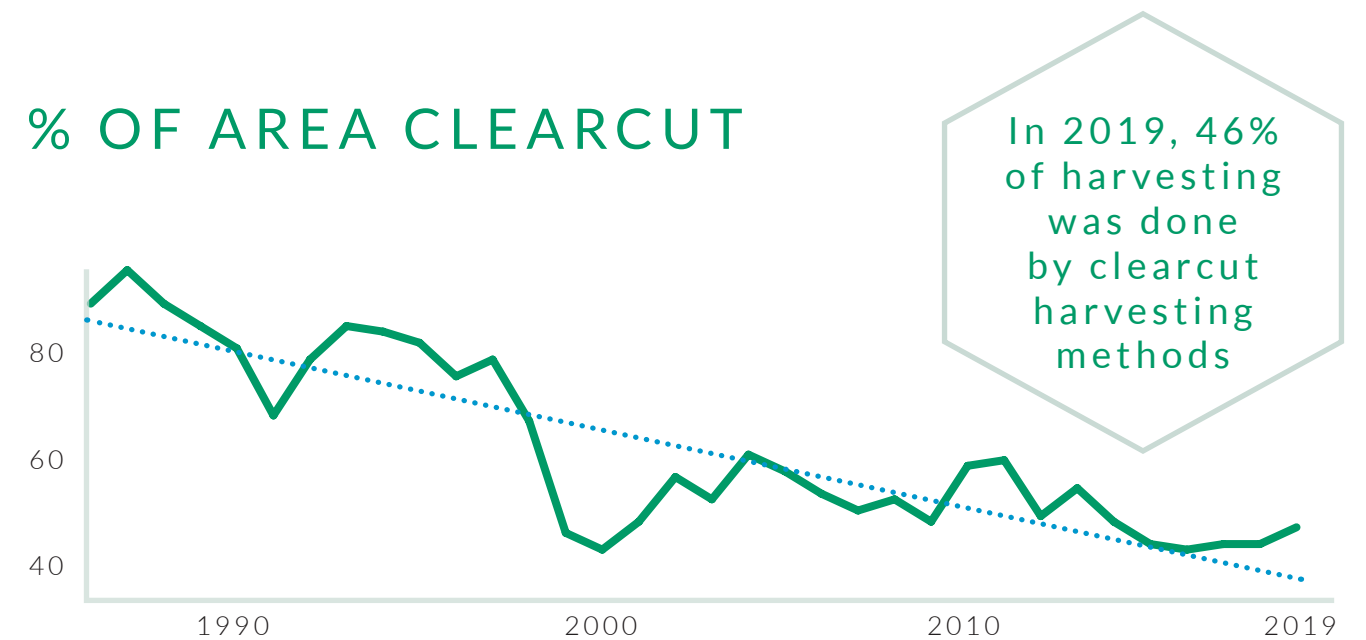
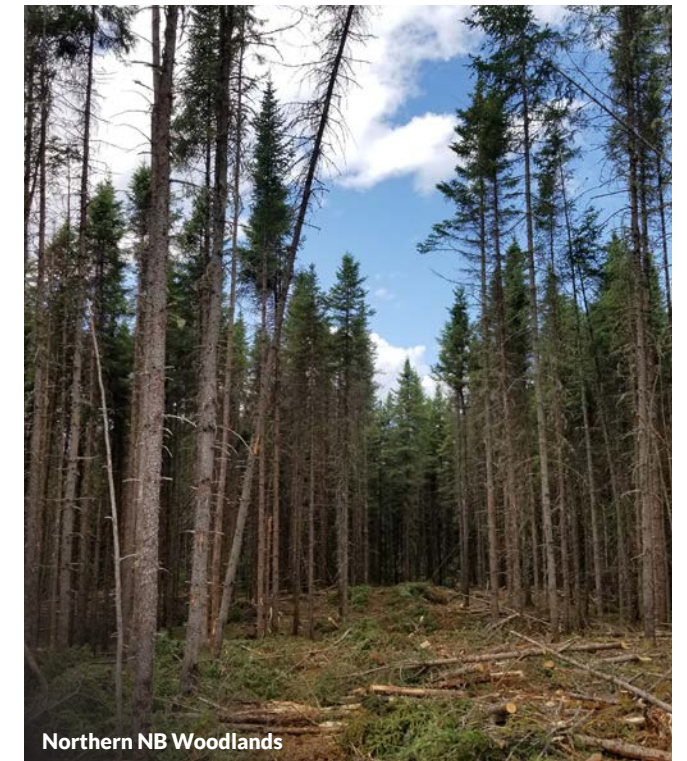


Figure 16.



**CLEARCUTTING** – A regeneration method that creates larger, even-aged disturbance. Effective in regenerating species that require full sunlight (intolerant to shade) and grow naturally in larger, even-aged patches. Regeneration can be planting or natural.

**COMMERCIAL THINNING** – A middle aged intervention to reduce competition between trees to focus growth on the best remaining trees. This is an even aged treatment carried out on planted or pre-commercially thinned stands. On good sites, regeneration will likely be through planting.

**QUALITY IMPROVEMENT SELECTION**

**SHELTERWOOD**

A quality improvement harvest focused on regeneration, providing seed and shade to species that tolerate indirect sunlight. An even-aged treatment where the overstory trees are removed once the regeneration is successful. Regeneration can be either natural or by planting.

**RIPARIAN ZONE HARVESTING** – An uneven-aged regeneration method that removes up to 30% of trees declining in value. Promotes long-lived species and regeneration for long term protection of watercourses.

**SELECTION HARVESTING**

A quality improvement harvest and uneven-aged regeneration method that focuses on removing trees declining in value and maintaining trees that are increasing in value. Regeneration is natural and is often used to regenerate quality hardwood tree species.

**HARVEST HISTORY BY TYPE**

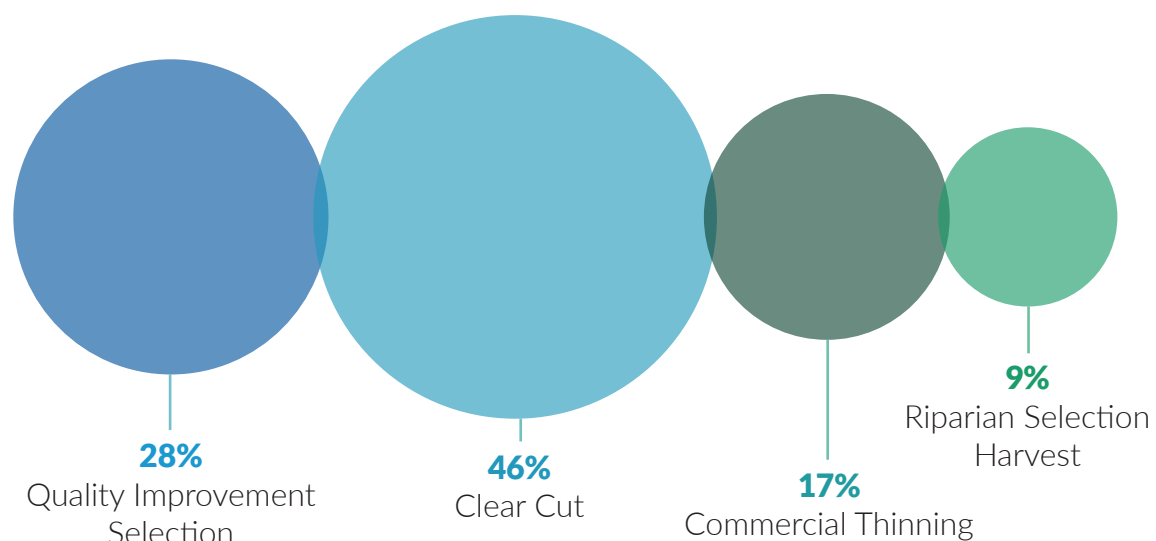


Figure 17.

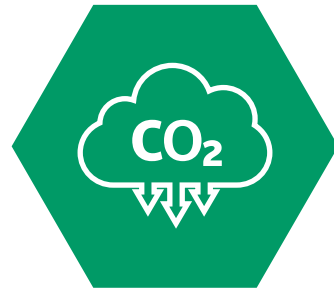


A VIRTUOUS AND RENEWABLE CYCLE. PLANTING TREES IS GOOD FOR:



**JOBS & ECONOMY**

Our wood supply is growing, facilitating investment and growth in our forest products industries



**CARBON SEQUESTRATION**

Planting superior trees sequesters four times more CO2 than a naturally regenerated forest



**CONSERVATION**

Planting improved trees helps to achieve conservation objectives

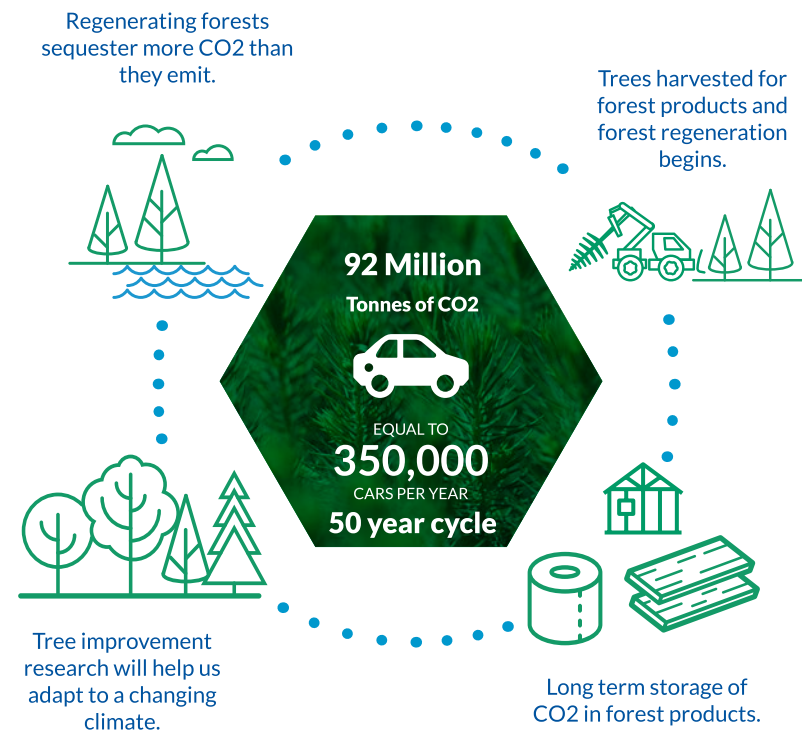


Figure 18.



In partnership with **University of New Brunswick's Dr. Chris Hennigar**, we have modeled a first of its kind, end to end carbon balance from the seed all the way to the customers store shelf. Our forestry and forest products operations absorb more carbon than they emit.



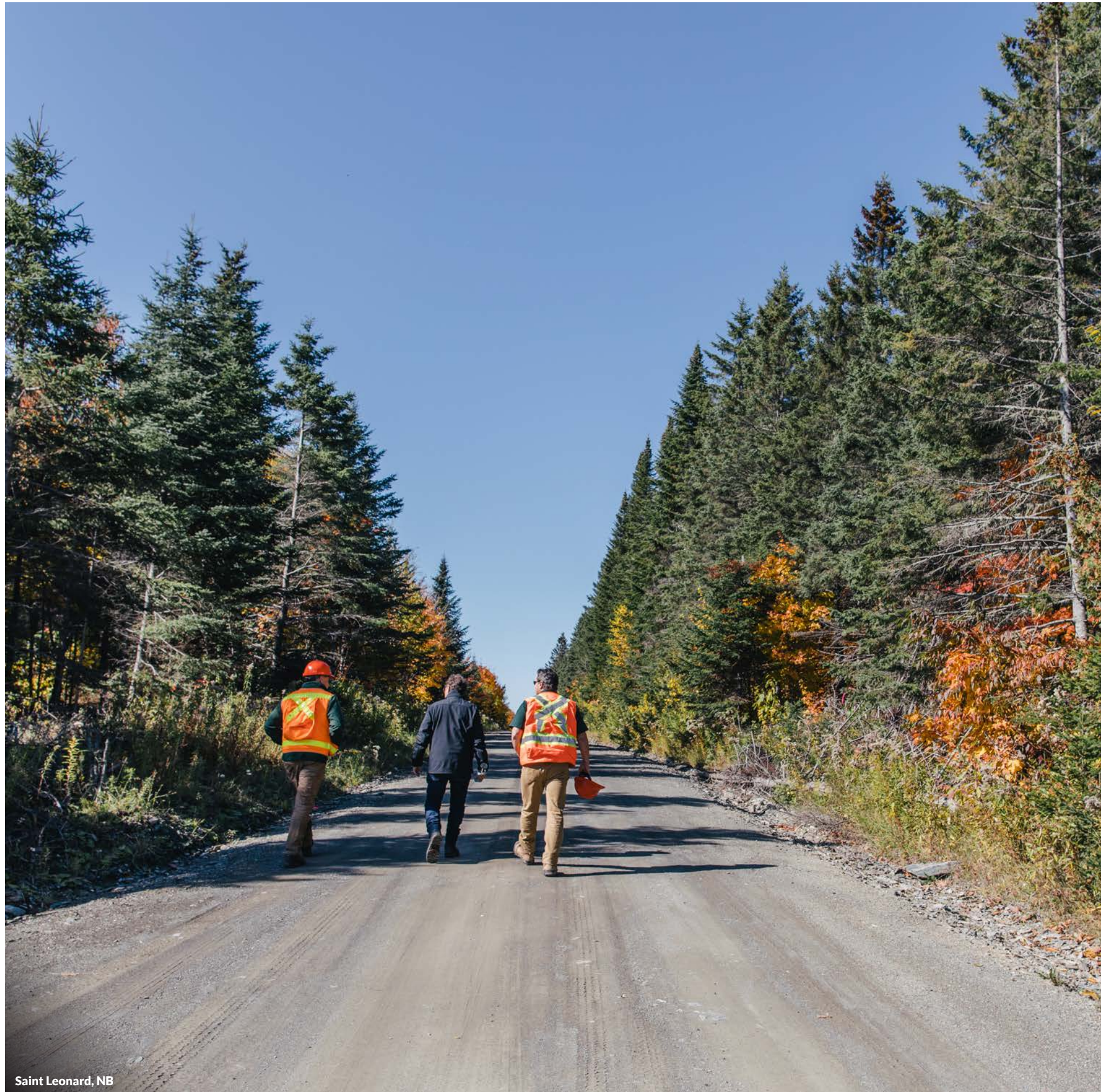
Billionth Tree Planting (2018) - Sussex, NB

# HOW DO YOU FIGHT CLIMATE CHANGE? PLANT TREES. LOTS OF THEM!

Over one billion and counting

In 1957, there were many who questioned why we needed to plant trees and others who doubted it would ever work, but it was a generational promise to care for the forest. A lot has changed since 1957, but the generational commitment has stayed the same and is more important than ever.

Planted trees grow 4x the volume as naturally regenerated softwood stands. That means 4x the carbon sequestration. As trees grow they absorb CO<sup>2</sup> from the air, but as they die, they release it back. By harvesting trees and making forest products like lumber, carbon is stored in homes, furniture and other forest products for hundreds of years, making our forests and forest products a net carbon sink.



Saint Leonard, NB

# ABOVE & BEYOND



Ottawa, Ontario - L to R: Paul Trianosky (SFI), Scott McDougall, Jason Killam, Andrew Willett, Jason Limongelli, Jim Irving, Kathy Abusow (SFI), Karla Guyn (DUC)

**“J.D. Irving stands out as a research leader that engages universities and conservation partners year after year. As Canada marks it’s 150th anniversary we are pleased to recognize J.D. Irving, Limited, whose roots in forestry go back 135 years.”**

- Kathy Abusow, President and CEO of SFI Inc. September 2017



The mark of responsible forestry

## DRIVEN TO IMPROVE

### JDI INTERNAL NON-CONFORMANCES PER YEAR

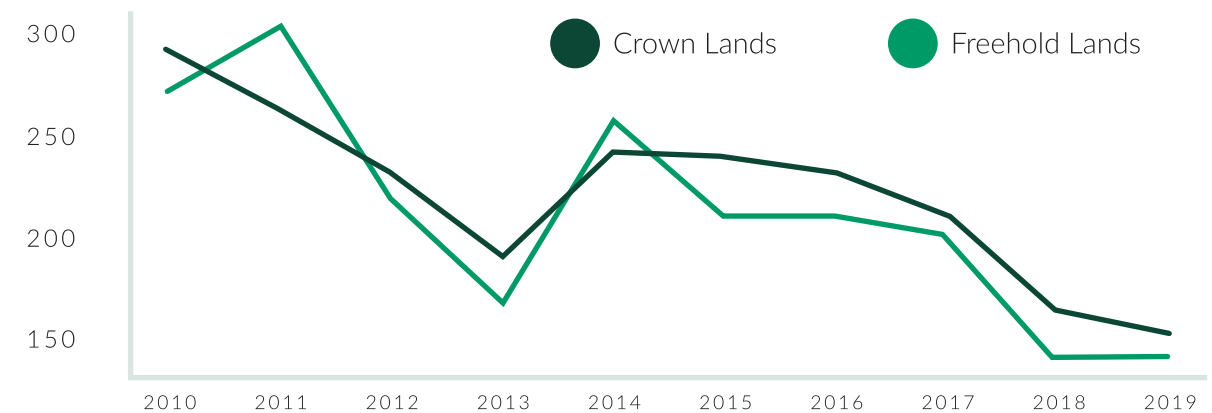


Figure 19.

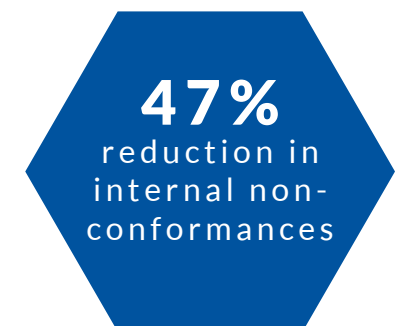
# ABOVE AND BEYOND

A standard of excellence and unwavering commitment to future generations since 1882

Since 1882, we’ve taken our role as stewards of the forests very seriously. It’s now a long-standing value shared by all our employees of not simply meet established standards for quality and performance – we exceed them. We ensure that we’re exceeding these standards through our forest certifications and annual third party audits measuring 145 indicators of corporate sustainability. Each year, the results are made available to the public in our Corporate Sustainability Report. See 2019 results published at the back of this document.

All our forest lands are certified to ISO14001 and the Sustainable Forestry Initiative® (SFI) program standards. In addition, our Maine forests are certified to the Forest Stewardship Council® (FSC® C041515) standards.

Audits are conducted by the New Brunswick Department of Natural Resources and Maine Forest Service. We rigorously audit our own operations too. Our process relies on finding problems ourselves and fixing them - continuous improvement is a core value. We track non-conformances in areas where there is environmental risk, like watercourse crossings, riparian zones, rutting, fuel and oil spills, wood waste, pesticide use and wildlife habitat.





Saint Leonard, NB - Charles Neveu (34 Years of Service)

## PROTECTING OUR NATURAL WONDERS

### It's more than just trees

Almost 25% of the forest lands that we own or manage have a primary objective of conservation. Our foresters are trained to find rare or specific plants, habitats or places and are rewarded to identify and protect them. While harvesting activity may be allowed in these areas (such as riparian zones and deer wintering areas), harvesting can only occur if it is improving the conservation value. A key element of our conservation forest is our Unique Area's Program. Currently there are almost 80,000 hectares (200,000 acres) in our Unique Areas Program, providing protection for a range of conservation values from old forests, nesting sites, rare plants or important archaeological areas. We also protect late successional forests by setting targets to maintain 10% of our forests as old and 3% as very old. This ensures that the biodiversity that relies on older forest conditions is represented across the forests we manage.

**THE TOTAL AMOUNT OF CONSERVATION FOREST ON THE LANDS WE OWN OR MANAGE IS 24%. THIS IS OVER 571,000 HECTARES OR 1,400,000 ACRES OF FOREST!**

## 20% CONSERVATION FOREST ON FREEHOLD LAND

HECTARES	ACRES	
<b>73,557</b>	<b>181,686</b>	Unique Sites & Inoperable
<b>57,185</b>	<b>141,247</b>	Water & Wetland Buffers
<b>64,845</b>	<b>160,167</b>	Deer Wintering Areas
<b>58,167</b>	<b>143,672</b>	Old Forest Habitats
<b>253,754</b>	<b>626,772</b>	<b>Total</b>



Figure 21.



Saint Leonard, NB

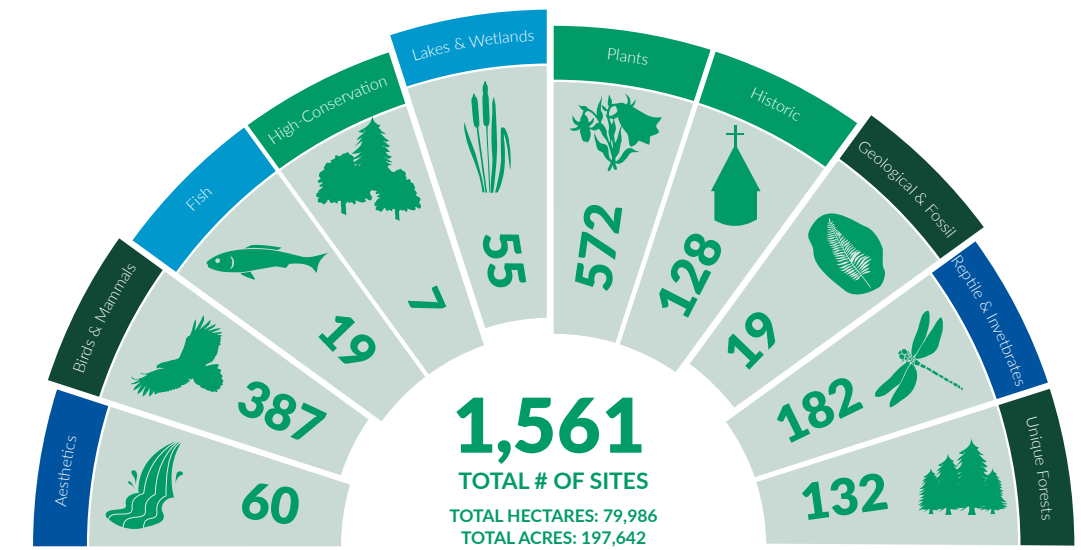
## 30% CONSERVATION FOREST ON NB JDI CROWN LICENSE 7

HECTARES	ACRES	
<b>36,900</b>	<b>91,143</b>	Unique Sites & Inoperable
<b>102,000</b>	<b>251,940</b>	Water & Wetland Buffers
<b>35,000</b>	<b>86,450</b>	Deer Wintering Areas
<b>45,500</b>	<b>112,385</b>	Old Forest Habitats
<b>98,200</b>	<b>242,554</b>	Protected Natural Areas
<b>317,600</b>	<b>784,472</b>	<b>Total</b>



Figure 22.

## UNIQUE AREAS: SITES BY CATEGORY



**67,396** ha  
Old Forest Sites

JDI has set an objective to designate and maintain old forest within the working forest landscape. To date, more than 67,396 hectares (166,540 acres) have been designated towards meeting this objective.

Figure 23.

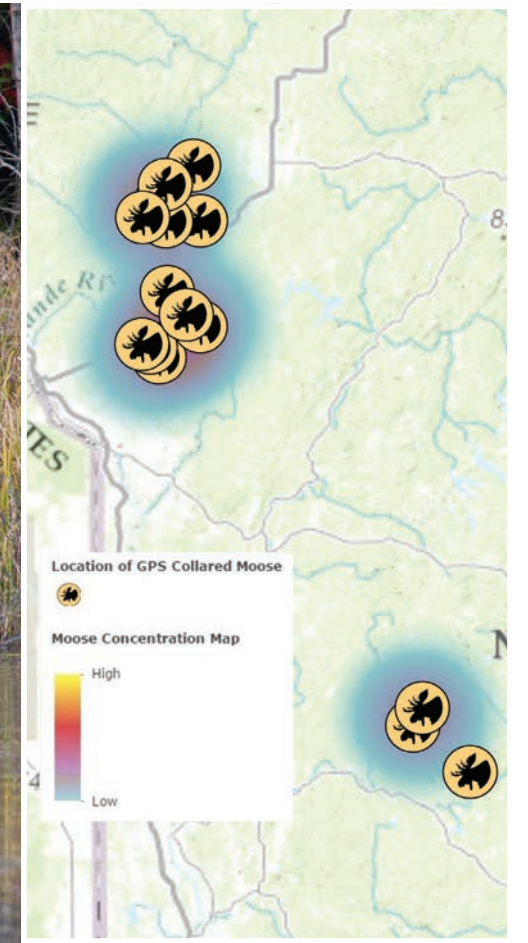
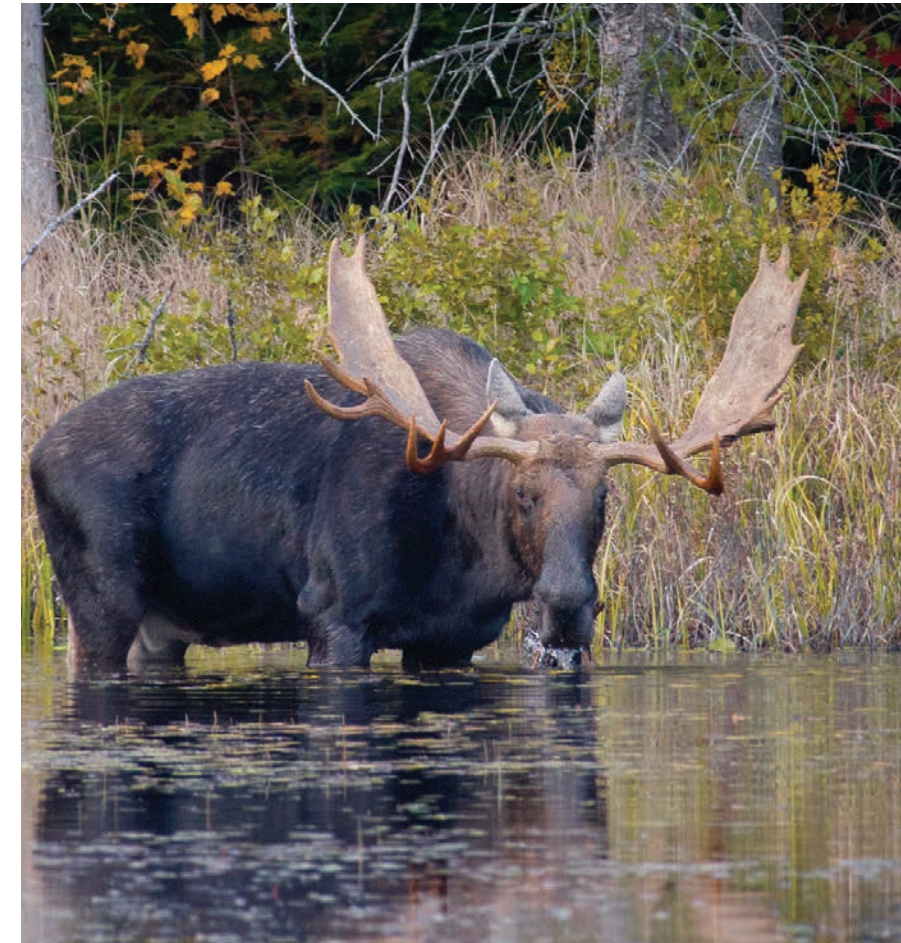
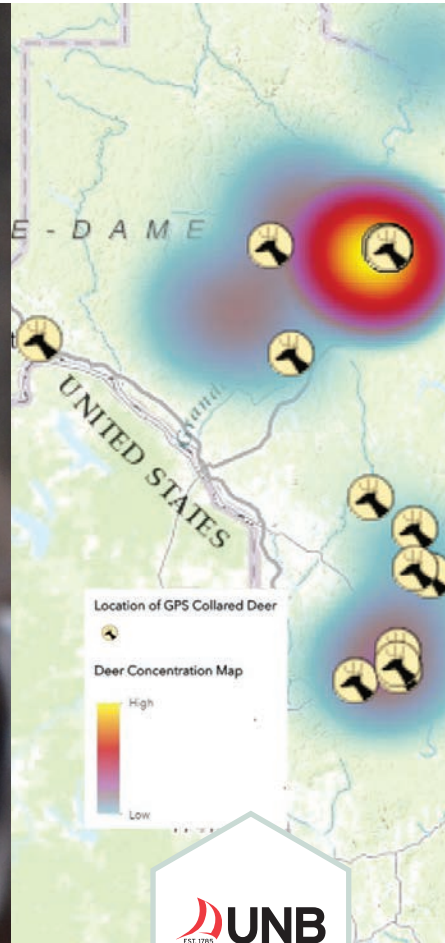


Tracy NB - Dr. Jean Pierre Trembley (Université Laval)

## WE'RE COMMITTED TO HEALTHY AND DIVERSE FORESTS FOR TODAY AND TOMORROW

That's why we are unique in incorporating world-class science into our operations and have been a founding partner of many wildlife and forestry research projects since 1992

We invest in research to learn more about the fish, wildlife and plants that are a part of the forests we work in. Since the early 1990s, we have invested \$30 million in research. We have collaborated with dozens researchers and more than 100 graduate students. Our Forest Research Advisory Committee (FRAC) has been in place for more than 20 years and brings researchers and forester managers together. Continuous learning and adapting our management based on facts and science are core values. Our research partners have their work peer-reviewed and published. Currently, we are focused on landscape level impacts on water, birds, beetles, bryophytes, trout, Atlantic salmon, deer and moose.



## NORTHEAST DEER PARTNERSHIP

- Focused on understanding how deer are using forests and what factors impact their populations.
- Collaboration of eight research and government partners in NB and Maine; the largest study of it's kind.
- Over 100 deer have been tracked and monitored in real time with precise GPS collars for more than 3 years.
- Researchers studying the effects of predators, winter conditions, forestry practices (including herbicide use) and feeding on deer populations.
- J.D. Irving, Limited initiated the project and is the major funding partner.



## MOOSE RESEARCH

- Research underway to understand the relationship between climate change, winter tick and moose population decline.
- Collaboration between 19 partners, in NB and Quebec.
- 324 moose monitored with high precision GPS collars.
- Climate gradient from southern NB to Northern Quebec.
- J.D. Irving, Limited is the major private funding partner.





## SONG BIRD STUDY

- Research to understand songbird diversity and habitat needs now and modeled into the future.
- Focused on understanding songbird diversity at different levels of forest management intensity (intensive - JDI freehold, extensive - NB Crown, limited - ME State lands).
- Songbird data collected with auto-acoustic recording devices during the breeding season across 17 different forest types and age classes.
- Collaboration of 5 partners with J.D. Irving, Limited providing private funding.



## ATLANTIC SALMON RESEARCH

- A results-based approach to Atlantic Salmon conservation with research focused on:
  - Understanding where cold water comes from on the landscape, so that it can be protected.
  - Developing new sonar technology and artificial intelligence to accurately count returning salmon.
  - Testing a Smolt-to-Adult Supplementation (SAS) strategy, a more natural way to repopulate a river, at scale.
  - Using new genetics procedures and technology.
- Collaboration of 8 partners with J.D. Irving, Limited as one of two private funders.

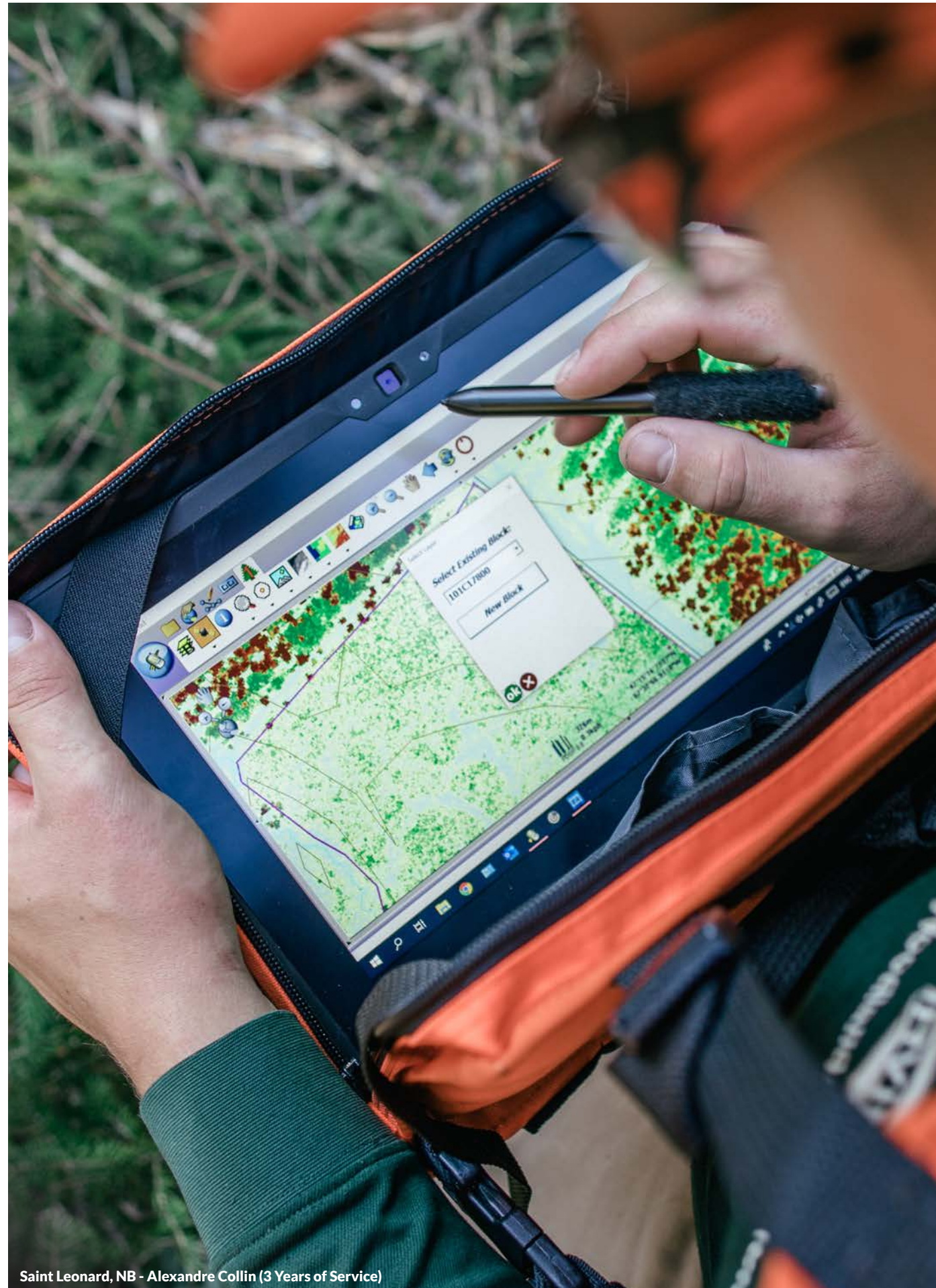






# WORLD CLASS TECHNOLOGY

Sussex, NB - Pamela Nicks (6 Years of Service)



Saint Leonard, NB - Alexandre Collin (3 Years of Service)

## EVERY TREE COUNTS

We're finding a better way every day with our world first technologies for precision forestry

J.D. Irving, Limited was the first company in Canada to build and maintain a Geographic Information System (GIS) and use GPS technology in the early 80's. Today state-of-the-art Light Detection and Ranging (LiDAR) technology is providing detailed mapping of over 25 billion forest attributes on the lands we own or manage. Finding a better way every day is a part of our culture and we're continuously creating, finding and implementing world first technologies to help manage multiple values, including: habitat, conservation, clean water, wood supply, silviculture, fire control and recreational areas.

Leveraging technology is integrated into every part of our business – from foresters providing real-time updates from their on-the-ground assessments, to enabling our team to deliver more than 20 forest products to over 30 mills across a 30,000 Km/18,750 miles road network. Technology is driving our business forward.

**“IT TAKES 40 YEARS TO GROW A TREE AND 40 SECONDS TO PROCESS IT. WE HAVE A RESPONSIBILITY TO DO IT RIGHT.”**

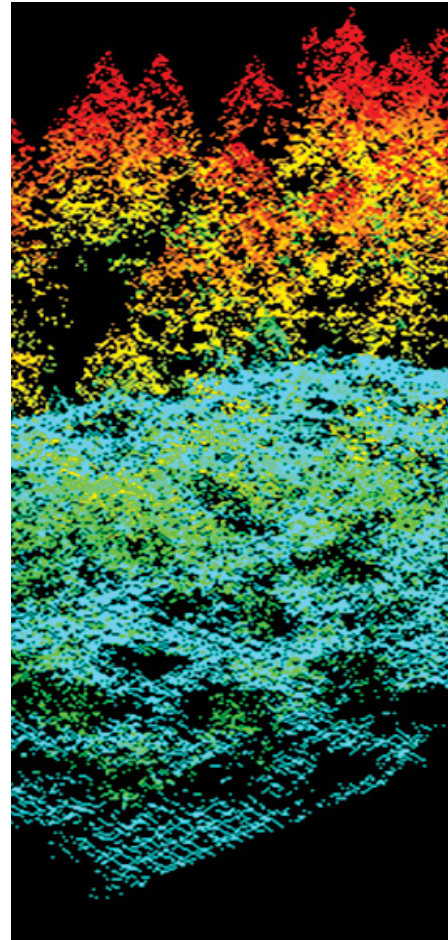
**- Lyne Arpin,** Process Improvement, J.D. Irving, Limited, Sawmills Division



Sussex, NB - Mullai Manoharan



Juniper, NB



## WORLD FIRST RESEARCH FACILITY

### Maritime Innovation Limited

Our team developed and patented world first techniques to identify fungi in healthy trees that provide natural protection from pests and how to transfer that protection to seedlings. Since 2007 we've treated 170+ million seedlings with this new method resulting in increased natural tolerance to insects and diseases. In 2019, the lab produced 3 million seedlings with superior genetics from our advanced breeding program.

## MODERN GREENHOUSES

### Advanced Automation

Our trees are grown in our state-of-the-art automated greenhouse facilities. These facilities have sensors that measure light, humidity, temperature, pressure and soil moisture, which feed data to our master growers to create optimal growing conditions. Our growers and technicians are also equipped with tablets to provide real-time information on how the crop is performing.

## MANAGEMENT PLANNING & INVENTORY

### Light Detection and Ranging

We are early adaptors of LiDAR technology to capture a very precise forest inventory. LiDAR is a hyper accurate laser scan of the forest that captures every tree. This data allows us to understand height, volume, vigor and species for the 10 billion trees we manage. Precision forestry techniques will drive improvement in all aspects of the supply chain.



Saint Leonard, NB

## PRECISION SILVICULTURE

### Geographic Information System

GIS is a precision tool used to capture and analyze spatial and geographic data such as depth to water table, soils, and species suitability. Silviculture supervisors are equipped with this information on a tablet, to help make the best decisions in the forest like identifying the site quality to match the right species or determining the right timing for thinning treatments.



Saint Leonard, NB

## ENABLING THE DIGITAL FOREST

### Mobile Technology

Our forest management plans come to life on the ground with the best mobile technology. All staff are connected to GIS, providing them with real time, two way access to the digital information in our GIS database. This allows foresters to recognize differences in soils, tree species, or wildlife habitats to create custom plans for every hectare, and seamlessly transmit those plans to contractors and back to the office.



Deersdale, NB

## ONBOARD SYSTEMS

### Optimization for Smart Harvesting

Each harvesting machine is equipped with on-board telematics which allow us to understand its location, production and product quality. Machine locations are known within one metre accuracy, using GPS to navigate in the operating block to ensure the protection of watercourses as well as critical habitat and no harvest zones. The machines are also equipped with 'price lists' which helps optimize the product value from each tree of our customers.



Chipman, NB

# COMMUNITIES GROW WITH TREES



Andrea Feunekes, CEO of Remsoft, Fredericton, NB

## SMALL BUSINESS. BIG IMPACT.

We couldn't do it without the support of over 5,000 small business where we operate

Small businesses, from communities large and small, are vital to our operations. We work with over 5,000 small businesses, from over 250 communities, the majority of which have less than 50 employees. Our operations in Woodlands wouldn't be possible without the 400+ harvesting and trucking business owners who represent hundreds of workers.

"JD Irving was among the first companies in Canada to leverage advanced technology in all areas of their forestry operations and they continue to lead the way, bringing the best technologies on board to support continual improvement across their business. Always ahead of the curve, J.D. Irving, has been instrumental in helping us adapt our software to meet new industry challenges. They continually challenge us to be our best and in return have been a strong supporter, helping us to innovate and grow not only in Canada but worldwide." Andrea Feunekes, CEO of Remsoft (A Fredericton NB based company and global leader in forest modeling and analytics.)



Southern NB Woodlands - Whitney Hiltz (17 Years of service) and Jonathon Marchbank (2 Years of Service)

## 2019 ECONOMIC IMPACT - JDI FORESTRY & FOREST PRODUCTS



OVER  
**18,000**  
JOBS (DIRECT,  
INDIRECT,  
INDUCED)



OVER  
**\$1.1**  
BILLION  
IN TOTAL  
EMPLOYMENT  
INCOME  
SUPPORTED



OVER  
**\$1.5**  
BILLION  
PURCHASES



OVER  
**\$512**  
MILLION  
IN CAPITAL  
INVESTMENTS



Atlantic Balloon Fiesta - Sussex NB

## IT STARTS WITH COMMUNITY

As a family company – we're rooted in community. We're proud to be a long time partner where we live and work

We are proud to be a long term partner with many organizations in the communities where we live and work. We recognize the importance of supporting diverse organizations that share our passion for education, environment, wellness and outdoor experiences. We are committed to working with communities to engage and support the events and organizations that are important to them.

We also focus on building new partnerships and maintaining many historical partnerships with outdoor groups such as ATV and snowmobile groups with over 800kms of trails that run through our lands.

Partnering in our communities also means engaging the community and stakeholders. In 2019 alone, we hosted over 400 meetings with stakeholders to source ideas, guidance, and suggestions into our management planning process.



**COAL MINER'S LUNG MOUNTAIN BIKE RACE**

Minto, New Brunswick

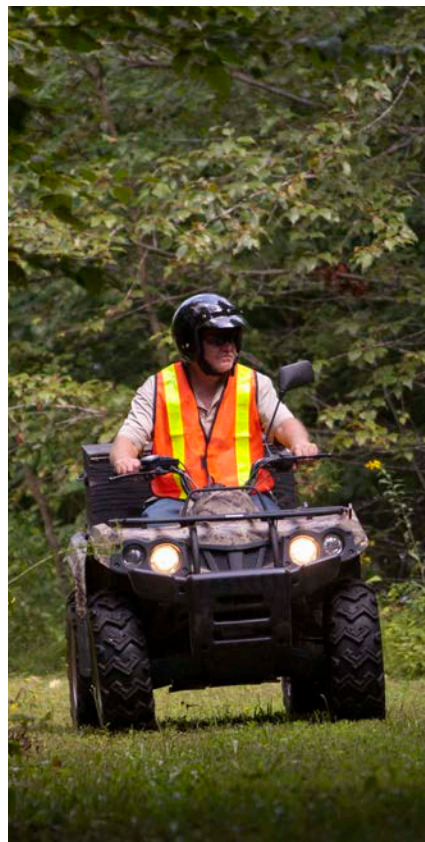
A fantastic event that brings over 130 bikers from across the Atlantic Canadian provinces together to mountain bike through trails. We're pleased to be the lead sponsor of the event, and participate in improving trails and providing bikes and prizes.



**ATLANTIC INTERNATIONAL BALLOON FIESTA**

Sussex, New Brunswick

We are a major sponsor that welcomes over 100,000 people from all over to come together for the three-day event, taking in hot air balloons, craft market, fair and food trucks. Spectators and riders enjoy seeing the hot air balloons go up each morning and evening.



**RECREATIONAL USE PARTNERSHIPS**

New Brunswick, Maine, Nova Scotia

We're pleased to work with various stakeholder groups to provide public access to private land to experience the woods. From ATV and snowmobile trails partnerships to hiking, historical sites and more – sharing our passion for the outdoors is a long standing tradition that continues today.



**FISHING TOURNAMENTS**

Minto, New Brunswick / Chipman, New Brunswick

The JDI Annual Fishing Tournament is a 2-day event hosted during the Chipman Summer Festival. JDI is the lead sponsor of the event that hosts hundreds of people and includes a BBQ, kids prizes and a grand prize! In the winter months Minto hosts several ice fishing tournaments which is a great opportunity to enjoy the outdoors all winter long.



**CAN-AM CROWN DOGSLED RACE**

Fort Kent, Maine

The Can-Am race has been a wonderful part of the winter community calendar in Fort Kent for the last 28 years. The event welcomes hundreds of dogs that race up to 250 miles through Maine's beautiful North Woods. Irving Woodlands has been proud to be the lead sponsor for 15 years and many of our employees are proud to volunteer year after year.



**ANNUAL MULCH SALE**

Nova Scotia / Sussex, New Brunswick

The regional Woodlands offices host an annual mulch sale where over 30 volunteers from both offices donate 100% of the proceeds of the sale to local organizations. In 2019 – they were able to support local youth sport organizations and Coats for Kids.

**IN 2019:  
WE DONATED OVER \$260,000 TO OVER 148 EVENTS AND ORGANIZATIONS IN THE AREAS WHERE WE LIVE AND WORK.**

**OUR TEAM DONATED OVER 900 VOLUNTEER PERSON HOURS AND HOSTED OVER 411 STAKEHOLDER MEETINGS.**



Fort Kent - Maine - Maine Woodlands Team at the Annual Can-Am Crown Dogsled Race

# OUR PEOPLE MAKE IT HAPPEN

To accomplish all of this – we need the best people

We believe that your education doesn't stop when you start your career and that continuous improvement can only happen when our team is growing with learning and training. We're also focused on hiring the best people by keeping people home, bringing people home from away and making it home for newcomers. Over the next 3 years, we're looking to hire over 6,800 full time employees in Canada and the US across the organization.

INVESTING IN OUR GROWING TEAM. IN 2019, ACROSS J.D. IRVING, LIMITED:







North Maine Woodlands - Lance Cunningham (13 Years of Service)

## EVERYONE GOES HOME SAFE - EVERYDAY

A safe workplace is a responsibility shared by all of us. Like all that we do, we are driven to improve. In recent years we have shifted our focus to leading indicators in order identify and correct hazards before they result in an incident. This takes training to improve communication and coaching. In 2019, 125 Woodlands people leaders attended safety leadership training to increase the quantity and quality of hazards identified in the workplace.

### WOODLANDS RECORDABLE INCIDENT RATE

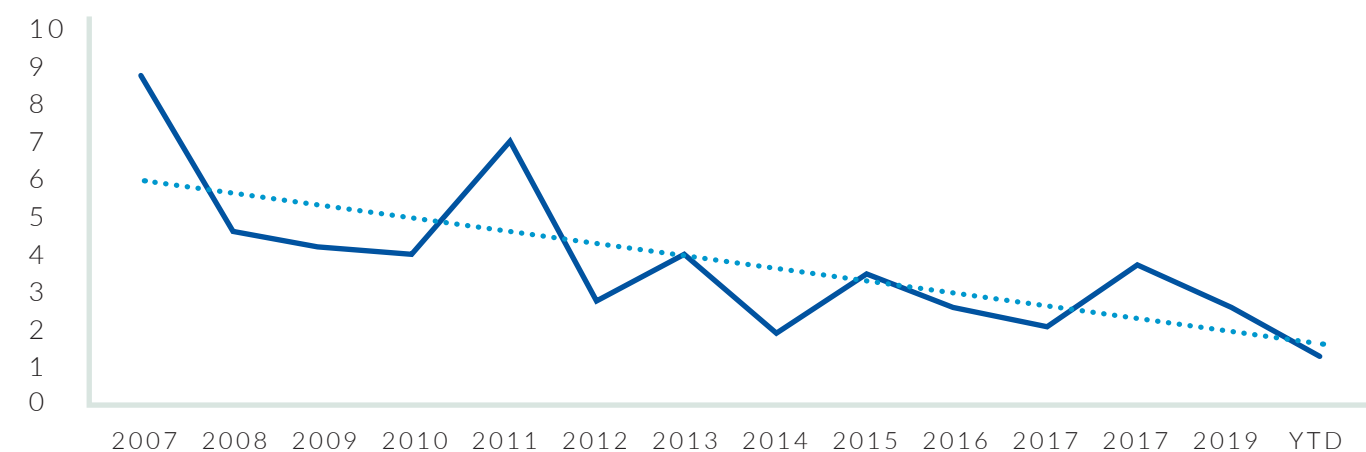


Figure 23.

**37%**  
reduction in  
Recordable  
Incidents  
Since 2009

**ZERO**  
Critical Incidents  
in 2019

**5844**  
Hazards  
Identified in  
2019 - 2.5X  
more than  
2018



Irving Nature Park, Saint John, NB



La Dune de Bouctouche, Bouctouche, NB

## DISCOVER THE GIFT OF NATURE

The Irving Nature Park and La Dune de Bouctouche were established by J.D. Irving, Limited for the enjoyment of the public free of charge. Both provide spectacular views and opportunities for the kids (and the kids at heart) to explore the great outdoors.

### IRVING NATURE PARK

In 1992, the Irving Nature Park was created as a gift to visitors to experience nature. The 600 acre park protects an environmentally significant area on the Southern New Brunswick coastline, with one of the province's richest marine ecosystems. The park is also a traditional staging site for migratory and marine birds that travel between the Arctic and South America and a breeding ground for many waterfowl of the Atlantic Coastline.

The park features over 11km (7 mi.) of rugged Bay of Fundy coastline that can be experienced through eight walking trails of varying lengths, various lookouts with 360° views of land and sea and a boardwalk extending into the salt marsh. Free programming is offered throughout the year to showcase the six different ecosystems with a diversity of flora and fauna. Park visitors can also take advantage of free picnic sites and barbecues and a unique Children's Forest with a playground and mazes.

## IN 2019, WE HAD A RECORD BREAKING YEAR FOR ATTENDANCE WITH OVER 430,000 VISITORS!

### IRVING ECO-CENTRE: LA DUNE DE BOUCTOUCHE

The Irving Eco-Centre: La dune de Bouctouche was developed and opened to the public in 1997, designated to preserve and restore one of the few remaining great sand dunes on the northeastern coastline of North America. Stretching 12 km (7.5 miles) across Bouctouche Bay, the dune features a rich variety of marine and aquatic plants and animals, especially shorebirds and other migratory birds who make the dune their habitat.

The park features an 800m (1/2 mi.) boardwalk with ramps and stairs to the beach, barbecues and free interactive educational programs for visitors of all ages.





# 2019 Sustainability Summary

All Forestry and Forest Product Operations



**6.5% OVERALL REDUCTION** in water use over the last 3 years or **1,684 OLYMPIC SWIMMING POOLS**



**17% INCREASE** in overall waste diverted from landfill for beneficial use in the last 5 years



**22% OVERALL REDUCTION** of carbon dioxide in the last 5 years



**32% INCREASE** to 1,627 Conservation Areas (2015-2019)

## FORESTRY TRENDS

### All Forestry & Forest Products Combined

Water Usage	m <sup>3</sup> /year	64,352,764	62,140,209	60,140,400
Water Usage	m <sup>3</sup> /tonne of production	55.8	54.1	51.2
Air Emissions - Sulphur Oxides	tonnes	1,264	1,247	1,344
Greenhouse Gas Emissions	CO <sub>2</sub> e tonnes	830,782	928,950	892,913
Permit Non-Compliances (mills)	number	4	0	1
Total forest management audits	# of major non-compliances/ # of indicators	0/143	0/145	0/145
Employee Turnover	%	8.9	8.2	10.2
Women in the workforce	%	11.9	12.9	13.6
Total Waste	tonnes	234,937	208,970	223,438
Wastes Diverted from Landfill for beneficial use	tonnes	137,399	126,855	137,257
Wastes Diverted from Landfill for beneficial use	%	58	61	61
Waste to landfill (i.e. not diverted)	tonnes	97,538	82,115	86,181
RIR	# of recordable incidents X 200,000 /total hours worked	3.0	2.9	3.0
Capital investment	\$ millions	171	390	512
Total local purchases	\$ millions	1188.0	1401.0	1539.0
Total employment income supported	\$ millions	936.0	956.0	1108.0

## COMPANY TRENDS

### Woodlands

Wood Harvested	tonnes	6,812,203	6,519,703	6,605,190
Pre-Commercial Thinning	hectares	5,971	6,062	7,063
Volunteer Conservation Areas on JDI Land	unique areas set aside	1,432	1,561	1,627
Trees Planted	# of seedlings	16,188,190	15,278,463	18,804,112
RIR	# of recordable incidents X 200,000 /total hours worked	2.2	3.6	2.6

### Sawmills

Lumber Production	tonnes	1,538,974	1,535,575	1,520,049
Lumber Production	MFBM	1,174,699	1,172,105	1,160,253
Total Greenhouse Gas Emissions	CO <sub>2</sub> tonnes	75,485	84,952	79,730
Total Waste	tonnes	130,185	113,620	113,103
RIR	# of recordable incidents X 200,000 /total hours worked	4.7	4.6	4.7

### Irving Pulp and Paper

Water Usage	m <sup>3</sup> /tonne	110	111	95
Total Greenhouse Gas Emissions	CO <sub>2</sub> tonnes	80,810	74,107	72,980
Dust Particulate Matter	tonnes	161	93	127
Total Waste	tonnes	27,852	24,938	25,272
RIR	# of recordable incidents X 200,000 /total hours worked	1.75	0.51	2.07

### Lake Utopia Paper

Water Usage	m <sup>3</sup> /tonne	34	33	34
Total Greenhouse Gas Emissions	CO <sub>2</sub> tonnes	81,444	83,699	72,937
Odour Complaints	number	17	15	7
Total Waste	tonnes	17,067	12,316	20,890
RIR	# of recordable incidents X 200,000 /total hours worked	4.22	0.00	1.31

### Irving Paper

Total Direct Greenhouse Gas Emissions	CO <sub>2</sub> tonnes	89,999	92,582	95,895
Total Greenhouse Gas Emissions	CO <sub>2</sub> tonnes	408,700	489,057	473,450
Air Emissions - Sulphur Oxides	tonnes	11.1	25.1	12.1
RIR	# of recordable incidents X 200,000 /total hours worked	4.17	1.63	2.87

### Irving Tissue

Water Usage	m <sup>3</sup> /tonne	40	35	34
Total Greenhouse Gas Emissions	CO <sub>2</sub> tonnes	184,342	197,136	193,817
Total Waste	tonnes	5,406	5,423	6,802
RIR	# of recordable incidents X 200,000 /total hours worked	0.0	2.5	0.8

## Values and Approach to Sustainability

J.D. Irving, Limited has core values and an approach to sustainability that motivates us to operate at the highest standards and to meet the evolving needs of the environment, our business, our stakeholders and the communities where we are proud to live and work. Our sustainability framework consists of five focus areas: healthy environment, growing and engaging people, vibrant communities, strong partnerships for business success, as well as safe and efficient operations.

- ✓ ECONOMIC
- ✓ ENVIRONMENTAL
- ✓ SOCIAL



## Sustainability at J.D. Irving, Limited



The woods in our lives have never played a more important role than they do today.

At J.D. Irving, Limited we know a diverse forest is better for everyone. For over 135 years, our business has been built around what the forest naturally provides – working with it to feed our mills in a sustainable way.

This means planning 80 years ahead for every acre. And always growing more than we harvest – over 1 billion trees planted so far.

From seedlings in the forest to the customer and store shelf, we absorb more carbon than we emit. And our pulp & paper mills are already exceeding the Paris Climate Change Accord targets. We use 100 percent of every tree.

Today, we are one of only three companies in North America who own every step in growing and delivering renewable forest products. This means a certainty of supply for our customers. From forests where every acre is environmentally certified.

In 2019 we marked continued progress on reducing our footprint on air land and water. At the same time, we increased the number of conservation areas, trees planted and carbon sequestered to reduce the impact of climate change. We do it while achieving zero non-compliance issues on 145 sustainability measures by the Forest Stewardship Council® and the Sustainable Forestry Initiative®.

Renewable wood products you can feel good about.



ABSORBING MORE CARBON DIOXIDE THAN WE EMIT. OUR PULP AND PAPER OPERATIONS ARE EXCEEDING THE PARIS CLIMATE CHANGE ACCORD TARGETS.



### ZERO NON-COMPLIANCE ISSUES

145 forest sustainability measures by Sustainable Forestry Initiative® (SFI®) and Forest Stewardship Council® (FSC® C041515) (2015-2019)



### 5% SAFETY IMPROVEMENT

over the last 5 years

### 3.0 RIR

across all operations (2019)

## Sustainable from seed to shelf...



TREES



WOOD



SAWMILLS



PULP MILL



CARDBOARD



PAPER



TISSUE



PACKAGING



TRANSPORT TO MARKET

JDI FOREST PRODUCTS TO OVER 30 COUNTRIES AROUND THE WORLD





**SCAN TO  
WATCH  
OUR STORY!**

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E2L 4M3 Canada

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1-506-632-7777

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[irvingwoodlands.com](http://irvingwoodlands.com)

OCTOBER 2020

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**WOODLANDS**  
SINCE 1882

