

SUSTAINABILITY IS
OUR BUSINESS



J.D. IRVING, LIMITED
WOODLANDS DIVISION



A dedicated team of over **100** forestry professionals

QUALITY AND SERVICE SINCE 1882



In 1882, Herbert Irving and his son, James, started our lumber business in the small coastal community of Bouctouche on the Northumberland Strait of New Brunswick, Canada. Over the generations, our business has grown and diversified but remains strongly linked to these historic roots.

Today, the family business continues with the same strong commitment to our valued customers: delivering quality forest products and superior service. The certainty of our sustainable and certified wood supply is a multi-generational commitment that has made us a leader in tree planting. Since 1957, we have planted nearly one billion trees, a Canadian record for a private company. Today we are a leader in sustainable forest management and research.

Our research on climate change and carbon sequestration has been internationally recognized. The forests we manage have a positive impact on reducing greenhouse gases – absorbing 92 million tonnes of carbon over the next 50 years – that's equal to over 350,000 cars off the road every year for the next 50 years.

For 135 years, our customers have appreciated our commitment to quality products, strong relationships, and service reliability – from seedling to store shelf. Our environmentally certified forests sustain a value chain of lumber, kraft pulp, corrugating medium, paper, consumer tissue products, and value-added wood products. We are proudly the proven choice for many leading retailers, supporting their commitment to customers with a team dedicated to value-added service that improves efficiency.



J.D. IRVING, LIMITED
WOODLANDS DIVISION

FROM SEED TO SHELF

A VERTICALLY INTEGRATED FORESTRY BUSINESS ADDING VALUE TO SERVE CUSTOMERS AROUND THE WORLD

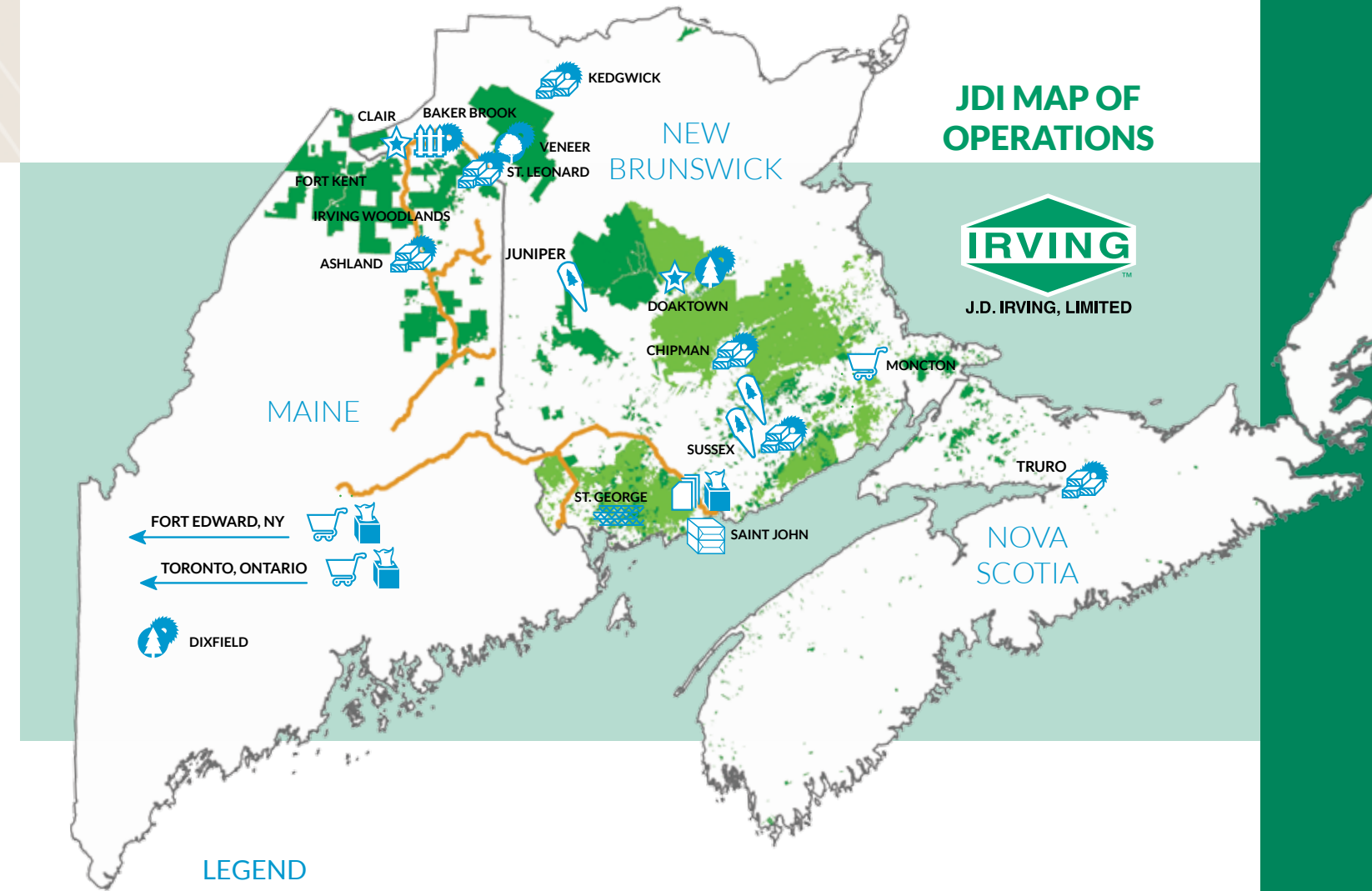
Over the last 135 years, J.D. Irving, Limited has been building and enhancing our reputation as a responsible steward of natural resources in North America, which is critical to our success.

As one of the top five land owners in North America, J.D. Irving, Limited owns and manages 3.2 million acres of private timberland and manages 2.8 million acres of government owned Crown Land in New Brunswick and Nova Scotia.

Continual reforestation 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, company contractor logging, sawmills, pulp, paper, 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.



JDI MAP OF OPERATIONS



LEGEND

FREEHOLD LAND	SAWMILLS	HARDWOOD	PULP (NBSK**, NBHK***)	CONSUMER PRODUCTS
CROWN LAND	SPF* LUMBER	PAPER	SPECIALTY WOOD PRODUCTS	TREE NURSERIES
RAIL LINES	WHITE PINE	CORRUGATING MEDIUM	TISSUE	
	CEDAR			

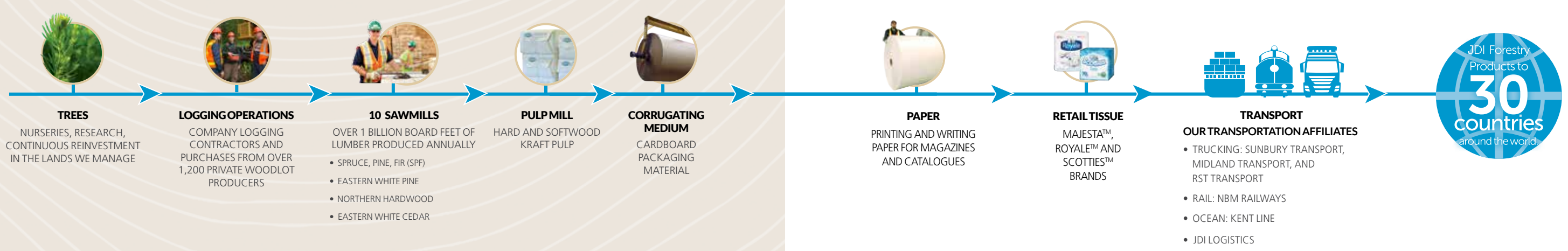
*Spruce Pine Fir
**Northern Bleached Softwood Kraft
***Northern Bleached Hardwood Kraft

Our Operations in Canada and the U.S. (2016)

4343 Direct Jobs (FTE)

8667 Indirect Jobs (FTE)

\$838 Million (CAD) Total Wages (Direct and Indirect)



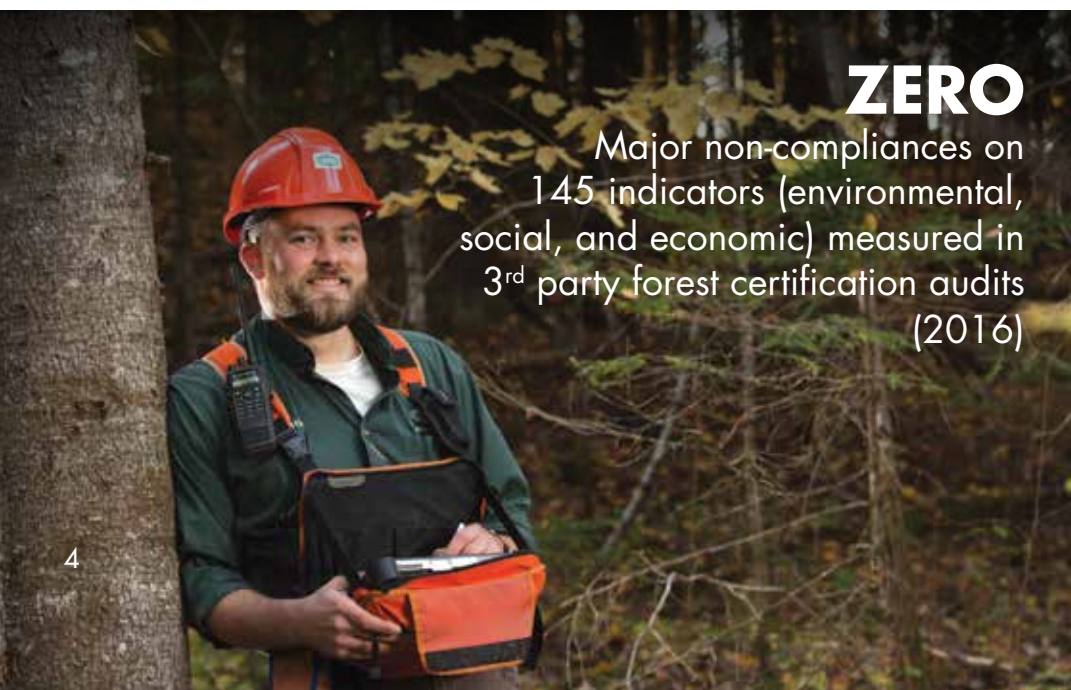
FORESTRY STATS AT A GLANCE



More hardwood
growing in the forest than 50 years ago



2% or less
of the landbase is harvested each year



ZERO
Major non-compliances on 145 indicators (environmental, social, and economic) measured in 3rd party forest certification audits (2016)



\$740 million
of major investments (2012-2016)



Over **\$25 million**
invested in scientific research since 1982



Over **1300**
Unique Areas
The largest voluntary conservation program by a private landowner in Canada



92 million
tonnes of Carbon sequestered over 50 years
Equivalent to over 350,000 cars off the road every year for the next 50 years.



Almost **1 billion**
trees planted – a national record in Canada for a private company

Over **70**
research projects in the past 20 years



Over **\$1 billion** purchases from local suppliers in the Provinces and States where we operate – NB, NS, ON, ME, NY (2016)



Delivering to over **30**
countries around the world

From trees to tissue:
Adding **35** times the value

All forest products operations: Canada & U.S.



We grow more wood than we harvest every year

OUR RESEARCH FOCUS

- Forest Health
- Forest Landscapes
- Biodiversity
- Wildlife Habitat
- Aquatic Habitat
- Hydrology
- Tree Improvement
- Soil
- Climate Change

GROWING MORE
THAN WE HARVEST
EACH YEAR

ALL OF OUR LAND IS CERTIFIED
TO THE HIGHEST STANDARDS

From seed to shelf, J.D. Irving, Limited manages 6 million acres of land with a sustainable, evergreen 80-year plan. Our focus is on growing more wood than we harvest every year, bio-diversity, protection of water resources, research, and conservation. This means annual certifications by **Sustainable Forestry Initiative® (SFI)** in Canada (NB & NS) and the US as well as **Forest Stewardship Council® (FSC® C041515)** certification of our timberlands in Maine.

Our 60 year commitment to planting trees and the use of green energy help combat climate change. Over the next 50 years the forests we own or manage will absorb 92 million tonnes of CO₂ – equivalent to over 350,000 cars off the road each year for 50 years.

Our conservation efforts have been internationally recognized by leading environmental groups such as the Nature Conservancy of Canada and the World Wildlife Fund. Safeguarding biodiversity and forest health means an annual investment of \$1.5 million in forest research, in partnership with leading scientists.



Canada Lynx kittens



Maine's oldest tree



Working with the Canadian Forest Service

WOODLANDS
Planning 80 years
ahead for the
environment
and to ensure
healthy forests
for generations
to come.



Sustainable forestry means **2%**
or less of the land base is harvested annually.

TREE PLANTING

Almost **1 billion** seedlings planted since 1957

ALMOST ONE BILLION TREES PLANTED IN THE LAST 60 YEARS

K.C. Irving and his son, J.K. Irving, were early pioneers, planting their first trees in 1957 and launching the company into a long-standing commitment of renewing the forest through high quality seedlings.

For more than 60 years, JDI has been an industry leader in growing and planting trees. Our over 20 year commitment to tree improvement has resulted in superior seedlings that are more resistant to pests and are well adapted to the changing climate.

Field tests have demonstrated that our superior seedlings grow 15 to 25% faster than natural trees allowing us to increase our wood supply while reducing our environmental footprint. This ensures we have healthy forests for generations to come.



K.C. Irving and his son, J.K. Irving



60 YEARS OF TREE IMPROVEMENT

Juniper Tree Nursery – **24 million** seedlings/year

WORLD CLASS FACILITIES – GROWING HEALTHY FUTURE FORESTS

PARKINDALE SEED ORCHARD

Our 247 acre seed orchard in Parkindale, NB, began producing seed in the late 1980's.

SUSSEX LAB

JDI established a \$3.5 million production laboratory in 2014 to expand and commercialize research and discovery.

This centre of excellence is focused on leading-edge research to propagate and grow healthier, larger trees from local species that adapt to changing climate and resist disease. JDI has developed new, award winning methods of increasing insect and disease tolerance in our planted trees. JDI has nine (9) patents granted or pending related to this discovery.

JUNIPER TREE NURSERY

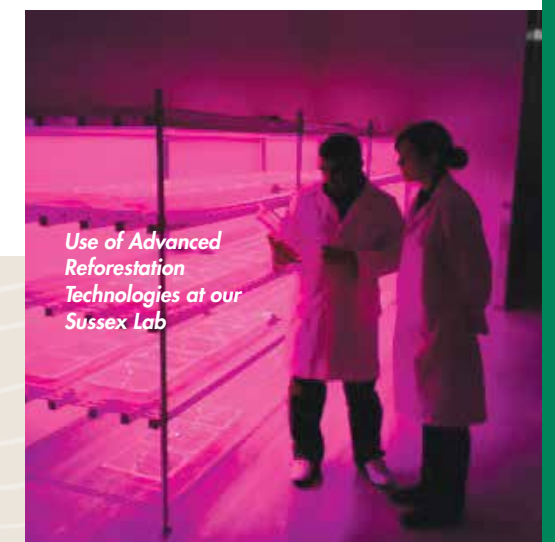
- J.D. Irving, Limited's Juniper Tree Nursery is one of the most modern tree nurseries in North America.
- We have produced 700 million seedlings since beginning operation in 1958.
- The Juniper Nursery has the capacity to produce over 24 million high quality seedlings in its six large free span greenhouses equipped with automatic fertilizing and irrigation equipment and supported by fourteen outdoor holding areas with blackout systems.



Dr. David Miller, partner in award winning forest research and patents

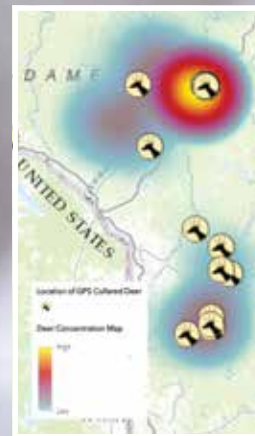
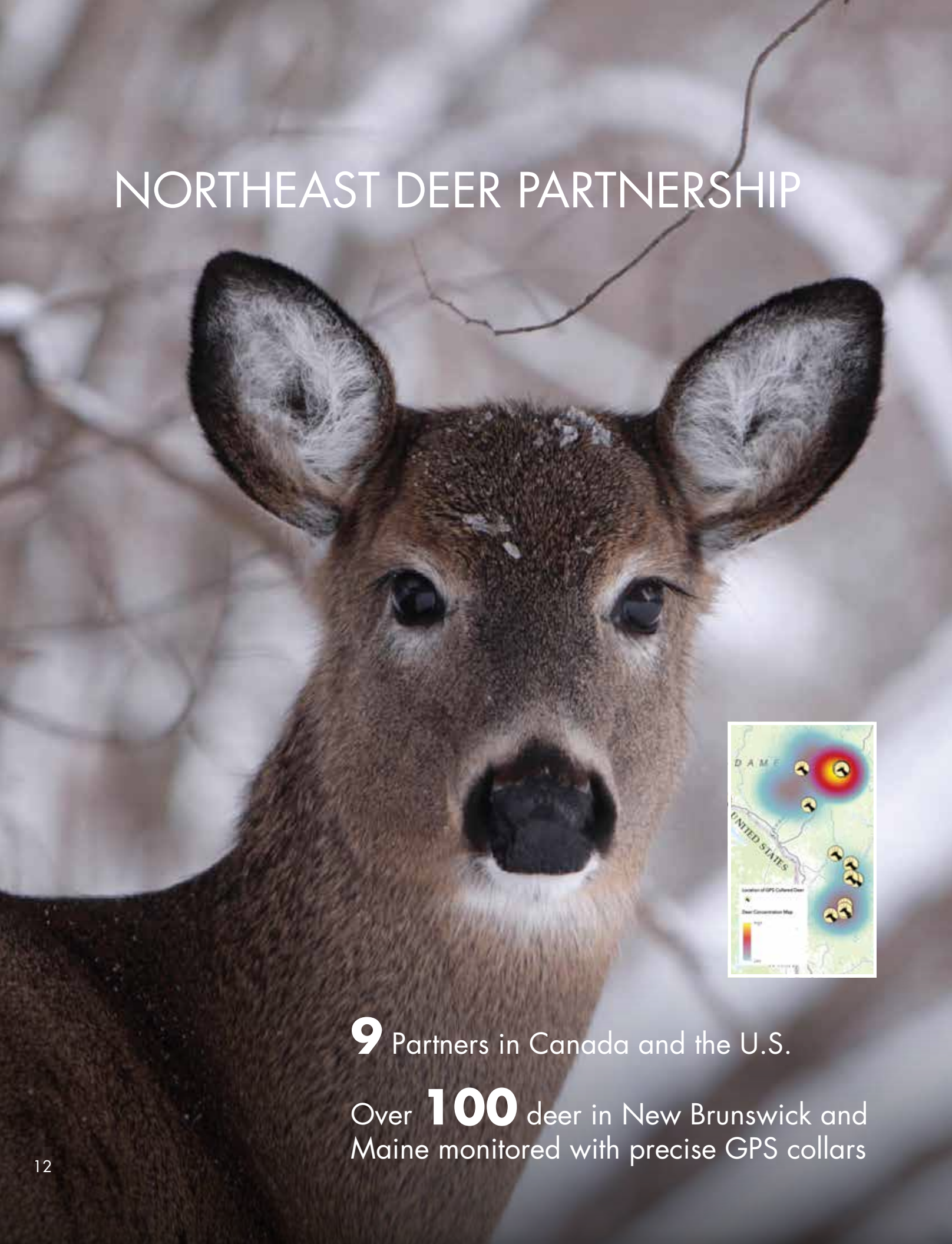


Parkindale seed orchard



Use of Advanced Reforestation Technologies at our Sussex Lab

NORTHEAST DEER PARTNERSHIP



9 Partners in Canada and the U.S.

Over **100** deer in New Brunswick and Maine monitored with precise GPS collars

THE LARGEST WHITE-TAIL DEER RESEARCH PROJECT IN THE REGION

This white tailed deer research project is the largest ever of its kind in the Northeast with JDI as the major funding partner. White-tailed deer are a valued part of the wildlife in New Brunswick and Maine. Initiated by J.D. Irving, Limited, the **Northeast Deer Research Partnership** is a collaboration between nine partners. The focus is understanding how deer are using our forests and what factors impact their populations.

Over 100 deer in New Brunswick and Maine will be tracked and monitored in real time with precise GPS collars to provide us with important real time data on their movements and use of the forest in various seasons.

The outcomes of this project will hopefully provide a greater understanding of factors influencing the deer herd in New Brunswick and Maine and this information will be used to refine existing guidelines and identify new forestry and wildlife management practices.



Deer net being deployed from helicopter.



Scientists collect data, including body length and circumference, blood and hair samples for DNA, plus tick samples.



Deer with radio tracking collar.



MOOSE STUDY



5 Partners
2 Provinces

The largest research project of its kind in North America.

MOOSE RESEARCH

The focus of this research is to assess the role of climate change on declining moose populations in New Brunswick and determine those forestry practices that can help curtail the decline of moose in the province.

This study looks at forest and soil types that may result in increased tick populations and identify those moose populations most at risk from ticks. The results will help inform best forestry practices to mitigate the problem and guide sustainable hunting levels.



J.D. Irving, Limited is the initiator and primary funder of the largest moose research project in the region.



Scientists place radio monitoring collar on moose.

SONG BIRD STUDY



4 scientists
323 sites
17 forest types
500 hours of
songbird recording

MULTI-YEAR FOREST SONGBIRD STUDY USING TECHNOLOGY TO MONITOR SONGBIRD HABITAT

J.D. Irving, Limited (JDI) has partnered with **Natural Resources Canada, Carleton University, and Environment and Climate Change Canada** on a 5-year songbird habitat research project on JDI land in Northern New Brunswick.

Researchers are collecting songbird data with auto-acoustic recording devices. During the breeding season in May and June of 2016, 323 sites were monitored across 17 different forest types and age classes. The recordings are being analyzed by bird experts or in some cases by sound recognition software to determine songbirds present at specific GPS locations.

Researchers also have access to JDI's enhanced, high resolution mapping of the entire forest study area for a range of forest structure metrics generated through LiDAR (Light Detection and Ranging) technology.

The songbird data is then used along with the forest structure metrics at the location as well as in the surrounding forest area to build habitat models for individual species. Model results can then be projected across the entire landscape.

Over 500 hours of expert listening to the recordings is being conducted with first year results to be completed in early 2017. Monitoring and analysis of breeding data will continue for several years and form the basis for ongoing monitoring, especially in light of climate change.

J.D. Irving, Limited is the initiator and primary funder of this research.



323 state-of-the-art recording devices



Collaboration for Atlantic Salmon Tomorrow

10 scientists
4 research projects

ATLANTIC SALMON RESEARCH

A unique collaboration of scientists, government, ENGOs, and industry, CAST is focused on strengthening wild Atlantic salmon in local rivers.

Using the latest technology, the team is doing radio, PIT, and acoustic tracking of fish. Heat-seeking cameras and LiDAR are helping detect cold water sources – the best habitat. Scientists are also using sonar technology to count the number of returning fish.

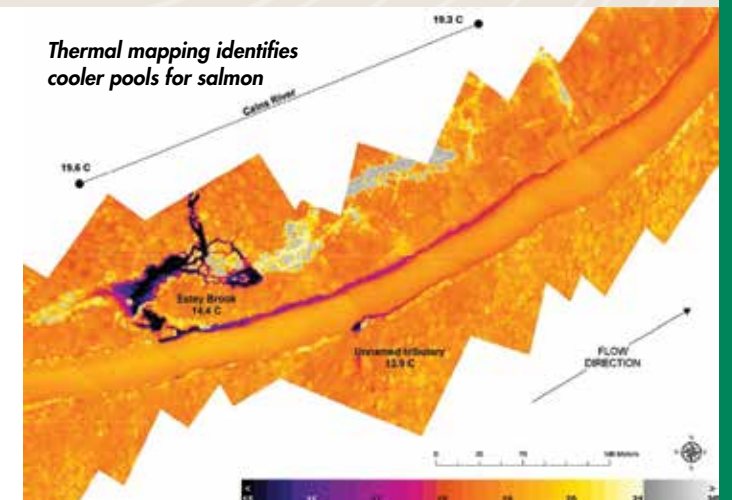
In an effort to give wild salmon a head start against ocean predators, small salmon smolts are being raised to adults at the **Miramichi Salmon Association (MSA)** hatchery at South Esk.



UNB Scientists using sonar technology to count salmon



Collaboration for Atlantic Salmon Tomorrow



PRECISION FORESTRY – LEVERAGING TECHNOLOGY



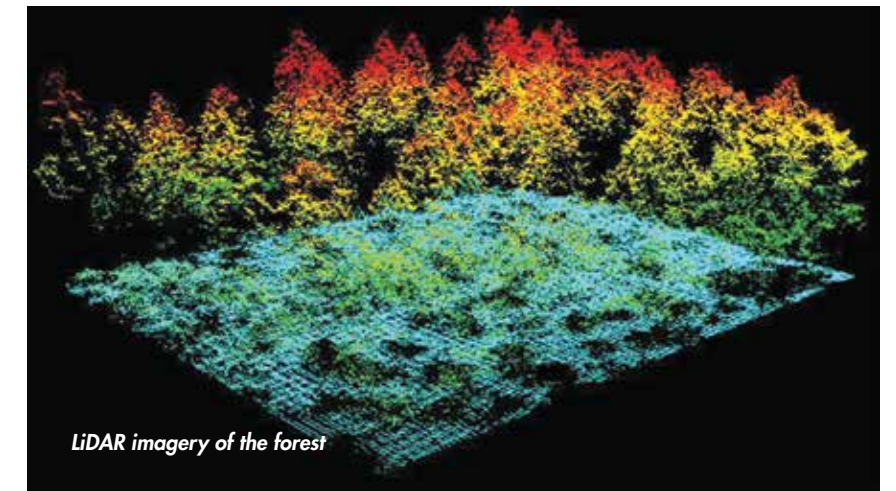
Tablets enabled with GIS and GPS technology allow the foresters to locate harvest areas and map physical, environmental, and operational constraints on the ground.

LEADING EDGE TECHNOLOGY TO ENSURE SUSTAINABILITY

J.D. Irving, Limited was the first forestry company in Canada to build and maintain a Geographic Information Systems (GIS) and use GPS technology in the early 1980's. Today, state-of-the-art Light Detection and Ranging (LiDAR) technology is providing even more detailed terrain mapping, measuring dozens of forest characteristics.

LiDAR is like an MRI of the forest. It is so accurate that the height of a tree can be measured within 10 cm and depressions on the ground to within 3 cm. This new level of accuracy allows foresters to plan at a much higher level of detail than ever before.

J.D. Irving, Limited continues to work with the **Canadian Forest Service**, several universities and leading IT companies to develop and use spatial technology to further improve forest management. This "cluster" of industry, academics, and government has made NB a leader in the use of precision forestry.



Technology is helping plan for multiple values like: watercourse protection; wildlife habitat conservation; recreation areas; timber supply; road maintenance; silviculture; biodiversity and fire control.



Foresters are equipped with state-of-the-art tools to ensure the best possible information is collected.



OVER 1300 AWARD WINNING CONSERVATION AREAS

OUR COMMITMENT TO CONSERVATION

We value the partnerships we have with many environmental and community groups as well as local universities in identifying, conserving and studying these special places.

Our voluntary and award winning Unique Areas program has grown from 29 conservation sites in the 1980's to over 1300 Unique Areas sites to-date on the lands we own and manage in New Brunswick, Nova Scotia, and Maine.

1 ha = 2.47 acres

OVER **1300**
CONSERVATION SITES TOTAL

75,593 total hectares
186,794 total acres



Lakes & Wetlands
107 SITES



Birds & Mammals
349 SITES



Old Growth & Conservation Forests
7 SITES



Reptiles & Invertebrates
70 SITES



Fish
19 SITES



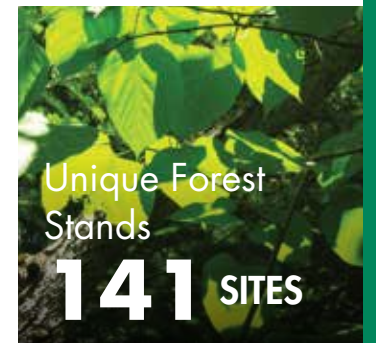
Historic
114 SITES



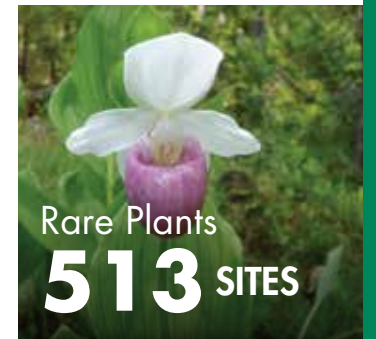
Geological & Fossil
19 SITES



Aesthetic Areas
43 SITES



Unique Forest Stands
141 SITES



Rare Plants
513 SITES

Our conservation efforts have been recognized by:

- The Atlantic Salmon Federation (ASF)
- The Nature Conservancy of Canada
- The Canadian Council of Ecological Areas (CCEA)
- The World Wildlife Fund
- The U.S. Department of Interior
- The State of Maine
- The Province of New Brunswick

PROTECTING WETLANDS AND WATERWAYS



34 conservation sites with Ducks Unlimited

CLEAN WATER

JDI partners with numerous environmental groups and researchers to ensure water quality and healthy aquatic habitat.

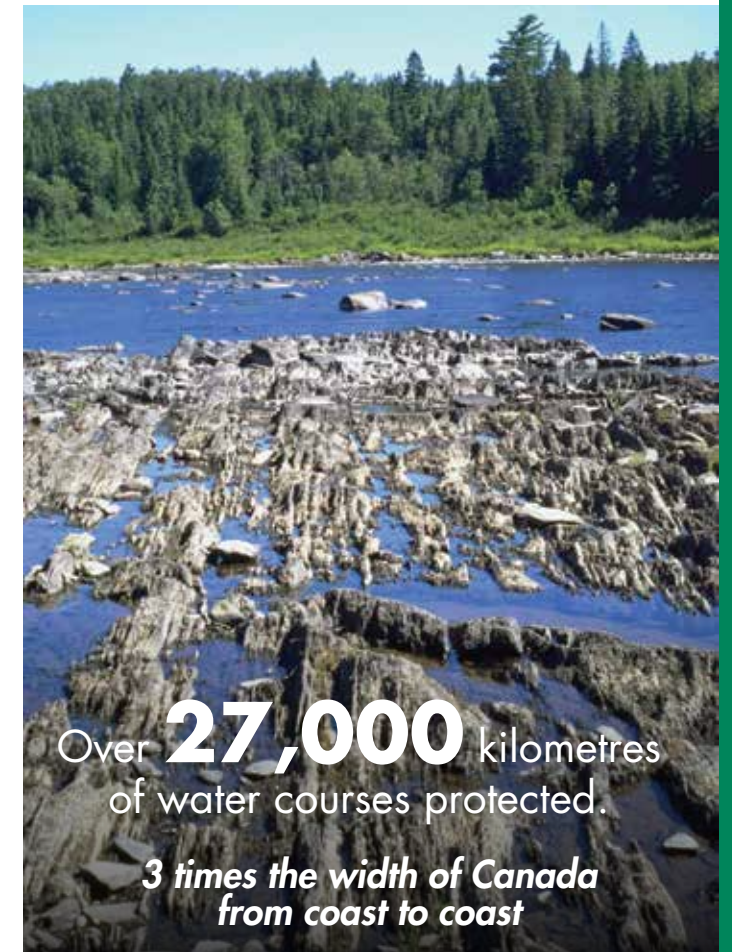
JDI has earned international recognition for research and conservation efforts regarding the wild Atlantic salmon from the **Atlantic Salmon Federation (ASF)**.

The Gulf of Maine Institute has recognized JDI with its Visionary Award for research and conservation of aquatic habitat.

JDI was the first industrial recipient in Canadian history to receive the national Recreational Fisheries Award from the **Government of Canada (DFO)** for conservation and research efforts.



The largest private conservation project ever in Atlantic Canada with **Nature Conservancy Canada**



Over **27,000** kilometres of water courses protected.

3 times the width of Canada from coast to coast



Government of Canada

OUR WOOD SUPPLY

All of the lands we own or manage are audited annually by independent experts under the Sustainable Forestry Initiative (SFI). In Maine, the lands we own are also audited every year under the Forest Stewardship Council® (FSC®) criteria.



52% of our wood supply comes from Local Woodlot Owners, Producers and JDI Freehold Land

48% is from NB Crown Land

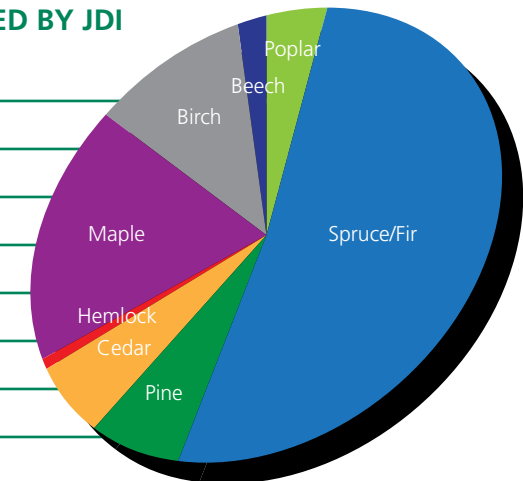
Record breaking private wood purchases in 2016

ACADIAN FOREST

The lands we own or manage are located in the Acadian Forest, one of eight forest regions in Canada. The Acadian Forest contains a unique blend of 32 native species of hardwood and softwood trees.

SPECIES BREAKDOWN FOR LANDS MANAGED BY JDI

Species	Percent
Spruce/Fir	52%
Pine	7%
Cedar	6%
Hemlock	1%
Maple	18%
Birch	10%
Beech	2%
Poplar	4%



There is more hardwood today than 50 years ago.

85% of the land we own or manage regenerates naturally

100% of the forests we own or manage are independently audited and certified to the highest standards.

CLIMATE CHANGE



The forests we own and manage will absorb **92 million tonnes** of CO₂ over the next 50 years – equal to 18 million cars off the road for one year

FROM SEED TO SHELF REDUCING OUR CARBON FOOTPRINT

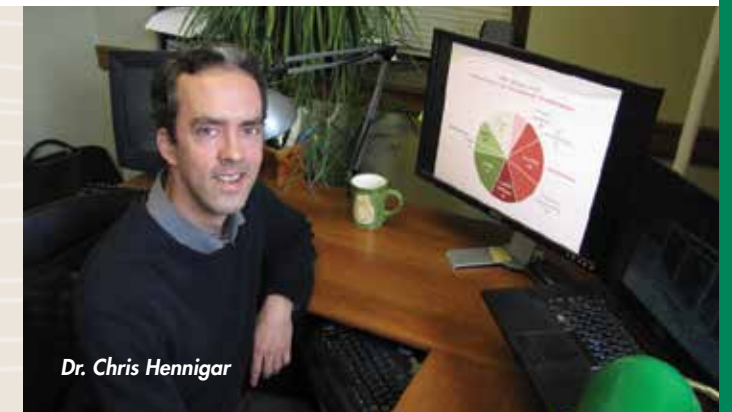
Trees are Nature's air filters. The average tree can absorb up to one tonne of CO₂ over its life span. Over the last 60 years, JDI has planted almost 1 billion trees.

In partnership with **University of New Brunswick's** Dr. Chris Hennigar, we assessed our carbon footprint from seedling to store shelf – including carbon absorbed by growing trees, carbon emissions through harvesting, transportation, manufacturing, as well as storage and eventual release of carbon in wood and paper products over time.

Significant reductions in greenhouse gas emissions have been achieved through the use of green energy like biomass.



Our forestry and forest products operations absorb more carbon than they emit.



Dr. Chris Hennigar



J.D. IRVING, LIMITED
WOODLANDS DIVISION

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