Restoring New Brunswick's Watersheds

A TOOLKIT

New Brunswick Environmental Network

2BILLION TREES

Photo by Arielle DeMerchant

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Acknowledgements

The New Brunswick Environmental Network (NBEN) would like to thank Natural Resources Canada and the 2 Billion Trees program for giving us the opportunity to create this document. Without this financial support, we would not have been able to write this manual to support watershed restoration initiatives in New Brunswick.

The NBEN team would also like to thank all the reviewers and contributors who volunteered their time and knowledge. These include, in no particular order: the Kennebecasis Watershed Restoration Committee, the Nashwaak Watershed Association, the Fundy Biosphere Region and thank you to the Members of New Brunswick's watershed Caucus that contributed ideas, comments, information and resources that helped bring this project to reality.

2BILLION TREES

Introduction

The objective of this toolkit is to create a hub of information needed by watershed and restoration groups who want to create a riparian reforestation project. This toolkit hopes to take you through all the steps required to create small and large reforestation and restoration projects that will be designed to benefit a watershed. Riparian restoration has become a major focus for Watershed Management groups in New Brunswick.

Created by the NBEN with the help of the 2 Billion Trees initiative, with this toolkit we aim to offer direction and assistance to not just watershed groups but anyone planning a Riparian Restoration project in New Brunswick.

2BILLION TREES

Photo by Juan Davila on Unsplash

New Brunswick Environmental Network

About the NBEN

The New Brunswick Environmental Network (NBEN), established in 1991, is a communication network that links together over 110 non-profit environmental organizations.

nben.ca

Through its caucuses and collaboratives, the NBEN brings together environmental organizations from across the province to work on joint issues and share knowledge and resources. Representing almost 30 groups from across the province, the N.B. Watershed Caucus is a forum for watershed conservation organizations across New Brunswick to share experiences, information, and techniques (NBEN, n.d.).

The NBEN is very proud of the work done by its Watershed Caucus members that include protecting land, planting thousands of trees (*It Is Tree Planting Season!*, 2021), collecting data on all our rivers and protecting biodiversity.

Riparian restoration and reforestation are nature-based climate solutions; to learn more: check out our community of practice.

naturalinfrastructurenb.ca

Riparian Zones

Riparian zones are the lands adjacent to streams, rivers, lakes, ponds, and wetlands. These areas are frequently flooded transitional lands, with no definite boundaries, between the body of water and drier upland areas. Included in the riparian zone are streambanks, the floodplain and plant and animal communities (Island Nature Trust & Agriculture and Agri Food Canada).

islandnaturetrust.ca

Maintaining healthy riparian zones provides many crucial environmental and economic benefits:

Shoreline and riparian vegetation lend stability and erosion protection to riverbanks and shorelines, preventing loss of valuable waterfront property and improving aesthetics that hard structure bank stabilization products cannot. Riparian vegetation can trap sediment and nutrients from surface run-off, improving water quality for downstream lakes and rivers. Riparian and aquatic plant communities can mitigate the magnitude of flood events. The underwater structure created by riparian plants supports aquatic invertebrate communities that, in turn, provide an important food source for fish. Riparian plant communities help to regulate water temperature. This is important in nutrient cycling and critical to the productivity of certain species of freshwater fish (Native Plant Solution, 2016).

This section is quoted and adapted from the Riparian Zone Reclamation document with permission from Native Plant Solutions.

nativeplantsolutions.com

Photo by Pascal Svcholl on Unsplash

Determining a Site

Land Assessment

The land assessment is an essential first step when planning a riparian restoration project. Conservation groups will usually need to identify a problem site, before they can apply for funding.

Planting near bodies of water can pose extra challenges for reforestation and restoration. Here are some best practices when seeking the right site for a project and how to best map out the area.

Characterizing the riparian strip involves measuring the length of each type of riverbank and identifying areas with degraded or no riparian strips. Any available environmental studies for the project area could provide this information. You will require the following equipment for the field visit:

- **Mapping tools:** Camera, map and aerial photos, ruler and GPS, measuring tape (Google maps, google earth and GeoNB are great mapping tools), a drone can be useful for the site visit but is not essential
- **Field notes:** Notepad, pencils, calculator and waterproof, resealable bag in case of rain
- **Transportation:** ATV or Motorboat, waders, safety equipment and lunch (Environment Canada, 2012)

The ideal would be to plot the degraded areas, their width and length, and the type of riparian strip directly on the map. In marine environments, visiting the site on foot during low tide is the best approach.

This section is quoted and adapted from the **Riparian Revegetation Project Planning and Submission Guide** with permission from © His majesty the King in right of Canada by the minister of the environment. 2012

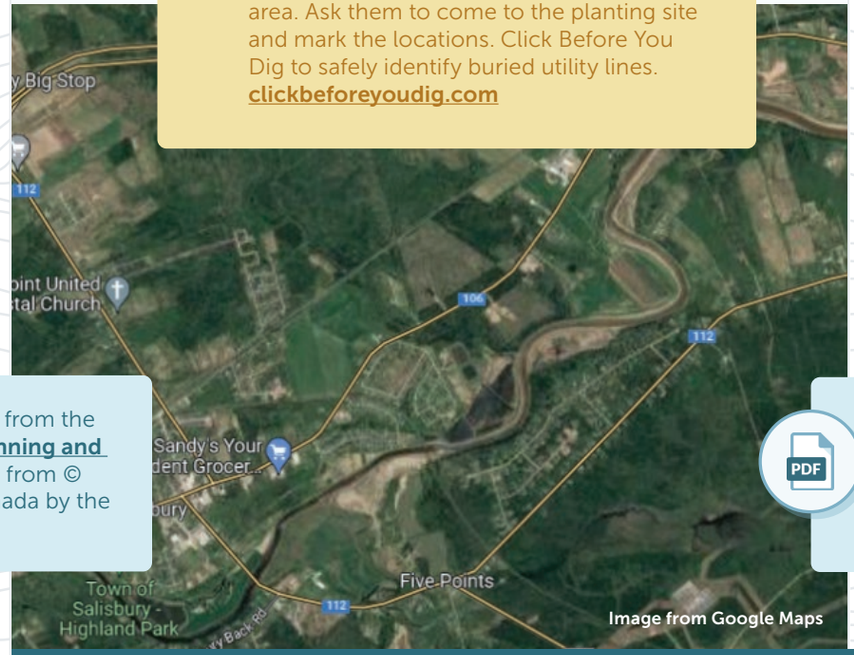
Once on the Site

Before undertaking any planting activities in a riparian zone, it is essential to know the existing conditions in the area. These measurements allow the development of a management plan adapted to the site (Kennebecasis Watershed Restoration Committee, 2020):

- **Water quality.** Measure the temperature, dissolved oxygen content and pH of the water
- **Bank height.** Measured from the water level to the top of the bank (the first elevation change or transition point) and it is noted in centimeters
- **Bank length.** The impacted area, or assessed area, is measured in meters along the water's edge
- **Riparian zone status.** Percent cover by trees, shrubs and grasses
- **Bank stabilization status.** Percent stable/degraded/eroded

CLICK BEFORE YOU DIG

For urban plantings make sure to call your public works department, phone, cable TV, hydro and gas companies to determine the location of buried utility lines within the area. Ask them to come to the planting site and mark the locations. Click Before You Dig to safely identify buried utility lines. **clickbeforeyoudig.com**



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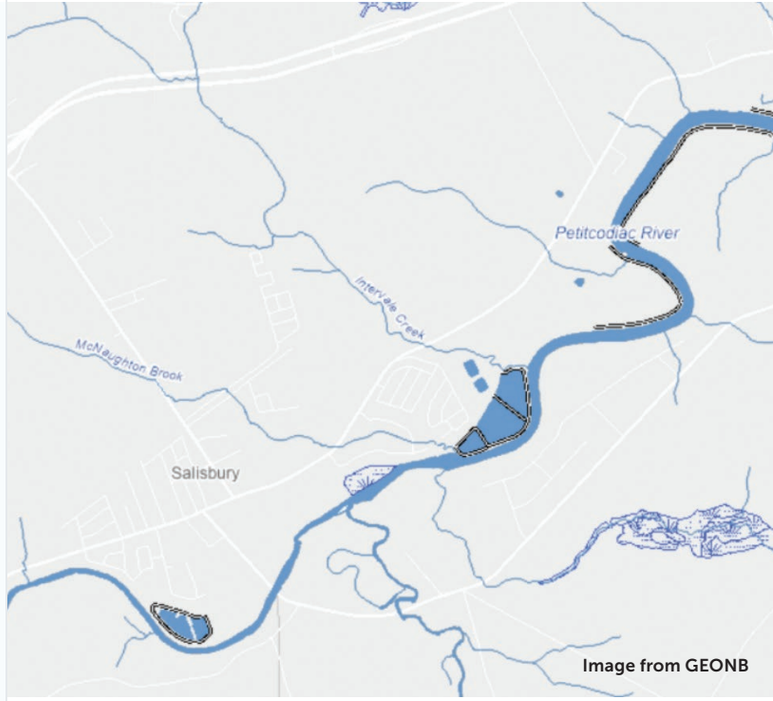


Image from GEONB

Other Important Factors

- soil types and moisture levels
- level of sunlight
- high water line
- characterization of the vegetation on undisturbed riparian strips so as to identify the main native species in the area and other natural elements, such as herbaceous plants, shrubs, vines, and trees (Environment Canada, Quebec Region & Terraformex, 2013)
- existing structures (walls, dock, riprap, etc.)
- hardiness zone
- list of landowners involved in the project, addresses and contact information

Information on how to measure some of these factors can be found on the **Riparian Restoration Toolbox** created by the Kennebecasis Watershed Restoration Committee.

Engaging Landowners

A big step on the path to riparian restoration and for any big changes/improvements in our environment is getting to know nearby landowners. Many landowners have great relationships with their land and the nearby watercourses and are often unaware of harm they may be causing to the ecosystem. Landowner engagement is an essential part to this work and is not only a first step in project management, but also an ongoing relationship. Environmental groups working on riparian restoration need to foster regular, respectful, and long-term relationships with landowners to effectively complete this work.

This section is quoted and adapted from the **Riparian Restoration Manual** with permission from the Kennebecasis Watershed Restoration Committee.

Photo by Emily Weigum

BEST PRACTICES IN LANDOWNER CONTACT

- **Reach out first by mail, phone or email to request a time to visit.** People are more likely to engage in a productive and positive conversation if they are not taken by surprise.
- **Listen patiently.** Start by finding out what the landowner knows about their property and what they might be concerned about. Don't make them feel like they need to defend their opinions. Take note of the emotion and knowledge behind their statements.
- **Respect.** Respecting the landowner and the opinions they express is a key ingredient for a positive relationship. Establishing trust and mutual respect is essential for maintaining a longer term, and productive relationship.
- **Provide information and support.** Help connect the landowner with stewardship information that relates to their interests for their property. Explain the relevant stewardship or restoration activities that are offered by your group. Closely monitor the discussion and be ready to change topics or styles to meet the needs of the landowner.

LETTER OF UNDERSTANDING

A signed LOU document legally protects the restoration organization and also provides incentives for the landowner to maintain the site after the work has been carried out. It is important that the restoration organization does not over commit or oversell the work they are able to carry out. Be realistic with expectations about the project (Kennebecasis Watershed Restoration Committee, 2020). An LOU can also be helpful in a funding application.

nben.ca

CROWN LAND

If you are planning to plant on Crown land or public land, please be prepared to upload documentation showing that you have met the requirements and have received approval from the relevant Federal or Provincial/Territorial government(s).

- **Cultivate a positive reputation in the community.** Landowners are more likely to participate in stewardship activities if they have heard of the positive work of an organization, and if they hear about other neighbors and friends who have these activities.
- **Prepare for questions.** Conversations with landowners can go in many different directions, and they could ask questions on a myriad of topics. Sometimes questions will be tangential to the topic at hand (e.g. Was it your organization that opposed fracking in this area?) or will be confrontational (e.g. Who are you to tell me what to do with my property?). Answer as best you can, and be prepared to tell them you will follow up with information about topics you cannot speak to.
- **Keep good records.** While it is okay to make note of a few things during the visit (e.g. questions they want followed up on), keep extensive note-taking for right after the visit—when things are still very fresh in mind. This will help cultivate an informal and collegial atmosphere during the visit, and will feel less like an interview or surveillance.
- **Follow up.** Sending a follow-up letter within a month of the visit can go a long way to fostering a positive relationship. Include any responses to questions that couldn't be answered during the discussion, and include any relevant resources that pertain to topics of interest that were discussed.

ENGAGING LANDOWNERS

Homework for Landowners

The Shediac Bay Watershed Association created this inspiring visual guide: **Shoreline Property Owner's Guide**

Lake Protection Workbook: A Self-Assessment Tool for Shoreline Property Owners was created for lakeside property owners but can be relevant for any waterfront property.

The **Conservation Partner Program** (previously Landowner Stewardship Program) is for landowners who care for their land in a way that preserves its environmental, economic and cultural values, keeping it healthy for today and for the future.

You can help protect and enhance these important natural areas

- Reduce your lawn area and let native vegetation take over
- Use biodegradable and phosphate-free products instead of harmful pesticides and chemicals
- Install rain barrels to control stormwater runoff
- Pick up pet wastes
- Empty the septic tank regularly and maintain your septic drain field
- Remove invasive species and only prune vegetation for maintenance purposes
- Only plant native trees, shrubs and deep-rooted grasses as they are better at stabilizing the soil and are more drought tolerant

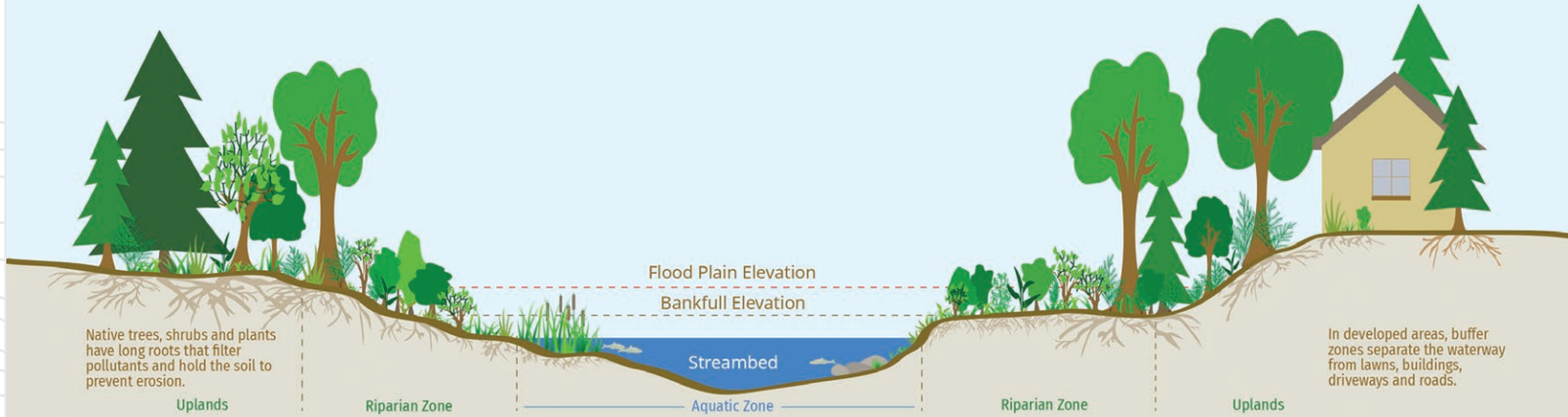
Buffer zone maintenance and enhancement : Plan before you plant

Riparian areas are more effective when they are composed of dense and mixed vegetation. Plants adapted to local climate and soil conditions tend to be easier to maintain because they require less water and no pesticides.

Before undertaking any planting activity in a riparian zone, it is important to be aware of the conditions prevailing in the area to be revegetated. The type of vegetation depends on many factors such as the high-water line, the type of soil, the stability of the streambank and many other considerations.

According to the laws and regulations of the New Brunswick Department of Environment and Local Government, you must obtain a permit to modify a property located within 30 metres of the water.

We can help you in choosing the right plants and trees for your property.
Please contact the Shediac Bay Watershed Association for more information.
Tel: 506 533-8880 Email: sbwa@nbnet.nb.ca



BENEFITS TO PROPERTY OWNERS

- Improves scenic and property values
- Reduces land loss due to erosion
- Protects from strong winds
- Promotes groundwater recharge and reduces floodwater damage
- Restores important stream functions, enhancing angling opportunities
- Improves water quality for swimming and recreation

BENEFITS TO AQUATIC HABITATS

- Reduces erosion by holding soil in place with roots
- Reduces stormwater runoff and filter pollutants
- Trees provide wood debris to streams, creating habitat for aquatic species and slowing the flow during storms
- Provides shade in summer to help keep water cool for fish
- Provides habitats and food for wildlife
- Absorbs nutrients that feed harmful algae

Shediac Bay Association Baie de Shediac Protection - Education www.shediacbayassociation.org
Canada
New Nouveau Brunswick Canada Your Environmental Trust Fund at Work Votre Fonds de fiducie pour l'Environnement au travail
NB Wildlife Trust Fund www.nbwlf.ca
Fonds en fiducie pour la faune du Nouveau-Brunswick www.ffnb.ca

ENGAGING WITH

Indigenous Communities

Fostering relationships with nearby First Nations communities is always recommended when working on projects that impact the land. Many watershed groups in New Brunswick already have ongoing respectful relationships with many First Nations people and elders. However, for those who don't know where to start or who want to continue to learn about decolonisation through environmental protection this section is for you.

New Brunswick has three Aboriginal Aquatic Resource & Oceans Management groups labeled AAROM departments. However, to summarize, AAROM departments are aggregate Indigenous organizations, typically organized around a watershed, that often include biologists, field technicians and other experts. These departments regularly lead or engage in research projects, stock assessments, and other studies to provide information, knowledge and technical advice for their member communities. They also support youth and community education and outreach programming to help build and maintain capacity in their member communities to pursue careers in environmental science and management (AAROM–PAGRAO, n.d.).

Learn more about the structure of AAROM groups.

MALISEET NATION CONSERVATION COUNCIL (MNCC)

Formed in 2004, the MNCC is a non-profit corporation created to increase the involvement of Wolastoqiyik people in the decision making processes in the traditional territory of the Wolostoq (Saint John River) watershed and Bay of Fundy.

maliseetconservation.ca

GESPE'GEWA'GI INSTITUTE OF NATURAL UNDERSTANDING (GINU, FORMERLY GMRC)

An evolving organization that is a trusted partner to the Mi'gmaq communities. Its member communities include Eel River Bar, Listuguj, and Pabineau.

ginu.co

NORTH SHORE MICMAC TRIBAL COUNCIL—ANQOTUM RESOURCE MANAGEMENT

The North Shore Mi'kmaq Tribal Council (NSMDC) established Anqotum Resource Management as an Aboriginal Aquatic Resources and Oceans Management (AAROM) body to support its member First Nations. Those First Nations are Elsipogtog, Oinpegitjoig (Pabineau), Ugpi'Ganjig (Eel River Bar), Natoaganeg (Eel Ground), L'nui Menikuk (Indian Island), Tjipogtotjg (Buctouche), Metepenagiag (Red Bank) and Amlamgog (Fort Folly) First Nations. Anqotum respects traditional values and is diverse, innovative, and flexible—striving to build capacity and enhance the lives of their communities by offering technical support, advocacy, and education in protecting environmental resources.

aarom.ca

Time, effort and preparation is required to establish meaningful relationships and collaboration across Indigenous and non-Indigenous cultures, communities, and initiatives. Laying a strong foundation by establishing trusting relationships with the people, organizations, and communities with whom you wish to collaborate is essential to the success of a project. When relationships are built from the ground up in the spirit of reconciliation, they can flourish and grow into fruitful partnerships and projects (Indigenous Knowledge Circle of the NBCKC, 2023).

Beyond Conservation

A Toolkit for Respectful Collaboration with Indigenous Peoples

The Indigenous Knowledge Circle of the NBCKC created a toolkit to support individuals and organizations seeking to learn how to:

- do things differently,
- avoid repeating the mistakes of the past, and
- embed reconciliation into their conservation and stewardship work.

The toolkit is intended to advance genuine, respectful, and productive collaborations between Indigenous and non-Indigenous people and organizations working to protect and restore lands, waters, and all living beings.

The Beyond Conservation toolkit resides in the IPCA Knowledge Basket website, which contains many other resources that support Indigenous-led conservation.

ipcaknowledgebasket.ca

RESTORATION PROJECT

Budgeting & Timelines

COST PER TREE BREAKDOWN	
Description	**Amount**
Tree Cost. Species mix to include bur oak, silver maple and butternut. $9/tree is the average cost.	$9.00
Planting Cost. Tree planting to be completed by professional tree planters, NWAI staff and community members.	$3.00
Site Preparation. Heavy machinery operator is contracted out.	$1.00
Wildlife Protection. Wooden stakes and cones to be made and installed for bur oak to protect from wildlife browsing.	$2.00
Cost for Maintenance. Due to the floodplain location pin flags need to be installed in the spring and removed in the fall to mark the trees so they don't get mowed. Wooden stakes need to be installed and painted—they help to locate the tree rows after the spring floods. Minimum of 5 years.	$14.00
Maintenance Materials. Pin flags and wooden stakes to mark rows of trees	$1.00
Mowing. Mowing work is contracted out and needs to be continued until the trees grow taller than the invasive reed canary grass (minimum of 5 years). Mowing is approximately every 2 weeks during the growing season.	$10.00
Total Cost Per Tree	**$40.00**

Budgeting

This table, created by the Nashwaak Watershed Association, describes an example of how budgeting can be calculated by a cost per tree breakdown.

It should be noted that the cost/tree is dependent on variables such as landscape type (i.e. floodplain vs. forest), species planted, age/size of tree, wildlife browsing impact (deer, rodents, etc.), site prep requirements (bush hogging/mowing necessity and frequency), and presence of invasives (i.e. reed canary grass). The $40/tree cost breakdown is based on the Neill's Flats restoration site which has all of the above challenges, as described in the table. We encourage you to do some research to find your own dollar values.

nashwaakwatershed.ca

For your own projects, a blank Cost per Tree Breakdown can be found on the Riparian Restoration and Reforestation for Watersheds Toolkit page on the NBEN Website.

nben.ca

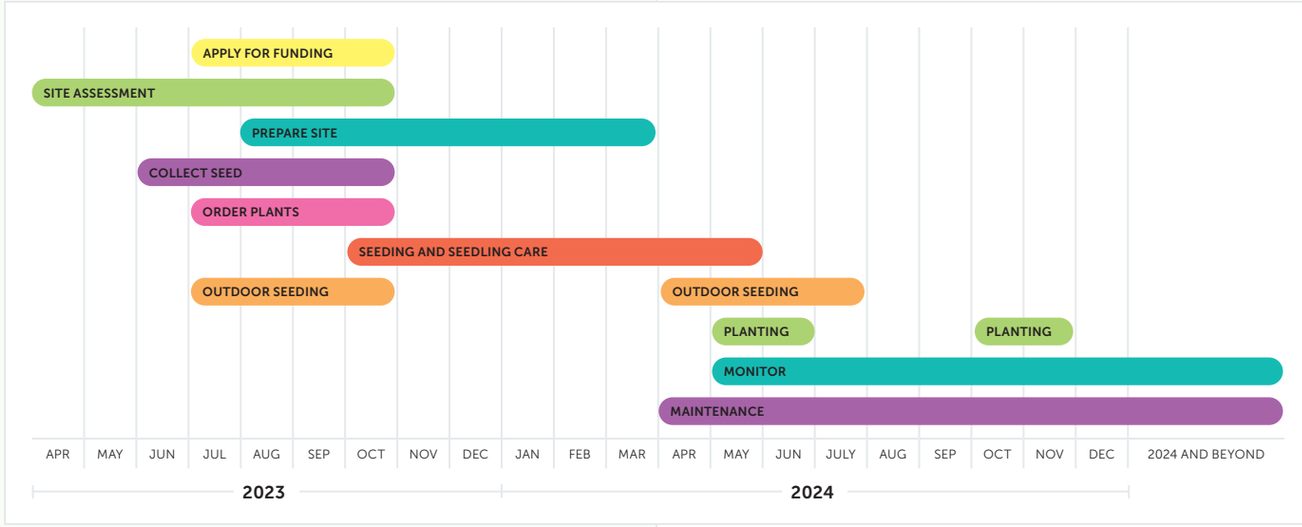
This section is reproduced with permission from the Nashwaak Watershed Association.

PERMITS AND LAWS

Depending on the location of the site, the project may need one or more permits for planting near bodies of water (see Permits and Laws section).

Timelines

Here is an example of a project timeline. Restoration groups will want to apply for provincial or federal funding at least 6 months to a year before the projected planting date. The planting itself should happen in the spring or fall. Plan for at least three years of maintenance after the planting date.



Funding

We have created this list of possible funders for your projects. As you likely know, funding can be quite ephemeral so some of these funding streams may not currently be available. Not all of these funding streams may apply to your project; some may be too large or too small, some may be specific to certain areas.

Application Guides

Many of the larger funding streams have created application guides. We encourage you to research the funders well before starting the application as there may be some available information that is tailored to funding applicants.

Although this is a long list of funding opportunities, there may be more that are not mentioned. It might be in your best interest to do more research to find the funding streams that are right for your project. Also many of these funding opportunities are not offered every year.

ATLANTIC ECOSYSTEMS INITIATIVES (ECCC)

The Atlantic Ecosystems Initiatives (AEI) provides funding for projects that improve the health, productivity and long-term sustainability of freshwater ecosystems in Atlantic Canada, resulting in collaborative action and positive environmental impacts.

canada.ca

This project was undertaken with the financial support of:
Ce projet a été réalisé avec l'appui financier de :
Environment and Climate Change Canada | Environnement et Changement climatique Canada

CANADIAN TREE FUND

Jack Kimmel Grant—This grant is awarded nationwide for projects promoting arboriculture research and education in Canada. Fund research and educational projects related to urban forestry. Individuals and/or agencies are invited to submit proposals for consideration.

canadiantreefund.org

ECOACTION COMMUNITY FUNDING PROGRAM

This program provides financial support to non-profit and non-government organizations for local action-based projects that produce measurable, positive effects on the environment. This year, projects must address fresh water environmental priorities listed in the call for proposals. We fund projects that:

- lead to tangible environmental results
- engage the community to improve the environment
- increase environmental awareness and capacity in communities

canada.ca | application guide

This project was undertaken with the financial support of:
Ce projet a été réalisé avec l'appui financier de :
Environment and Climate Change Canada | Environnement et Changement climatique Canada

2 Billion Trees

The 2 Billion Trees (2BT) program aims to motivate and support new tree planting projects. Over a period of 10 years, by 2031, up to $3.2 billion will be invested in tree planting efforts to support provinces, territories, third-party organizations (for-profit and not-for profit) and Indigenous organizations to plant two billion trees across Canada. Because this funding is for very large projects, watershed groups may want to aggregate with other organizations to help meet the targets.

canada.ca

Funded by the Government of Canada
Financé par le gouvernement du Canada
Canada

ENVIRONMENTAL TRUST FUND

Funding for action-based projects focused on protecting, preserving, and enhancing New Brunswick's natural environment.

gnb.ca

ENVIRONMENTAL DAMAGES FUND

The purpose of any contribution to the EDF is to achieve restoration of damage to the natural environment and wildlife conservation, in a cost-effective way. Eligible projects include:

- environmental quality improvement initiatives
- research and development on environmental restoration and improvement
- education and awareness on issues affecting the health of the natural environment

canada.ca

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GREEN COMMUNITIES CANADA

Mini Forest/Miyawaki Forest Planting Strategies— Green Communities Canada are looking for urban stream projects that are focused on mini forest/ Miyawaki forest planting strategies. This funding stream is dedicated to smaller projects with a minimum 300 trees and 100m² sized sites. This ongoing project is funded by 2 Billion Trees Canada.

greencommunitiescanada.org
info@greencommunitiescanada.org

TreeCanada

National Greening Program

The TreeCanada National Greening Program supports landowners with their tree planting projects where there is a need for forest rehabilitation, afforestation or ecosystem restoration.

Eligible Properties Include:

- meadows, grasslands and riparian areas
- woodlands that could use enhancement
- fallow land, farm land or previously burned areas
- Plant-able area must be a minimum of 4 hectares (10 acres) or greater

treecanada.ca

OTHER TREE CANADA FUNDS

GREENING CANADA'S SCHOOL GROUNDS

This grant helps support school greening projects that in turn enhance the learning experience for students and strengthen their relationship with nature.

Eligibility. This grant is offered to educational institution properties such as elementary or primary schools, junior and high schools, and universities, colleges, and others.

Grant amount: $3,500

treecanada.ca

EDIBLE TREES

This grant helps fight food insecurity by offering financial and logistical support to plant fruit- and nut- bearing trees and shrubs in communities on publicly accessible sites.

Eligibility. Funding is available to schools, non profits, community groups or gardens, food banks, community housing projects, Indigenous communities, and municipalities.

Grant amount: $3,500

treecanada.ca

TREEMENDOUS COMMUNITIES

This grant encourages and supports community tree planting projects that create long-lasting benefits where people live, work or play.

Eligibility. This grant is available to Canadian municipalities, Indigenous communities, business improvement associations, non-profit organisations and community groups.

Grant amount: $3,500–$10,000

treecanada.ca

Photo by Michael Fenton on unsplash

HABITAT STEWARDSHIP PROGRAM FOR SPECIES AT RISK

- Support habitat projects that benefit species at risk and that prevent others from becoming a conservation concern
- Enable Canadians to become actively involved in stewardship projects for species at risk, which will result in tangible and measurable conservation benefits
- Improve the scientific, sociological and economic understanding of the role that stewardship has as a conservation tool

canada.ca

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INDIGENOUS-LED NATURAL CLIMATE SOLUTIONS

Support for Indigenous-led projects that restore wetlands, peatlands, and grasslands to store and capture carbon and support biodiversity.

canada.ca

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Ce projet a été réalisé avec l'appui financier de :

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NATURE SMART CLIMATE SOLUTIONS FUND

Support for projects that restore wetlands, peatlands, and grasslands to store and capture carbon and support biodiversity.

canada.ca

This project was undertaken with the financial support of:
Ce projet a été réalisé avec l'appui financier de :

Environment and Climate Change Canada | Environnement et Changement climatique Canada

NATURAL INFRASTRUCTURE FUND

Natural infrastructure is a way for communities to use their ecosystems to improve quality of life, reduce pollution, enhance biodiversity and habitats, and build resilience to climate change. Examples of natural infrastructure include urban forests, street trees, wetlands, living dykes, bioswales, and naturalized coastal restoration. The fund is not currently accepting applications.

infrastructure.gc.ca

PROJECT LEARNING TREE—GREEN EMPLOYERS PROGRAM

PLT Canada has supported over 400 employers with funding to hire diverse youth in meaningful work experiences. Since 2018, we have placed youth in more than 7,000 paid work experiences in the forest, conservation, and parks sectors.

pltcanada.org

SFI COMMUNITY GRANTS

The Sustainable Forestry Initiative® (SFI) Community Grants Program supports collaborative projects between local communities and the SFI network to increase understanding of the values and benefits provided by sustainably managed forests across the US and Canada.

Grant amount: $5,000 to $20,000

forests.org

TD FRIENDS OF THE ENVIRONMENT FOUNDATION

Founded by TD Bank Group in 1990, the TD Friends of the Environment Foundation (TD FEF) is a national charity that funds environmental projects across Canada. It should be noted that the TD FEF primarily supports CRA-qualified donees.provided by sustainably managed forests across the US and Canada.

td.com/ca

UNI

Concour Voila!—Voilà! Projects that unite us. Organizations and engaged residents from the five major regions are encouraged to submit meaningful, visionary, sustainable projects that drive change and contribute to the wellbeing of the community.

Prize amount: $5,000 or $50,000

uni.ca

Determining the Best Trees for the Location

Photo by Hemmings House

To align with the key principle of the 2BT program, it is critical that the "right" species are planted in the right ecosystem (Natural Resources Canada, 2023). Tree planting projects will need to demonstrate how they intend to select the right tree species and seeds to ensure the survival of trees for a given location or climate. In general, native tree species are more likely to survive and grow well and provide the greatest ecological benefits. In addition, choosing the right source of seeds will play a key role in ensuring trees planted in the next decade will survive and grow in a climate that may exist over the next century (Natural resources Canada, 2 Billion Trees Frequently Asked Questions).

The right tree at the right place can survive for decades and will positively impact its environment for even longer. When deciding which species to plant you may also want to think about which species will best adapt to climate change. The information below, provided by the Fundy Biosphere Region, Josh Noseworthy, and Anthony Taylor, should help guide you as you create and plan for planting day.

Planting Stock

Genes are the basic unit of biodiversity, and maintaining the genetic diversity of native species is therefore essential for successful forest conservation and restoration.

For small projects, this can be accomplished simply by digging up native seedlings in your local watershed (with the landowner's permission). However, for large projects, try to obtain trees from local nurseries that can provide genetic stock that is both native and adapted to your specific area, this will not only benefit gene conservation but can also increase the survival rate of the planted trees. Another option is producing your own trees from local seed or cuttings (Noseworthy & Global Conservation Solutions, 2018).

Quality and Size

Choosing trees of good quality and of the appropriate size can make the difference between success and a failed restoration project. Generally, planting stock taller than 30 cm (1 ft) with sturdy stems and well-developed root systems is desirable. Bare-root stock more than 1 m (3 ft) high with well-developed root systems will provide the highest rate of survival and growth response, but may be too costly or not available in sufficient quantity for large-scale restoration projects. Seedling plugs may be a more viable option in these cases. The survival rate of seedling plugs is considerably less than that of large, sturdy planting stock, but failed seedlings tend to be easier and cheaper to replace. Seedling plugs are much more susceptible to competition with herbaceous vegetation, and they are not recommended for planting on abandoned farmland unless aggressive site preparation and vegetation control have been used. If you are planting on sites that can only be prepared by mowing, large planting stock—more than 1 m (3 ft) in height—will be required (Noseworthy & Global Conservation Solutions, 2018).

While choosing tree species, beware of invasive species and look-a-likes, the **Grow Me Instead** guide, created by the New Brunswick Invasive Species Council (NSISC) and the Nova Scotia Invasive Species Council (NSISC) can help you choose the right species.

This section is quoted and adapted from the **New England-Acadian Forest Restoration, A Landowner's Guide to Theory and Practice** with permission from Nature Conservancy of Canada and Josh Noseworthy.

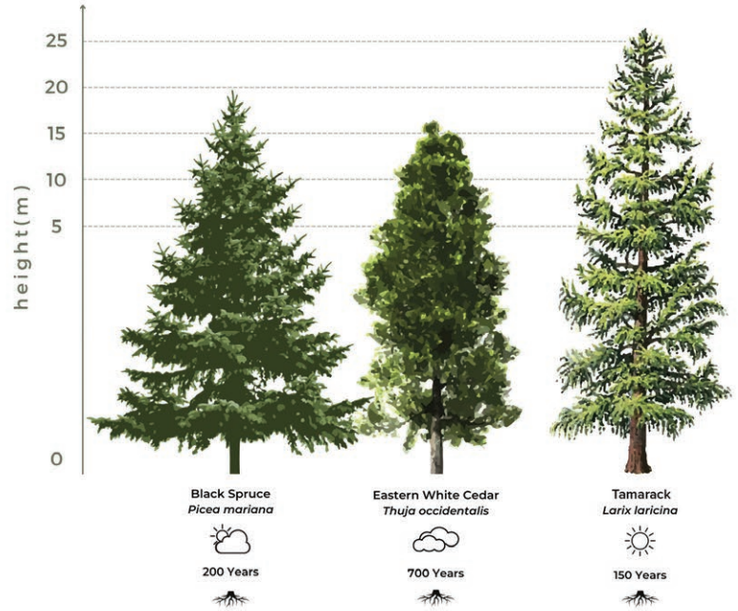
TREE SPECIES FOR THE WABANAKI FOREST

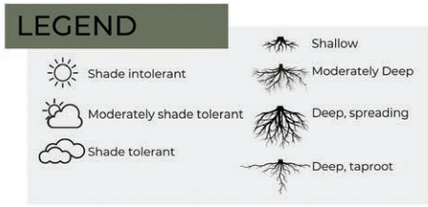
The four diagrams on the following pages were created by the Fundy Biosphere Region for this toolkit and describe with visuals which tree species will grow best in different environments.

Photo by Tourism NB

Wabanaki Forest

Bog & Fen





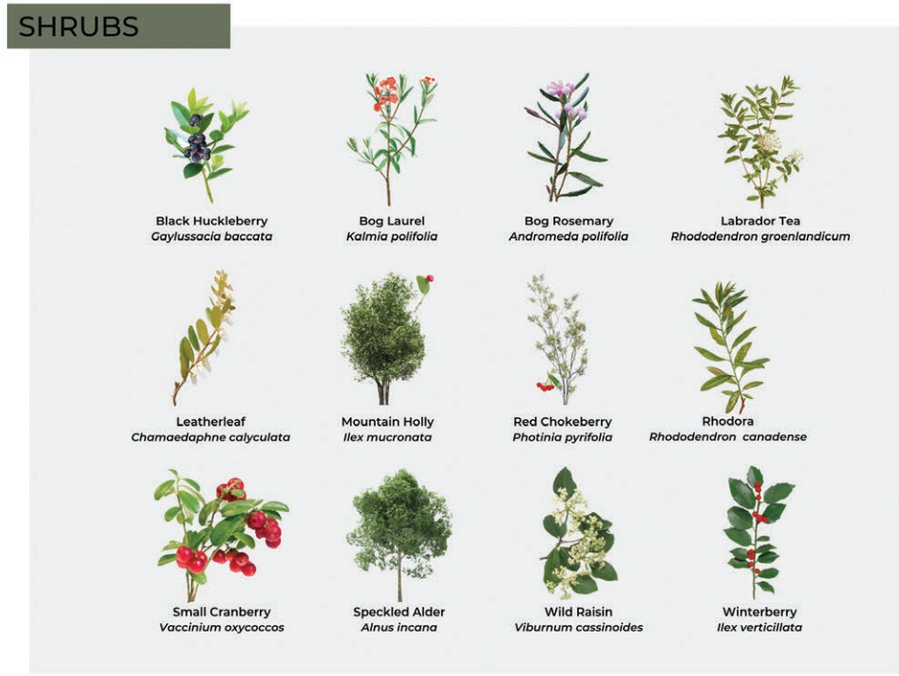


Illustration: Fundy Biosphere Region

Wabanaki Forest

Marsh

NBEN RENB

Région de la Biosphère de FUNDY Biosphere Region

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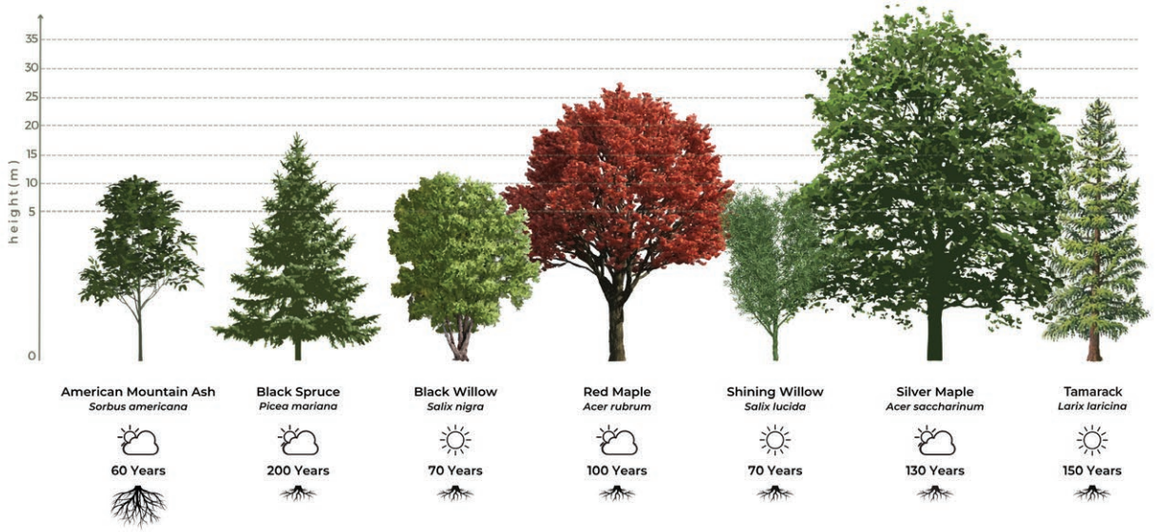
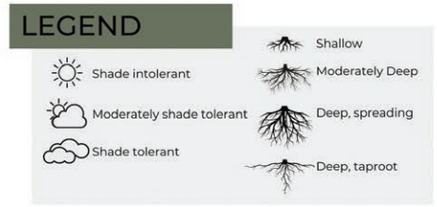




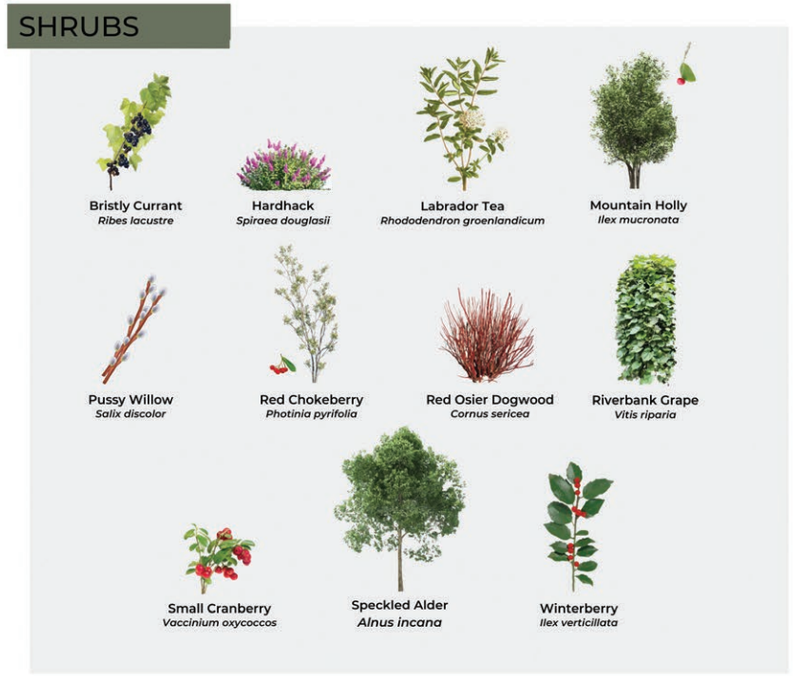


Illustration: Fundy Biosphere Region

The Effect of Climate Change on the Acadian Forest

Forester and wildlife biologist Josh Noseworthy, founder of Global Conservation Solutions, explains: "New Brunswick's forests are a meeting point between cold-loving species from the north (known as 'boreal'), and warm-loving species from the south (known as 'temperate'). The general consensus is that boreal trees and wildlife will not fare well in the face of climate change and will have to move farther and farther north to find the cold environments that they need to survive" (MacDonnell and Josh Noseworthy 2020).

The Wabanaki Forest region—also referred to as the Acadian Forest—is a unique part of an ecological transition zone occurring along the border of the Eastern United States into Canada. This area links the conifer-dominant northern boreal forest together with temperate deciduous forests found further south. Transition zones such as these are particularly vulnerable to effects of climate change, since many of the species that coexist in these ecosystems are close to their extreme southern or northern climatic limits (Taylor et. al., 2017). In recent years, researchers have found that cold-adapted species of the Wabanaki forest, such as balsam fir (Abies balsamea L.) and black spruce (Picea mariana (Mill.) B.S.P.), are likely to decrease in both growth and abundance (Taylor et. al., 2017). These studies also showed that temperate species such as red maple (Acer rubrum L.) and red oak (Quercus rubra L.) could benefit from warming, seeing an expansion northward in their ranges (Taylor et. al., 2017; De Graaf, 2018; Noseworthy, 2018).

PDF

For those who seek more knowledge on the effects of climate change on the acadian forest. The Fundy Biosphere region has published a report on this titled **Climate Change Resiliency of Tree Species in the Fundy Biosphere Region**.

Establishing the resilience of individual tree species to climate change is critical for conservation planning, forest management, and successfully adapting to climate change.

DE GRAAF, 2018

Fundy Biosphere Region's Most Recommended to Plant

The eight largest trees in the above graphic are the FBR most recommended to plant. They are from left to right, ironwood, eastern hemlock, black cherry, American beech, red oak, sugar maple, white pine, and red maple. Other species in the prosper category like butternut, white ash and white elm are or will be likely affected by insect or disease in the coming decades. Tree species in the "persevere" list should also be planted, but in lesser amounts than this list of eight (Figure 2 in Phillips, n.d.).

PDF

Another paper titled **Climate Change-Resilience in the Acadian Forest** by Megan de Graaf, MScF (2018) compares three different studies on climate change in New Brunswick's forests.

PDF

This section is quoted and adapted from the **Forest Ecology and Management** (Rapid 21st century climate change projected to shift composition and growth of Canada's Acadian Forest Region, Issue 405, pages 284-294)

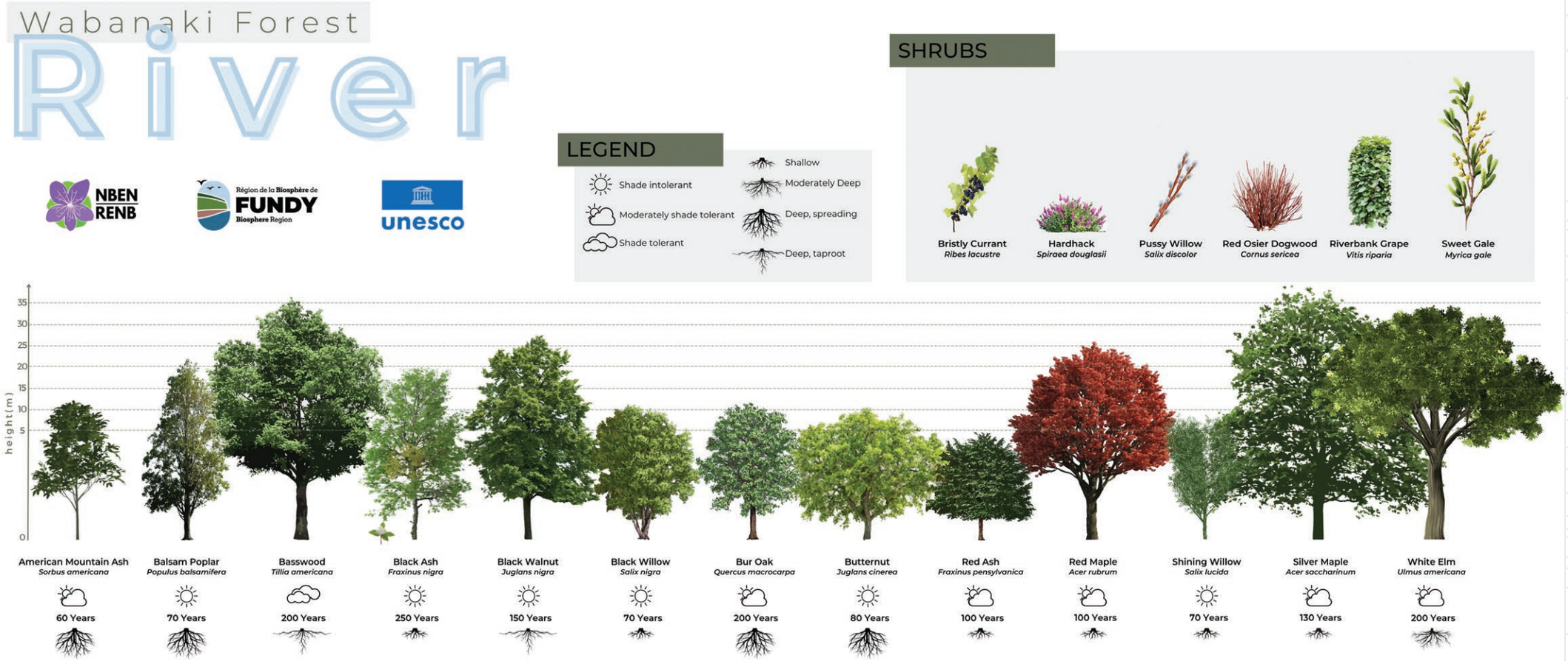


Illustration: Fundy Biosphere Region

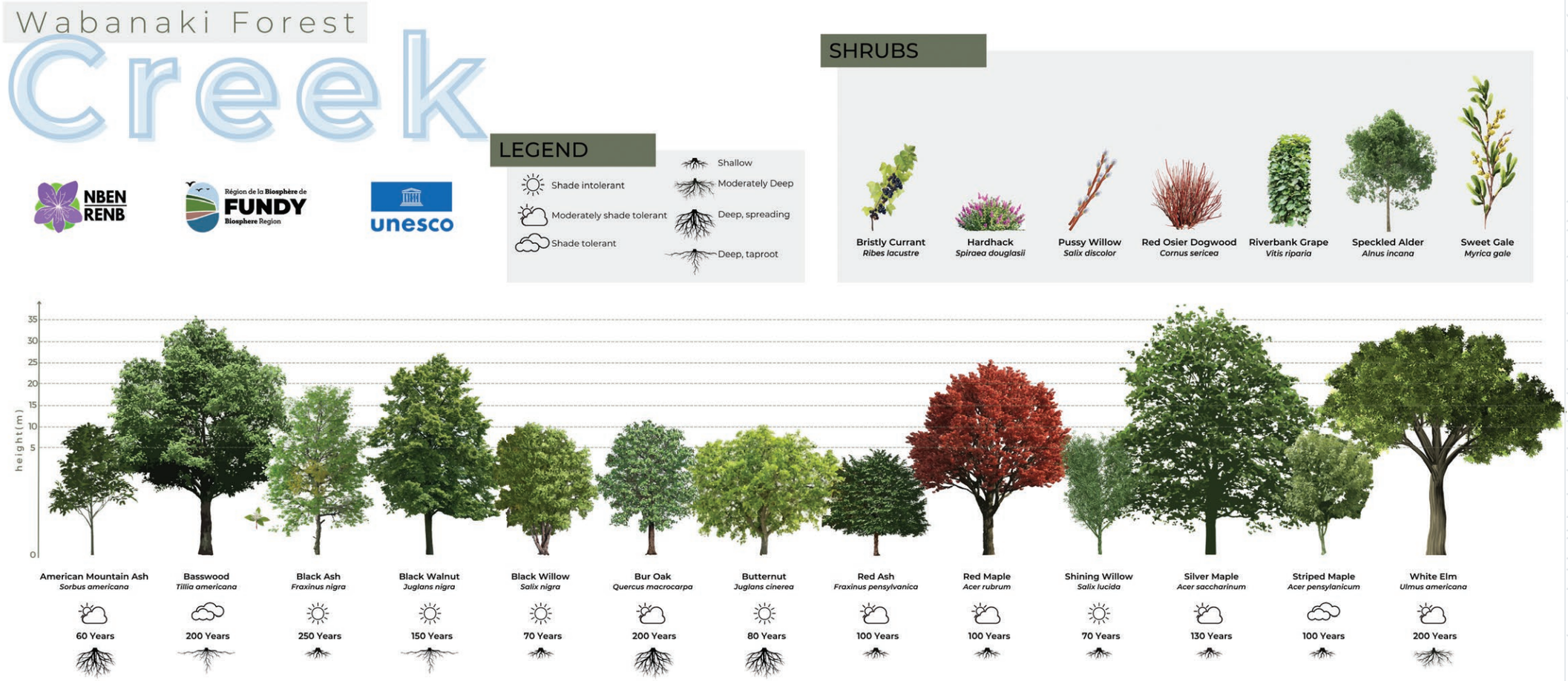


Illustration: Fundy Biosphere Region

Producing Your Own Trees/Nursery Maintenance

It is no secret that native tree species are not easy to find in our local nurseries. That is why many reforestation initiatives have started their own nurseries. This chapter has information on seed collection, propagation and nursery maintenance.

Propagation Through Seed

When collected correctly and in an ethical way, seeds are a great way to propagate tree seedlings. Before collecting tree seeds it is very important to properly identify the tree species you are collecting-from (to prevent misidentifying with an invasive, non-native lookalike) and make sure to do your research on when and how to collect those seeds.

Three guides for those who plan on harvesting their own seed:

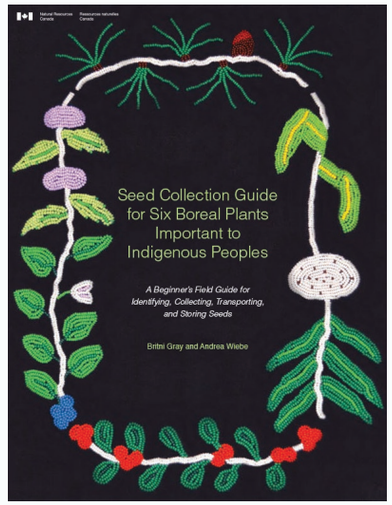
Photo by Annemarie Schaepman on Unsplash

Native Woody Plant Seed Collection Guide for British Columbia

This seed collection guide, created by the Government of BC has some very detailed information on seed collection and storing. Some of the species mentioned are not native to New Brunswick but our province has many similar species.

gov.bc.ca

Seed Collection Guide for Six Boreal Plants Important to Indigenous Peoples—this guide was made in Alberta but many of the species mentioned are also native to New Brunswick.



Collection Calendar: NB, NL, NS, and 3 more

Germination Test 0.0 – 100.0

Scientific	Zone	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR
Abies balsamea	Atlantic Maritime												
	Boreal Shield												
	MixedWood Plain												
Abies balsamea var.	Atlantic Maritime												
phanerolepis	Boreal Shield												
Acer japonicum	MixedWood Plain												
Acer negundo	MixedWood Plain												
Acer pensylvanicum	Atlantic Maritime												
	Boreal Shield												
Acer platanoides	MixedWood Plain												

Seed Collection Calendar made for the Atlantic Provinces

The National Tree Seed Centre has created a Seed Collection Calendar made for the Atlantic Provinces. This a preview of what the seed collection calendar looks like. To see the whole doc you can contact Natural Resources Canada and request the NTSC Seed Collection Calendar–Atlantic Provinces.

nrcan.ntsc-cnsf.rncan@canada.ca

Propagation From Cuttings or Live Stakes

Cuttings or live stakes are pieces of carefully selected plant material taken from stems or branches, cut into lengths and inserted into soil. If this is done properly, most of these cuttings will take root and grow. It is very important to use only genetic stock from native species that were ideally found near the planting area to maintain local genetic diversity.

Some types of trees and shrubs can be established inexpensively by using this method. The easiest plants to propagate from cuttings are native willows and poplar, elderberry and native dogwoods.

ASK PERMISSION
Ask permission from neighbors or the provincial or regional government but please do not take cuttings unless you have received permission.

Image from video: Planting Trees Along a River

VIDEOS
The video section of this toolkit has two videos on the topic of propagation through stakes: Planting Trees Along a River and Bioengineering Restoration Efforts on the Kennebecasis River: Willow Staking

Take cuttings using a sharp knife or pruners, during late winter while plants are fully dormant. Collect them from over a wide area to ensure genetic variety in your stock and avoid stressing any one plant.

Cut the shoots approximately 20 cm long. Identify the tops of your cuttings by making a horizontal cut at the top, cutting 5 mm above a node (the place where a leaf or side branch would join the stem). Make a slanted cut (roughly 45°) at the bottom end, angling it down from a point approximately 5 mm below a node. This ensures the best success and makes it easier to insert the cutting into the ground.

While you work, put the shoots in a plastic bag that contains a moist material like wood shavings or paper to prevent them from drying out. Store the cuttings in a dark, cool, moist place until you are ready to plant them in the early spring. You can store them in your refrigerator in plastic bags with a small moist piece of paper towel. Alternatively, they can be stored outside in a snow mount in the shade. Don't worry if the cuttings sprout roots or shoots in storage, they should be okay but do plant them as soon as is practical.

The best time to plant is during the spring or fall. Soak the cuttings in water for three to ten days before planting. Poke a hole in the ground using a rod. Try to make the depth of the hole match the length of the in-ground portion of the cutting; you don't want an air pocket underneath your cutting. Gently insert the cutting into the hole so that at least 70% of the cutting is in the soil, leaving 30% above ground.

Keep in mind that most likely not all cuttings will survive and you can always thin them out later. Generally, it is advisable to arrange your cuttings randomly rather than in rows, spacing willows and dogwoods approximately 30 to 90 cm apart. Because of their size, large trees such as poplars should be planted further apart. Keep an eye on the soil and water the cuttings if necessary; it is critical that the soil stays moist while they grow roots and become established.

This section has been quoted and adapted from On the Living Edge: Your Handbook for Waterfront Living. Sarah Kipp, lead author & Clive Callaway.

Tree Nursery Management

The Nashwaak Watershed Association Inc. has created a great **Tree Nursery Management Plan**. Although this plan was created specifically for the NWAI Nursery Site, so it may not fit the needs of your own project, it is a great report that describes a local tree nursery in our own province.

This section is adapted from the NWAI Nursery Plan 2015 with permission from the Nashwaak Watershed Association Inc and Josh Noseworthy of Global Conservation Solutions.

nashwaakwatershed.ca

FOR MORE INFORMATION

More information on other species such as:

- Red-tipped Willow (Salix eriocephala)
- Sandbar Willow (Salix exigua)
- Basswood (TIlia americana)
- Red Maple (Acer rubrum)
- Red Oak (Quercus rubra)
- Eastern White Cedar (Thuja occidentalis)
- Eastern White Pine (Pinus strobus)
- Eastern Hemlock (Tsuga canadensis)
- White Elm (Ulmus americana)
- Silver Maple (Acer saccharinum)

can be found in the Appendix C of the Nashwaak Watershed Association Inc. **Tree Nursery Management Plan** (2015).

Butternut (Juglans cinerea)

Butternuts ripen in September – October and will remain on the tree until after leaf fall. Early seed collection is recommended as butternuts are highly prized by squirrels and other wildlife. Seeds require cold stratification to overcome dormancy, and will germinate the following spring. Seedlings will establish a tap root followed by a deep and widespread root network, so care should be taken to minimize root stress during outplanting. Outplanting is most successful on trees greater than 30 cm in height (von Althen, 1990).

Basswood (Tilia americana)

Seeds ripen in September–October and can be collected at this time. Basswood seeds require extended dormancy in nature, but this can be overcome by early harvesting (September) and immediately sowing the harvested seeds. Seeds are ready for harvest once they turn brown, but before they dry and harden. Basswood seedlings can form a taproot up to 20 cm in length during their first year's growth. Outplantings have been successful on abandoned farmland that received site preparation and weed control (von Althen, 1990).

Ordering and Handling Tree Seedlings

What do I need to do when preparing my tree order?

- Growing seedlings can take up to several years. Ensure that the timely delivery of your project agrees with the timelines of your nursery(s) and planting contractor. **Order early!**
- Ask you tree supplier questions to be clear about what style of nursery pot the seedlings will be in. Make sure your planting contractor is aware as well because it will influence how they're handled.
- Unloading and storing trees can be labour, water and energy intensive. Stay in frequent communication with your nursery representative and contractor to make sure that trees are spending the least amount of time between leaving the nursery and being planted. Delivery timelines must correspond with stock handling considerations (below).
- Develop a comprehensive plan for delivery from nursery, transport to the site(s), and storage until planted. Enclosed trailers are ideal as wind will shock and dry out the seedlings. Whenever possible store trees on-site in the shade. If needed, create a shade shelter using special Sylvicool tarps which allows airflow to seedlings. Never store trees directly under a regular tarp without airflow as this will kill the seedlings. Water daily, or more if required (wind and heat will increase the need for watering).
- Hardwoods should not be placed in planting bags but should be planted directly out of the tray/container. Limit the number of trees in planting bags at one time, where possible, to avoid damage from crushing. Ensure trees are handled gently and (ideally) from the root ball rather than the sensitive tops.

This section is quoted from the Community Forests International's Guide for Two Billion Tree Projects found on the **Growing Resilient Forests page**. The whole document can be found here:

forestsinternational.org

Community Forests International

Photo from A Guide for Two Billion Tree Projects

Site Preparation and Planting Day

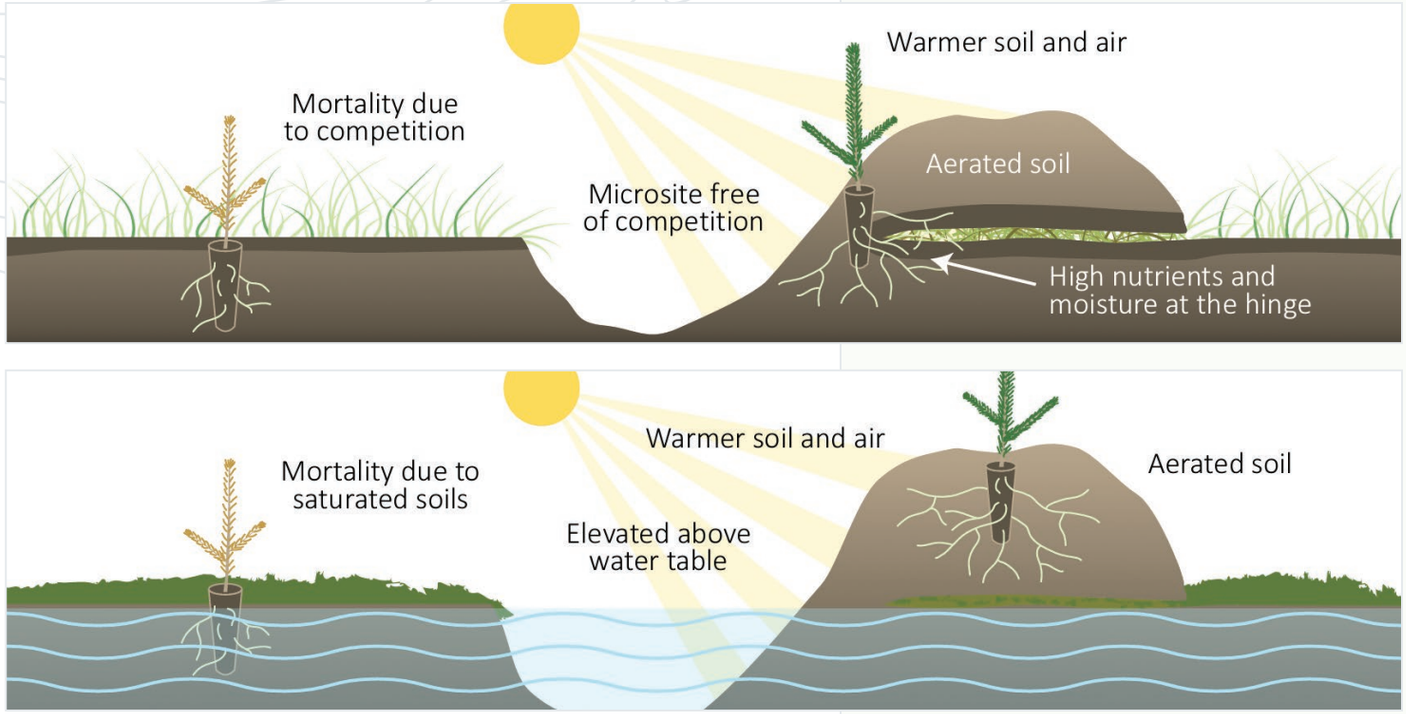


Image from *Forestry and land reclamation - a natural fit : an introduction to the silvicultural toolkit for land reclamation*

Mowing, Bush Hogging, and Mulching

"Mowing and bush hogging are the most basic forms of site preparation. They can be used alone, such as when sensitive soils cannot be disturbed, or in preparation for more aggressive techniques. Mowing and bush hogging can involve a variety of tools, from hand-held string trimmers to tractor attachments, depending on the scale of the project. Since the purpose of mowing is to clear undesirable vegetation, the intensity of mowing or bush hogging also depends on the vegetation to be cleared." (Noseworthy & Global Conservation Solutions, 2018)

"Depending on your jurisdiction, site preparation that disturbs soil may not be permitted in riparian zones. If restoring in an open field, vegetation should be mowed or bush-hogged repeatedly before planting. If no restrictions exist, plowing and disking is highly recommended, except near banks that are susceptible to erosion; these areas can be mowed if required. Naturally established shrubs along watercourses are important for preventing erosion and should not be removed during site preparation"

"The recommended method to prepare a site for willow plantings is mowing. Herbaceous field vegetation should be mowed in the autumn before planting. This will allow for planting early in the spring when the soil is saturated, giving the willows a full growing season to develop their root systems. Although activities that disturb the soil directly adjacent to rivers and streams are generally not recommended, if banks are sloughing from erosion, they may need to be graded to a shallower slope. The ideal slope for planting willow is less than 2:1 but the final grade will depend on the extent of erosion and whether you are legally able to grade riparian soils in your jurisdiction. Whether grading is done by hand or with machinery, ensure that proper silt fencing is installed to prevent sedimentation of the watercourse."

Tending and Regenerating

"Begin by determining what riparian buffer laws apply in your jurisdiction as there may be restrictions on removing trees within a watercourse buffer. Even if some harvesting is allowed, for restoration purposes, patch cuts should never be used within a riparian zone. Instead, use tending treatments such as crop-tree release, with or without spacing, to favour desirable species and create conditions for underplanting. Girdling should be the primary means of removing undesirable trees in riparian zones." (Noseworthy & Global Conservation Solutions, 2018)

Microsites

Microsites are pockets of shade and moisture that help promote the growth of tree seedlings and other plants. Depending on the limiting factors of the site, the ideal microsite might be slightly warmer, drier, wetter, or more or less sheltered than the surroundings.

This section is quoted and adapted from the **New England—Acadian Forest Restoration**, a manual created by Nature Conservancy Canada.

Tree Spacing

Tree spacing varies on every project based on the tree species, intention for the project, tree age, environment,and other factors. There are three major ways to plant trees for restoration: Blanket Planting, Fill Planting, and Cluster Planting.

Blanket Planting

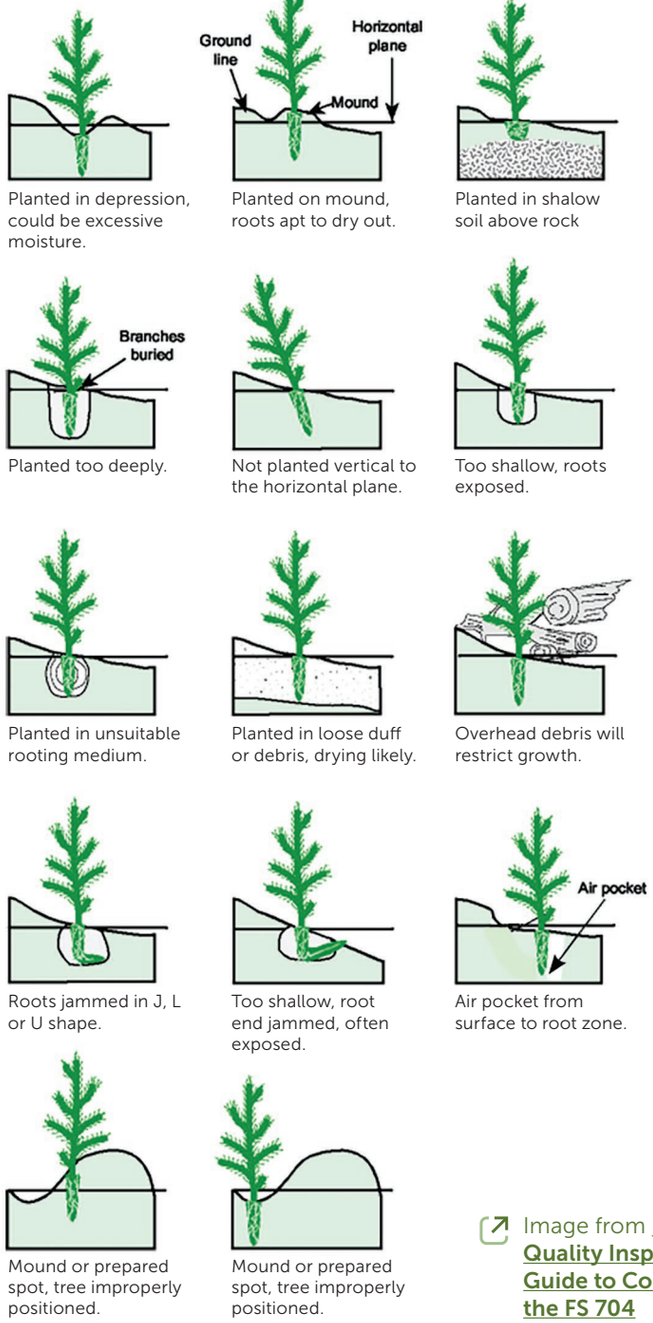
"Blanket planting refers to using uniform spacing when planting in open areas (such as a field). Generally, trees should be spaced close together so that canopy closure occurs as quickly as possible. This not only shades out field vegetation, but also encourages the trees to grow upward, rather than turning into branchy, poorly formed stems . Blanket planting should be spaced at 2 m × 2 m (2,500 trees/ha). However, if machinery is needed to mow, a 3 m × 1.5 m spacing (~2,200 trees/ha) can facilitate this. Planting in irregular or crooked rows is considered a best practice for restoration, as it more closely resembles natural forest succession" (Noseworthy & Nashwaak Watershed Association, 2016).

Fill Planting

Fill planting is done in forests that are already established, either naturally or planted. One of the main benefits of fill planting (according to the NWAI, 2016) is the opportunity to add less common tree species into the mix. Fill planting is most often used in replacing dead trees on newly planted sites, planting canopy openings in existing floodplain forests or planting patches that are cut for the purpose of planting, in degraded forests or plantations.

This section is adapted from the **NWAI Bottomland Restoration 2016** with permission from the Nashwaak Watershed Association Inc. and Josh Noseworthy from Global Conservation Solutions.

Common Planting Faults



Planted in depression, could be excessive moisture.

Planted on mound, roots apt to dry out.

Planted in shalow soil above rock

Planted too deeply.

Not planted vertical to the horizontal plane.

Too shallow, roots exposed.

Planted in unsuitable rooting medium.

Planted in loose duff or debris, drying likely.

Overhead debris will restrict growth.

Roots jammed in J, L or U shape.

Too shallow, root end jammed, often exposed.

Air pocket from surface to root zone.

Mound or prepared spot, tree improperly positioned.

Mound or prepared spot, tree improperly positioned.

Image from **Planting Quality Inspection: Guide to Completing the FS 704**

Public Tree Planting Events

For public Tree Planting events, we suggest having experienced staff or volunteers demonstrate how to properly plant the trees. However, if no one on the team has tree planting experience, **How to Plant a Tree** was created by Tree Canada to offer advice.

Tree Spacing

Cluster Planting

Tree groupings in nature tend to be in clusters. A new approach to tree planting in reclamation areas is "cluster planting" in which groups of fast-growing trees, such as aspen, are planted at very high local densities (up to 100,000 stems per hectare within the cluster) with no or fewer trees planted in between clusters. The clumpy spatial pattern may also more closely resemble natural boreal forest regeneration with the unoccupied space between tree clumps allowing for natural revegetation processes to occur. The cluster planting approach may result in a wide variety of microhabitats, from closed canopy forest to more open areas, which may also increase the overall site level biodiversity (Pinno et al., 2017).

publicdocs.nait.ca

VIDEO
A video recording of a webinar lead by Amanda Schoonmakeron on this topic can be found in the Video section of this toolkit: **Cluster Planting Webinar with Amanda Schoonmaker**

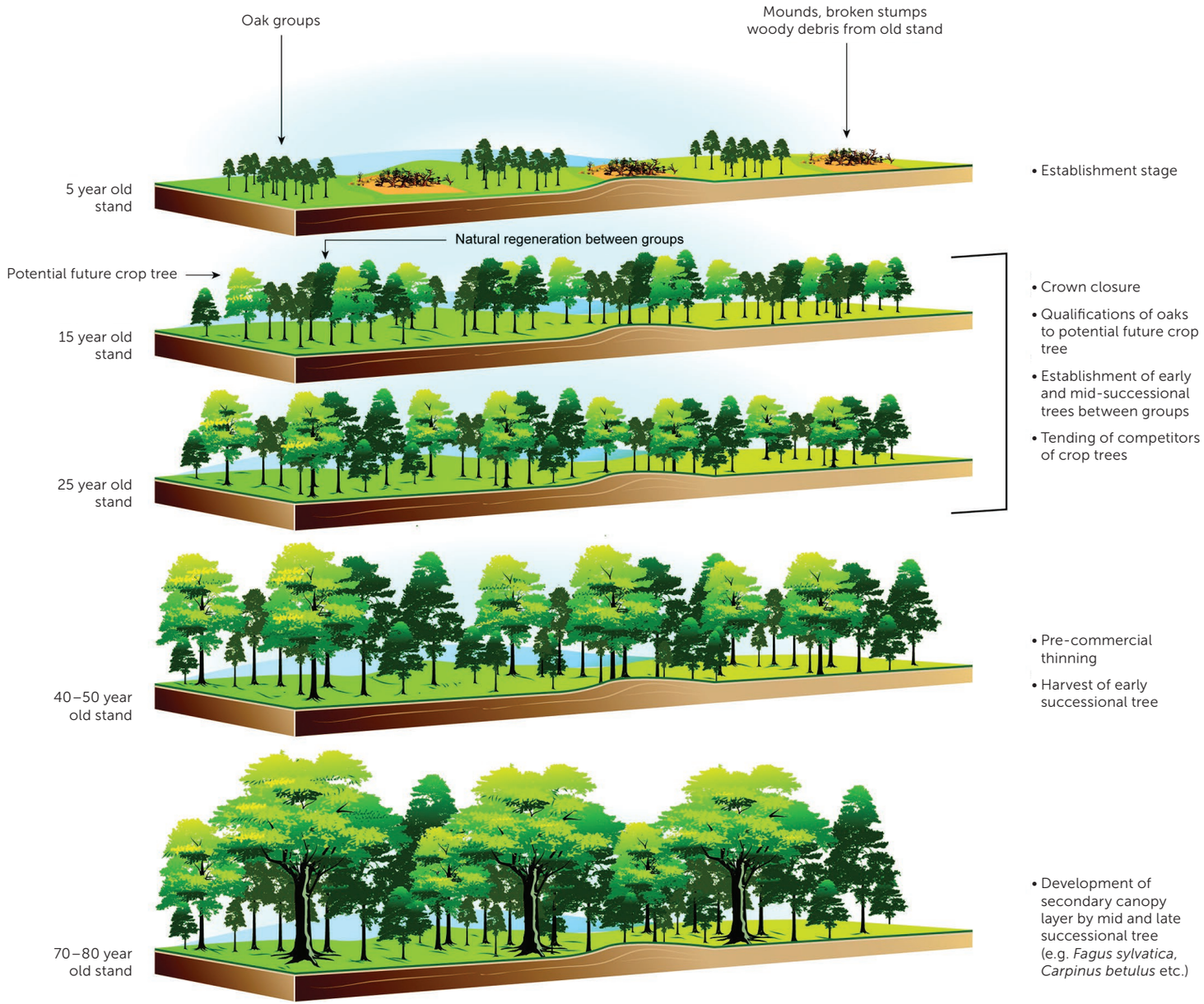


Figure from the Canadian Journal of Forest Research Volume 47, Number 2, February 2017

Larger planting projects will need experienced tree planters on staff but this does not prevent you from also organizing a volunteer event. You can organize the tree planting as a one-day event or as a series of events. Most volunteers won't have the time to commit for two consecutive days, so know your limitations.

TRACKING VOLUNTEER ENGAGEMENT

The Kennebecasis Watershed Restoration Committee uses an Engagement Report template to track the details of each program or event that it hosts. This is useful for recording additional community partners that were involved in an event, as well as the hours that any participants volunteered.

Tracking the number of volunteer hours allows the event host to calculate the amount of in-kind support that an event generated, which is very useful information for potential or actual funding bodies.More info can be found in the Kennebecasis Watershed Restoration Committee's riparian toolbox.

A downloadable Engagement report can be found with this Toolkit on the NBEN Resources page.

nben.ca

Volunteer Engagement

Photo by Susana Cheng

SUGGESTIONS FOR A SUCCESSFUL PLANTING DAY

- **Make sure the site is accessible.** You will be transporting trees, equipment and volunteers both to and from the site. Draw a detailed map of the location for volunteers and identify public transit routes.
- **Devise a system for volunteers to properly identify what type of tree is to be planted where.** For example, you could tag the trees with coloured ribbon and place stakes with the matching colour at the correct location. Have trained supervisors on-site to assist volunteers.
- **Check on your tree delivery.** In most cases, nurseries will only deliver trees on weekdays. You may even have to pick up the stock yourself to save money. Keep the roots of the trees covered with mulch or wet burlap so that they do not dry out. Keep trees out of the sun during storage, in a cool place if possible. If a major planting is planned, or if trees will be stored for several days, a cooler may be required. The sooner the trees are planted, the higher the survival rate.
- **Locate a nearby source of water for the trees.** If one is not available, water will have to be transported to the site.
- **Make sure you have enough tools for all the volunteers, and encourage them to bring some from home.** You will also need wheelbarrows, pruning clippers and saws, wire cutters, watering hoses and/or buckets, old hose and wire for staking, and a rototiller if the soil is hard. Ask volunteers to mark their own equipment to avoid confusion at the end of the day.
- **Advertise in advance on social media, TV and radio stations and in local papers so that the word gets out.** Involve members of the city council and turn it into a community event. Volunteers love when food and water is provided. Contact local businesses for donations of food and drink. Ask volunteers to bring their own lunches if food is not being supplied.
- **Try to obtain permission from local gas stations, churches, restaurants and shopping malls for the use of their washroom facilities or make sure to have porta-john facilities.**
- **Take some "before and after" pictures of the planting site.**
- **Let volunteers know what they should bring and wear for the planting day.** Remember that this is their day too, and that everybody wants to feel useful. You may even want to conduct other educational activities that relate to tree planting. You may also wish to have the volunteers sign a register to allow you to contact them for future plantings.
- **Mark your planting area with stakes, fences or tall trees.** This will make it easier for maintenance crews to avoid mowing or damaging small seedlings
- **Everyone wants a successful, enjoyable day, so take along a first aid kit and train your supervisors well before the planting day.** Review training for emergencies and arrange backup plans if something isn't delivered on time or if weather conditions are not ideal. Organize demonstrations for volunteers to show them how to plant the trees properly.
- **Dispose of garbage properly.** Bring garbage containers and recycling bins. Leave the site clean and tidy.
- **Thank all participants, particularly those who donated money or supplies.** This can also be done through social media.
- **Hold a wrap-up party for your group at the end of spring planting season.** It is a great way for the regular volunteers to relax together and do something other than work, and it marks the end of another successful season. Many close friendships have developed which have enhanced the effectiveness of the team.

This section is quoted and adapted from the Greening Canada Workbook: A Guide To Community Tree Planting And Care with permission from Tree Canada.

Long Term Maintenance

Every tree, species, and situation requires different maintenance needs. Before you plant, it is important to create a maintenance plan for at least three years in the future. The plan could include mowing, pruning, watering, mulching, and pest management. Here are a few examples taken from the Nashwaak Watershed Association:

- When the soil cannot be disturbed, it is extremely important that all field vegetation be mowed as often as possible for three or more years after planting (von Althen 1990). This not only controls competition, but also discourages rodents from nesting in the grass, as they will girdle young trees.
- Once established, Silver Maples are prolific sprouters, so it may be desirable to prune any sprouting stems once the trees have hardened off. Although labour intensive, pruning will focus energy into height growth and root growth, and promote healthy trees with good form (von Althen 1990).
- With Willow: after stems have hardened off in autumn, it is recommended to prune roughly half of the planted stems. Pruning back to 5 cm above the ground will encourage coppicing and root growth the following year. In this way, half the stems will provide a living buffer against ice scouring, and the other half will better prevent erosion in the following spring. Any cut stems > 2 cm at the base can be used for planting in the following year.

This section is quoted and adapted from the **Neils Flatts Management Plan** (2015) with permission from the Nashwaak Watershed Association Inc.

Photo by Eric Prouzet on Unsplash

New England-Acadian Forest Restoration Guide, a manual created by Nature Conservancy Canada, also offers some great advice on management and maintenance of specific replanted environments such as: farmlands, conifer plantations, clearcuts, floodplains, riparian forests, forested wetlands, Appalachian Hardwood forests and coastal forests.

For woodland properties that are managing a riparian property as part of silviculture, **The Climate Adaptive Silviculture Prescription Decision Tool**, made by NB Woodlot Owners, may be useful.

Permits and Laws

Watercourses and Wetlands

According to the laws and regulations of the New Brunswick Department of Environment and Local Government, you must obtain a permit to modify a property located within 30 m of the water (Clean Water Act, Revised Statutes of Canada (1989). It should also be noted that The area below the ordinary high water mark (OHWM) is submerged Crown lands and is under the administration and control of the Minister of Natural Resources and Energy Development.

Watercourse and Wetland Alteration Permit

The Kennebecasis Watershed Restoration Committee has some great advice and instructions on how to obtain a Watercourse or Wetland Alteration Permit. They describe the application Process, information required with some extra tips on page 61 of the Riparian Restoration Toolbox.

The Watercourse Wetland Alteration Technical Guidelines were made by the Government of New Brunswick and can assist you during the application process. Note that this document is over ten years old and some information may be out of date.

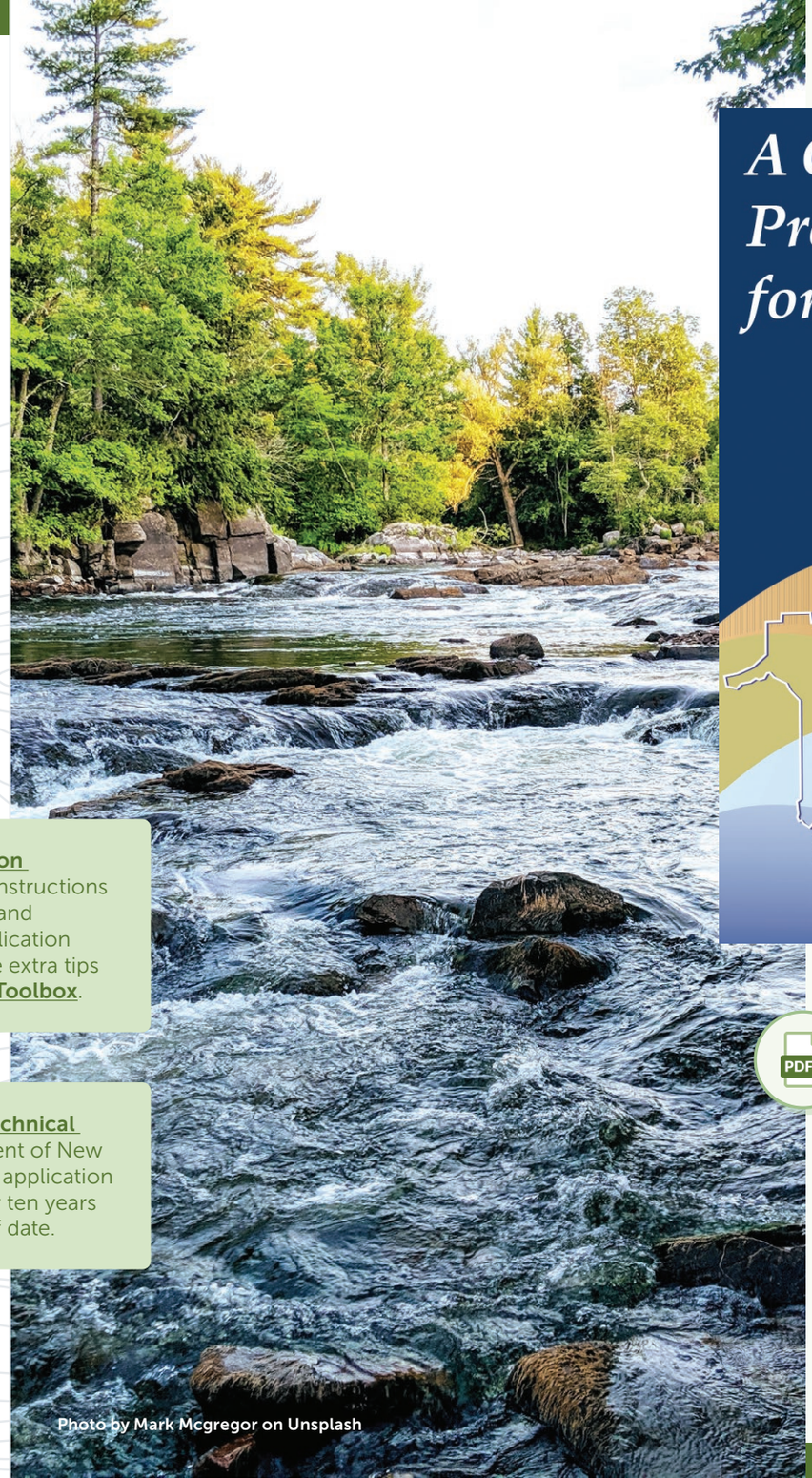
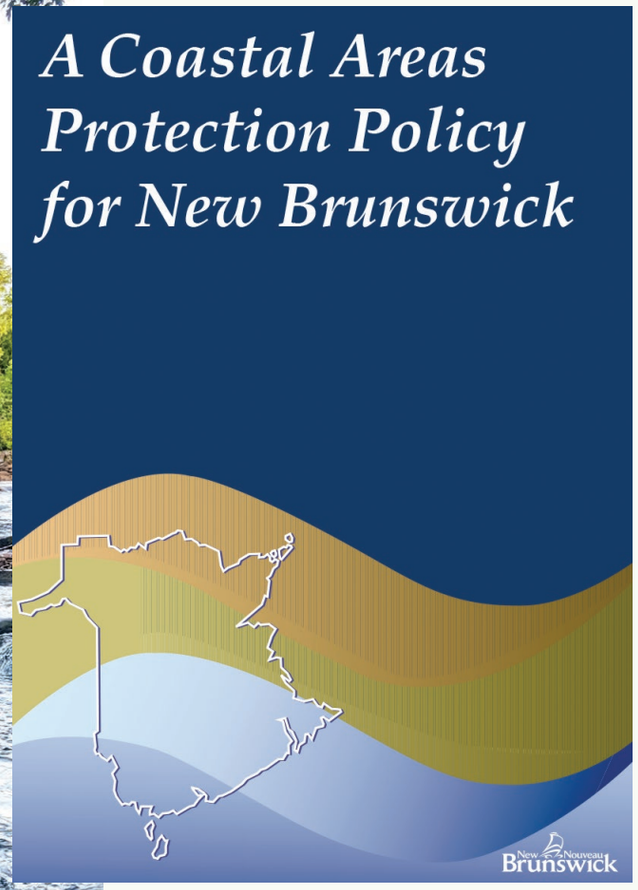


Photo by Mark Mcgregor on Unsplash



Coastal Projects

For projects that are near a coast, refer to the New Brunswick Coastal Areas Protection Policy.

gnb.ca

Other Useful Programs and Guides

BENEFICIAL MANAGEMENT PRACTICES FOR RIPARIAN ZONES IN ATLANTIC CANADA

The focus of this manual is on beneficial management practices for riparian zone management in agricultural landscapes in Atlantic Canada.

islandnaturetrust.ca

BOTTOMLANDS FOREVER

A Guide to Restoring Floodplain Structure, Function and Biodiversity in the Lower St. John River Watershed.

nashwaakwatershed.ca

FOREST OF THE FUTURE IN THE FUNDY BIOSPHERE REGION

Planting Guide for a Climate Change Resilient Forest.

islandnaturetrust.ca

HABITAT RESTORATION TREE PLANTING

Created by Community Forests International, a guide to planning and implementing restoration-focused tree planting projects with public funding from the 2 Billion Trees (2BT) program in Atlantic Canada and the Wabanaki Forest.

forestsinternational.org

NATURAL EDGE PROGRAM

Watersheds Canada have built the Natural Edge program with small grassroots groups in mind, and want to partner with organizations across Canada to restore shoreline and agricultural buffers. They provide groups with the tools and information they need to deliver the program in their community, including their Natural Edge App, Canada-wide Native Plant Database, private online Admin system, and all necessary program materials.

naturaledge.watersheds.ca

NB WOODLOT OWNERS

NB Woodlot Owners have a 2 BIllion Tree program and all members of the NBFWO are eligible to be a part of the program. If you know someone interested in being part of the program, but they are not yet a member, get them to contact The NBFWO and join today!

nbwoodlotowners.ca

NEW ENGLAND–ACADIAN FOREST RESTORATION A LANDOWNER'S GUIDE TO THEORY AND PRACTICE

A manual created by Nature Conservancy Canada for those who manage and conserve the ecosystems in the New England–Acadian Forest. The manual has some very specific instructions on climate adapted reforestation and restoration.

nswooa.ca

NRCAN A GUIDE TO PLANTING

Timing, Microsites, Technique and Monitoring.

d1ied5g1xfgpx8.cloudfront.net

RIPARIAN REVEGETATION PROJECT PLANNING AND SUBMISSION GUIDE

This guide was created in 2012 to help Quebec groups apply for the Eco action fund. It has some great information and checklists that can help while creating a restoration project.

publications.gc.ca

TREE CANADA'S GUIDE TO COMMUNITY TREE PLANTING AND CARE

This detailed guide was created for urban planting projects, it is a great resource for first-time tree planting projects.

treecanada.ca

THE NOVA SCOTIA BIODIVERSITY STEWARDSHIP GUIDE

This is a field guide full of local information and best practices for different environments and biomes.

novascotia.ca

Video Resources

Bank stabilization with Alder

Created by the Petitcodiac Watershed Alliance, for restoration of habitat for fish, mollusks and other animals living in our streams, one technique involves the construction of brush mats made with weaved alders and conifer boughs.

petitcodiacwatershed.org

Bioengineering Restoration Efforts on the Kennebecasis River: Willow Staking

These bioengineering techniques used by the KWRC will result in the eventual growth of mature willow trees, resulting in overall restoration of a site.

youtube.com

Cluster Planting Webinar with Amanda Schoonmaker

Conventional planting practices create forests with evenly spaced trees, at low density, which maximizes individual tree growing space but delays the time until crown closure, potentially for decades. In this study, they examined first year tree growth and vegetation competition results of a cluster planting trial in which trembling aspen (Populus tremuloides) trees were planted in clusters of 4, 10, or 20 trees with an internal spacing of 0.25 m along with non-clustered controls.

youtube.com

Improving the Availability of Native Plants in NB: Part 3

This video was part of a collaborative workshop on native plants, participants disscussed the current challenges of the availability of native plants in the province of New Brunswick. Ben Whalen describes how to use willow cutting to help riparian restoration.

youtube.com

Our Changing Forest

This short video series follows climate researchers, ecologists, and forest professionals as they share the projected changes to the Wabanaki Forest, Which Tree species are at risk, and discuss how to manage three typical forest stand types in the region.

youtube.com

Our Forest at Risk: Un paysage en transition (English Version)

Climate change is expected to have significant impacts on drought and wind regimes in Atlantic Canada's forests, largely due to associated changes in temperature, precipitation, and significant weather events. If important species in the region decline in growth and/or disappear, there may be significant socio-economic costs in the forest sector (including industry, woodlot owners, and government) and forest-dependent/ First Nations communities. Such costs may be associated with reduced timber supply, employment, traditional (aboriginal) wood products, recreation, aesthetics, and other such ecosystem services.

youtube.com

Planting Trees Along a River

This video by One Tree Planted showcases the Nashwaak Watershed Association and the amazing work they have done and will continue to do. Their work is truly inspiring.

youtube.com

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Conclusion

We at the NBEN hope that this document has helped watershed groups and other organizations with their reforestation and restoration projects and encourages the use of nature-based solutions to protect our rivers and coasts. Nature-based and natural approaches aid us in restoring and protecting natural areas while removing greenhouse gasses from the atmosphere, reducing flooding and stormwater surge risks, and supporting biodiversity.

Restoring New Brunswick's Watersheds

A TOOLKIT

New Brunswick Environmental Network

2BILLION TREES