



Nashwaak Watershed Association Inc.

STRATEGIC PLAN 2021-2030



Table of Contents

Strategic Plan Purpose and Approach	1
NWAI Vision	1
Strategic Planning Team	1
Potential Partner Organizations	1
Scope	3
Biodiversity Targets.....	4
Direct Pressures	5
Situation Analyses	6
Goals.....	12
Strategies and Interventions.....	12
Theories of Change and Objectives	19
Monitoring Plan	26
Timeframe and Budget	29
Funding Sources	32
References	33
Appendix A: Target Health Assessments	34

Please cite as: Nashwaak Watershed Association Inc. (2023). Strategic Plan: 2021-2030. Version 2023.18.04. 40pp.

This plan was developed with support from:



www.GlobalConservationSolutions.com



Strategic Plan Purpose and Approach

The Nashwaak Watershed Association Inc. (NWA) was established in 1995 as a not-for-profit organization, whose mission is to promote, conserve, and restore the Nashwaak ecosystem by using science-based methods, community collaboration, and advocacy for the watershed and its inhabitants. This 10-year strategic plan was developed to identify priority strategies that the NWA will undertake between 2021-2030. The strategic planning process follows the [Conservation Standards](#) (v.4.0), which is an adaptive management framework to systematically plan, implement, and monitor conservation initiatives to better learn what works, what does not work, and why to adapt and improve the practice of conservation over time.

NWA Vision

The Nashwaak Watershed Association envisions people caring for a clean, healthy, and beautiful Nashwaak River watershed that supports and connects people and wildlife for years to come.

Strategic Planning Team

Name	Organization	Role
Marieka Chaplin	Nashwaak Watershed Association Inc.	NWA Executive Director
Jillian Hudgins	Nashwaak Watershed Association Inc.	NWA Project Coordinator
Natalie Deseta	Nashwaak Watershed Association Inc.	NWA Restoration and Outreach Coordinator
Ian Lodge	Nature Trust of New Brunswick	NWA Board Member
Peter Toner	St. Thomas University	NWA President, Board Member
Stephanie Merrill	Global Institute for Water Security	NWA Vice-President, Board Member
Julia Carpenter	LuminUltra Technologies Inc.	NWA Board Member
Ian Smith	Retired Parks NB Program Manager	Education Consultant
Ian Lodge	Nature Trust of New Brunswick	NWA Board Member
Josh Noseworthy	Global Conservation Solutions	NWA Board Member; Process Facilitator
Kate Turner	Nashwaak Watershed Association Inc.	NWA Forest Stewardship Coordinator
Lauren Murdock	Nashwaak Watershed Association Inc.	NWA Conservation Coordinator
Mariah Belyea	Nashwaak Watershed Association Inc.	NWA Restoration Coordinator
Francie Morgan	Nashwaak Watershed Association Inc.	NWA Education and Outreach Coordinator
Victoria Ruigrok	Nashwaak Watershed Association Inc.	NWA Restoration Coordinator
Jeff Martin	Nashwaak Watershed Association Inc.	Species at Risk Coordinator
Shaylyn Wallace	Government of New Brunswick	NWA Board Member

Potential Partner Organizations

Organization Name	Role And Primary Interest
Community Forests International	Leads programs for sustainable forest management / restoration
Ducks Unlimited Canada	Expertise in wetland design and restoration
Environment and Climate Change Canada	Partner / funder for various conservation initiatives
Government of New Brunswick	Partner / funder for various conservation initiatives
J.D. Irving Limited	Large landowner in the watershed



Organization Name	Role And Primary Interest
Maliseet Nation Conservation Council	Engaging indigenous communities in NA and conservation concerns
Nature Trust of New Brunswick	Land trust partner
New Brunswick Invasive Species Council	Provides coordination, outreach and tools on IAS
New Brunswick Dept. of Natural Resources	Partner / funder for various conservation initiatives
World Wildlife Fund	Leads assessments and collaboration in the St. John River watershed
Canadian Wildlife Federation	Partner on aquatic barrier removal and remediation
Nature Conservancy of Canada	Potential partner related to provincial changes in water strategies
Liberty Tree Nursery	Local tree supplier and capacity builder for floodplain species
Aboriginal Peoples' Council	Partner in numerous conservation projects in the Nashwaak River
St. Mary's First Nation	Partner in numerous conservation projects in the Wolastoq River
City of Fredericton	Partner/Landowner for floodplain restoration and conservation
YSC Marketing Board	Potential partner in forest conservation projects
Department of Fisheries and Oceans Canada	Species at risk conservation funder/partner in the Wolastoq watershed
Kennebecasis Watershed Restoration Committee	Partner in floodplain conservation projects in the Wolastoq watershed
ACAP Saint John	Partner in monitoring and fish projects in the Wolastoq watershed
Wolastoq Nation in New Brunswick	Partner in conservation projects in the Wolastoq watershed
Multicultural Association of Fredericton	Partner for outreach initiatives targeting new immigrants
New Brunswick Environmental Network	Facilitates watershed collaboration/communication in NB
The University of New Brunswick	Provides support and promotes the NWA vision and goals
Canadian Rivers Institute	Provides training and support for a variety of aquatic projects



Scope



The Nashwaak Watershed 



Biodiversity Targets

Target	Target Health ¹
Floodplain Forest	Poor
Riparian Zone	Fair
Wetlands	Very Good
Wabanaki Forest	Fair
Aquatic Habitat	Good

Very Good	Ecologically desirable status; requires little intervention for maintenance.
Good	Within acceptable range of variation; some intervention required for maintenance.
Fair	Outside acceptable range of variation; requires human intervention.
Poor	Restoration is difficult; may result in extirpation without intervention.

Floodplain Forest

Floodplain forests primarily occur in the lower watershed, providing habitat for a wide variety of wildlife, as well as important ecosystem services to local communities (e.g. flood mitigation). Conserving and restoring floodplain forest benefits several “nested targets” in the watershed, including Silver Maple, Bur Oak, Butternut, Red and Black Ash, Wood Turtle, soil fauna, birds, mammals, invertebrates, understory plants, backwater swales and vernal pools.

Riparian Zone

For the purpose of this plan, the riparian zone represents lands directly adjacent to rivers, streams and lakes throughout the watershed. Conserving and restoring the riparian zone benefits numerous “nested targets” in the watershed, including river banks, sand and gravel bars, Wood Turtle, shrub communities, Silver Maple, Bur Oak, Butternut, White, Red and Black Ash, and Kingfisher.

Wetlands

For the purpose of this strategy, wetlands refer to non-floodplain (i.e. upland) areas where the water table saturates the soil surface either permanently or periodically. Conserving and restoring wetlands benefits numerous “nested targets” in the watershed, including birds, mammals, insects, soil fauna, Wood Turtle, benthic communities, plant communities, and Black Ash.

Wabanaki Forest

Wabanaki (Acadian) forest refers to upland forest communities comprised of long-lived, shade-tolerant tree species, which are increasingly becoming rare across the landscape. Conserving and restoring Wabanaki forest benefits numerous “nested targets” in the watershed, such as old growth and the wildlife that depend on it, soil fauna, and White Ash.

Aquatic Habitat

Aquatic habitat refers to the Nashwaak river and its tributaries. Conserving and restoring aquatic habitat benefits numerous “nested targets” in the watershed, such as native fish communities, benthic invertebrates, Wood Turtle, water, American Eel, lakes, cold-water refugia, Atlantic Salmon, and substrate features.

¹ See Appendix A for detailed target health assessments



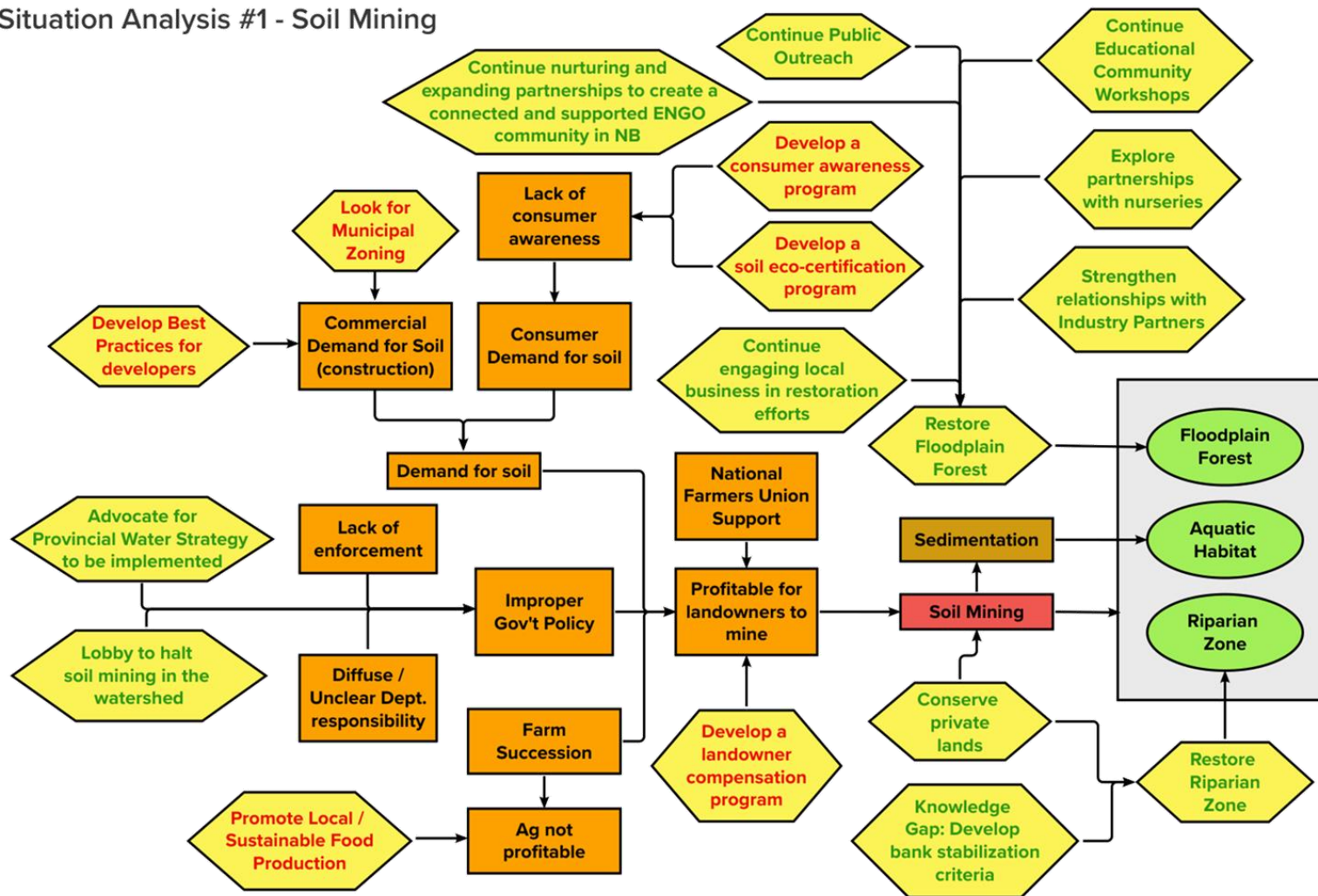
Direct Pressures

Pressures \ Targets	Floodplain Forest	Riparian Zone	Wetlands	Wabanaki Forest	Aquatic Habitat	Summary Rating
Sisson Mine	Very High	Very High	Medium	Medium	Very High	Very High
Unsustainable Forestry		Low	Low	High	High	High
Invasive Species	Low	Low	Medium	Very High	High	High
Agriculture	High	Low			Medium	Medium
Urbanization	Medium	Medium	Medium	Medium	Low	Medium
Commercial / Industrial Development			Medium	Medium	Medium	Medium
Aquatic Barriers		Low	Low		High	Medium
Roads	Medium		Low	High	Medium	Medium
Soil Mining	Low	Low			Medium	Low
Microplastics					Medium	Low
Sewage					Medium	Low
Illegal Dumping	Low	Low	Low	Low	Low	Low
Poaching	Low	Low	Low		Low	Low
Bank Hardening	Low	Low			Low	Low
Recreational Activities	Low	Low	Low	Low	Low	Low
Summary Rating:	High	High	Medium	High	Very High	Very High



Situation Analyses

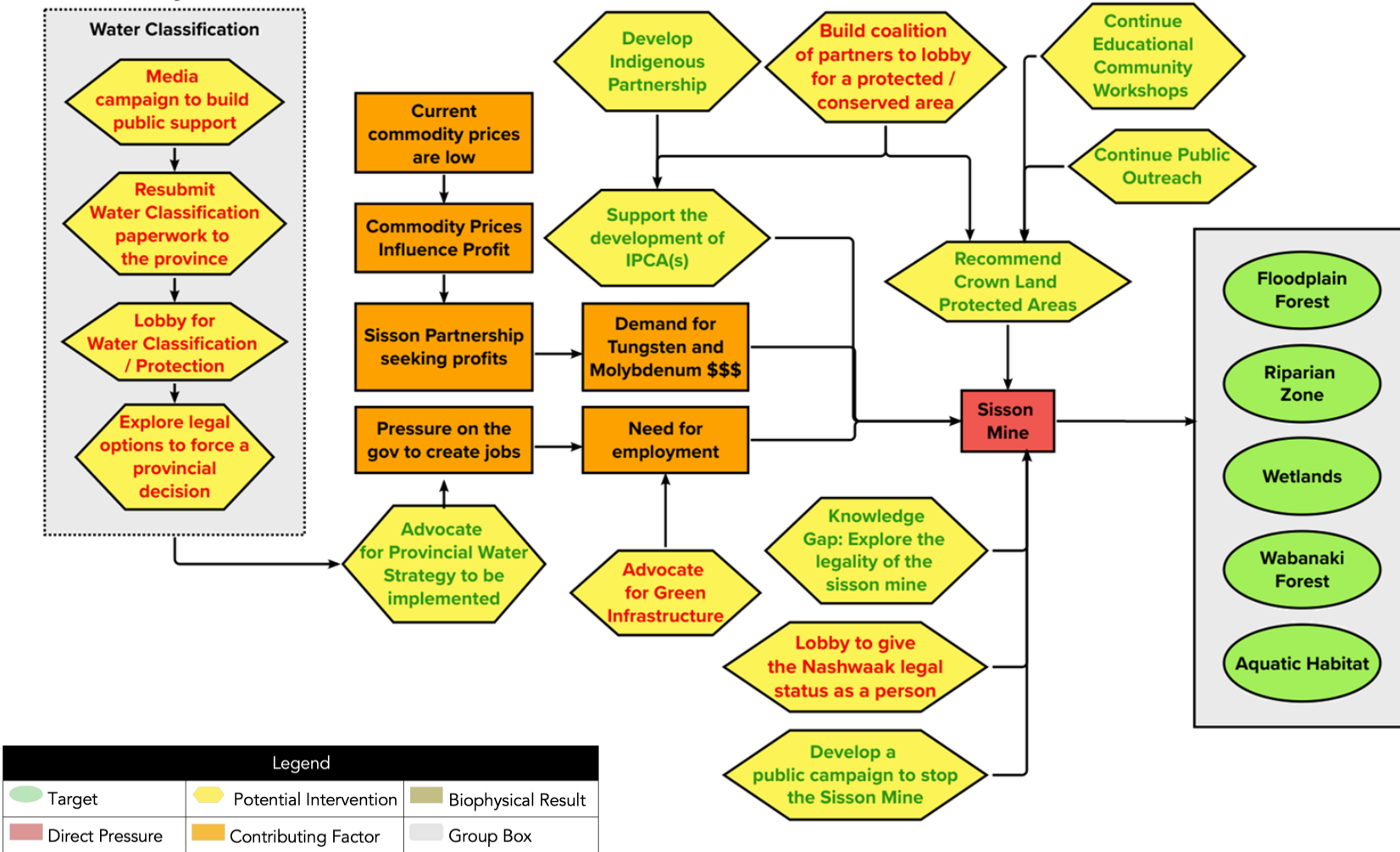
Situation Analysis #1 - Soil Mining



Legend		
	Potential Intervention	Biophysical Result
	Contributing Factor	Group Box

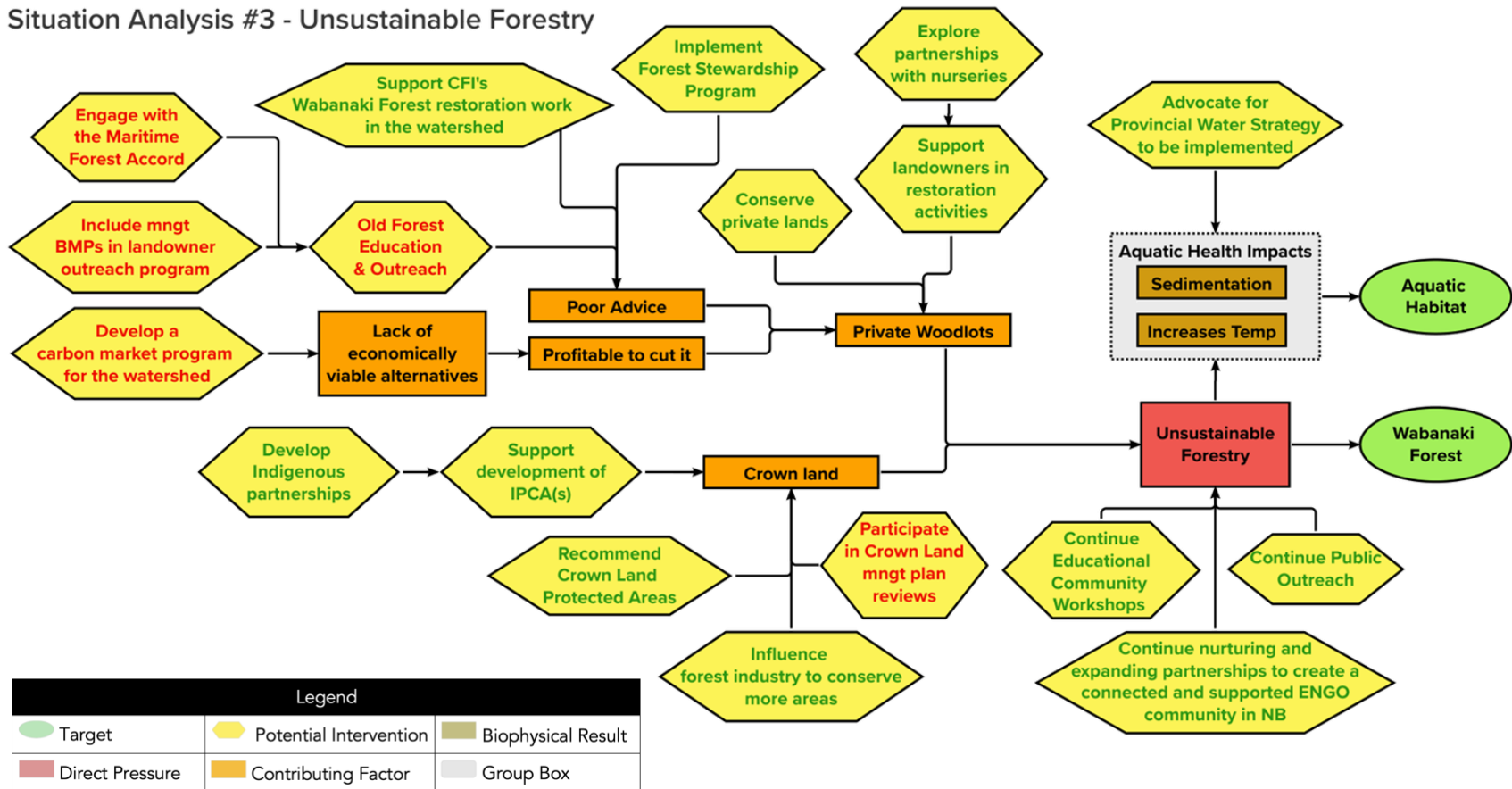


Situation Analysis #2 - Sisson Mine



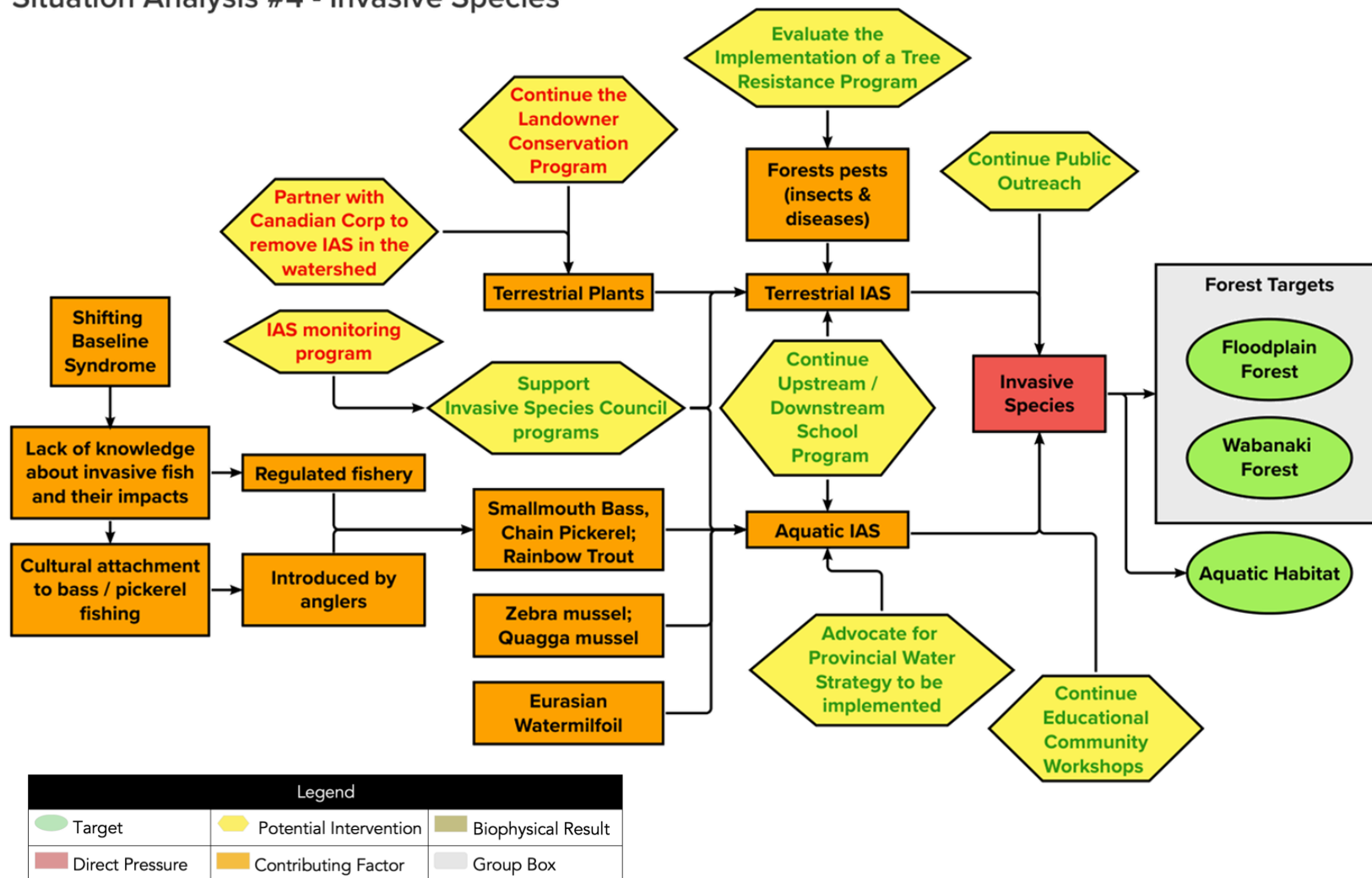


Situation Analysis #3 - Unsustainable Forestry



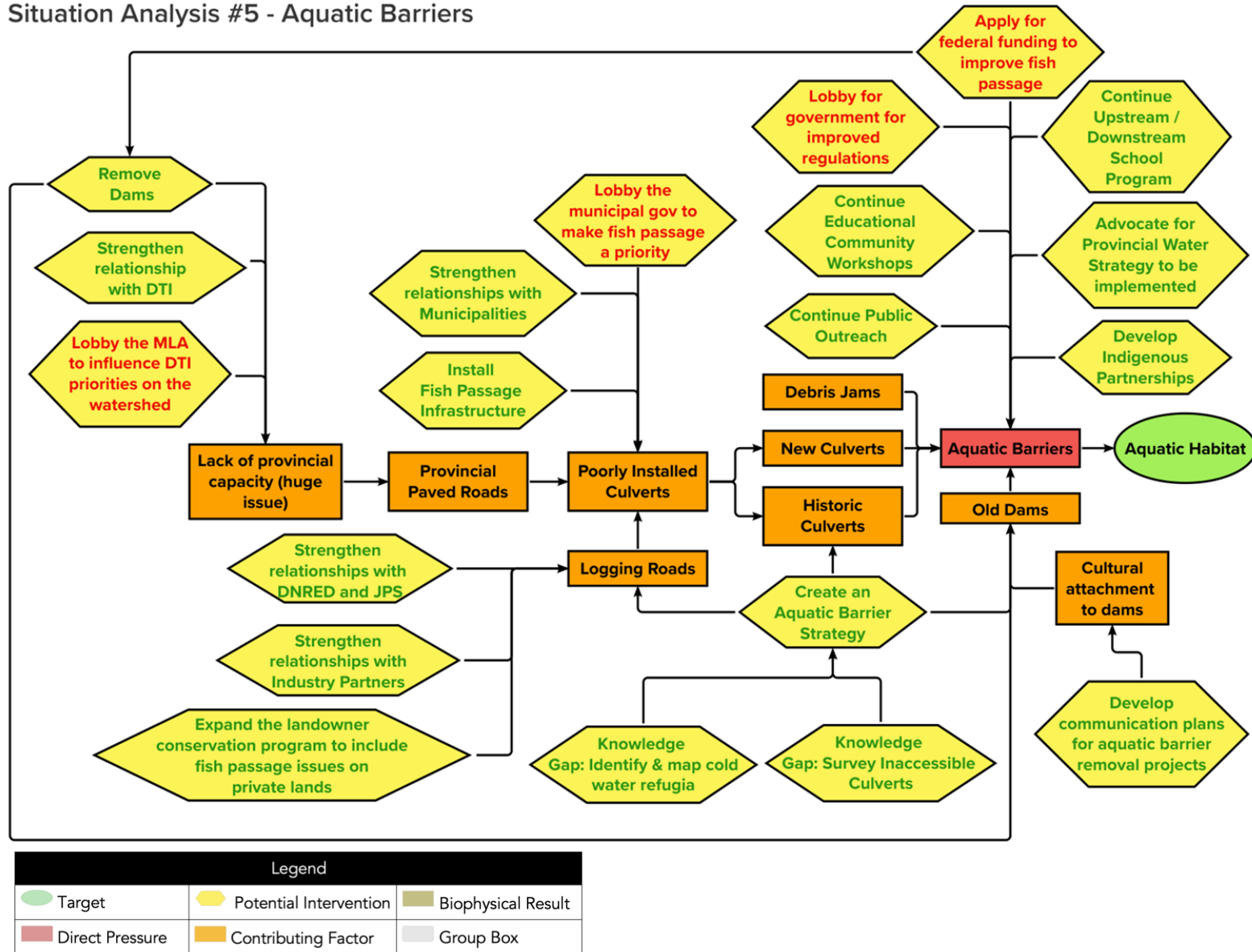


Situation Analysis #4 - Invasive Species



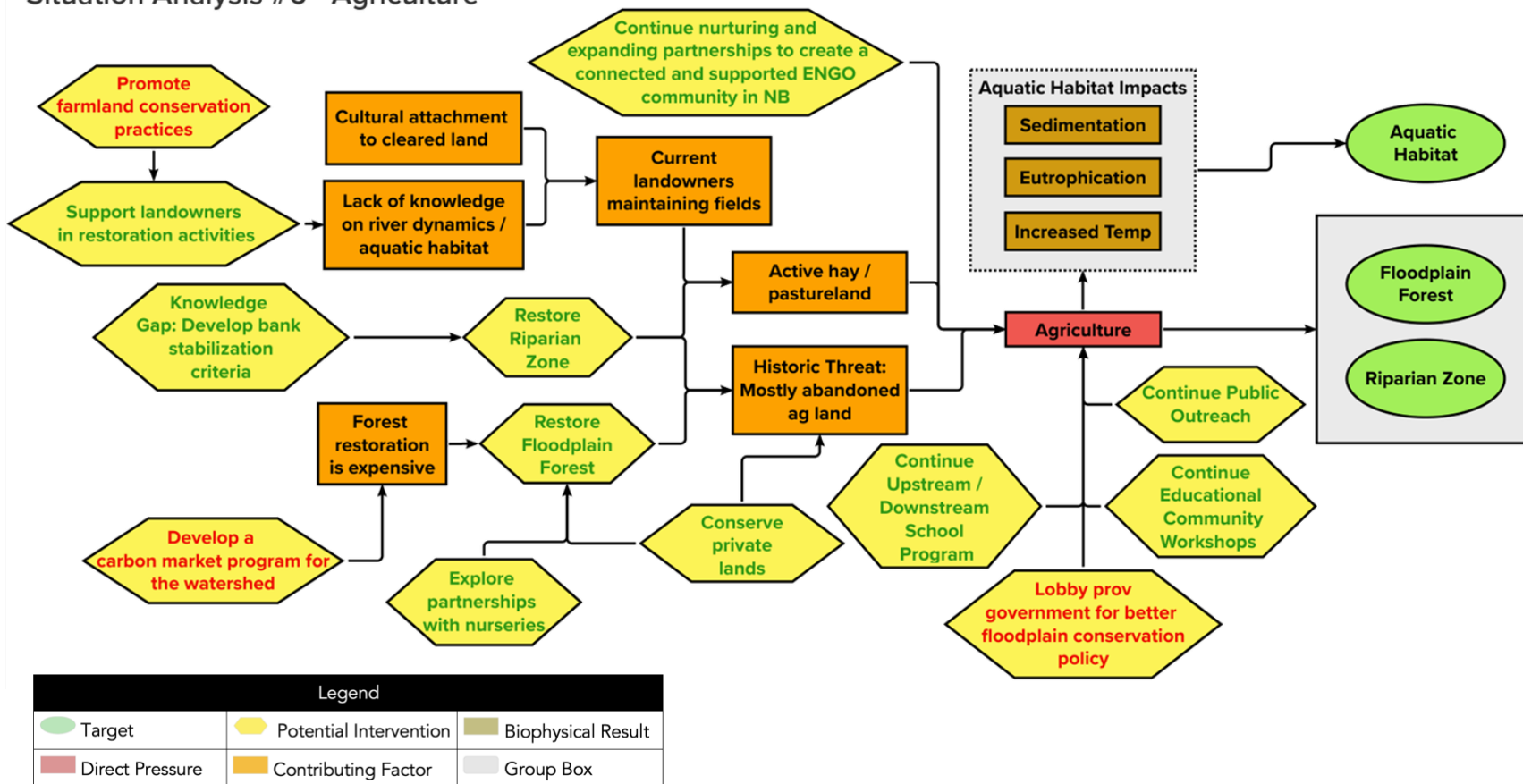


Situation Analysis #5 - Aquatic Barriers





Situation Analysis #6 - Agriculture





Goals

#	Target	Goal
1	Floodplain Forest	By 2030, the extent of floodplain forest in the Nashwaak Watershed will increase from 21% to 25% (i.e. from 368ha to 439ha)
2	Riparian Zone	By 2030, the percent of natural cover within a 30m buffer of streams and rivers will meet or exceed 93%.
3	Wetlands	By 2030, the total area of wetlands will meet or exceed 89% of the historic wetland extent in the Nashwaak Watershed.
4	Wabanaki Forest	By 2030, the total area of mature Wabanaki forest will meet or exceed 22% of forest in the Nashwaak Watershed.
5	Aquatic Habitat	By 2030, the total length of streams and rivers in the Nashwaak Watershed that are unobstructed by barriers will increase by 110 km.

Strategies and Interventions

Strategy 1: Restore Priority Ecosystems

This strategy focuses on restoring floodplains, riparian ecosystems, and mature Wabanaki forest to create wildlife habitat and to generate ecosystem service benefits to local communities.

ID	Intervention	Details	Feasibility	Impact	Effectiveness
1.1	Restore Floodplain Forest	Floodplain Forest restoration efforts will focus on abandoned farmland and areas that were previously soil mined; Consider building support by including a SAR lens (Wood Turtle, forest birds, etc.) in funding applications. This intervention is also linked to outplanting IAS-resistant trees (see intervention 1.5).	High	High	Effective



ID	Intervention	Details	Feasibility	Impact	Effectiveness
1.2	Restore Riparian Zone	This intervention primarily involves planting willows and other shrubs / trees within the riparian buffer zone where land was historically cleared to the waters edge. It may also include bioengineered bank stabilization projects prior to planting where erosion is severe (see Intervention 1.8). Consider building support by including a SAR lens (Wood Turtle, forest birds, etc.) in funding applications.	Very High	High	Effective
1.3	Continue engaging local businesses in restoration efforts	This intervention is designed to engage the business community in outdoor immersion activities (e.g. tree planting), with a secondary aim of raising unrestricted funds for restoration work through donations. Consider building support by including a SAR lens in funding applications.	Very High	Medium	More information required
1.4	Support landowners in restoration activities	Encourage and support riparian landowners to reforest in the riparian zone, plant native species (e.g. rain gardens), and (if applicable) facilitate bank stabilization projects (see Intervention 1.8) through the Natural Edge Program ; Encourage and support forest owners to restore degraded forested areas through the Forest Stewardship Program . Consider building support by including a SAR lens (Wood Turtle, forest birds, etc.) in funding applications.	High	Medium	More information required
1.5	Evaluate the Implementation of a Tree Resistance Program	In recognition of numerous invasive forest pests that are threatening several tree species throughout the region, this intervention aims to use existing platforms (e.g. iNaturalist) to map resistant trees as seed sources for local nurseries, which can then be outplanted by NWA and partners. At minimum, tree species should include White Elm (Dutch elm disease), Butternut (butternut canker), White, Black and Red Ash (Emerald Ash Borer), and Beech (Beech bark disease).	High	High	Effective
1.6	Support CFI's Wabanaki Forest restoration work in the watershed	Rather than the NWA expanding into upland forest restoration work, this intervention aims to improve the Wabanaki Forest target by working with Community Forests International toward expanding their work into the Nashua Watershed.	High	High	Effective
1.7	Explore partnerships with nurseries	Explore partnership opportunities with local/regional nurseries to support the NWA in large-scale tree growing / planting efforts.	Very High	Medium	More information required
1.8	Knowledge Gap: Develop bank stabilization criteria	This intervention is designed to help determine where bank stabilizations should be focused in the watershed (e.g. major sources of sedimentation? protecting cold-water refugia? protecting NWA planted areas? etc.). The aim is to develop a decision support tool (e.g. what form of stabilization is best to apply?), as well as to establish how to measure the effectiveness of bank stabilization projects.	Medium	Medium	More information required



Strategy 2: Increase Protected and Conserved Lands

This strategy focuses on increasing the amount of protected and conserved areas within the watershed. The NWA has made a strategic decision not to become a land trust in the short-term. As such, implementing this strategy will rely on strong partnerships with existing owners and managers.

ID	Intervention	Details	Feasibility	Impact	Effectiveness
2.1	Conserve private lands	Continue to pursue conservation easements with the City of Fredericton to conserve city-owned lands that the NWA is actively restoring, as well as pursuing a partnership with land trust(s) to facilitate purchasing private lands to: (1) conserve floodplain properties that the NWA would then restore (see Intervention 1.1), and (2) conserve remaining mature Wabanaki Forest to contribute to the goal of no net loss.	Medium	Very High	More information required
2.2	Recommend Crown Land protected areas	Submit recommendations to the province for new Crown Land protected areas to conserve remaining mature Wabanaki Forest. Additionally, staff will reach out to Larry Wuest about a previously-proposed PNA to determine whether this should also be submitted as a recommendation.	Very High	Medium	More information required
2.3	Support development of IPCA(s)	Provide continued support to Indigenous partners in designating one or more IPCAs in the watershed to decrease the pressures of unsustainable forestry and the Sisson mine. NWA staff have discussed the concept of an IPCA in the proposed mine footprint with the Wolastoqey Nation and it was well received. Consider building support by including a SAR lens (Wood Turtle, forest birds, etc.) in funding applications.	Very High	Medium	More information required
2.4	Influence forest industry to conserve more areas	Explore partnership opportunities with J.D. Irving Ltd and other industrial forest companies working in the watershed to conserve mature Wabanaki Forest and other rare ecosystems (e.g. JDI Unique Areas program; increasing buffers around cold-water refugia, etc.).	Very High	Medium	More information required
2.5	Implement Forest Stewardship Program	Engage with private woodlot owners in the watershed by providing best management practices on how to conserve and sustainably manage Wabanaki Forest, including identifying AND conserving habitat for SAR. This intervention may also link to intervention 1.4, which aims to assist in restoring Wabanaki Forest in private lands.	High	High	Effective



Strategy 3: Remove Barriers to Fish Passage

This strategy is intended to build on the success of the existing aquatic barrier remediation program, with emphasis on formalizing a strategy, exploring low-cost solutions, and creating a dam-free watershed.

ID	Intervention	Details	Feasibility	Impact	Effectiveness
3.1	Create an Aquatic Barrier Strategy	An Aquatic Barrier Strategy for the watershed aims to, (1) prioritize critical barriers to focus on for removal / remediation, (2) identify ways to improve the NWA capacity to remediate barriers, (3) identify partners and expected outcomes from partnerships (see interventions 3.6–3.9), (4) identify multi-year funding opportunities (e.g. include a SAR lens to access funding), and (5) develop a plan for tackling Key Knowledge Gaps (see Intervention 3.10 and 3.11).	Very High	High	Effective
3.2	Install Fish Passage Infrastructure	Given the high costs of upgrading road-stream crossings, explore low-cost solutions to removing aquatic barriers, such as by installing fish passage infrastructure.	Medium	High	More information required
3.3	Remove Dams	Continue working with partners to remove the Campbell Creek dam, and determine whether the “Irving Dam” is a barrier to fish passage and whether its removal should be an NWA priority.	Very High	Very High	Very Effective
3.4	Expand the Landowner Conservation Program to include fish passage issues on private lands	Engage with landowners to improve fish passage on private lands. Options may include providing free passage assessments, providing best practice information for upgrading existing road-stream crossings and/or influencing crossings along new roads, and assisting with priority barrier removals / installing fish passage infrastructure	Medium	Medium	More information required
3.5	Develop communication plans for aquatic barrier removal projects	In recognition of the cultural and historical attachment that some members of the public feel toward dams, this activity aims to acknowledge the cultural / historical values of the Campbell Creek dam, as well as the benefits of removing the dam (see intervention 3.3). This intervention will also apply to other barrier removal and remediation projects in the future.	Very High	Medium	More information required
3.6	Strengthen relationships with DTI	Continue building trust with DTI by finding new ways to partner together and to celebrate successful projects, such as by establishing a pilot project for a an open-bottom culvert in the watershed.	Very High	Medium	More information required
3.7	Strengthen relationships with DNRED and JPS	Explore partnership opportunities with DNRED (Fish and Wildlife branch; Crown Lands branch) and Justice and Public Safety (JPS) to address aquatic barrier removal / remediation on Crown Land within the watershed	Very High	Medium	More information required



ID	Intervention	Details	Feasibility	Impact	Effectiveness
3.8	Strengthen relationships with Municipalities	Continue partnering with the City of Fredericton on aquatic barrier removal / remediation projects (e.g. Campbell Creek dam). Explore whether similar partnerships could be developed with other municipalities in the watershed (e.g. Stanley).	High	High	Effective
3.9	Develop Indigenous Partnerships	Explore partnership opportunities with the Wolastoqey Nation to identify potential aquatic barrier removal / mitigation projects.	Medium	Medium	More information required
3.10	Strengthen relationships with Industry Partners	Explore partnership opportunities with forestry companies (e.g. JDI, AV Nackawick, Acadian Timber) to identify potential aquatic barrier removal / mitigation projects.	High	High	Effective
3.11	Knowledge Gap: Survey inaccessible culverts	Determine how best to locate and survey road-stream crossings that are difficult to access. One option may be to use existing LiDAR data to identify obvious barriers (i.e. hanging culverts).	High	Medium	More information required
3.12	Knowledge Gap: Identify & map cold-water refugia	Mapping cold-water refugia throughout the watershed will help inform planning efforts, Explore a potential project with BGC Engineering and/or Antoin O'Sullivan at CDI to map cold-water refugia. Consider building support by including a SAR lens (e.g., Atlantic Salmon) in funding applications.	Very High	Medium	More information required

Strategy 4: Community Education and Outreach Toward Achieving a Healthier Watershed

This strategy focuses on connecting people to the ecology and systems of the Nashwaak Watershed through education and experiential learning. The aim is to inspire environmental stewardship, protection, conservation and restoration work in the region.

ID	Intervention	Details	Feasibility	Impact	Effectiveness
4.1	Continue Upstream / Downstream School Program	Continue working with school-aged children to inspire stewardship and improve environmental awareness within the watershed. Share experiential outdoor educational programming that focuses on watershed life and habitat. The program connects students to the watershed through hands-on activities such as critter dipping and tree planting. Educational topics include (but are not limited to) connected ecological communities, the importance of old growth forest, the impacts of aquatic barriers, and the importance of restoring floodplains and riparian areas and the flora and fauna who inhabit them.	High	Medium	More information required



ID	Intervention	Details	Feasibility	Impact	Effectiveness
4.2	Continue Educational Community Workshops	Continue hosting and co-hosting focused educational workshops (i.e. Owl prowls, birding outings) within the watershed, to provide place-based education for the community to deepen their understanding and belonging (e.g., newcomers, First Nations, etc.).	Very High	Very High	Very Effective
4.3	Continue Public Outreach	Continue promoting the NWA's work and vision and increasing the organization's visibility in the broader community (e.g., social media, farmers markets, radio, etc.) to inspire people to work toward a healthier watershed.	Very High	Very High	Very Effective
4.4	Continue nurturing and expanding partnerships to create a connected and supported ENGO community in New Brunswick	Continue facilitating new and fostering old connections with other environmental non-government organizations. I.E. NBAPC, Parks Canada, Ducks Unlimited, Nature NB, Nature Trust NB, ACAP, Invasive Species Council etc. Continue forming partnerships that improve the impact of our individual and collective efforts and result in increased community benefit.	High	Very High	Effective

Strategy 5: Advocate for a Healthier Watershed

This strategy focuses on influencing government decision making and building public support for better environmental policies and practices within the watershed.

ID	Intervention	Details	Feasibility	Impact	Effectiveness
5.1	Advocate for Provincial Water Strategy to be implemented	Continue to support the watershed caucus in lobbying the government to implement and enforce the provincial water strategy.	Very High	Medium	More information required
5.2	Lobby to halt soil mining in the watershed	Lobby the provincial government to halt soil mining in the watershed by, (1) continue working to convene a meeting with various provincial government departments to discuss options around soil mining, (2) developing a letter template for NWA staff, board and members to send to local MLA, and (3) support the AANB's proposed changes to the Agriculture Act so that topsoil mining will no longer be recognized as an ag practice, and (4) use social media to bring attention to soil mining impacts.	Very High	Medium	More information required

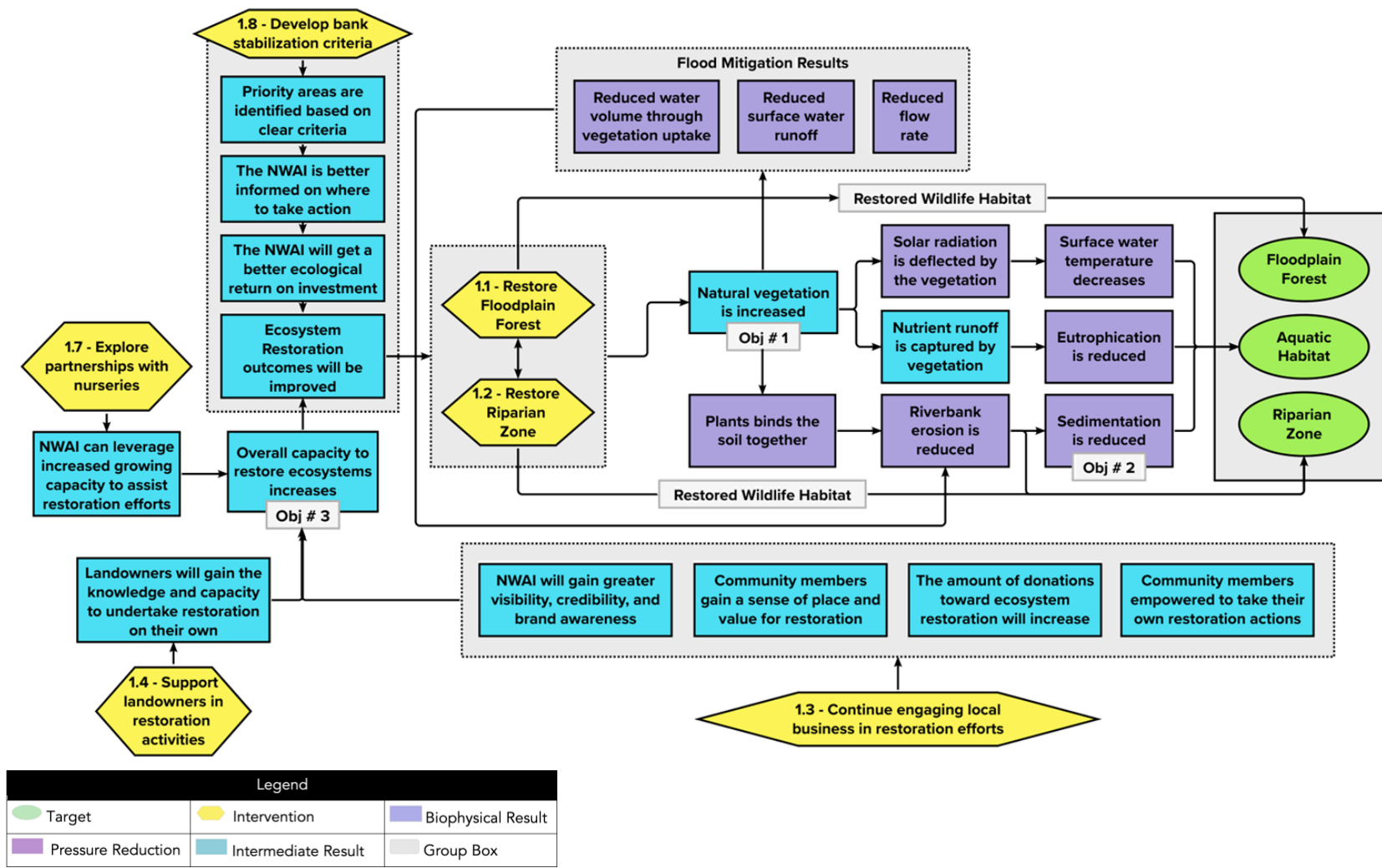


ID	Intervention	Details	Feasibility	Impact	Effectiveness
5.3	Develop a public campaign to stop the Sisson mine	If the Sisson mine project becomes active again, create a campaign to put public pressure on elected officials to stop the mine being developed. The campaign should focus on both the environmental and long-term economic consequences of the mine. The campaign may include, but is not limited to, social media, Nwai newsletter, AGM, community events, public reports, website updates, and a publicly accessible digital library of information about the mine.	Medium	Medium	More information required
5.4	Knowledge Gap: Explore the legality of the Sisson mine	It is currently unknown whether a legal case can be built against the Sisson mine as it relates to the 40 conditions required by the Province. This intervention involves gathering information to help inform whether a legal case could be built, including, (1) the current status of the mine, (2) the EIA expiration date, (3) potential partners in building a legal case, (4) who the Indigenous representatives are that the proponent needs to engage with, and (5) whether a community consultation committee was created.	High	Medium	More information required
5.5	Support Invasive Species Council programs	Help the Invasive Species Council disseminate information to watershed visitors and residents, and potentially assist with any monitoring and/or prevention programs that they initiate. Example projects may include installing signage at boat launches, engaging with tubing companies to promote best practices, landowner training workshops to identify, prevent and control IAS, and disseminating information to the public about terrestrial and aquatic IAS and their prevention methods. The success of this intervention is dependent on the council implementing projects that result in tangible outcomes related to tackling IAS in the watershed, and the Nwai will need to periodically assess this to determine whether additional action is required.	Very High	Medium	More information required



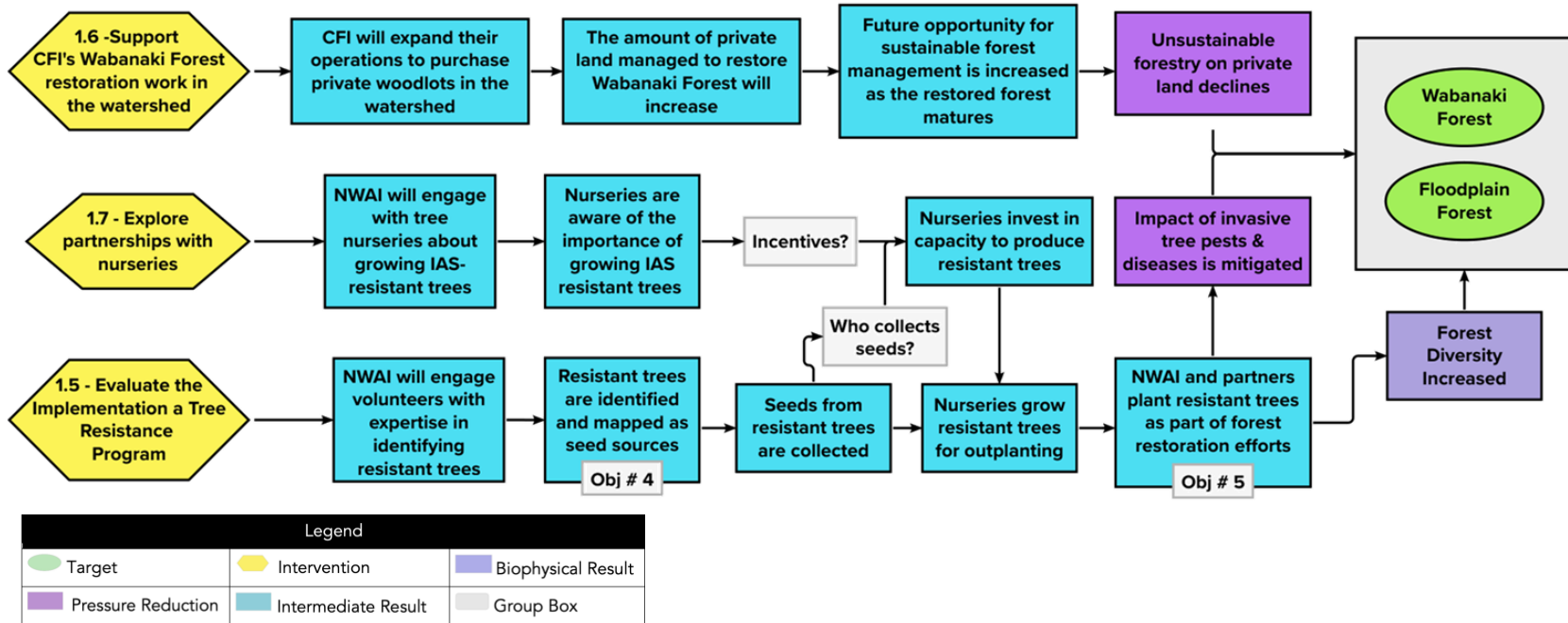
Theories of Change and Objectives

Strategy #1 ToC - Restore Priority Ecosystems



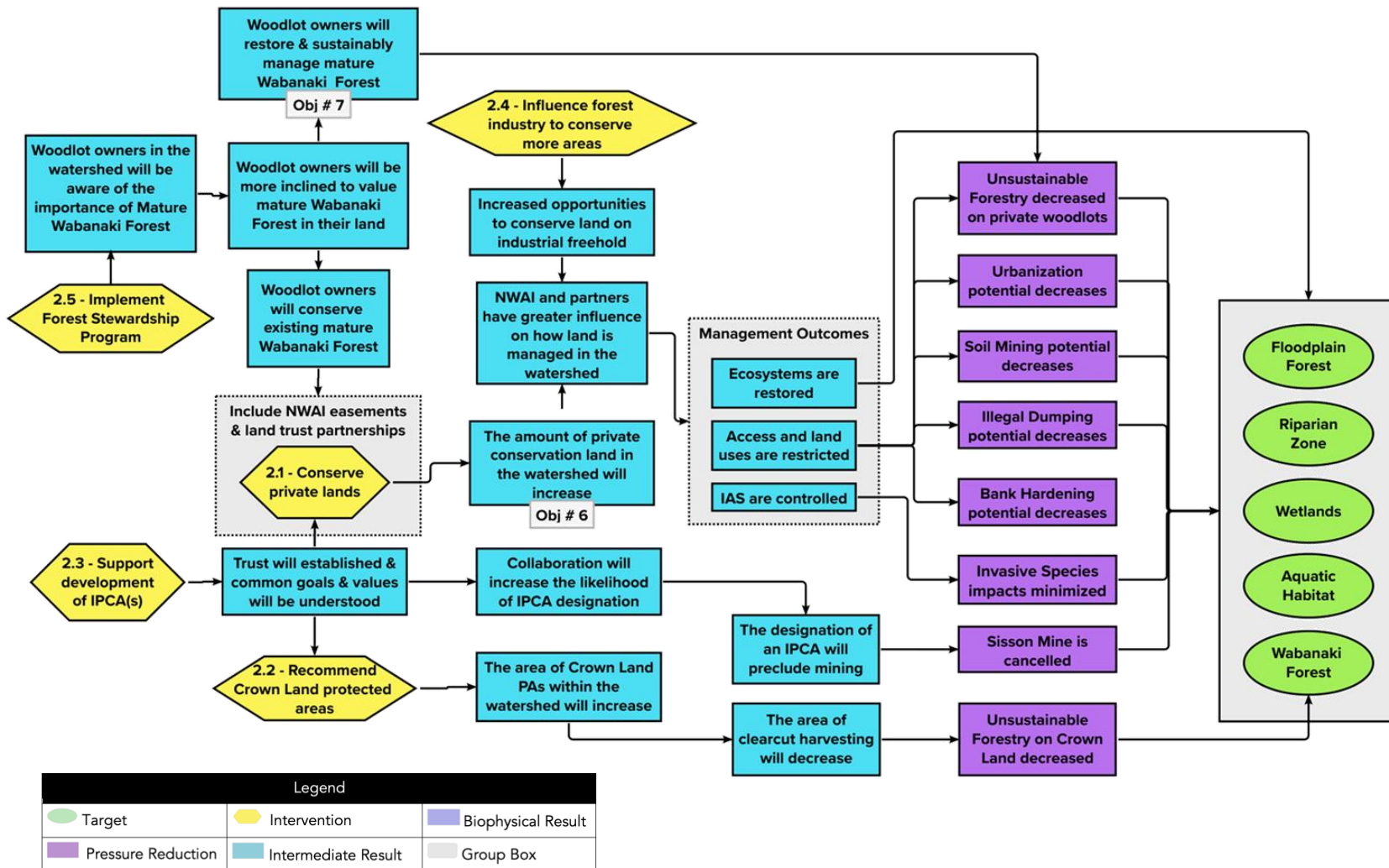


Strategy #1 ToC (continued) - Restore Priority Ecosystems



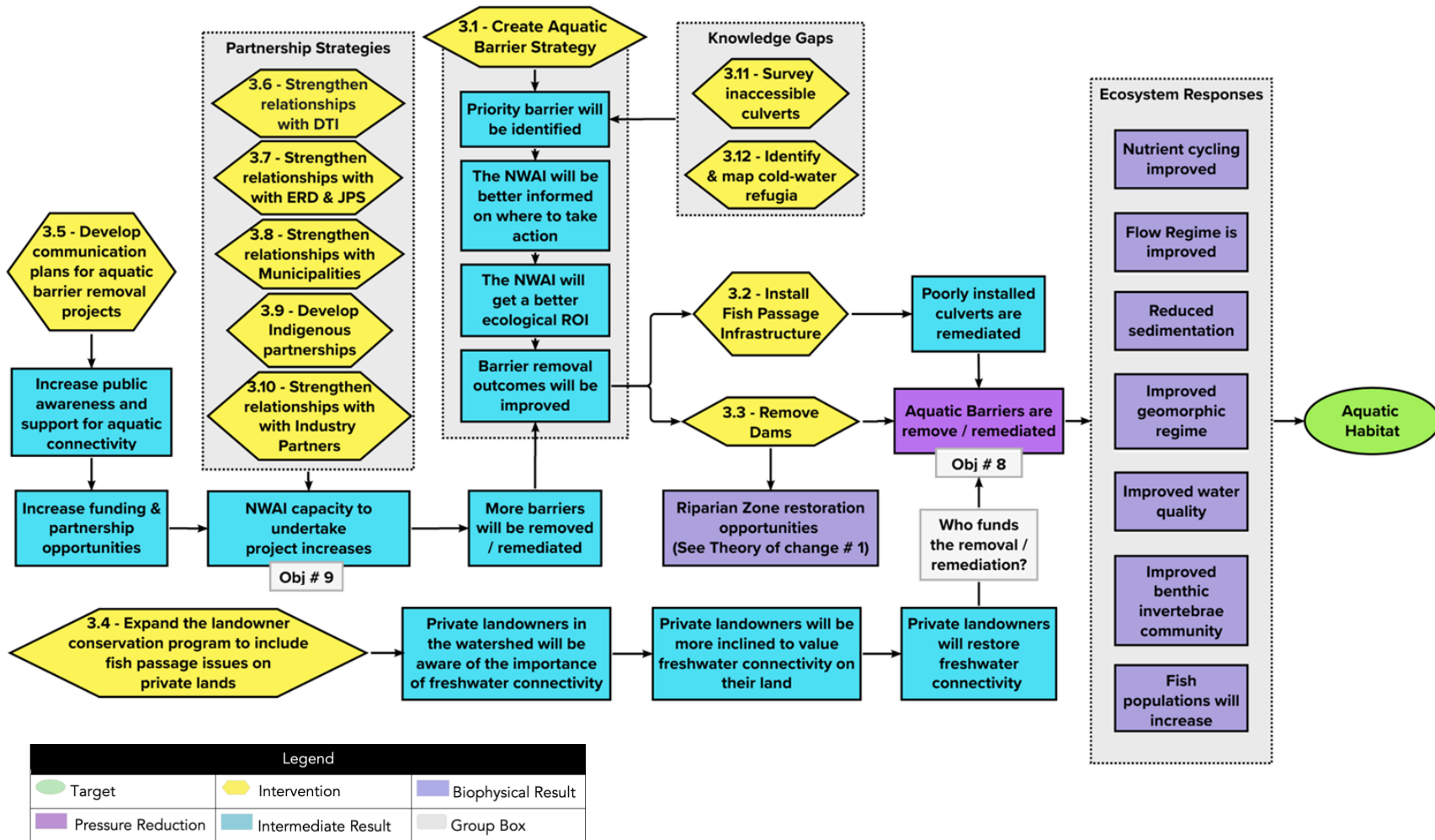


Strategy #2 ToC - Increase Protected and Conserved Lands



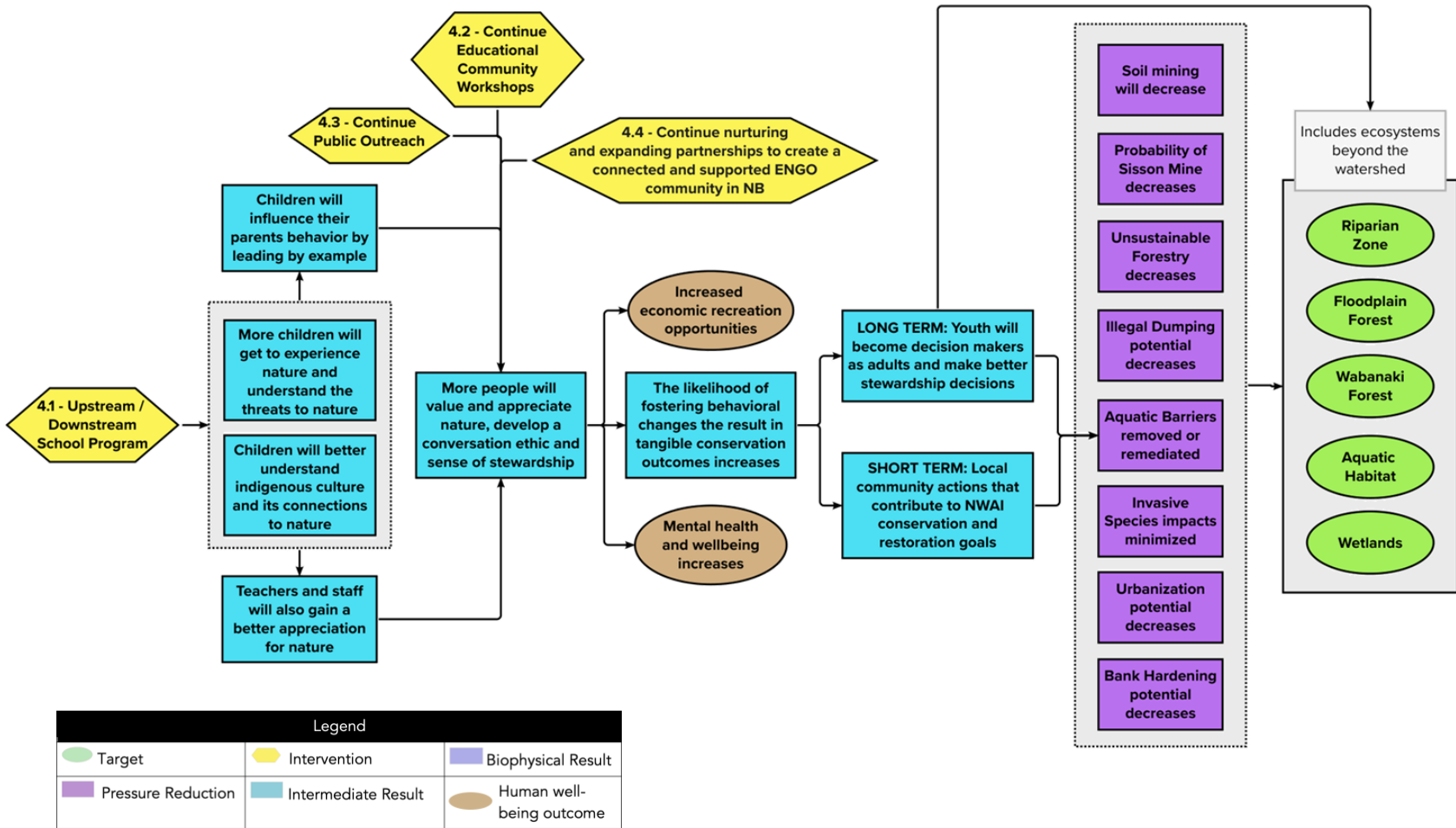


Strategy #3 ToC - Remove Barriers to Fish Passage



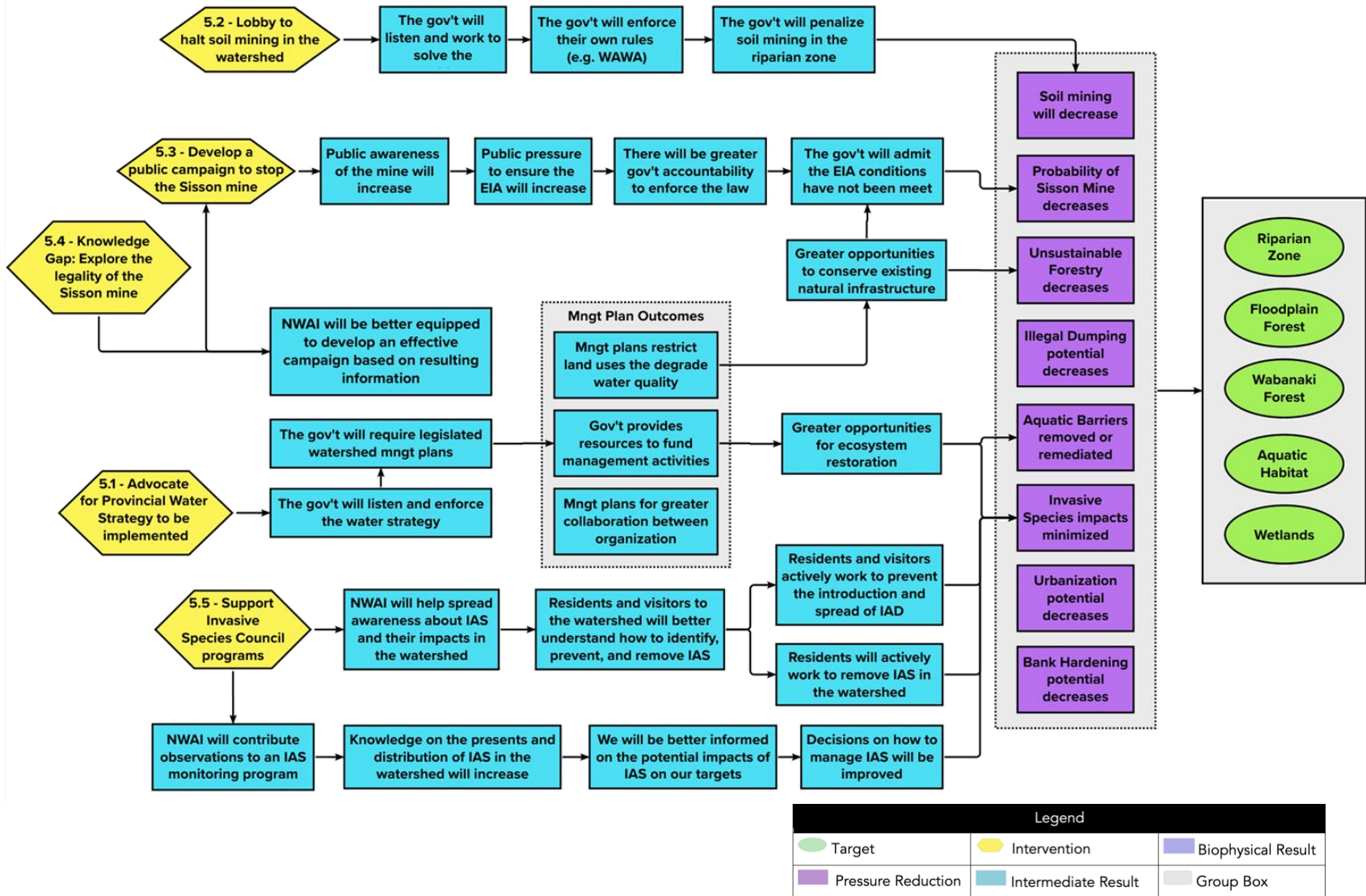


Strategy #4 ToC - Community Education and Outreach Toward Achieving a Healthier Watershed





Strategy #5 ToC - Advocate for a Healthier Watershed





Objective #	Objective
1	By 2025, a minimum of 20 hectares of floodplain forest and riparian zones will be restored
2	By 2025, the amount of soil entering streams and rivers in restored riparian zones has declined by 50% or more
3	By 2025, 5 new businesses and/or community organizations will be engaged in NWAJ restoration activities.
4	By 2025, a minimum of 100 IAS-resistant trees have been identified and mapped as part of the Tree Resistance Program
5	By 2030, a minimum of 5,000 trees have been planted by NWAJ and partners toward achieving IAS-resistance
6	By 2025, the amount of private conservation land in the watershed has increased by a minimum by 62 ha (i.e. from 10.4 ha to 72.4 ha; the 62ha represents Marysville and Neils Flats).
7	By 2030, a minimum of 5 private woodlot owners are engaged in sustainable forest management as a direct result NWAJ and partner engagement
8	By 2030, the percent of fish-passable road-stream crossings in the Nashwaak Watershed will increase by 3% (i.e. 13 road-stream crossing barriers remediated) ²
9	By 2025, the proportion of barrier removal / remediation projects undertaken through cost-sharing partnerships is >25%

*The planning team decided not to develop objectives for Strategies 4 and 5 due to the tenuous assumptions around our ability to influence government decision makers, change human behavior through education and outreach programs, and measure interim outcomes for lobbying and advocacy. However, these will be reassessed in future iterations of the strategic plan, with the aim of developing objectives and measurable indicators.

² This value is a placeholder until a barrier prioritization analysis is conducted to determine the optimal number of barriers that, if removed or remediated, would achieve Goal #5 of opening up 110km of streams and rivers.



Monitoring Plan

Goals / Objectives	Indicator	Methods	Timeframe	Who	Comments
Goal 1: By 2030, the extent of floodplain forest in the Nashwaak Watershed will increase from 21% to 25% (i.e. from 368ha to 439ha)	Total area (ha) of floodplain forest	GIS analysis using the Canopy Height Model and UNB landcover map to determine the % of floodplain that is forested. Adding in NWA planted sites.	Annually	Kate/Mariah	Did Ian Lodge already map Floodplain Forests? The baseline measure needs to be established.
Goal 2: By 2030, the percent of natural cover within a 30m buffer of streams and rivers will meet or exceed 93%.	Total % of area in 30m buffers that are in natural cover	GIS analysis involving a 30m buffer layer and a landcover / resource inventory layer.	Every 2 years	Kate/Mariah	Natural cover needs to be clearly defined based on the GIS datasets available.
Goal 3: By 2030, the total area of wetlands will meet or exceed 89% of the historic wetland extent in the Nashwaak Watershed.	Total area of wetlands (no net loss)	GIS analysis involving provincial GIS layers to calculate total area.	Every 5 years	Mariah	
Goal 4: By 2030, the total area (ha) of mature Wabanaki forest will meet or exceed 22% of forest in the Nashwaak Watershed.	Total area (ha) of Mature Wabanaki Forest (no net loss)	Global Forest Watch data will be used to update provincial inventory, supplemented by opportunistic ground-truthed data.	Every 5 years	Ian Lodge	Mature is defined as 80 yrs or older
Goal 5: By 2030, the stream and river length unobstructed by barriers will increase by 110km	Total stream and river length (km) unobstructed by barriers	GIS analysis TBD, and supplemented by ground-truthed barriers and remediation data.	Every 2 years	Lauren	
Objective 1: By 2025, a minimum of 20 hectares of floodplain forest and riparian zones will be restored	# of ha of restored floodplain forest and riparian zone	New planting areas are GPS'd and delineated in GIS to calculate total area	Ongoing – after each planting event	Mariah	See Monitoring plan spreadsheet – Objective 1



Goals / Objectives	Indicator	Methods	Timeframe	Who	Comments
Objective 2: By 2025, the amount of soil entering streams and rivers in restored riparian zones has declined by 50% or more	Amount of soil entering streams and rivers (indicator?)	Field surveys of restored sites + GIS analyses. Use of BANCS method (Bank Assessment for Non-point source Consequences of Sediment)	Every 2 years	Lauren/Mariah	Exact indicator and methods will be defined as part of intervention 1.8.
Objective 3: By 2025, 5 new businesses and/or community organizations will be engaged in NWAI restoration activities	Number of new business and/or landowners	Landowner engagement tracking workbook	Annually	Marieka	
Objective 4: By 2025, a minimum of 100 IAS-resistant trees have been identified and mapped as part of the Tree Resistance Program	Number of IAS-resistant trees mapped	Create a iNaturalist Project. Request nursery growers to map seed source trees.	Annually	Executive Director	Focus is on identifying seed-source trees.
Objective 5: By 2030, a minimum of 5,000 trees have been planted by NWAI and partners toward achieving IAS-resistance	Number of IAS-resistant trees planted	Number of IAS-resistant trees tallied during each planting event / provided to partners for planting	Ongoing	Executive Director	
Objective 6: By 2025, the amount of private conservation land in the watershed has increased by a minimum by 62 ha (i.e. from 10.4 ha to 72.4 ha; the 62ha represents Marysville and Neils Flats).	Total area (ha) of private lands owned or easement held by land trusts	Reach out to NTN, NCC and CFI to determine if any new lands have been conserved in the watershed and if so, what the total area is.	Annually	Mariah/ Executive Director	62ha represents the easements on the Marysville Flats and Neill's flats.
Objective 7: By 2030, a minimum of 5 private woodlot owners are engaged in sustainable forest management as a direct result of NWAI and partner engagement	Number of private woodlot owners engaged in sustainable forest management	Likely accomplished by a survey, preferably through one-on-one discussions with landowners.	Annually	Kate	We need to be cautious about how we communicate this – we don't want to take credit away from landowners or other orgs.



Goals / Objectives	Indicator	Methods	Timeframe	Who	Comments
Objective 8: By 2030, the percent of fish-passable road-stream crossings in the Nashwaak Watershed will increase by 3% (i.e. 13 road-stream crossing barriers remediated).	Number of road-stream crossing remediation projects completed	Road-stream crossing remediation projects tallied after completion	Ongoing	Lauren	Includes NWAJ remediations and those accomplished by partners
Objective 9: By 2025, the proportion of barrier removal / remediation projects undertaken through cost-sharing partnerships is >25%.	Number of road-stream crossing remediation projects completed through cost-sharing partnerships	Road-stream crossing remediation projects tallied after completion	Ongoing	Lauren	



Timeframe and Budget

Strategy/Action	Implementation Lead	Timeframe	Work Days ³	Total Budget ⁴
Strategy 1: Restore Priority Ecosystems				
1.1 - Restore Floodplain Forest	Executive Director & Mariah	Jan 2021 – Dec 2025	6,000	\$260,000.00
1.2 - Restore Riparian Zone	Mariah	Jan 2021 – Dec 2025	3,000	\$100,000.00
1.3 - Continue engaging local business in restoration efforts	Marieka	Jan 2021 – Dec 2025	200	\$5,000.00
1.4 – Support landowners in restoration activities	Executive Director, Francie & Mariah	Jan 2021 – Dec 2025	3,000	\$100,000.00
1.5 - Evaluate the Implementation a Tree Resistance Program	Executive Director	Jan 2021 – Dec 2025	400	\$10,000.00
1.6 - Support CFI's Wabanaki Forest restoration work in the watershed	Kate	Jan 2021 – Dec 2025	200	\$5,000.00
1.7 - Explore forest restoration partnerships with nurseries	Kate & Executive Director	Jan 2021 – Dec 2025	200	\$5,000.00
1.8 – <u>Knowledge Gap</u> : Develop bank stabilization criteria	Lauren	Jan 2021 – Dec 2025	350	\$10,000.00
Strategy 2: Increase Protected and Conserved Areas				
2.1 - Conserve Private Lands	Executive Director	Jan 2021 – Dec 2025	350	\$10,000.00
2.2 - Recommend Crown Land protected areas	NWAI Staff	Jan 2021 – Dec 2025	200	\$5,000.00
2.3 - Support development of IPCA(s)	NWAI Staff	Jan 2021 – Dec 2025	360	\$10,000.00
2.4 - Influence forest industry to conserve more areas	NWAI Staff	Jan 2021 – Dec 2025	200	\$5,000.00

³ Work Days or "Person Days" are defined as the number of people working per day multiplied by the number of days worked.

⁴ Total Budget is defined as the combined costs of staff time and projected expenses.



Strategy/Action	Implementation Lead	Timeframe	Work Days ³	Total Budget ⁴
2.5 – Implement Forest Stewardship Program	Kate	Jan 2021 – Dec 2025	4,000	\$200,000.00
Strategy 3: Remove Barriers to Fish Passage				
3.1 - Create an Aquatic Barrier Strategy	Lauren	Jan 2021 – Dec 2025	200	\$5,000.00
3.2 - Install fish passage infrastructure	Lauren	Jan 2021 – Dec 2025	6,000	\$300,000.00
3.3 - Remove dams	Lauren	Jan 2021 – Dec 2025	3,000	\$100,000.00
3.4 - Expand LCP to include fish passage issues on private lands	Lauren	Jan 2021 – Dec 2025	3,000	\$100,000.00
3.5 – Develop communication plans for aquatic barrier removal projects	Lauren	Jan 2021 – Dec 2025	350	\$10,000.00
3.6 - Strengthen relationships with DTI	Lauren	Jan 2021 – Dec 2025	200	\$5,000.00
3.7 - Strengthen relationships with ERD & JPS	NWAI Staff	Jan 2021 – Dec 2025	200	\$5,000.00
3.8 - Strengthen relationships with municipalities	NWAI Staff and Board	Jan 2021 – Dec 2025	200	\$5,000.00
3.9 - Develop Indigenous Partnership	NWAI Staff	Jan 2021 – Dec 2025	350	\$10,000.00
3.10 – Strengthen relationships with Industry Partners	NWAI Staff	Jan 2021 – Dec 2025	20	\$5,000.00
3.11 – <u>Knowledge Gap</u> : Survey inaccessible culverts	Lauren	Jan 2021 – Dec 2025	300	\$10,000.00
3.12 – <u>Knowledge Gap</u> : Identify and map cold-water refugia	Lauren	Jan 2021 – Dec 2025	300	\$10,000.00
Strategy 4: Community Education and Outreach Toward Achieving a Healthier Watershed				
4.1 - Continue Upstream/Downstream school program	Francie & Ian Smith	Jan 2021 – Dec 2025	3,000	\$170,000.00
4.2 – Continue Community Educational Workshops	Francie & Ian Smith	Jan 2021 – Dec 2025	1,000	\$56, 667
4.3 – Continue public outreach	Francie Morgan	Jan 2021 – Dec 2025	1,000	\$29, 292
4.4 - Continue nurturing and expanding partnerships to	NWAI Staff	Jan 2021 – Dec 2025	650	\$19, 038



Strategy/Action	Implementation Lead	Timeframe	Work Days ³	Total Budget ⁴
create a connected and supported ENGO community in New Brunswick				
Strategy 5: Advocate for a Healthier Watershed				
5.1 - Advocate for Provincial Water Strategy to be implemented	Executive Director	Jan 2021 – Dec 2025	200	\$5,000.00
5.2 - Lobby to halt soil mining in the watershed	NWAI Staff	Jan 2021 – Dec 2025	1000	\$60,000.00
5.3 - Develop a public campaign to stop the Sisson Mine	NWAI Staff and Board	Jan 2021 – Dec 2025	350	\$10,000.00
5.4 – <u>Knowledge Gap</u> : Explore the legality of the Sisson Mine	NWAI Board	Jan 2021 – Dec 2025	200	\$5,000.00
5.5 - Support Invasive Species Council programs	NWAI Staff	Jan 2021 – Dec 2025	200	\$5,000.00
Monitoring Plan Implementation				
6.1 – Monitor all goals and objectives	NWAI Staff	Jan 2021 – Dec 2025	700	\$20,000.00
Total:			40,880	\$1,565,000.00



Funding Sources

Funding Source	Estimated % Of Total Budget	Restrictions On Fund Use
NB Wildlife Trust Fund	8%	Funding must link to benefiting wildlife – possibly use to fund restoration
NB Environmental Trust Fund	25%	Funding must match the annual priorities of the fund
DFO	10%	DFO is currently funding work that benefit SAR
ECCC	20%	Eco-Action: community involvement is a priority. Atlantic Ecosystems Initiative: project must be of benefit to larger geographic area and involve partners Priority Place Funding
WWF-Canada	20%	Wolostoq River, aquatic SAR
Tree Canada	2%	Tree planting, corporate
ASCF	7%	Atlantic Salmon projects
Wildlife Habitat Canada	8%	Waterfowl and wetlands
Total:	100%	



References

- Anderson, M.G., Vickery, B., Gorman, M., Gratton, L., Morrison, M., Maillet, J., Olivero, A., Ferree, C., Morse, D., Kehm, G., Rosalska, K., Khanna, S., & S. Bernstein. (2006). *The Northern Appalachian / Acadian Ecoregion: Ecoregional Assessment, Conservation Status and Resource CD*. The Nature Conservancy, Eastern Conservation Science and The Nature Conservancy of Canada: Atlantic and Quebec regions.
- Anderson, M.G., A. Barnett, M. Clark, C. Ferree, A. Olivero Sheldon, J. Prince. 2016. *Resilient Sites for Terrestrial Conservation in Eastern North America*. The Nature Conservancy, Eastern Conservation Science
- Betts, M.G. & Forbes, G.J. (2005). *Forest management guidelines to protect native biodiversity in the Greater Fundy Ecosystem*. 2nd ed. New Brunswick Co-operative Fish and Wildlife Research Unit, University of New Brunswick. Fredericton, New Brunswick.
- Environment Canada (2013). *How much Habitat is Enough?* Third Edition. Environment Canada, Toronto, Ontario.
- Hansen, M. C., P. V. Potapov, R. Moore, M. Hancher, S. A. Turubanova, A. Tyukavina, D. Thau, S. V. Stehman, S. J. Goetz, T. R. Loveland, A. Kommareddy, A. Egorov, L. Chini, C. O. Justice, and J. R. G. Townshend. 2013. "High-Resolution Global Maps of 21st-Century Forest Cover Change." *Science* 342 (15 November): 850–53. Data available on-line from: <http://earthenginepartners.appspot.com/science-2013-global-forest>
- Mosseler, A., Lynds, J. A., & Major, J. E. (2003). Old-growth forests of the Acadian Forest Region. *Environmental Reviews*, 11(S1), S47-S77.
- Nussey, P. & Noseworthy, J. (2020). *The Active River Area for the Northern Appalachian–Acadian Region of Canada*. Nature Conservancy of Canada. Atlantic Regional Office. Fredericton, New Brunswick.



Appendix A: Target Health Assessments

Floodplain Forest Health = **Poor**

			Indicator Ratings			
Target	KEA	Indicator	Poor	Fair	Good	Very Good
Floodplain Forest	Geographic Extent	Extent of Historic Floodplain Forest (%)	<25%	25-50%	51-75%	>75%
Current Status:			21%			

Calculated as the current floodplain forest extent divided by the historic extent in the watershed (1,754 ha) using the provincial Historic Flood shapefile (all historically flooded area is assumed to have been floodplain forest).

			Indicator Ratings			
Target	KEA	Indicator	Poor	Fair	Good	Very Good
Floodplain Forest	Floodplain Forest Intactness	Average Patch Size (ha)	< 20 ha	20-35 ha	35-75 ha	>75 ha
Current Status:			3.9 ha			

The lower limit of 20 ha of mature forest was used by Anderson et al. (2006) to meet their forest patch criteria; 35 and 75 ha were identified by Betts & Forbes (2005) for Greater Fundy. Only 2 patches out of 93 exceeded the “Poor” threshold of 20ha, both of them between the confluence of the St. John River The Marysville Flats.

			Indicator Ratings			
Target	KEA	Indicator	Poor	Fair	Good	Very Good
Floodplain Forest	Floodplain Connectivity	TNC Connectivity Index	0-25	25-50	51-75	75-100
Current Status:			14			

A measure of connectivity across the historic floodplain forest area of the watershed. Details on how Local Connectedness is calculated can be found in [Anderson et al. \(2016\)](#).



Riparian Zone Health = Fair

			Indicator Ratings			
Target	KEA	Indicator	Poor	Fair	Good	Very Good
Riparian Zone	Riparian Condition	Natural cover (%) within a 30m buffer of streams and rivers	<25%	25-50%	51-75%	>75%
Current Status:						93%

Total area in 30m buffers = 11,298 ha.
Total area affected by ag, development and plantations = 767 ha.

			Indicator Ratings			
Target	KEA	Indicator	Poor	Fair	Good	Very Good
Riparian Zone	Riparian Intactness	Natural cover (%) within the Active River Area	<25%	25-50%	50-75%	>75%
Current Status:						85%

Total Active River Area = 13,796 ha.
Total area affected by ag, development and plantations = 2,098 ha. Details on the Active River Area can be found in [Nussey & Noseworthy \(2020\)](#).

			Indicator Ratings			
Target	KEA	Indicator	Poor	Fair	Good	Very Good
Riparian Zone	Geomorphic Condition	% of river banks "In Regime or Stable" condition	<25%	25-50%	51-75%	>75%
Current Status:			16%			

Value taken directly from Parish Aquatic Services (2016): Nashwaak River Geomorphic Assessments



Wetlands Health = Very Good

			Indicator Ratings			
Target	KEA	Indicator	Poor	Fair	Good	Very Good
Wetlands	Geographic Extent	Historic extent of wetlands still remaining (%)	<40%	40-60%	61-80%	>80%
Current Status:						89%

To estimate the historic extent of wetlands, a transfer function was used. It was found that 12.4% of the watershed has been developed or converted to agriculture, and there are currently 6,521 ha of wetlands in the watershed. If we assume a loss equal to development (12.4%), the historic wetland extent would have been 7,330 ha. Therefore, the current wetland extent represents 89% of the historic extent present in the watershed prior to development. The 40% threshold for poor was taken from: [Environment Canada \(2013\). How much Habitat is Enough?](#)

			Indicator Ratings			
Target	KEA	Indicator	Poor	Fair	Good	Very Good
Wetlands	Intactness	Natural cover (%) within a 100m buffer of wetlands	<25%	25-50%	51-75%	>75%
Current Status:						90%

Total area in 100m buffers = 20,071 ha. Total area affected by ag, development and plantations = 2,045 ha.



Wabanaki Forest Health = Fair

			Indicator Ratings			
Target	KEA	Indicator	Poor	Fair	Good	Very Good
Wabanaki Forest	Geographic extent of mature forest	Total area (ha) of mature Wabanaki forest	<40%	40-60%	60-80%	80-100%
Current Status:			22%			

80% threshold for 'Good' based on Mosseler et al. (2003) paper. Total forested area = 153,471 ha; Old forest = 34,091 ha. Used Global Forest Watch (Hanson et al., 2013) to include clearcuts up to 2018.

			Indicator Ratings			
Target	KEA	Indicator	Poor	Fair	Good	Very Good
Wabanaki Forest	Wabanaki Forest Intactness	Percent area of Mature Forest in patches >75 ha	<25%	25-50%	51-75%	>75%
Current Status:				38%		

The 75 ha threshold was identified by Betts & Forbes (2005) as good for most old forest species. Old forest = 34,091 ha and 12,868 ha of mature forest are in patches >75ha.

			Indicator Ratings			
Target	KEA	Indicator	Poor	Fair	Good	Very Good
Wabanaki Forest	Wabanaki Forest Connectivity	TNC Local Connectedness Index	0-25	25-50	51-75	75-100
Current Status:					51%	

A measure of connectivity across the entire forested area of the watershed. Details on how Local Connectedness is calculated can be found in [Anderson et al. \(2016\)](#).



Aquatic Habitat Health = **Good**

			Indicator Ratings			
Target	KEA	Indicator	Poor	Fair	Good	Very Good
Aquatic Habitat	Water Quality	Avg NWA Water Quality Index Value	0-64	65-79	80-94	95-100
Current Status:						95.05

Taken from 2019 Water Quality Report for the watershed (NWA 2020). The bottom two WQI rating categories were combined to represent the Poor rating definition. The current status is the 2019 average across the 12 monitoring sites.

			Indicator Ratings			
Target	KEA	Indicator	Poor	Fair	Good	Very Good
Aquatic Habitat	Free-flowing Status	Linear % of free-flowing streams / rivers	0-25%	25-50%	50-75%	75-100%
Current Status:						77%

Total length of streams that are not obstructed by dams (1,229 km) divided by total length of streams in the watershed (1,597 km).

			Indicator Ratings			
Target	KEA	Indicator	Poor	Fair	Good	Very Good
Aquatic Habitat	Aquatic Connectivity	% of fish-passable road-stream crossings	0-25%	25-50%	50-75%	75-100%
Current Status:				35%		

Current value based on an assessment of 168 culverts surveyed between 2017-2019 within the watershed.