Lower Coquitlam River Watershed Plan
Final Draft Version: 1.0

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Coquitlam
River Watershed
Roundtable
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Vision:
"A Healthy Watershed that is Enjoyed and Supported by the Community"

Contents

Executive Summary

The overarching vision for the Lower Coquitlam River Watershed Plan is a healthy watershed that is enjoyed and supported by the community. Integral to achieving this vision is recognizing the linkages between healthy watersheds and healthy people. The Lower Coquitlam River Watershed Plan includes the integration of natural and human systems, such as land-based resources, social development, economic development, and inclusion of cultural and spiritual values.

Between 2012 and 2015, over 60 partners in the municipal, provincial, regional, federal and First Nations governments, aggregate industry, arts and culture, education, outdoor recreation, real estate development sectors and stewardship groups worked together to create this plan.

The Coquitlam River is one of the largest and most significant rivers in the Metro Vancouver Region and forms part of the traditional territory of the Kwikwetlem First Nation. Urban development in the lower watershed spans 75% of lands within the cities of Coquitlam and Port Coquitlam, where an estimated 156,700 residents now live. Yet, until now, the lower Coquitlam River watershed has lacked its own watershed plan.

Development of the Lower Coquitlam River Watershed Plan follows the Open Standards for the Practice of Conservation, an adaptive and unique management approach that considers ecological and human well-being components – the things we care about and presents strategies for action that will provide for a healthy watershed and a healthy community. The approach allows for continual improvement and adaptation as new resources and information becomes available. Though the Open Standards for the Practice of Conservation has been used throughout the United States for conservation planning, and in the Pacific Northwest for watershed planning, this is the first application of the Open Standards for watershed planning in Canada. In addition, this is among the first applications of the Open Standards to fully integrate both ecological and human well-being goals and could be considered an innovative and cost-effective approach watershed management.

This Watershed Plan highlights the progress the Roundtable has made over three years' effort, to develop a plan that responds to key pressures that affect watershed health, and some first strategies developed to address them. Detailed action plans have been drafted for three key watershed pressures: Stormwater, Invasive Species and Development that, provided the implementation support and resources, will proceed through 2015 and 2016. The goal is to seek the commitment to implement these strategies that aim to provide a healthy, liveable community for people in this watershed.

The process of developing this plan has demonstrated the strength and importance of collaborative, watershed based decision making on an ecological scale, and highlights the need for sustainable funding, support and resources to ensure effective and implementation of the strategies and action plans.

Developing the Watershed Plan

The Coquitlam River Watershed

The Coquitlam River Watershed is a partially urbanized watershed that drains 261 km^2 of the North Shore Mountains in the lower mainland of British Columbia. A dam separates the watershed into the upper and lower Coquitlam River drainages (Figure 1). As an important source of drinking water and hydroelectric power for the Metro Vancouver region, the upper watershed is a protected area and boasts a vast headwater wilderness including the Coquitlam Lake Reservoir above the Coquitlam Lake Dam. Below the dam is the lower Coquitlam River watershed, which includes at least thirty watercourses. The lower Coquitlam River runs through Coquitlam and Port Coquitlam and the traditional territory and reserve lands of the Kwikwetlem First Nation. An estimated 156,700 residents live in the lower Coquitlam River watershed.

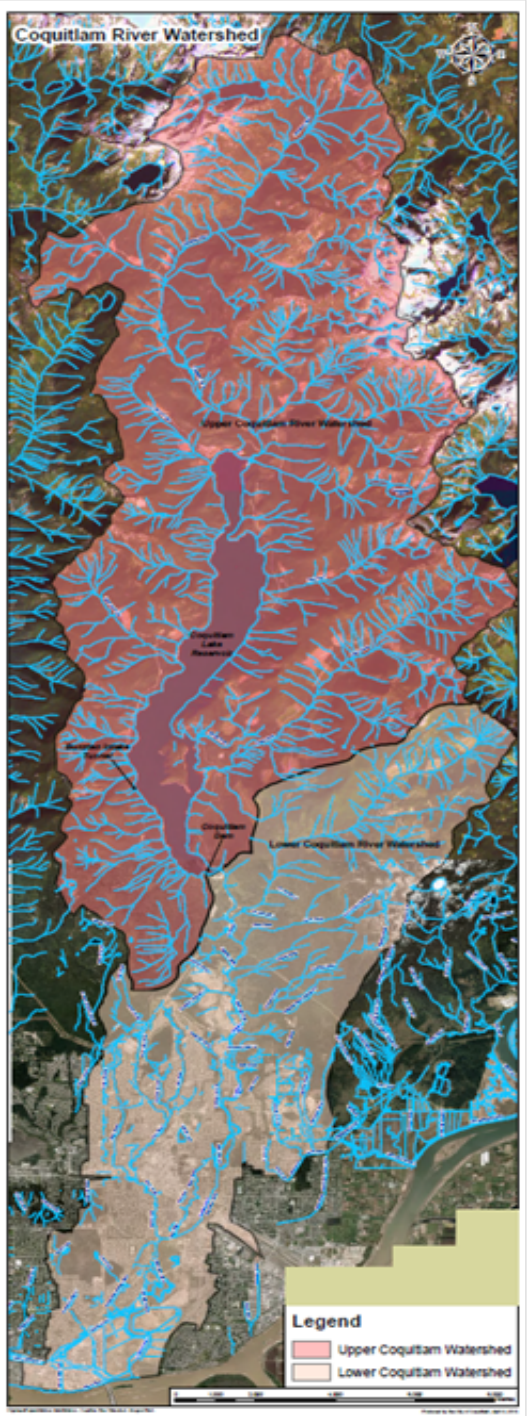


Figure 1. Coquitlam River Watershed.

The Need for a Watershed Plan

Within the lower watershed, two sub-watershed plans have been completed; however, the balance of the watershed faced similar resource and land use pressures, but lacked a plan to bring about actions for a healthy watershed. With over 75% of the lands in the lower Coquitlam River watershed developed, this lower portion, like many other urban watersheds, has been significantly impacted by human activity over the last century.

Significant human disturbances on the Coquitlam River started with the erection of the two dams, firstly for water supply in 1904, then power generation in 1914 to support the growing communities on the Lower Mainland. Installation of these dams in the watershed effectively cut off spawning and rearing habitat for salmon in the upper part of the river. As a result, sockeye were extirpated from the watershed circa 1913 and remaining salmon populations have suffered great instability.

The natural characteristics of the lower watershed have also been altered as urban development proceeded. For example, a significant portion of the watershed's drainage is now carried in the storm drain system, which eventually empties

into open watercourses. Mining activities also began in the 1950's, during which gravel removal activities took place both in and along the Coquitlam River. From this time period until the mid-1960's it was common practice for industry and government agencies to remove gravel directly from the river. These activities were principally responsible for the destruction of the main pink and chum spawning beds. The direct destruction of the salmon spawning grounds did not stop until the British Columbia Gravel Removal Order came into effect in 1965.

Commercial logging was also prominent in the watershed from the 1960's to the 1970's. While logging was a less significant impact to the river than were other mentioned activities, present day instability issues, and consequent pulse sediment loadings of Or Creek to Coquitlam River upon heavy precipitation events, can likely be attributed to previous logging activity in the Or Creek watershed.

Differences between commercial, industrial, real estate, recreational and environmental interests in the watershed were rarely resolved to the satisfaction of all parties, and cooperation was elusive. There was no central forum where all parties could work together to address existing problems and proactively plan through consensus-based solutions that considered the broader interests of the parties and the watershed environment.

In 2007, realizing that a different approach was required, the City of Coquitlam joined with the Kwikwetlem First Nation, to help launch the development of a Coquitlam River Watershed Strategy. In 2009, the City of Port Coquitlam joined as a third partner in leading this initiative. Over a four-year period, the two municipalities and Kwikwetlem First Nation, assisted by a multi-sector steering committee, led a stakeholder and community engagement process resulting in the creation of the Coquitlam River Watershed Roundtable in February 2011. As a result of this deliberative and collaborative process, the Roundtable has a strong foundation with a mission statement, a common vision and values statement, guiding operating principles and a clear governance structure. The Roundtable recognizes and promotes watershed interests through communication, co-ordination, collaboration and education. It does not have or seek any regulatory authority. This Roundtable is open for participation by anyone who has an interest in the watershed and respects the values of the Roundtable. The initiatives of the Roundtable are implemented by the Core Committee, who strikes task groups as required to assist in the implementation of various projects and activities.

Early in its visioning process, the Roundtable recognized the value of developing a watershed plan that characterizes existing conditions and potential pressures, and identified strategies needed to ensure the future health of the watershed. Due to the many watershed pressures evident in the lower watershed, the Roundtable identified the need to develop a Watershed Plan for the community that would:

- Address a comprehensive and integrated scope of issues;
- Recognize the important linkages between ecological health and human well-being;
- Identify measurable and achievable goals;
- Complement other studies and fill information gaps;
- Involve the community;
- Help track improvement in watershed health; and
- Remain feasible in cost.

The challenge was how to deliver an innovative solution to advance watershed governance in a realistic and timely manner across multiple jurisdictions on a watershed-wide scale.

The Need for an Adaptive Management Approach

In order to develop a cost-effective Watershed Plan within a reasonable timeframe on a scale of this size, the Roundtable was tasked with the challenge of finding a process that could be comprehensive while being flexible enough to account for the areas where there was limited availability of data, or resources.

Open Standards for the Practice of Conservation

The Roundtable chose the concept referred as the "Open Standards for the Practice of Conservation", which follows a five-step adaptive management cycle that seeks to **integrate both ecological and human well-being concepts into the watershed planning process.** The Roundtable recognized the linkages between ecosystem services and human well-being as integral to achieving the vision of a healthy watershed and community.

The Open Standards for the Practice of Conservation has been used throughout the United States for conservation planning, and in the Pacific Northwest for watershed planning, but this is the first application of the Open Standards for watershed planning in Canada. In addition, this is among the first applications of the Open Standards that fully integrates both ecological and human well-being goals.

Funding Development of the Plan

As development of this Watershed Plan may guide future land use decisions, the Roundtable sought funding from organizations that support healthy living values and could influence growth to this area. The Real Estate Foundation of BC (REFBC), Metro Vancouver, and the Bullitt Foundation committed funding to hire consultants with expertise in watershed planning and the Open Standards for the Practice of Conservation. Bullitt Foundation and REFBC are interested in fostering innovation in watershed governance, land use planning and ecosystem services.

Selecting Consultants: Experts in Open Standards and Watershed Planning

After obtaining financial support, the roundtable hired a consultant specializing in Open Standards planning to develop this first-in-Canada Watershed Plan. Abby Hook of Hook Environmental, a Seattle-based company that has been implementing the Open Standards for watershed planning in the Pacific Northwest since 2008, was hired to design and facilitate the planning process. Kerr Wood Leidal, a local consulting firm with experience in Integrated Stormwater Management Planning within the Coquitlam River Watershed, was hired to provide technical information, analysis and mapping for the watershed plan.

The Watershed Task Group

The development of the Watershed Plan is facilitated by a Watershed Task Group comprised of Core Committee members, consultants and experts, including: Local government (City of Coquitlam); First Nation (Kwikwetlem First Nation); federal government (Fisheries and Oceans Canada); real estate development (Urban Development Institute); recreation (Port Coquitlam and District Hunting and Fishing Club); and, stewardship (Tri-City Green Council). The WTG

liaises between the Roundtable partners and consultants in coordinating and facilitating the Watershed Plan development (i.e., strategy meetings, Community Roundtable events, Workshops on various components of the plan). The Task Group met in September and October 2012 to discuss the desired approach, develop a terms of reference for completing the first phase of the plan and hire consultants. The Core Committee approved the Terms of Reference for the project in October 2012.

Planning Process

Geographic Scope

The geographic scope of the Lower Coquitlam River Watershed Plan includes the lower Coquitlam River watershed from the dam at Coquitlam Lake Reservoir to the mouth of the Coquitlam River, where it enters the Fraser River, including all tributaries and upland areas. The Scott-Hoy and Maple Creek watersheds are sub-watersheds that fall within the Coquitlam River watershed footprint.

Open Standards for the Practice of Conservation

The Roundtable is following the **Open Standards for Practice of Conservation** framework, an adaptive management approach that seeks to integrate both ecological and human service (well-being) concepts into conservation planning (Figure 2).

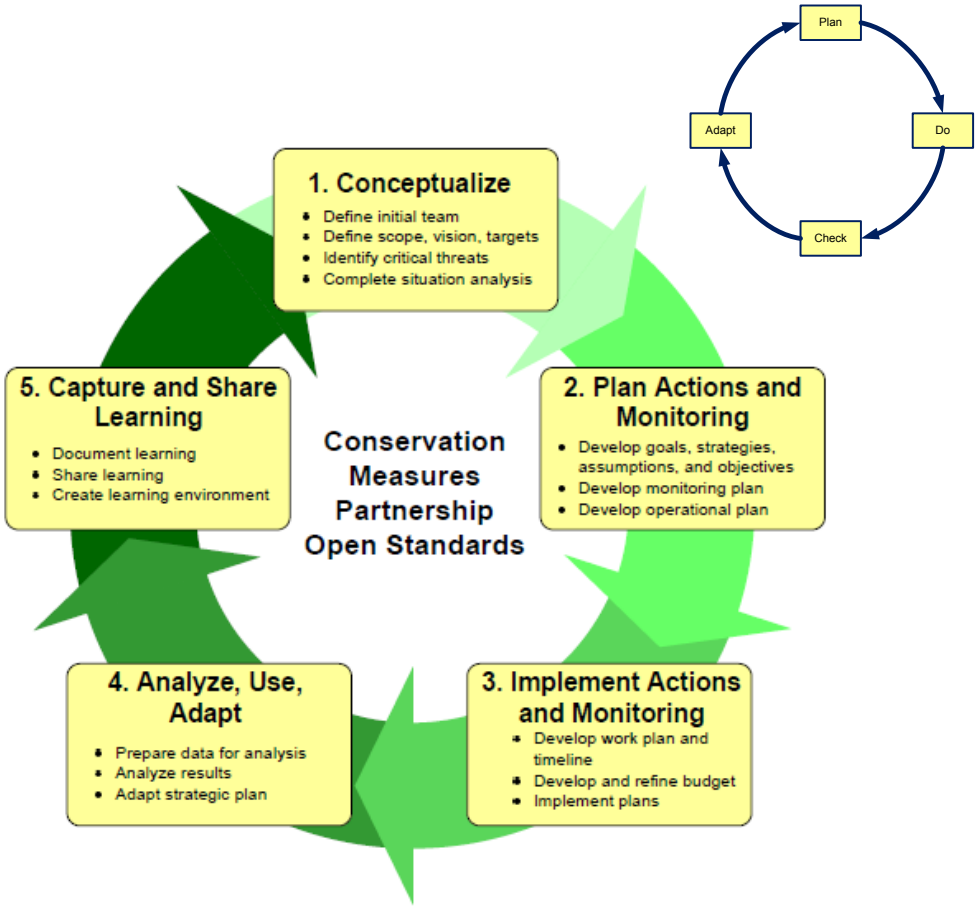


Figure 2. Open Standards for the Practice of Conservation planning cycle.

The Open Standards were developed by the Conservation Measure Partnership (CMP) to provide a guide for best practices in planning and project management. CMP is a consortium of international conservation organizations whose mission is to advance the practice of conservation by developing, testing, and promoting principles and tools to credibly assess and improve the effectiveness of conservation actions. In developing the Open Standards for the Practice of Conservation, CMP combined principles and best practices in adaptive management and results-based management from conservation and other fields to bring together common concepts, approaches, and terminology in conservation project design, management, and monitoring. The key benefits of the Open Standards include the ability to:

- Better link actions to desired impacts;
- Build in an evaluation framework from the beginning;
- Synthesize all different types of information;
- Use an iterative process that allows for faster implementation; and
- **Account for ecological goals and human goals**, which are linked through the provision of ecosystem services.

Phase I: Conceptualization (Completed March 2014)

In 2012, the Roundtable launched Phase I of the watershed planning process, which involved developing conceptual models that describe:

- What do we care about and think is critical? ***Component Identification***
- How healthy are the things that we care about? ***Health Assessment***
- What pressures are affecting the things we care about? ***Pressures Assessment***
- Which pressures are worst? ***Pressure Rating***
- What are contributing factors to current situation? ***Conceptual Modeling***

Component Identification: What Things Do We Care About?

The Open Standards process began at a Community Roundtable meeting held November 3, 2012 with the identification of a set of conservation 'components', including both ecological and human well-being aspects.

Components are representative of the system, such that conservation of the components will ensure the conservation of the Lower Coquitlam River. Participants were asked to consider:

- What needs to be protected/restored to achieve the Vision?
- What do you care about and want to protect/restore?
- What things are under pressure?

Through fall 2012 to spring 2013, the Watershed Task Group formed assembled and reviewed the input. The findings resulted in ten Ecological and Human Well-being components being apparent. The following four ecological and six draft human well-being components were identified (Table 1). Together, these components represent what is needed to achieve our vision of a healthy watershed that is enjoyed and supported by the community.

Table 1. Ecological and Human Well-Being Components Included in the LCRWP

Ecological Components	Human well-being Components
1. **Coquitlam River System** – water (quality and quantity) and habitat within the river and creeks (Scott, Hoy, Maple, Orr, etc.). 2. **Salmon** – all species of native salmon (chum, coho, Chinook, sockeye, pink and steelhead) 3. **Riparian Areas** – forested habitat beside the river and creeks 4. **Natural Areas** – forests, trees, wetlands and open space across the watershed and species that depend on these habitats	1. **Liveable Communities** – aspects of our built and cultivated environment that relate to land resources in the watershed 2. **Resource Industries** – key resource industries, including hydro-electricity, drinking water, gravel and eco-tourism 3. **Human Health and Safety** – aspects of safety and well-being influenced by natural resources and hazards 4. **Stewardship** – awareness, involvement and responsibility to act within our watershed 5. **Cultural & Spiritual Values** – experiences and connections that people have in the watershed and intrinsic or other values 6. **Recreation** – passive and active forms of recreation within the river, riparian areas and natural areas

Refer to Appendix 2. for further details on component identification.

Health Assessments: How Healthy are the Things We Care About?

The next step was goal setting to describe the desired future condition for each component (often long-term), and assessing the current status of the components (health assessment or viability analysis). Components were described using several Key Ecological Attributes that illustrate the size, condition and context. Indicators were used to measure the status of the attribute and provide a means to assess trends and track change over time: POOR, FAIR, GOOD, and VERY GOOD (Appendix 3). Component health viability was assessed in January 2013, and the results are presented in Appendix 4. Health Rating Assessments.

Components can be described using several *key ecological attributes* (KEA) that illustrate the size, condition and context for the component. A KEA is described as an aspect of a component that if missing or altered would lead to the loss or reduced integrity of the component. For example, a salmon component may be described in terms of the population (size), the productivity of the run (condition) and diversity (context).

Indicators are used to measure the status of the attribute and provide a means to assess trends and track change over time. Each attribute may be associated with one or more indicators. The state or level of an indicator can be described as poor, fair, good and very good according to the definitions provided in Appendix. 3. Where information on the range of acceptable variation or the ecologically desirable status is lacking, more general categories or descriptions may be used where good and very good refer to conditions that contribute to the goal and are realistic and achievable (over a long term), fair refers to a less than ideal condition, and poor refers to a condition that is trending in the wrong direction. One of the benefits of this approach is that indicators may be described quantitatively or qualitatively, yet overall health and status can be

illustrated using a common scale. In addition, this approach allows a simple evaluation of the health of all attributes, and therefore the health of all components.

Pressure Identification and Rating: What Pressures are Affecting What We Care About?

Pressures are those human activities that contribute to the degradation of the things we care about. After determining the health and viability of each component, the next step in the Open Standards process is to identify and rank pressures, stresses, and drivers, in order to prioritize conservation actions. After all the pressures to the Lower Coquitlam River Watershed were identified (Appendix 5), the Watershed Plan Task Group began a collaborative process in order to develop definitions for each pressure and to identify potential stresses and sources of stresses to the components (Appendix 6).

The following fifteen pressures were identified: hazardous spills, stormwater, invasive species, development, water extraction, vandalism/illegal activities, roads, railroads/transportation, recreation, mainstream cultural norms, dams and dikes, culverts, urban wildlife, mining, hatcheries, sewage and wastewater spills.

Once pressures were clearly defined and stresses and sources of stresses were identified, pressures were rated using specific pressure rating criteria (Appendix 7) to assess the scope, severity and irreversibility for each of the pressures. The purpose of this step is to identify the most critical pressures to the components so that attention can be directed at them.

The key pressures found to affect the watershed include:

- Development (high)
- Stormwater (high)
- Invasive Species(high)
- Water Extraction (medium)
- Illegal Activities & Vandalism (medium)
- Recreation (medium)
- Mainstream Cultural Norms (medium)

Conceptual Modeling: What is Contributing to Allow These Pressures to Persist?

The Roundtable constructed conceptual models for each pressure in order to further explore the factors that contribute to pressures in the Lower Coquitlam River watershed. Conceptual models contribute to a broader understanding of the Lower Coquitlam River watershed social-ecological system, as it allows moving beyond components and pressures, in order to include both the biological environment and the social, economic, political, and institutional systems that affect each component. In this way, situation analysis can ultimately assist in strategy development. Development of conceptual models is an iterative process.

This step carries the process forward by linking concepts together visually through conceptual modeling. A conceptual model is a tool that visually portrays the relationships among the different factors in the situation analysis. Developing conceptual models for each component illustrates the main cause-and effect relationships that exist within the Lower Coquitlam River watershed.

A conceptual model includes identifying:

- ***Components*** – The entities (species, communities, ecosystems etc.) that the project is trying to conserve.
- ***Stresses*** – Impaired aspects of components that result directly or indirectly from human activities.
- ***Sources of Stress (Direct Pressures)*** – The proximate anthropogenic activities or processes that have caused, are causing or may cause the destruction, degradation and/or impairment of one or more components. They can also be natural phenomena altered by human activities (e.g., increase in extreme storm events due to climate change).
- ***Contributing Factors*** – Factors, usually social, economic, political, institutional, or cultural in nature that enable or otherwise contribute to the occurrence and/or persistence of pressures. These may be either:
    - ***Indirect Pressures (Drivers/Root Causes),*** which can negatively affect the component, or
    - ***Opportunities*****,** which can positively affect the component and may demonstrate avenues for strategy development.

Through this exercise, by focusing on the bigger picture, the Watershed Plan Task Group helped lay the groundwork for developing conservation strategies in the future. The aim is to implement strategies that will be able to influence or affect change for improved watershed health. Conceptual models explain the context: Why there continues to be a problem, identifies the root causes that could be technical, social, legal, political or cultural, and describes where strategies could be applied.

The Watershed Task Group partnered with key experts for each of the "topic pressure areas" to identify the root causes, drivers and factors that were contributing pressures on the key Ecological and Human Well-being components being affected. The results were presented to the community in May 2014 for review, to help the Roundtable with strategy ideas and identify opportunities that could be shaped into an Action Plan.

Although 'Mining' was rated low as a pressure, it was included in the conceptual modelling process due to the perception that it is considered high pressure to the watershed. This exercise provide the opportunity to test the validity of the pressure ranking exercise and follow the process to address mining in terms of its context to identify contributing factors.

Conceptual models for the eight pressures can be found in Appendix 9. Narratives for the conceptual models were drafted to help to read the models (Appendix 10).

Phase 2: Plan Actions and Monitoring (Completed April 2015)

In May 2014, the Roundtable launched Phase II of the watershed planning process, which involved developing a strategic plan to identify action plans to advance the specific priority strategies. Strategies will guide future actions in the Lower Coquitlam Watershed. This step involves deciding how to overcome critical threats and restore degraded components, including what specific objectives need to be achieved and what specific actions need to be taken to achieve those objectives. Thus, a conservation strategy is a broad course of action that consists of three tiered parts:

- ***An objective*** - a specific statement detailing the desired accomplishments or outcomes;

- ***Strategic actions*** - the interventions designed to reach the project's objectives; and
- ***Action steps*** - smaller, preliminary steps taken to accomplish the strategic action.

Strategy Development

Initial work on identifying strategies occurred at the public Roundtable meeting in May 2014. The feedback from the Community Roundtable meeting and the work previously completed by the Watershed Task Group provided a strong suite of strategies to work from with. More than 200 ideas were brought forward for consideration. Refer to Appendix 12 Strategy Types. These strategies needed to be prioritized in order to identify which actions should be moved forward in the near term.

Strategy Assessment and Rating

The Watershed Task Group held two days of focussed Strategy Assessment workshops to assess and prioritize the strategies. Strategy types covered plans involving Policy, Planning, Outreach, Research, Education and Programs. Many strategies were found to address more than one pressure, and many strategies focused on actions across the entire lower watershed, regardless of jurisdiction. Strategies were combined if redundant, which reduced the total number to ~160. Refer to Appendix 12 for an assessment of the strategies by pressure and type. Supported by external experts, the Watershed Task Group rated the strategies based on well-outlined Strategy Rating Criteria of APPRORIATENESS, FEASIBILITY (cost, technical, political) and POTENTIAL IMPACT (Appendix 13) to help prioritize which actions should be moved forward by the Roundtable in the near term.

The aim of this step was to develop at least one or two strategies for each pressure, (though the entire suite of strategies has been archived to provide guidance for future actions). The Strategy Rating exercise resulted in identifying eighteen draft strategies for action (Appendix 14).

Results Chains

Results chains are used to test the effectiveness of strategies by qualifying the assumptions of how a strategy will produce change:

- How is the strategy supposed to work?
- How do you know if it is working or not?
- What is the logic underlying the strategy?
- What measures tell you whether or not you are seeing expected results?

More specifically, they convey the underlying assumptions that link the strategy to the source of stress to the conservation target. The series of “if-then” assumptions that link actions and desired results are mapped in diagrams to capture and communicate these relationships.

From the top eleven strategies, results chains were drafted to describe in detail the logic behind the strategy (Appendix 15). The part of the conceptual models illustrating selected context for each strategy to address that pressure were updated (Appendix 11).

Action Plans

Action Planning Workshops were held February/ March 2015. From the suite of strategies, three stood out as having the most potential for detailed Action Planning and implementation in the immediate future based on feasibility, available implementers and potential for access to resources:

- Development: 'Incentives for Developers';
- Stormwater: "Homeowner Outreach'; and
- Invasive Species: 'Alignment of Efforts.'

The entire suite of strategies has been archived to provide guidance for future actions, and will advance as capacity grows and resources to help implement come forward.

The Stormwater 'Homeowner Outreach' Strategy has been advanced the furthest. Each detailed action plan includes SMART objectives and indicators, identifying key participants, implementers, funding sources and a detailed list of activities.

On Earth Day, April 22, 2015, the Roundtable held a Community Roundtable meeting to:

- Share the draft priority strategies and action plans, and
- Illustrate and celebrate the process followed to arrive at this stage.

Watershed Plan Progress Report

A Watershed Plan Progress Report was developed to share the three action plans that stood out as having the most potential for detailed action planning and implementation through 2015 and 2016.
http://www.coquitlamriverwatershed.ca/sites/default/files/CITYDOCS-%231960497-v1-Lower_Coquitlam_River_Watershed_Plan_Progress_Report_1_FINAL_for_web_April_2015.PDF

Strategic Plan: 2015 – 2016

The action steps listed in this Strategic Plan span a broad reach of detail for different strategic actions, are intended to act as starting points, and may be revised as progress is made in implementing strategic actions. This Strategic Plan is intended to be a working document in which revisions, additions and updates will be made over time as opportunities, resources, partners and funding changes. In order to ensure the strongest strategies possible, the "**SMART"** approach, which stands for specific, measurable, achievable, relevant and time-limited has been used.

Detailed action plans have been drafted for:

- Stormwater: Homeowner Outreach
- Invasive Species: Alignment of Efforts
- Development: Green Development Incentive Program for Developers

Granted the implementation support and resources, these will proceed through 2015 and 2016. Once a project team is established, the action plans will be reviewed to clarify and strengthen them, and allow partners to have further input.

Development Action Plan

Three priority strategies were identified for Development, with the first strategy proceeding to the detailed action planning phase:

- **Green Development Incentive Program for Developers**
- Development of an Impact Map
- Natural Space Strategy

Green Development Incentive Program for Developers

Focus of Strategy: Conduct feasibility study on potential incentive tools for the development community. Key actions will:

- Involve research and recommendations for green development incentive programs;
- Address sensitive ecological priorities in areas that are developable and presently grandfathered;
- Address important areas, and those affected by shortcomings in regulations being understood;
- Encourage developers to enroll in programs that support green development; and,
- Reduce development impacts on natural areas, riparian areas, recreation and livable communities.

GOAL: Assess present potential tools that municipalities and others can provide to incentivize environmentally friendly designs for neighbourhoods.

Supporting Partners: The development community within the Coquitlam River watershed.

Draft Action Plan March 11, 2015 – furthered through summer/fall 2015.
NOTE: To be developed further once funding obtained.
Context: Action plan likely has two main steps: (1) Research and recommendations, and (2) implementation.

Action	Lead	Funding	Timeline
Task 1. Build political/funding support for strategy with Coquitlam Council members as a spokesmen and requests for the work from the development community?	RT - coordinate?		
Task 2. Develop/align watershed-wide baseline information • Most sensitive areas/sites (riparian areas/natural areas) • Most sensitive areas/sites (human well being – livable communities/recreation) • Areas that are likely to be re/developed (policy/zoning) • Layer them to see where there areas most vulnerable • Identify areas/sites most appropriate for development/redevelopment* (related intermediate result: priorities identified)	Municipalities (ecologically sensitive sites + policy/zoning) RT – define HWB sensitive areas?	Staff hours?	Q2 2015
Task 3. Develop incentive recommendations • Identify development/redevelopment practices or siting that you want to change – what shared values could changed practices/siting result in? • Research/interview what incentivizes developers – what could make them change their practices/siting • Describe potential incentive programs based on research from other areas • Describe opportunities/gaps within each municipality for expanded/improved programs • Present recommendations to council (related to intermediate result: recommendations for municipalities)	Research on incentives: consultant? Support/ participation from the development community. Recommendations to council: RT + Development Community?		Q3 & Q4 2015?
Task 4. Work with municipalities to change processes to incorporate incentive recommendations.			
Task 5. Track participation of developers in incentive programs*, ecological and HWB outcomes, report on progress through the RT.			

*potential objectives

Stormwater Action Plan

Two priority strategies were identified for Stormwater, with the first strategy proceeding to the detailed action planning phase:

- **Outreach to Single-Family Homeowners**
- Adaptive Management Plan

Strategy: Outreach to Single-Family Homeowners

Focus of Strategy: Develop outreach materials to help single-family homeowners improve stormwater practices in the lower Coquitlam River watershed. Key actions will:

- Encourage best practices in rainwater management, water quality and riparian areas;
- Provide outreach awareness of stormwater problems caused by every day actions;
- Promote voluntary best practices, following technical assistance and an incentives program; and
- Reduce stormwater impacts on the river system, riparian areas, salmon, cultural and spiritual values, human health and safety, and resources industries.

GOALS:

- Assess and address current messaging,
- Implement an outreach pilot within the watershed, and
- Attempt to track what behaviour change has resulted.

Supporting Partners: Coquitlam and Port Coquitlam.

Strategy: Outreach to single-family homeowners regarding best practices for three priority issue areas:

- Rainwater
- Water Quality
- Riparian Areas

Draft Action Plan - 3 February 2015 – To be developed further once funding obtained.

Action	Lead (partners)	Funder	Timeline
1. Define target audiences for all three issue areas	Coq, PoCo (RT)	Staff hours	
2. Compile existing materials for all three issue area, identify gaps	Coq, PoCo (RT)	Staff hours	
3.a. Develop preliminary scope/budget of outreach campaign	Coq, Poco, consultant	Staff hours, consultant bids?	
3.b. Seek funding and/or political support for outreach campaign	Coq, PoCo (RT)	Staff hours	
4. Fully develop/define outreach campaign. Tasks: • Align audience and materials • Prioritize pilot area • Explore incentives/technical assistance	Consultant? *Depends on funding*	?	

Action	Lead (partners)	Funder	Timeline
5. Produce materials	Consultant with oversight from Coq, PoCo?		
6. Implement campaign (distribute materials) Tasks: • Train implementers	Coq, Poco (RT volunteers)		
7. Follow-up with homeowners	Coq, Poco (RT volunteers)		
ON-GOING: Measure indicators and adaptively manage	Coq, Poco (RT volunteers)		

Objectives and Indicators:

Intermediate Result: Outreach materials directly delivered and widely available

- *Objective:* By the end of 2016, x number single-family homeowners will be reached with appropriate outreach materials regarding rainwater best practices.
    - *Indicator:* Number of single-family homeowners reached with appropriate outreach materials regarding rainwater best practices.
- *Objective:* By the end of 2016, x number single-family homeowners will be reached with appropriate outreach materials regarding water quality best practices.
    - *Indicator:* Number of single-family homeowners reached with appropriate outreach materials regarding water quality best practices.
- *Objective:* By the end of 2016, x number single family homeowners with streamside property will be reached with appropriate outreach materials regarding riparian best practices.
    - *Indicator:* Number of single-family homeowners with streamside property reached with appropriate outreach materials regarding riparian best practices.

Intermediate Result: New and existing single-family residents adopt best stormwater practices

- *Objective:* By the end of 2017, ?,000 single-family homeowners will change their behavior and adopt SW best practices based on outreach campaign (could be broken down into 3 issue areas as with homeowners reached).
    - *Indicator:* Number of single-family homeowners who adopted SW best practices based on outreach campaign.

Invasive Species Action Plan

Two priority strategies were identified for Invasive Species, with the first strategy proceeding to the detailed action planning phase:

- **Alignment of Efforts**
- Ban on Sale of Invasive Species

Strategy: Alignment of Efforts

Focus of Strategy: Develop a coordinated approach to invasive species management that can apply for the region. Key actions will:

- Align invasive species management efforts through an information-sharing network;

- Establish a coordinated approach to all aspects of invasive species activities;
- Coordinate activities to develop model bylaws for invasive species management and mapping inventories;
- Align policies, identify priority species, resources for oversight and enforcement, targeting priority species using strategic, cost-effective measures; and,
- Reduce invasive species impacts on riparian areas, natural areas and recreation.

Goal:

- Develop regionally effective legislation and policy supported by monitoring, enforcement and education.

Supporting Partners: Coquitlam and Port Coquitlam.

Draft Action Plan: February 25, 2015 – to be refined following Step 1.

Actions	**Lead (Partners)**	**Funder**	**Timeline**
Step 1. Formalize coordinated Coquitlam Watershed invasive species network. • ID partners – generate list – include Plantwise. • Check partners with RT vision – look for alignment. • Get partners to a kick off meeting – information session • Ask partners to bring current existing information. • Existing data/baseline. • Existing policies and controls. • Hold kick off meeting to describe effort.	Roundtable – convener	RT and municipalities: staff hours	Spring 2016
Step 2. Develop approach for coordinated network • Prioritize species, critical areas, control measures* • Define steps for assessing, amending, and creating aligned policies	Lead: Coquitlam – Shannon Wagner	RT and municipalities: staff hours	Summer 2016
Step 3. Secure Funding Apply for funding with coordinated partners	Lead: Cities	Municipalities: staff hours Possible Funder: Vancity	Late 2016
Step 4. Assess Current Situation Assess current policies/bylaws - identify bylaws that could be amended/improved, identify gaps/bylaws that need to be created Map infestations for priority species and critical- collect data, collate data, create maps	Cities		

Actions	Lead (Partners)	Funder	Timeline
Step 5. Develop Coordinated Approach • Draft bylaw changes* (using template?) Consider local plans with regional invasive species council, parks update and adoption of the invasive plant strategy, etc. • Integrate control measures and monitoring.	Cities		
Step 6. Councils Adopt Policies. • Approach councils with baseline information, costs for control, etc. and request for policy changes.	Cities - presenter Roundtable support – social media blitz	Staff hours	2017
Step 7. Control Effectiveness Monitoring - Report to RT. • Report on progress to Roundtable for updates 2017.	??? Project Guide?		

*Related to an objective

Objectives:

- *Objective:* RT supports the coordination across municipalities for the development of model aligned policy language by 2016.
- *Objective:* Baseline information is developed for X number of species in the critical areas by 2016.

Delivering the Strategy – Implementation Going Forward

Overview of the Next Steps in Open Standards

Monitoring and Operational Plan

Phase II of the Open Standards approach includes developing the Monitoring Plan that will be used to track progress and in developing an Operational Plan that will specify the resources needed and the risks that should be considered. Each strategy will be monitored, based on set objectives and tracked through indicators to measure success on reducing impacts to improve watershed health. The action plans will move forward as implementation partners and funding is identified. The Roundtable will be evaluating a variety of potential platforms or tools to report on implementation, effectiveness, and affected component health.

Measures

The development of measures is the final step in Phase II of the LCRWP. Measures provide a mechanism to track whether progress is made relative to the desired results, assess the effectiveness of management actions, and adapt the action plan if needed to get the best results. The process of establishing measures includes determining strategy effectiveness and status assessment information needs, reviewing and refining draft indicators and exploring methods, assigning priority status to all indicators and developing a measures plan. The next major step for the Lower Coquitlam River Watershed Plan is to develop the measures to monitor the progress and an implementation tracking tool and pursue implementation of the strategies designed to achieve the vision of a healthy watershed.

The key ecological attributes and indicators developed during viability assessment can serve in assessing the strategy effectiveness, as can the results chains that lay out a causal chain of assumptions to achieving implementation. Additionally, even where strategies are not implemented immediately, target status should be periodically assessed to determine if it remains at an acceptable state (e.g., meeting long term goals set for that target), or if undesirable changes are detected. These monitoring efforts can serve as an early warning to trigger action or more intensive measurement if target status is in decline. If necessary, strategies will be reviewed and modified with the same approach used to develop them, to ensure that this plan is adaptive moving forward.

Draft Recommendations

These recommendations relate to overall implementation and watershed based decision making in the immediate future regarding the implementation of the detailed action plans identified in the Strategic Plan, and into the longer term as the plan evolves.

Short Term Goal: Effective Implementation of the Strategic Plan (2015 - 2017)
Long Term Goal: Effective Implementation and advancement of the Lower Coquitlam River Watershed Plan Over the Long Term (2015 and beyond 5+ yrs to allow for the implementation of the detailed action plans and full Open Standards adaptive management cycle and adaptations).

These recommendations will be further developed following review byt the Watershed Task Group and the Roundtable's Core Committee.

Recommendation 1: Support and Endorsement

- Seek support to have the Lower Coquitlam River Watershed Plan endorsed by appropriate roundtable partners.
- Integrate Strategies into Other Local and Regional Plans: Encourage the incorporation of the strategies into other policies and processes.
- Share Lower Coquitlam River Watershed Plan Action Plans with additional groups with the authority to sponsor and/or implement strategies.

Recommendation 2: Administration and Funding

- Continuation of the work of the Roundtable as a catalyst to effective watershed planning and motivating partners to fulfill the vision of a healthy watershed.
- Annual review of the implementation strategy, communication, education and outreach, performance monitoring and evaluation.
- Seek consistent, sustainable funding In order to sustaining effective watershed based decision making over the long term, ongoing coordination support is needed to continue the work of the Roundtable and the implementation of strategies under the Watershed Action Plan. Lack of stable support for Roundtable coordination has been identified as a pressure in Appendix 14. Various priority strategies require coordination to ensure a base level operational support continues as the Roundtable seeks support and funding to implement its work and roll out watershed action plan strategies, as resources permit. Shaping the Action Plan for the future requires stable operational funding.

Recommendation 3: Accessibility of LCRWP Documentation

- Make the Lower Coquitlam River Watershed Plan available online so that it is accessible by other communities and organizations.

Concluding Remarks

After several years of collaboration, many technical workshops and Community Roundtable meetings, and countless volunteer hours, over 60 partners (Watershed Task Group, local experts, key stakeholders, and consultants), and numerous citizens and volunteers have made the Lower Coquitlam River Watershed Plan a reality. With the identification and assessment of ecosystem targets, threats to targets, and the development of strategies, the Lower Coquitlam River Watershed Plan has made great strides towards realizing the vision of a healthy watershed.

This Phase II Watershed Plan includes a strategic plan that will guide the collaborative team in implementing this significant body of work. 2015 has focused on working with the Watershed Task Group and local experts and potential implementation partners to develop the detailed strategic plan. The strategic plan is based on the strategies identified through this planning process, and will further develop measures to monitor strategy effectiveness (pending funding). The next major step for the Lower Coquitlam River Watershed Plan is to develop the measures to monitor the progress and an implementation-tracking tool and pursue implementation of the strategies designed to achieve the vision of a healthy watershed.

Collaborators who have participated throughout the development of the LCRWP are already stepping forward to implement appropriate strategies. For example, the City of Coquitlam and Metro Vancouver have already applied for funding to advance the invasive species and stormwater action plans. Brook Pooni and Associates, Core Committee representative for the Urban Development Institute, has stepped forward in launching a funding campaign to advance the development action plan.

The LCRWP plan, and all of the work that has gone into it and the multidimensional organizations that have participated, will serve as a testament to the commitment to watershed health. It will be used to support future grant proposals to implement strategies and to gain support from collaborators during the grant application process. The Coquitlam River had been on the BC's Endangered Rivers list for nearly two decades and with this new advancement of collaborative watershed governance, the Coquitlam River was removed from this list in 2014.

The creation of the Lower Coquitlam River Watershed Plan is the result of the combined efforts of many organizations, interest groups, managers, community leaders, and citizens who care deeply for the long-term health of the Coquitlam River Watershed. If the same energy and commitment can be dedicated to implementing the draft strategies and monitoring their effectiveness, then this plan will be a success and the benefits will be realized through a healthier ecosystem and community.

The Coquitlam River Watershed Roundtable encourages others working to protect and restore the resources throughout the Coquitlam River Watershed to carefully review this plan and incorporate the outputs into your efforts. If you would like a presentation on the plan, please contact the Roundtable at info@coquitlamriverwatershed.ca.

Appendices

Appendix 1. Definitions

Pressure: Pressures are defined as human activities or natural processes that have caused, are causing, or may cause the destruction, degradation, and/or impairment of ecosystem components.

Stresses: Stresses represent the ultimate ecological effect or symptom of pressures.

Driver: Underlying conditions that support the persistence of pressures and are often outside the scope of local strategies. Common drivers include climate change, economy, population growth, and underlying geology or physical processes.

Contributing Factors: Contributing factors are the underlying, human-induced actions that allow pressures to persist (e.g. indirect threats, root causes and opportunities). They can commonly be classified as social, technical, funding, institutional, and legal factors.

Key Ecological Aspect (KEA): A KEA is described as an aspect of a component that if missing or altered would lead to the loss or reduced integrity of the component. For example, a salmon component may be described in terms of the population (size), the productivity of the run (condition) and diversity (context).

Indicator: Indicators are those parameters, e.g., % intact forest, amount of accessible habitat, # of participants in stewardship, that can be used to provide best measures of health for an ecological or human well-being component as part of the Health Assessment step. Indicators are also used within Action Plans, to assess resulting success to target objectives to reduce a given pressure, e.g., by end of 2017, 1,850 single family home-owners will have changed their behavior and adopted one or more stormwater best practices based on the campaign.

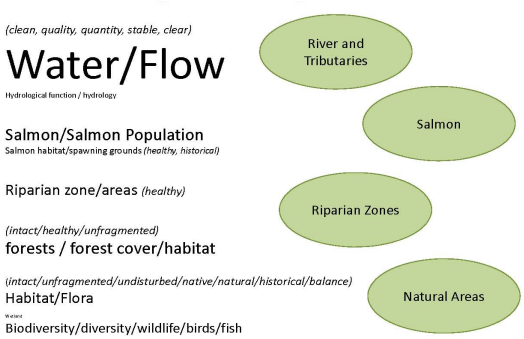
Results Chains: Diagrams with a series of "if….then" statements that define how a strategy should work. The graphic describes the logic of the strategy through the identification of intermediate results or outcomes. The hope is that if the strategy gets off course, managers will be able to tell early and course correct quickly. Often, objectives and indicators are developed to describe the intermediate results, thus creating the base of your implementation and effectiveness measures. Note that the results chain graphically represents a limited number of strategies in isolation. It does not take into account other complementary and likely necessary strategies such as control measures and restoration, which will also significantly influence the health of the components.

Appendix 2. Component Identification Exercise

The first phase of the watershed planning process was kicked off at a public Roundtable meeting on November 3rd, 2012, which was attended by approximately 80 individuals. Abby Hook provided an overview of the Open Standards for the Practice of Conservation and led an exercise to identify the things we care about in the watershed, known as components. Participants were asked to provide suggestions for two ecological and two human well-being components. To help participants come up with their components, they were asked to consider:

- What things need to be protected/restored to achieve the vision?
- What do stakeholders care about and want to protect/restore (components should be easily communicated to the public)?
- What represents an intact and resilient watershed?
- What things (Ecological or Human Well-Being) are currently threatened (components should be nouns)?
- What Ecological Components need to be maintained in order to deliver the ecosystem services?
- How do the ecosystem services benefit humans? Could these be the Human Well-Being Components?

In total 211 cards were completed, with an estimated 53 people participating in the process. The results of the comments are shown in the word clouds. The size of each word represents the number of times the word(s) was mentioned.



Ecological Well-Being Components

- Water/flow – mentioned 28 times
- Hydrological function/hydrology, natural range of variability, natural hydrology, cycle – mentioned 5 times
- Salmon or salmon population – mentioned 11 times
- Salmon spawning grounds, habitat, healthy salmon habitat or access to historical habitat – mentioned 6 times
- Healthy/riparian zone/areas – mentioned by 10 people
- Un-fragmented forest/habitat or intact/healthy forests/forest cover – mentioned by 11 people
- Habitat/flora/areas mentioned 10 times – qualified with intact, undisturbed, un-fragmented, natural, historical, balance between wildlife and fish, true to original nature

- Biodiversity/diversity/wildlife/birds/fish – mentioned by 10 people (including linkages between species)
- Wetlands – mentioned by 3 people
- Air/quality – 4 people –moved to human well-being
- Other comments by individual people: Protection of headwater source; Stable environment; Availability of nutrients; Pollution control of the watershed; Watershed enhancement to restore former health so self-sustaining in future

Human Well-Being Components

- Water (clean, drinking, quality, for human use/health – mentioned by 12 people
- Air (quality, clean, for human health) – mentioned by 5 people
- Health security, wellbeing, comfort, safe, sustainable, buffered from severe flows – mentioned by 10 people
- Aesthetics/looks/watching – mentioned by 6 people
- Good, gardens, agriculture (cultural, spiritual, salmon, self-sufficiency) – mentioned by 7 people
- Educated/education/knowledge/responsibility to protect – mentioned by 10 people
- Development/infrastructure/growth (proximity, reduced, slowed, smart, limited, smaller) – mentioned by 6 people
- Energy/power – mentioned by 3 people
- Recreation (trails, facilities, direct and indirect, opportunities, uses, nature) – mentioned by 18 people
- Fisheries/recreational – mentioned by 3 people
- Access (waterfronts, river, trails, nature) – mentioned by 5 people
- Involvement/collaboration (multi-level, public, youth) – mentioned by 3 people
- Link/connection (communion, nature and wilderness) – mentioned by 4 people
- Cultural/spiritual – mentioned by 3 people
- Other comments by individual people: Realization of role of humans in nature; Robust biodiversity provides enjoyment for living in the watershed; Amazing environmental experience; Fish, peaceful; Riverview hospital area (trees, birds, green space); Potential for creative expression (problem solving); Potential to tap into citizen science for monitoring; Intrinsic value of having healthy fish populations.

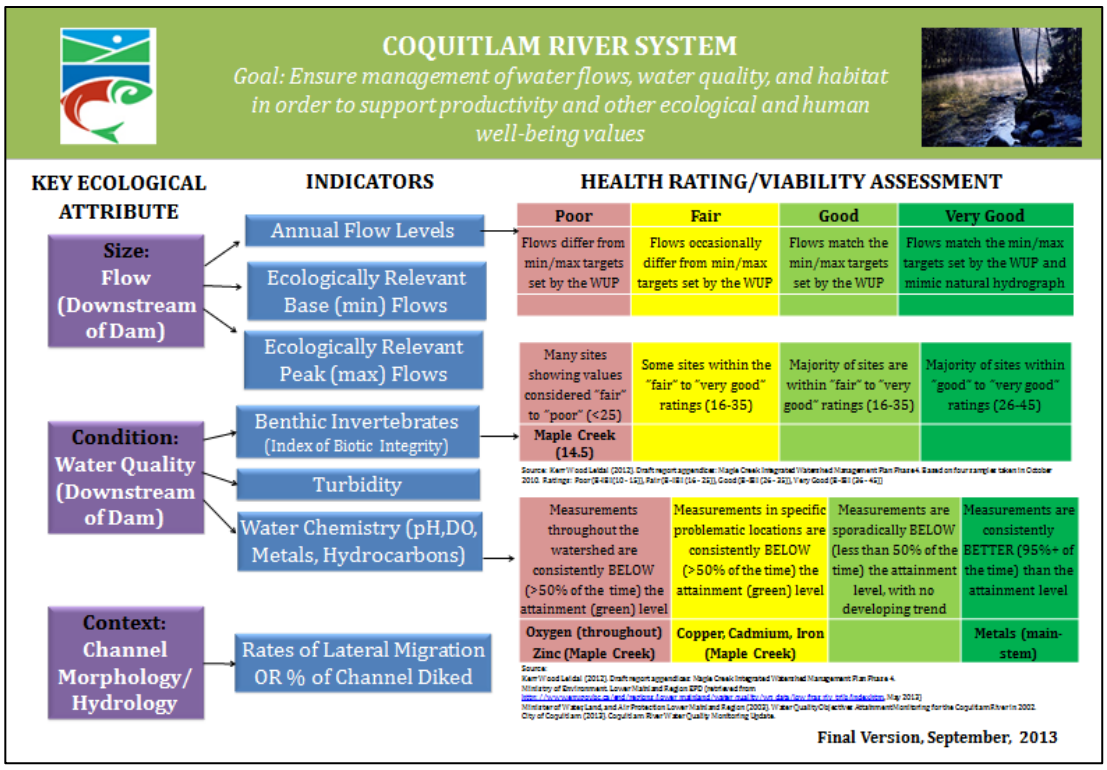
Appendix 3. Definitions for Health Assessment of Component Indicators

Definitions of poor, fair, good and very good for health assessment of component indicators.

	Poor	Fair	Good	Very Good
Ecological	Restoration increasingly difficult; May result in extirpation	Outside acceptable range of variation; Requires human intervention	Indicator within acceptable range of variation; Some intervention required for maintenance	Ecologically desirable status; Requires little intervention for maintenance
Human well-being	Does not meet goal condition and requires significant intervention to improve condition	Does not meet goal condition but has potential with moderate intervention	Meets goal condition; Some intervention required to ensure stability of that condition	Indicator meets goal and requires little intervention to maintain stability of condition

Appendix 4. Health Assessments

http://www.coquitlamriverwatershed.ca/sites/default/files/Lower%20Coquitlam%20River%20Watershed%20Plan%20-%20Step%201%20-%20November%202013.PDF



COQUITLAM RIVER SYSTEM

Goal: Ensure management of water flows, water quality, and habitat in order to support productivity and other ecological and human well-being values

KEY ECOLOGICAL ATTRIBUTE	INDICATORS	HEALTH RATING/VIABILITY ASSESSMENT			
		Poor	Fair	Good	Very Good
Size: Flow (Downstream of Dam)	Annual Flow Levels	Flows differ from min/max targets set by the WUP	Flows occasionally differ from min/max targets set by the WUP	Flows match the min/max targets set by the WUP	Flows match the min/max targets set by the WUP and mimic natural hydrograph
	Ecologically Relevant Base (min) Flows				
	Ecologically Relevant Peak (max) Flows				
Condition: Water Quality (Downstream of Dam)	Benthic Invertebrates (Index of Biotic Integrity)	Many sites showing values considered "fair" to "poor" (<25)	Some sites within the "fair" to "very good" ratings (16-35)	Majority of sites are within "fair" to "very good" ratings (16-35)	Majority of sites within "good" to "very good" ratings (26-45)
		Maple Creek (14.5)			
	Turbidity				
	Water Chemistry (pH,DO, Metals, Hydrocarbons)	Measurements throughout the watershed are consistently BELOW (>50% of the time) the attainment (green) level	Measurements in specific problematic locations are consistently BELOW (>50% of the time) the attainment (green) level	Measurements are sporadically BELOW (less than 50% of the time) the attainment level, with no developing trend	Measurements are consistently BETTER (95%+ of the time) than the attainment level
		Oxygen (throughout) Zinc (Maple Creek)	Copper, Cadmium, Iron (Maple Creek)		Metals (main-stem)
Context: Channel Morphology/ Hydrology	Rates of Lateral Migration OR % of Channel Diked				

Source: Ken Wood Leidal (2012). Draft report appendix: Maple Creek Integrated Watershed Management Plan Phase 4. Based on four samples taken in October 2010. Ratings: Poor [5-15] ([10 - 12]), Fair [5-15] ([16 - 22]), Good [5-15] ([26 - 32]), Very Good [5-15] ([36 - 42])

Source: Ken Wood Leidal (2012). Draft report appendix: Maple Creek Integrated Watershed Management Plan Phase 4.
Ministry of Environment. Lower Mainland Region EPD (retrieved from http://www.env.gov.bc.ca/wat/wq/monitoring/lower_mainland/water_quality_lwr_data_flow_freq_qty_wtq.html#stations, May 2012)
Ministry of Water, Land, and Air Protection Lower Mainland Region (2002). Water Quality Objective Attainment Monitoring for the Coquitlam River in 2002.
City of Coquitlam (2012). Coquitlam River Water Quality Monitoring Update.

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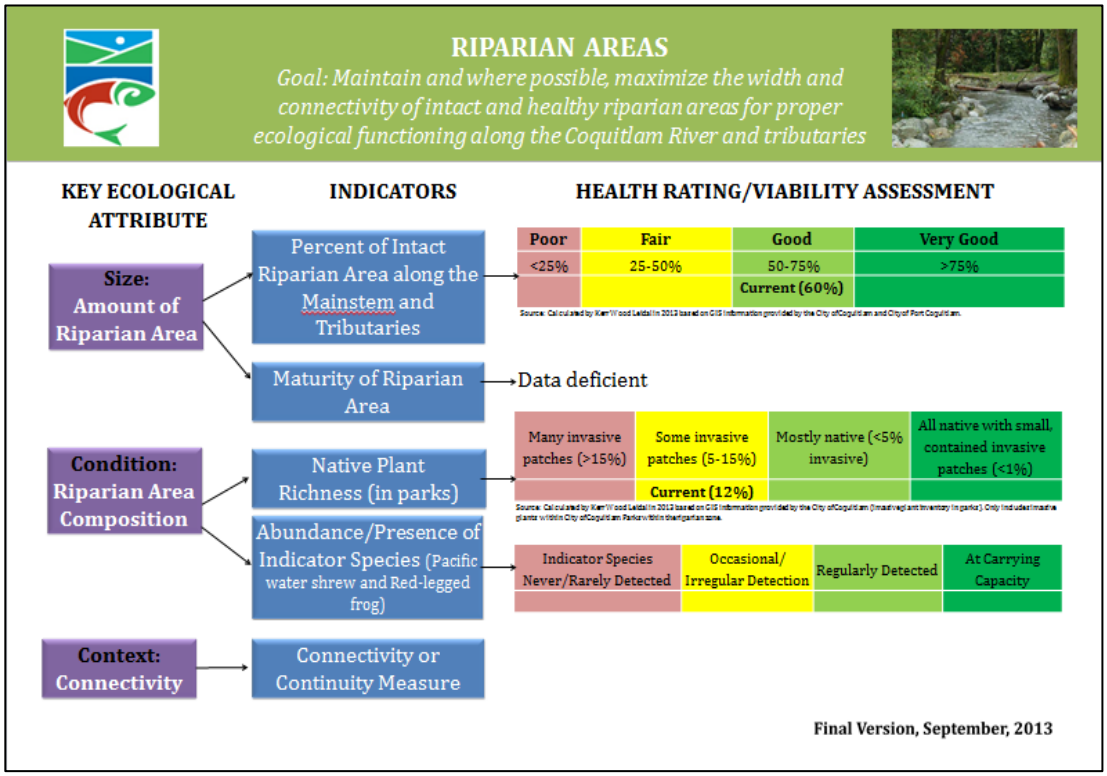

RIPARIAN AREAS

Goal: Maintain and where possible, maximize the width and connectivity of intact and healthy riparian areas for proper ecological functioning along the Coquitlam River and tributaries

KEY ECOLOGICAL ATTRIBUTE	INDICATORS	HEALTH RATING/VIABILITY ASSESSMENT			
		Poor	Fair	Good	Very Good
Size: Amount of Riparian Area	Percent of Intact Riparian Area along the Mainstem and Tributaries	<25%	25-50%	50-75%	>75%
				Current (60%)	
	Maturity of Riparian Area	→ Data deficient			
Condition: Riparian Area Composition	Native Plant Richness (in parks)	Many invasive patches (>15%)	Some invasive patches (5-15%)	Mostly native (<5% invasive)	All native with small, contained invasive patches (<1%)
			Current (12%)		
	Abundance/Presence of Indicator Species (Pacific water shrew and Red-legged frog)	Indicator Species Never/Rarely Detected	Occasional/ Irregular Detection	Regularly Detected	At Carrying Capacity
Context: Connectivity	Connectivity or Continuity Measure				

Source: Calculated by Ken Wood Leidal in 2013 based on GIS information provided by the City of Coquitlam and City of Port Coquitlam.

Source: Calculated by Ken Wood Leidal in 2013 based on GIS information provided by the City of Coquitlam (Invasive plant inventory in parks). Only includes invasive plants within City of Coquitlam Parks within the riparian zone.

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SALMON

Goal: Ensure resilient, healthy populations of native salmon, for current and future generations

KEY ECOLOGICAL ATTRIBUTE	INDICATORS	HEALTH RATING/VIABILITY ASSESSMENT			
		Poor	Fair	Good	Very Good
Size: Abundance	Juvenile Outmigration (chum and pink)	Downward trend in #s	Increasing trend in #s	#s at capacity (limited by ocean conditions)	Increased habitat results in increased #s
			Current		
	Number of Spawners (chum and pink)	Source: Decker S., Macnab J. and C. Lewis. 2012. Lower Coquitlam River Fish Productivity Index Coquitlam/Buntzen Water Use Plan Implementation Year 5 (reference COQMON-7). Study period 2000-2010			
Condition: Productivity	Smolt Density/100m2 (Coho, Steelhead)	Smolt densities show declining trend	Smolt densities are stable, but lower than reference	Smolt densities approximate reference conditions	Smolt densities exceed reference conditions
				Current	
	Benthos Diversity and Abundance	Source: Decker S., Macnab J. and C. Lewis. 2012. Lower Coquitlam River Fish Productivity Index Coquitlam/Buntzen Water Use Plan Implementation Year 5 (reference COQMON-7). Study period 2000-2010			
Context: Diversity	Proportion of Species at Healthy or Capacity/Potential	0-2 Species (Pink, Chum)	2-3 Species (Pink, Chum, Coho)	4-5 Species (Pink, Chum, Coho, Steelhead, Chinook)	All 6 Species (Pink, Chum, Coho, Steelhead, Chinook, Sockeye)
				Current	
Context: Salmon Habitat	Condition of Spawning Gravel	Decrease from current	Current level	Increase by 10%	Increase to historic levels
	Blockages to Salmon Access		Current		
	Accessible Spawning and Wintering Habitat				

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NATURAL AREAS

Goal: Maintain an interconnected network of land and water resources to support functioning natural systems, recreational opportunities, and aesthetic values

KEY ECOLOGICAL ATTRIBUTE	INDICATORS	HEALTH RATING/VIABILITY ASSESSMENT			
		Poor	Fair	Good	Very Good
Size: Amount of Natural Area	Area of Forest Cover	0-20%	20-30%	30-40%	>40%
				Current	
	Area of Freshwater and Wetland	<1%	1-1.5%	1.5-2%	>2%
				Current	
	Area of Shrub, Grassland, and Old Field Habitat	<1%	1-3%	3-5%	>5%
				Current	
		Source: Metro Vancouver technical report (Sensitive Ecosystem Inventory for Metro Vancouver & Abbotsford 2010-2012). The Environmentally Sensitive Areas percentages are calculated within the watershed of the City of Coquitlam and City of Port Coquitlam. The Forest category includes mature forest, old forest, young forest and riparian. The freshwater/wetland category includes freshwater and wetland. The grassland and shrub category includes old field.			
Condition: Ecological Integrity of Natural Areas	Native Plant Richness	Many invasive patches (>15%)	Some invasive patches (5-15%)	Mostly native (<5% invasive)	All native with small, contained invasive patches (<1%)
		Current			
	Wildlife Trees	Source: City of Coquitlam 2008. Invasive Plant Management Strategy. Prepared by Raincoast Applied Ecology Vancouver BC.			
	Indicator Species (one for each habitat)	Indicator Species Never/Rarely Detected	Occasional/ Irregular Detection	Regularly Detected	At Carrying Capacity
Context: Connectivity	Wildlife Corridors				

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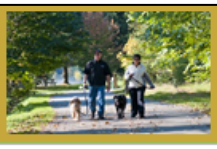
LIVEABLE COMMUNITIES

Goal: Promote sustainable, liveable communities

KEY ECOLOGICAL ATTRIBUTE	INDICATORS	HEALTH RATING/VIABILITY ASSESSMENT			
		Poor	Fair	Good	Very Good
Sustainable Growth	Density Targets (upa)	Decrease in density	0 - 7.5 upa Low 7.5 - 20 upa Low-Med 20 - 40 upa Medium 40 - 60 upa Med-High	20 upa Low-Medium 80 upa Medium -High *(to be developed based on 2011 census data)*	0 - 7.5 upa Low 7.5 - 20 upa Low-Med 40 - 60 upa Medium 60 - 80 upa Med-High 80 - 100 upa High
			Current		
	Mixed Use Types	40% residences within 400 m of shops/services; single type	60% residences within 400 m of shops/services; some mixed types	80% residences within 400 m of shops/services; balanced mixed types	90%+ residences within 400 m of shops/services; diversity of types
	Waste Reduction	Waste >250 kg/person/yr; some recycling	Waste <250 kg/person/yr; 60% diversion	Waste <200 kg/person/yr; 70% diversion	Waste <150 kg/person/yr; 80% diversion
			Current		
Green Infrastructure	Storm-water Practices	<50% pervious	60-74% pervious	75-89% pervious	90%+ pervious
	Total Pervious Surfaces				
	Availability of community/ garden spaces	Limited to backyards in single family homes	Common areas available to multi-family residents	Some community gardens	No waitlist on Community gardens
				Current	
Aesthetics	Urban Tree Cover (%)				
	Ratio of Proportion of Developed Areas to Natural Areas				
Transportation and Safety	Transportation and Safety Measure (to be developed)				

HUMAN HEALTH, AND SAFETY

Goal: Promote a watershed environment that contributes to human health, well-being and safety



KEY ECOLOGICAL ATTRIBUTE	INDICATORS	HEALTH RATING/VIABILITY ASSESSMENT			
		Poor	Fair	Good	Very Good
Clean Air	Air Quality Objectives for NO2, CO, O3, and Fine Particulates	MV air quality objectives rarely met	MV air quality objectives met sometimes	MV air quality objectives met most of the time	MV air quality objectives always met
					Current
Clean Water	E.Coli and Coliforms in Main-stem and Tributaries	Measurements throughout the watershed are consistently BELOW (>50% of the time) the attainment (green) level	Measurements in specific problematic locations are consistently BELOW (>50% of the time) the attainment (green) level	Measurements are sporadically BELOW (less than 50% of the time) the attainment level, with no developing trend	Measurements are consistently BETTER (95%+ of the time) than the attainment level
			Maple Creek		Mainstem
	Source Drinking Water Quality (Turbidity, E-Coli and Coliforms)	Drinking water objectives rarely met	Drinking water objectives met sometimes	Drinking water objectives met most of the time	Drinking water objectives always met
					Current (2011)
Safety From Natural Hazards and Floods	Safety from Floods and Other Natural Hazards				
Physical Use of The Watershed	Duration and Frequency of Walking in the Watershed				

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RESOURCE INDUSTRIES

Goal: Promote sustainable use of renewable resources and monitored, prudent use of non-renewable resources

KEY ECOLOGICAL ATTRIBUTE	INDICATORS	Poor	Fair	Good	Very Good
Water Supply	Annual Demand (m3)	Increased demand	Maintained at current level	Slight decrease in demand	Substantial decrease in demand
			Current		
	Average Annual Daily Flow per Capita (Lpcd)	Increased demand	Maintained at current level	Slight decrease in demand	Substantial decrease in demand
				Current	
Energy	Production				
	Consumption				
Gravel	Annual Production				
	Consumption				

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STEWARDSHIP

Goal: Foster a stewardship ethic in all who interact with the watershed

KEY ECOLOGICAL ATTRIBUTE	INDICATORS	Poor	Fair	Good	Very Good
Awareness and Education	Coquitlam River Watershed in the Media (Facebook, Twitter, YouTube, Local Papers)	Decrease from current level	Current level	10% more	20% more
			Current		
	# of Roundtable & Environmental Events and Classroom Programs (and Participants)				
Regulatory Support	Municipal and Regional Bylaws, Regulations, Policies, and Programs for Environmental Protection	Few bylaws, inconsistently applied. Limited or no enforcement.	Regulations for natural areas protection. Some enforcement and tracking.	Regulations for a range of environmental components, including water, vegetation, soils and air quality. Some enforcement.	Detailed regulations including water quality, water conservation, invasive species, pesticide use, wildlife management, air quality, etc. Coordinated enforcement.
				Current	
Community Engagement in Responsible Behaviours	# of People Participating in Stewardship Activities (Great Canadian Shoreline Cleanup, Adopt a Trail Program, Invasive Species Removal, and Tree Plantings)	Decrease from current level	Current level	10% more	20% more
	Private Land Stewardship (# of households purchasing rain-barrels etc.)		Current		

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CULTURAL AND SPIRITUAL

Goal: Support opportunities for people to connect in the watershed through personal spiritual experiences, heritage conservation and the arts

KEY ECOLOGICAL ATTRIBUTE	INDICATORS	HEALTH RATING/VIABILITY ASSESSMENT			
		Poor	**Fair**	**Good**	**Very Good**
Spiritual	Catalogue or Description of Spiritual Experiences	No catalogue/ descriptions	Some catalogue/ descriptions **Current?**	Growing catalogue/ descriptions	Complete catalogue/ descriptions
Spiritual	Sockeye Returns	Less than 50 detected per year; Irregular **Current**	Regular detections of 50+ per year	Regular detections of 500+ per year	At maximum levels allowed (5,000)
Spiritual	Maintenance of Places that Provide Connections	No places; Places lost	Few places; places threatened or inaccessible **Current ?**	Sufficient; places protected/restored or access improved	New places created
Heritage	Storytelling and language	Stories/language lost or archived	Some stories shared **Current?**	Stories shared regularly; language preserved	Wide format/ variety of sharing
Public Art	Number of Artistic Displays/Events Inspired by the Watershed	Rare watershed inspired public art installations or events	Occasional watershed inspired public art installations or events **Current ?**	Regular watershed inspired public art installations or events	Regular watershed inspired public art installations or events connected to the Roundtable

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RECREATION

Goal: Promote passive and active recreation that respects other users and the watershed

KEY ECOLOGICAL ATTRIBUTE	INDICATORS	HEALTH RATING/VIABILITY ASSESSMENT			
Access and Opportunity	Accessibility , Diversity, and Impact of Trails to River (to be further developed)				
Access and Opportunity	Organized and Self-Guided Wildlife and Nature Viewing Opportunities				
Recreational Use	Percent of Residents Who Use the Watershed for Active or Passive Recreation	Decrease from current level	Current level	Increased percentage of users from current level	Increased percentage of users from current level and increased diversity of users (e.g. age).
Satisfaction, Safety, and Respect	Satisfaction with Hiking, Walking and Biking Trails				
Satisfaction, Safety, and Respect	Recreational User Safety	Increase from current level of reported incidents	Current level	Decrease of reported incidents from current level	No reported incidents
Satisfaction, Safety, and Respect	Compliance with Regulations and Social Norms				
Satisfaction, Safety, and Respect	Catch Success				

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Appendix 5. Identification of Pressures

An initial phase to identify *pressures, stresses, and drivers* in the Lower Coquitlam River watershed occurred during the June 6th, 2013, public Roundtable meeting.

At the June 6th, 2013, public Roundtable meeting, Abby Hook provided an overview of how pressures that exist within the watershed are identified and ranked for each component and illustrated how ranking pressures within the watershed will help prioritize efforts and funds in addressing pressures which have the largest impact on the watershed. Abby Hook also presented the basis of conceptual modeling of pressures within the watershed as per the Open Standards framework process, and explained how conceptual modeling of pressures will assist in tracking the progress and health of each component within the watershed plan.

Abby Hook and partner Michelle Wainstein, then led an exercise with attendees to identify pressures that exist within the Lower Coquitlam Watershed. Participants were asked to consider the importance of defining pressures and the component(s) which the pressure impacts, as well as associated stressors and root causes of the pressure. Below is a table of results from the feedback session with attendees.

Results from feedback session at the June 6th, 2013, public Roundtable meeting for identifying pressures in the Lower Coquitlam watershed.

Component	Pressure	Associated Stresses	Root Causes
Coquitlam River System	Unsustainable development	Loss of vegetation	1. Lack of a watershed plan **(Technical)** 2. Growth management pressures at the regional level **(Driver)** 3. Unsustainable processes: mindset of people, lifestyle choices **(Social)**
Livable Communities	Storm water		1. Lack of education/awareness **(Social)** 2. Economic/political pressures 3. Legacy regulations 4. Varying standards (re: density) 5. Limitations to measuring/monitoring **(Technical)**

Attendees of the Roundtable meeting were then each provided a "Pressures Feedback" form and asked to individually identify and rank, in order of severity, the top three pressures and associated stresses for three ecological components and three human well-being components of their choice.

A list of typically cited, pre-defined pressures used in the Open Standards process was provided in the "Pressures Feedback" form by Hook and Knauer to encourage participants to use common language when identifying pressures. Since including human well-being components in the Open Standards planning process is relatively new, a predefined list of common pressures to human well-being components was not available. Noted pressures that were outside of the pre-defined

pressures were re-labeled as one of the listed pressures, or under a newly defined pressure (e.g. mainstream cultural norms), as appropriate.

Of the 61 participants, 32 participants either fully or partially completed the pressures feedback form. This process enabled pressures and stresses to be identified and ranked in severity, in order to determine the most critical pressures to individual components and to the Lower Coquitlam River ecosystem as a whole, so that attention can be directed at them.

Appendix 6. Pressure Definitions with Potential Stresses

Pressures	**Definitions**	**Potential Stresses to be Further Investigated**
Culverts	Pressures from actions that convert or degrade habitat or alter hydrology via installation of culverts to manage the flow and passage of water, sediment, and species.	Species passage limitations, altered hydrological dynamics, loss of riparian habitat, and altered sediment dynamics.
Dams and Dikes	Pressures from actions that convert or degrade habitat or alter hydrology via establishment of dikes or the installation of dams in order to manage the hydrologic flow in a system, often to improve human welfare.	Species passage limitations, altered hydrological processes, altered sediment dynamics, altered nutrient/organic dynamics, altered dissolved oxygen levels for rivers, flood intensification, changes in terrestrial/freshwater habitat upstream, and reduced habitat connectivity.
Development	Pressures associated with human settlements or other land uses with a substantial footprint, including residential, commercial, and industrial. This includes new and existing development. This also includes pressures from the deliberate and unintentional cutting of forests and trees (e.g. clearing for development, removal of hazardous trees, etc.).This does not include transportation and utility infrastructure, or storm-water associated with any developed areas (see related pressures).	Changes in habitat extent and quality, forest cover, habitat connectivity, diversity, structure, hydrology, noise, light pollution, solid waste, and traffic. Other stresses include reduced genetic diversity, reduced species abundance, disease, unsustainable growth, reduced natural aesthetics, lack of access to open/natural/gardening/recreational space, reduced cultural/spiritual connection, and decreased resilience to natural hazards.
Hatcheries	Pressures associated with non-commercial small-scale community run fish hatchery-related practices.	Potential possibility of disease introduction and pollution. Possible impacts to genetic diversity, abundance, fecundity, and productivity.
Hazardous Spills	Pressures associated with the accidental, episodic, or potentially catastrophic spill of oil and other hazardous wastes in aquatic and terrestrial environments. This does not include chronic or other frequent, smaller pollution events related to normal operations of vehicles, and vessels etc. (see related pressures).	Species kills, habitat degradation or destruction, impaired species/habitat condition, reduced access to or quality of recreational activities in the river, and apathy towards improving/upgrading infrastructure for prevention.

Invasive Species	Pressures associated with the introduction and distribution of non-native species or genes that are capable of aggressively establishing or causing environmental damage.	Competition, genetic disruption, predation, and habitat degradation and loss of recreational and cultural connections to native species.
"Mainstream" Cultural Norms	Pressures associated with the disconnection from or lack of understanding of the value of local ecosystem services provided to people by local natural resources. Includes quality/access to environmental education, work-life imbalances, and pervasiveness of media/technology, globalization of culture and products, and materialism/consumerism.	Changes in apathy, stewardship interest, environmental knowledge/awareness, sense of place or identification/connection with nature, of time/value for nature, of value for local culture and products, and feelings of wellness.
Mining	Pressures associated with the commercial extraction of non-biological resources. This includes air and water pollution associated with mining and related activities.	Potential erosion, altered sediment dynamics, and altered hydrology. Possible slope instability, air/water quality, habitat loss, and habitat degradation.
Recreational Activities	Pressures from human activities that alter, destroy, and disturb habitats and species associated with non-consumptive and consumptive uses of biological resources. This includes illegal harvesting of wild and cultivated species (such as fishing and gathering of berries and fiddleheads). This also includes recreational vessels, off-road vehicles, associated air and water pollution, and disobeying bylaws for recreation such as dogs off leash, biking on walking trails, and creating fires where not permitted. This does not include transportation networks associated with recreational activities.	Potential erosion. Impacts to air quality, water quality, and species conditions (including genetic diversity, abundance, fecundity, and productivity). Possible loss of recreational and cultural connections to iconic species, and impacts to quality of recreational experiences.
Roads, Railroads and Transportation	Pressures associated with the quantity and location of transportation and service networks, including boats, cars, trains and pipelines, transmission lines, and roads associated with timber harvest. This includes air pollution from vehicles. This does not include storm-water, accidental spills associated with transportation networks, or pressures associated with recreational vehicles (see related pressures).	A change in habitat extent and quality, habitat connectivity, species diversity, air quality, water quality, impervious surfaces, human health (accidents, air/water quality), and pedestrian/cycling opportunities.

Sewage and Wastewater Spills	Pressures associated with accidental spills of water-borne sewage that includes nutrients, pathogens, toxic chemicals, and sediments.	Introduction of toxins, and degraded water quality, reduced access to or quality of recreational activities in the river, apathy towards improving/upgrading infrastructure for prevention.
Stormwater	Pressures from the introduction of exotic or excess material into hydrologic systems due to surface water loading and runoff from the built environment. The "built environment" includes commercial, residential, and industrial lands and transportation facilities and corridors. This does not include discharge from, wastewater discharged from recreational and other vessels, or runoff from other activities (e.g. tree clearing) (see related pressures).	Introduction of toxins, degraded water quality (temperature, turbidity), altered hydrological dynamics, altered nutrient levels, reduced human health, and impaired species/habitat condition and reduced access to or quality of recreational activities in the river.
Urban Wildlife	Pressures associated with urban wildlife accessing areas in search of places to reside and to find food, both natural (e.g., berries, insects, salmon) and unnatural attractants (e.g., solid food waste), causing conflicts for residential safety and wildlife resulting in injury or death.	Changes in species abundance and composition (e.g., deer, bears, cougars versus smaller mammals, wildfowl residing and changes in suitable natural habitat spaces for local wildlife.
Vandalism/ Illegal Activities	Pressures associated with the crime of destroying or damaging natural resources that can also affect human well-being. This includes dumping of garbage, littering, trespassing, vandalizing public and private property, and intentionally harming nature and species such as vegetation, birds, and fish.	Effects on water and habitat quality, and species abundance. May also result in stresses to cultural and spiritual connections to nature, changes in the quality of recreational activities, and apathy/ stewardship interest..
Water Extraction	Pressures associated with modification, extraction, or diversion of water supplies. This includes changing water flow patterns, such as in-stream flows, from their natural range of variation either deliberately as a result of water supply or flood management operations.	Changes in volume – groundwater or surface flow, altered flow regime (timing and magnitude of high and low flows) and habitat.

Appendix 7. Pressure Rating Criteria

Scope: This can be thought of as the "scope of impact", and differs from the entire geographic "project scope". Most commonly defined spatially, scope is the proportion of the component that can reasonably be expected to be affected by the pressure within ten years, given the continuation of current circumstances and trends. Scope is binned into four categories:

- **Very High:** The pressure is likely to be pervasive in its scope, affecting the component across all or most (71-100%) of its occurrence/population.
- **High:** The pressure is likely to be widespread in its scope, affecting the component across much (31-70%) of its occurrence/population.
- **Medium:** The pressure is likely to be restricted in its scope, affecting the component across some (11-30%) of its occurrence/population.
- **Low:** The pressure is likely to be very narrow in its scope, affecting the component across a small proportion (1-10%) of its occurrence/population.

Severity. Within the scope, severity is the level of damage to the component from the pressure that can reasonably be expected given the continuation of current circumstances and trends.
For ecosystems and ecological communities, this is typically measured as the degree of destruction or degradation of the component within the geographic project scope. Severity is binned into four categories:

- **Very High:** Within the geographic project scope, the pressure is likely to destroy or eliminate the component, or reduce its population by 71-100% within ten years or three generations.
- **High:** Within the geographic project scope, the pressure is likely to seriously degrade/reduce the component or reduce its population by 31-70% within ten years or three generations.
- **Medium:** Within the geographic project scope, the pressure is likely to moderately degrade/reduce the component or reduce its population by 11-30% within ten years or three generations.
- **Low:** Within the geographic project scope, the pressure is likely to only slightly degrade/reduce the component or reduce its population by 1-10% within ten years or three generations.

Irreversibility. Irreversibility is the degree to which the effects of a pressure can (or cannot) be reversed and the health of the affected component restored (or not). Irreversibility is binned into four categories:

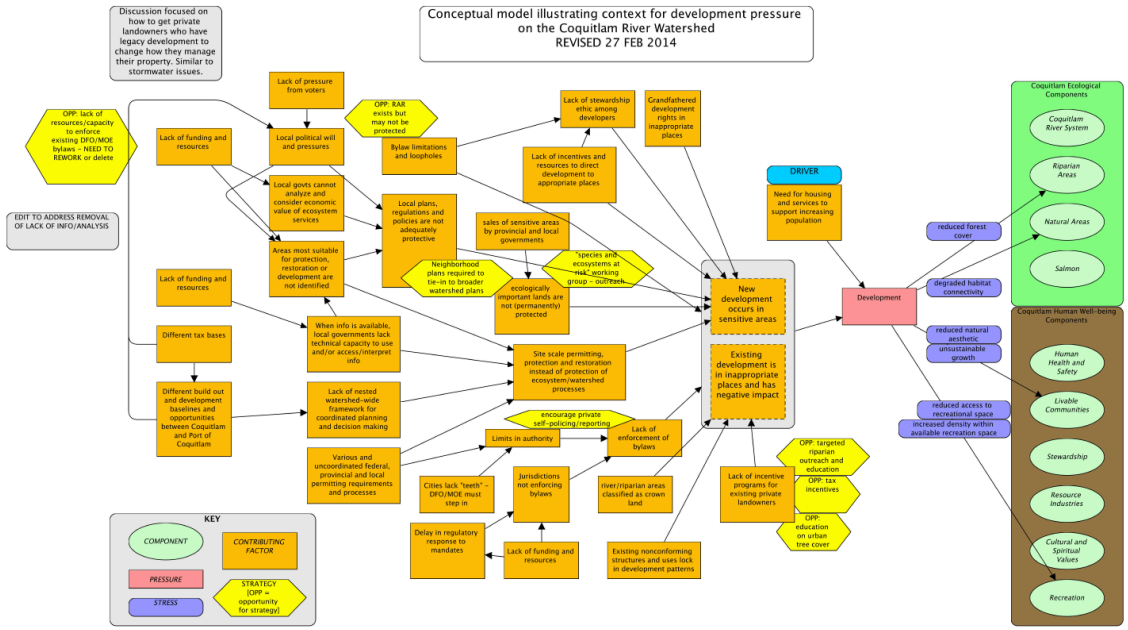
- **Very High:** The effects of the pressure cannot be reversed and it is very unlikely the component can be restored, and/or it would take more than 100 years to achieve this (e.g., wetlands converted to a shopping center).
- **High:** The effects of the pressure can technically be reversed and the component restored, but it is not practically affordable and/or it would take 21-100 years to achieve this (e.g., wetland converted to agriculture).
- **Medium:** The effects of the pressure can be reversed and the component restored with a reasonable commitment of resources and/or within 6-20 years (e.g., ditching and draining of wetland).
- **Low:** The effects of the pressure are easily reversible and the component can be easily restored at a relatively low cost and/or within 0-5 years (e.g., off-road vehicles trespassing in wetland).

Appendix 8. Ranking of Severity for Identified Pressures

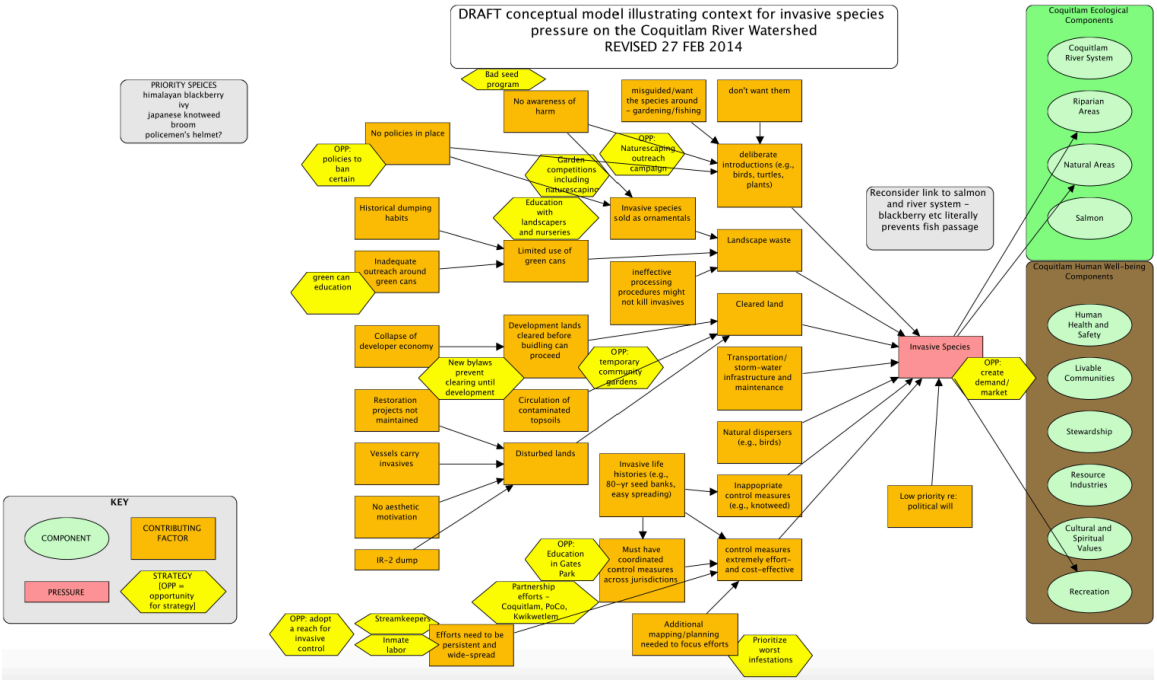
	Ecological and Human Well-being Components										
Pressures ↓	**Coquitlam River system**	**Natural areas**	**Salmon**	**Riparian areas**	**Human health and safety**	**Resource industries**	**Livable communities**	**Cultural and spiritual values**	**Stewardship**	**Recreation**	**Summary Pressure Rating ↓**
Hazardous spills	High		Very High		High					High	Very High
Stormwater	High		High	Medium	Low	Low		Low			High
Invasive species		High		High						Low	High
Development	Medium	Very High		High	Low	Low	Low	Medium			High
Water extraction	Medium		Medium		Low	Low		Low		Low	Medium
Vandalism / Illegal activities	Medium	Low		High				Medium	Low	Low	Medium
Roads, railroads, transportation	Medium	Medium	Low	Low	Medium		Medium			Low	Medium
Recreation	Medium	Medium	Low	Medium		Low				Medium	Medium
Mainstream cultural norms					High	Low		Medium	Medium	Medium	Medium
Dams and dikes	Medium	Medium	Medium	Low				Medium			Medium
Culverts	Medium		Medium								Medium
Urban wildlife					Low		Low				Low
Sewage and wastewater spills			Low		Low		Low				Low
Mining - aggregate	Low		Low				Low				Low
Hatcheries			Low							Low	Low

Appendix 9. Conceptual Models Illustrating Context for Pressures

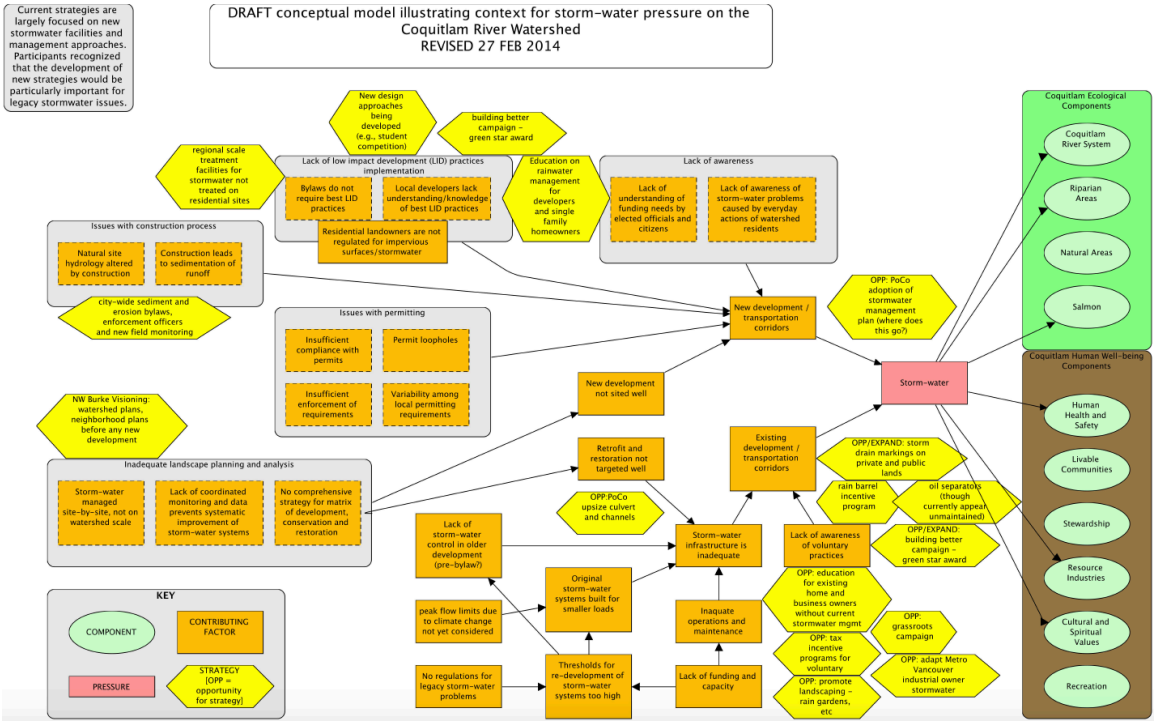
DRAFT Development Conceptual Model



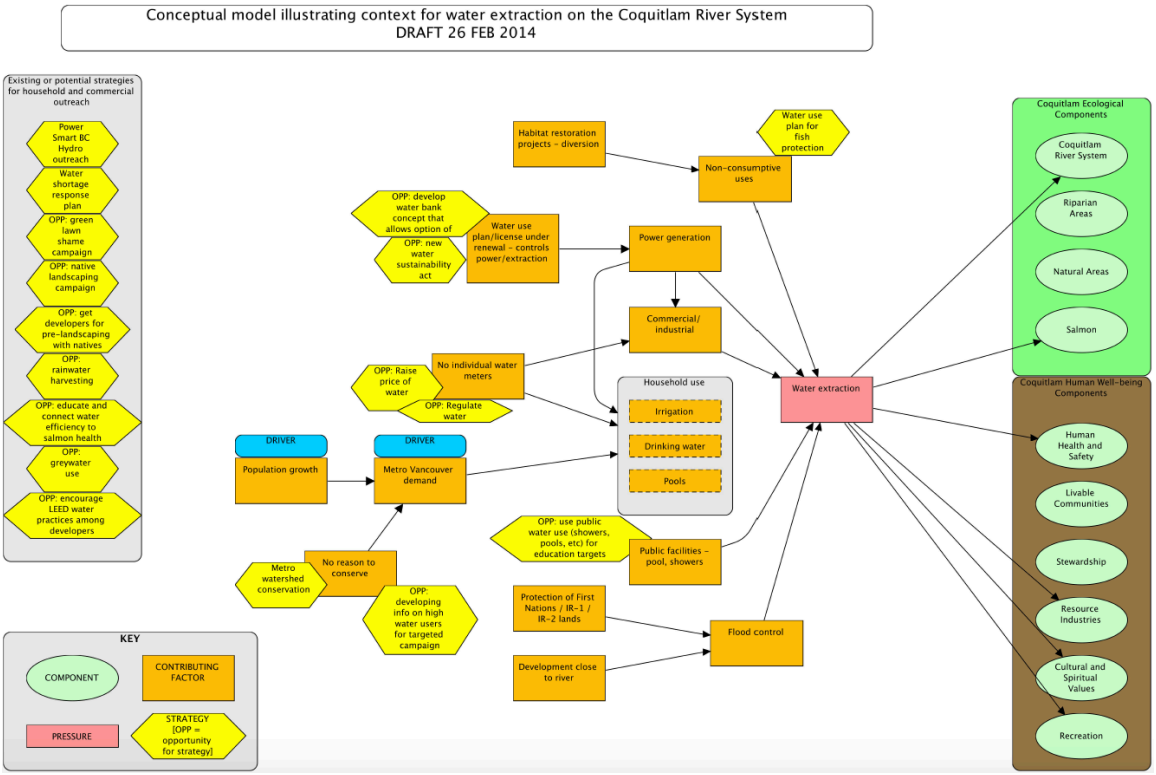
DRAFT Invasive Species Conceptual Model



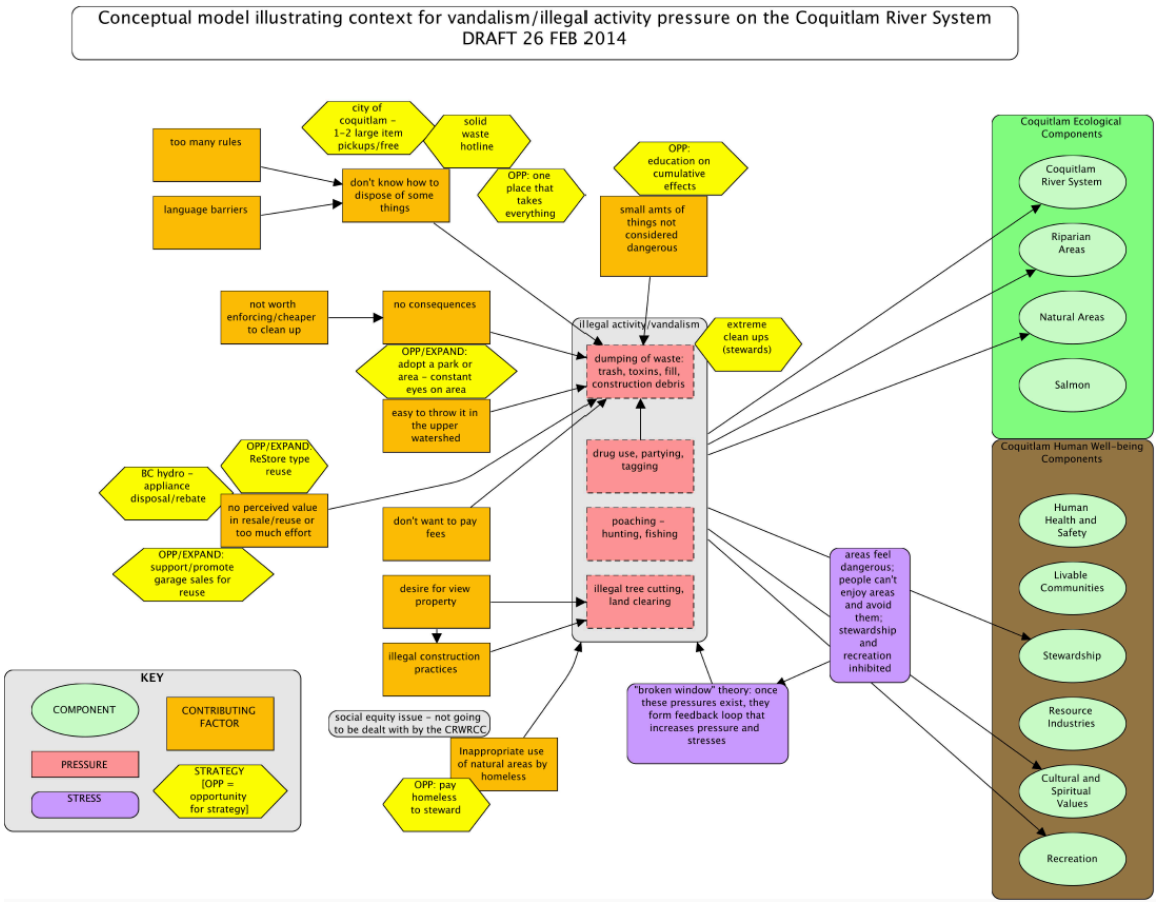
DRAFT Stormwater Conceptual Model



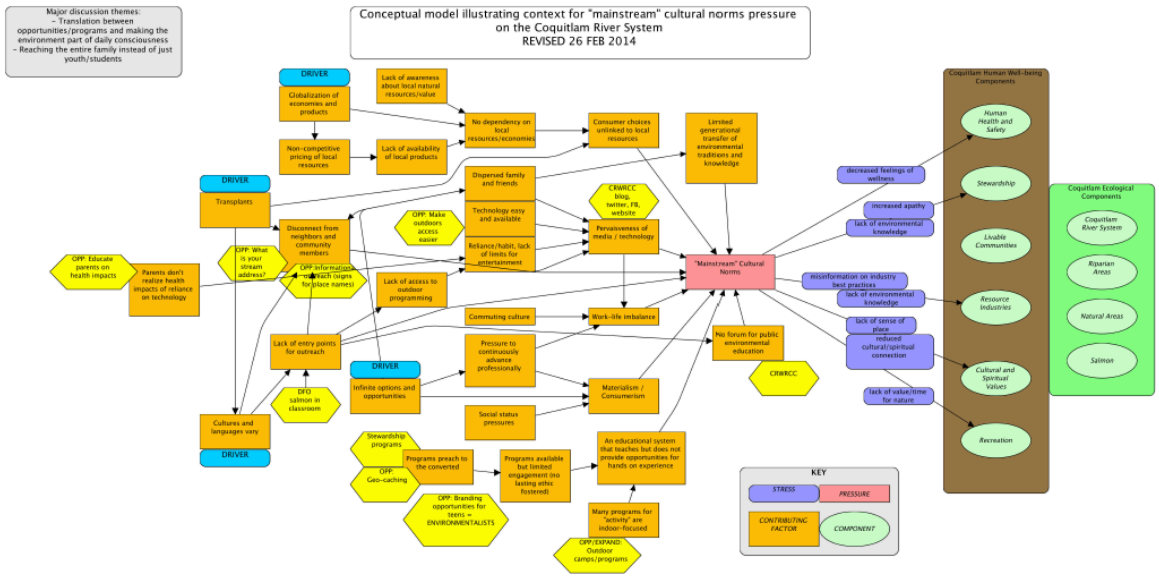
DRAFT Water Extraction Conceptual Model



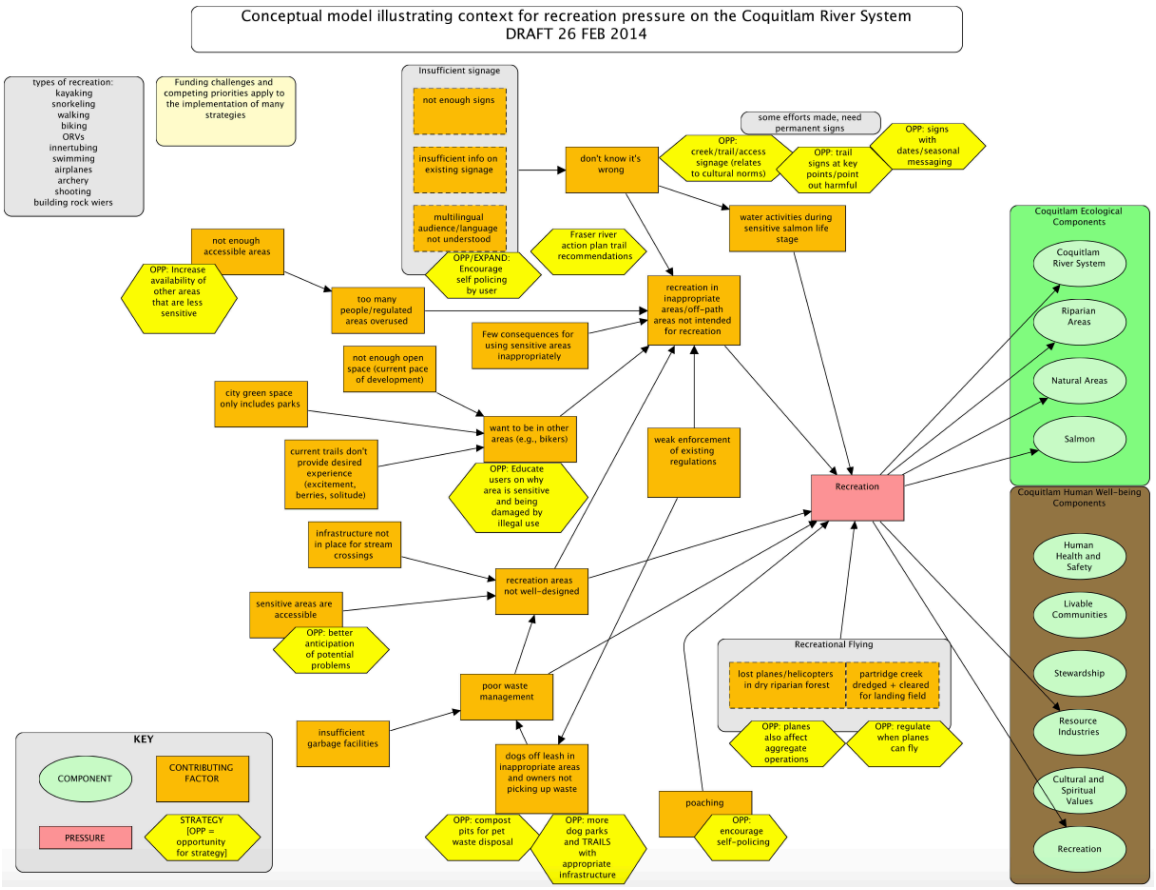
DRAFT Vandalism/ Illegal Activities Conceptual Model



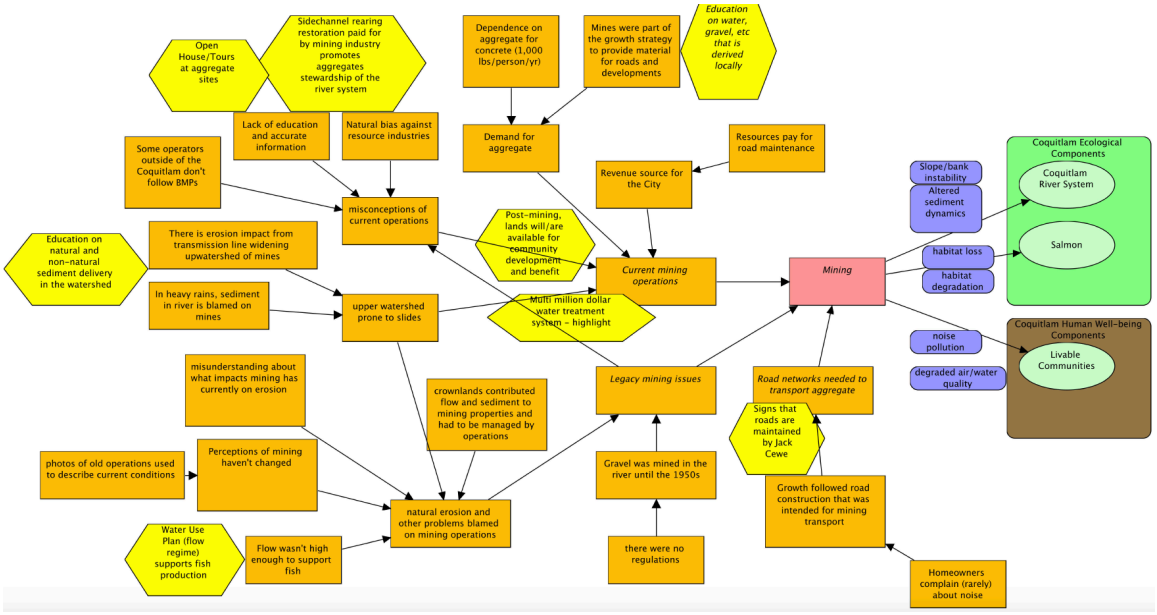
DRAFT Mainstream Cultural Norms Conceptual Model



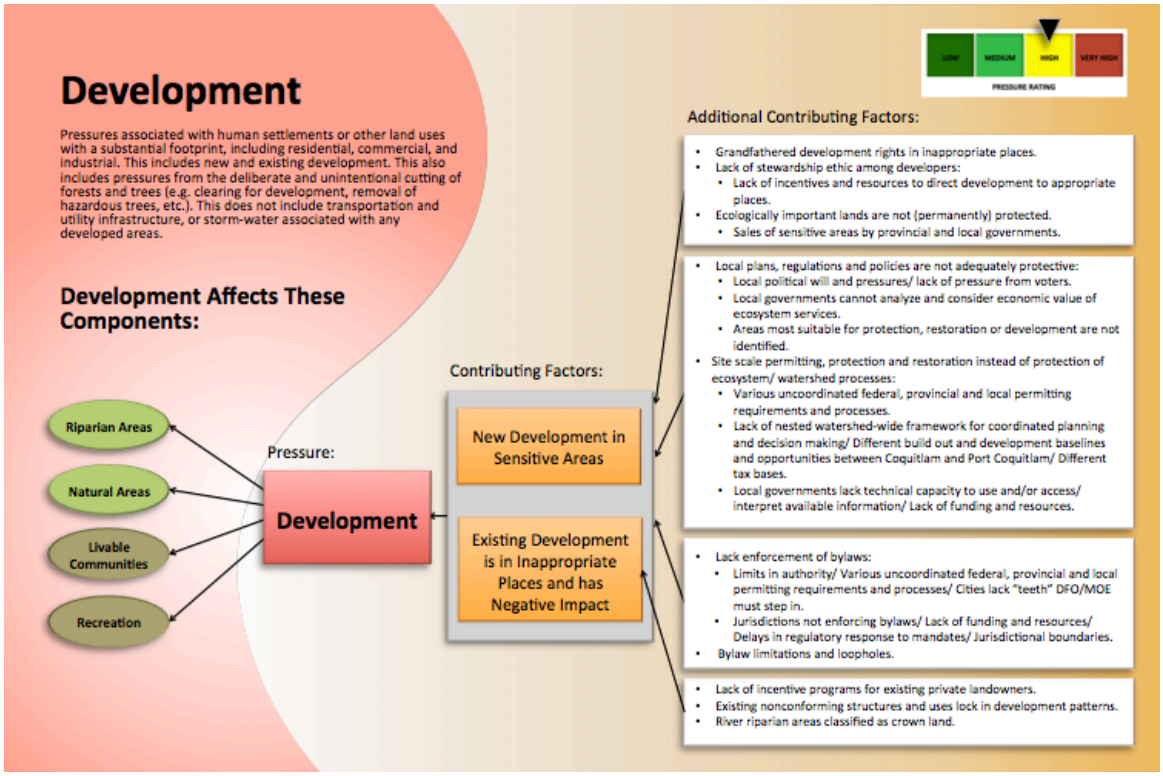
DRAFT Recreation Conceptual Model

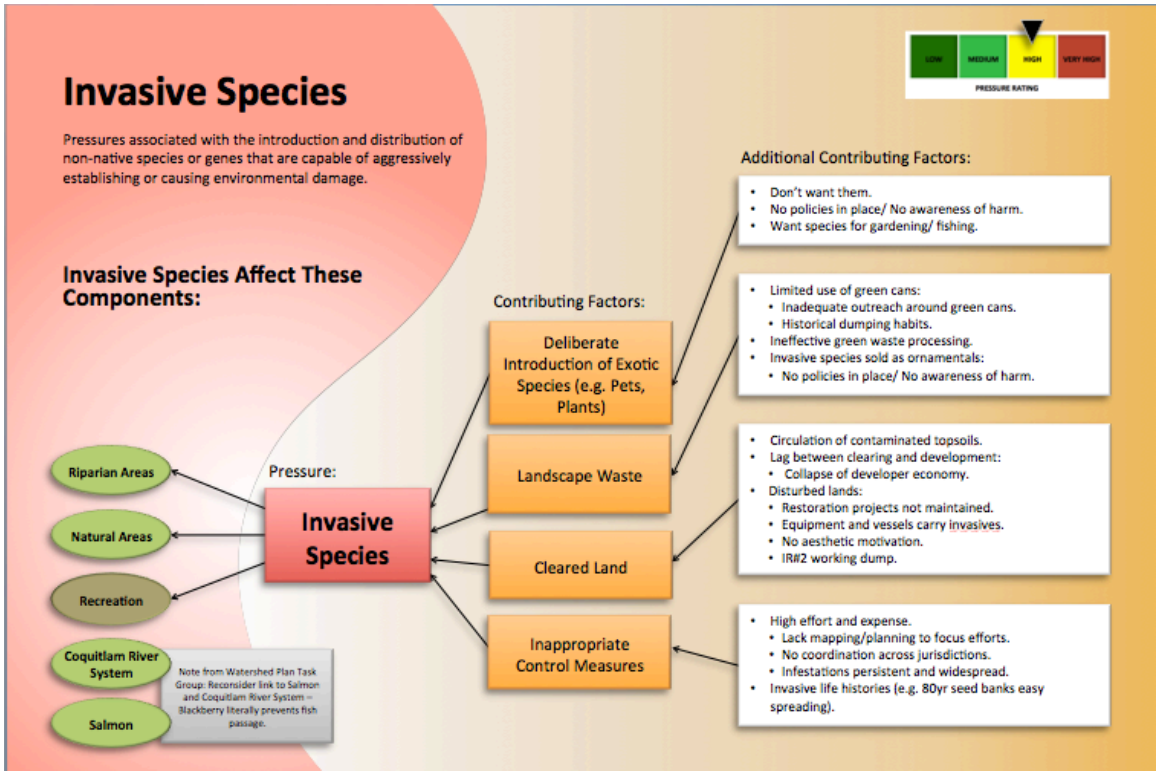


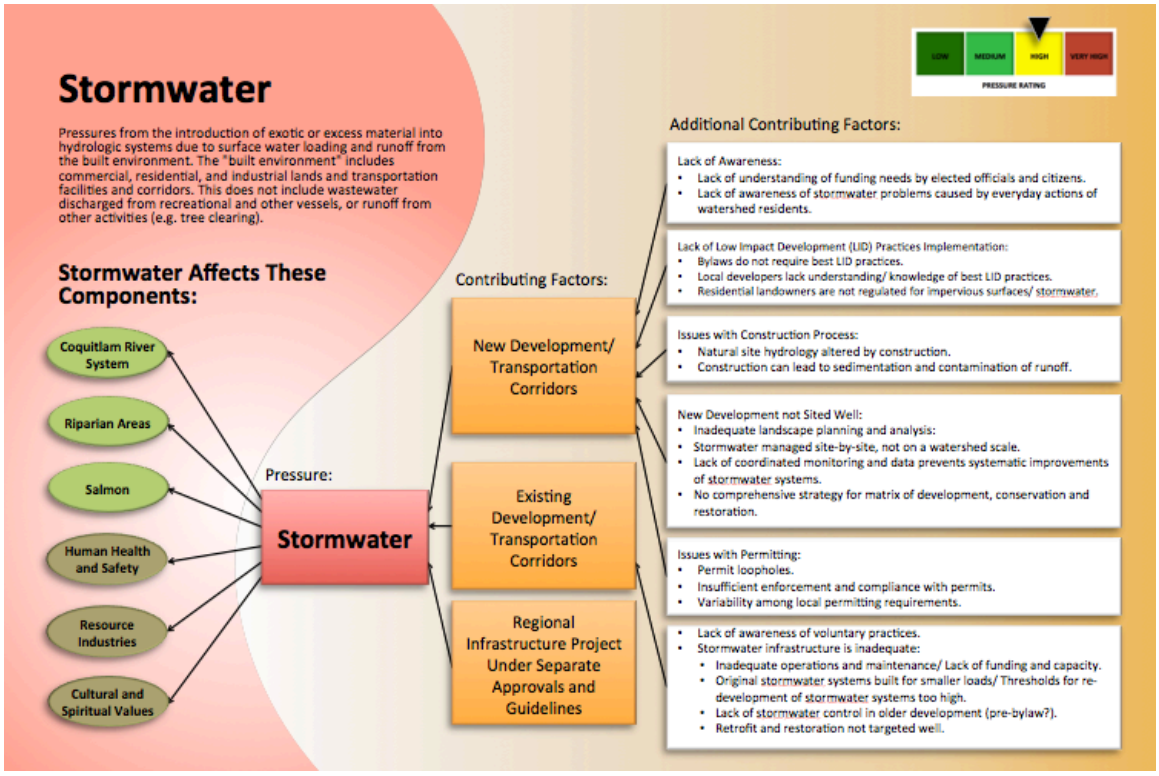
DRAFT Mining Conceptual Model

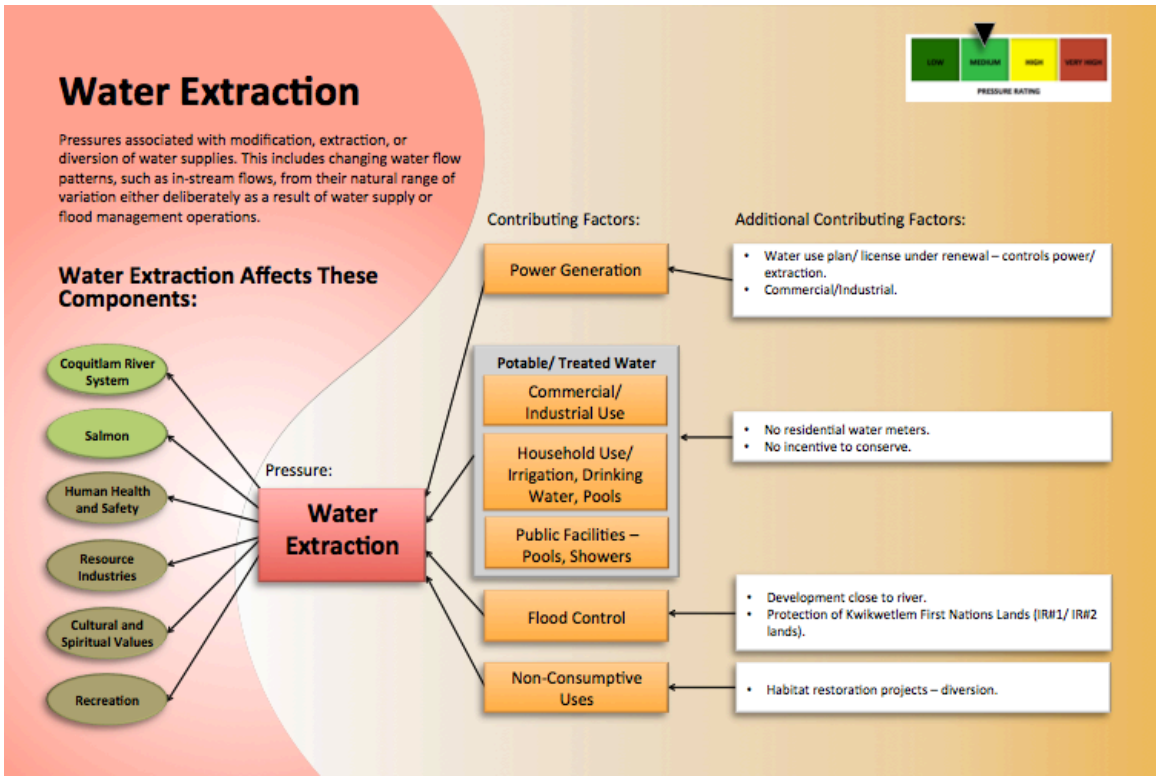


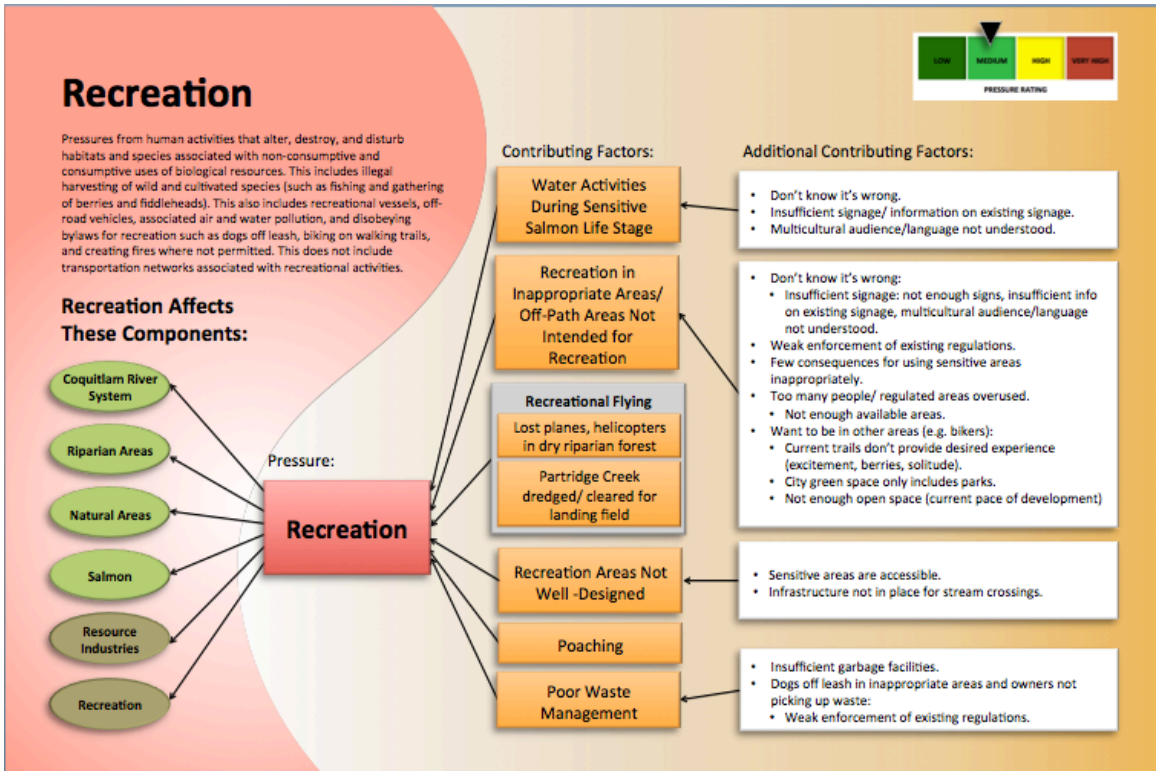
Appendix 10. Conceptual Models – Community Oriented Narratives

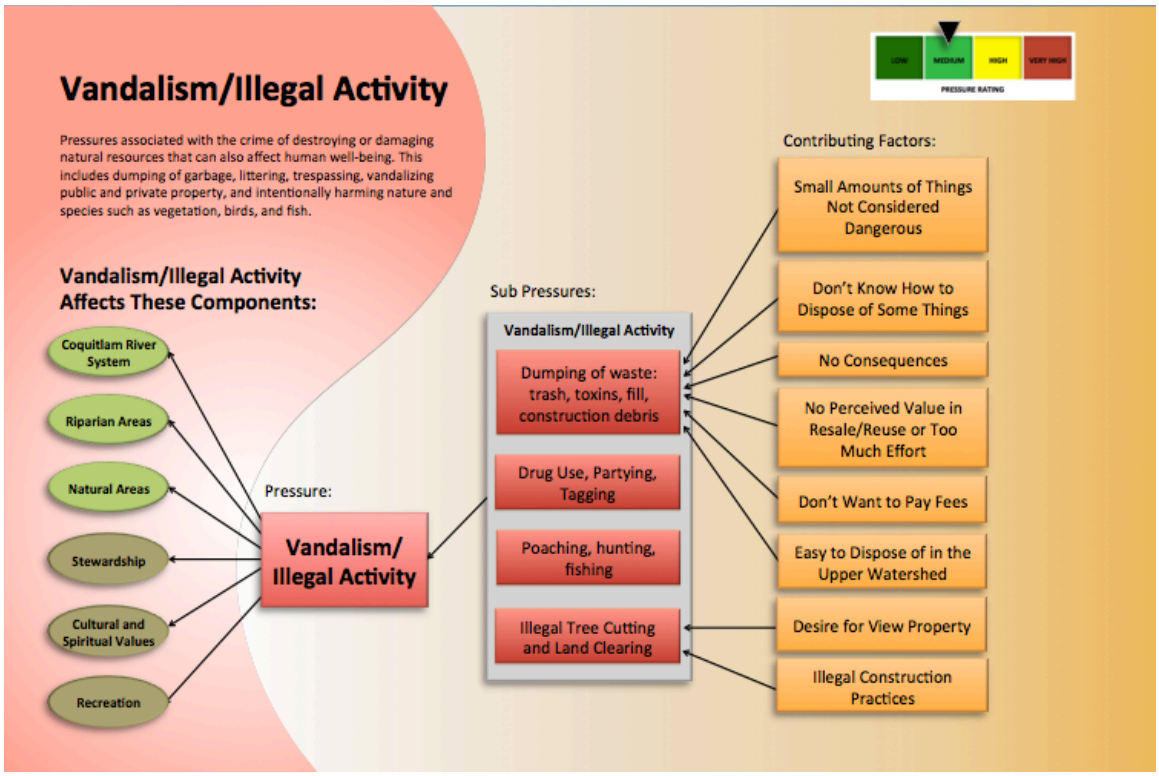


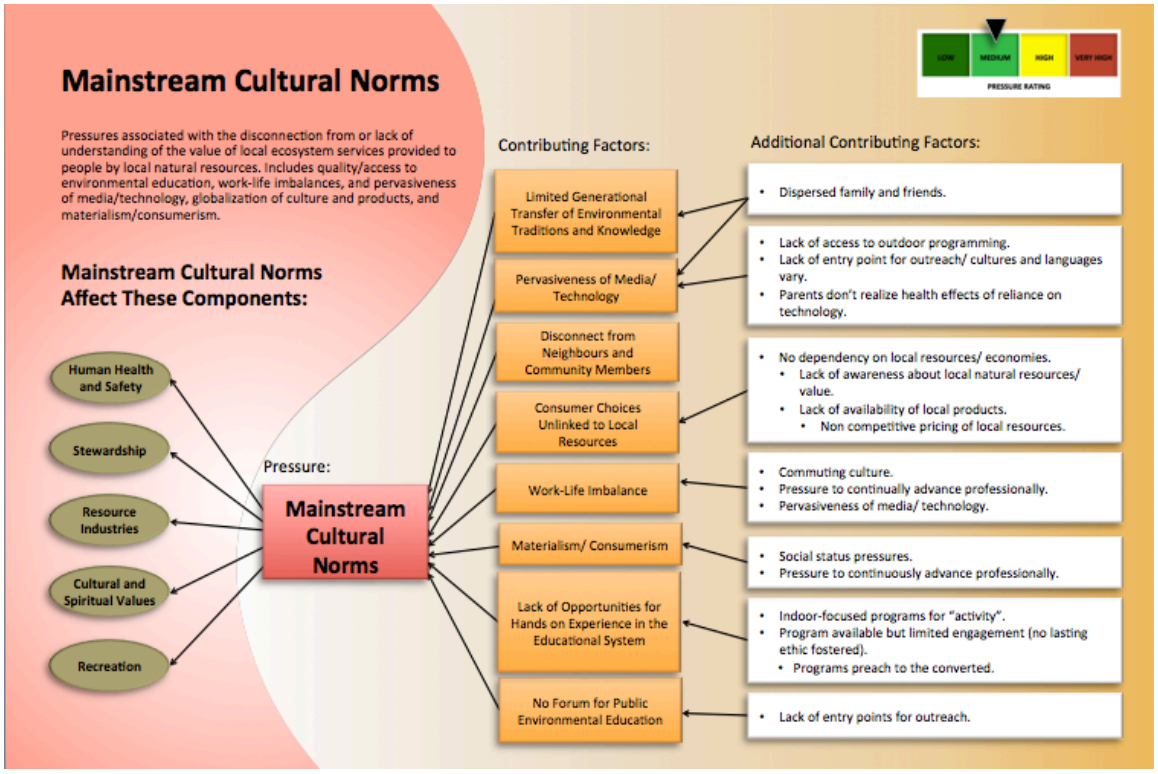


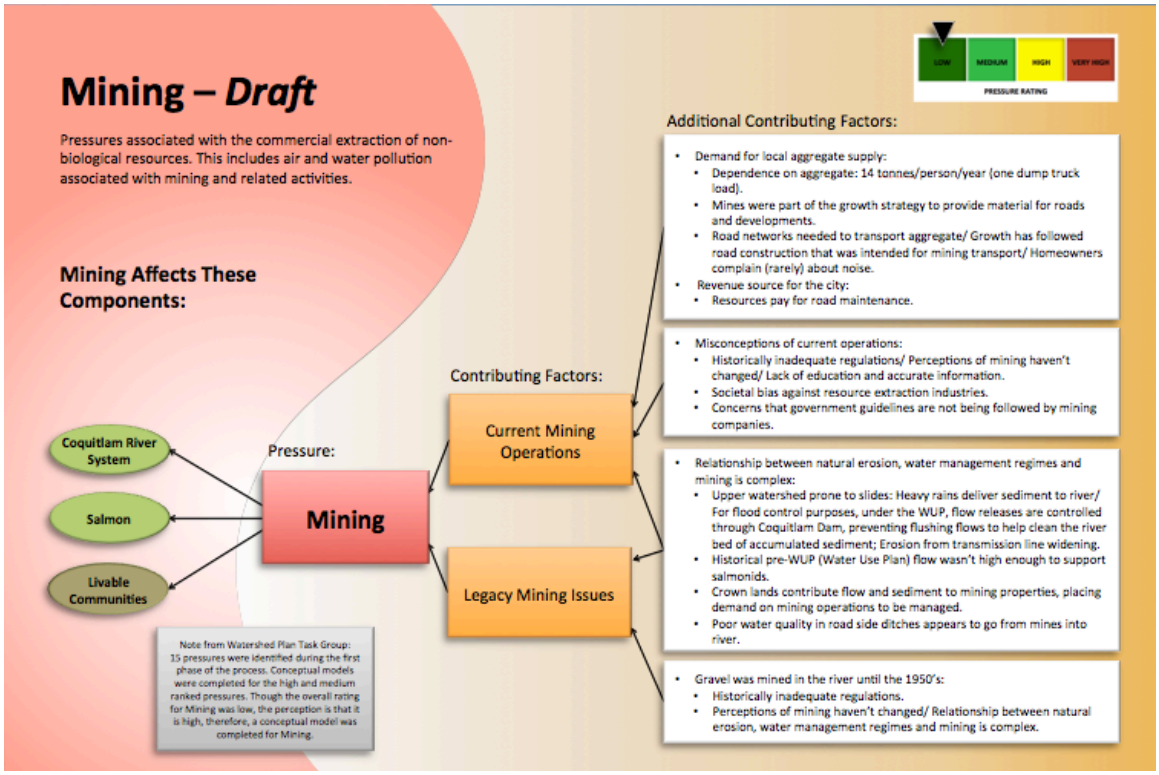

Stormwater
Pressures from the introduction of exotic or excess material into hydrologic systems due to surface water loading and runoff from the built environment. The "built environment" includes commercial, residential, and industrial lands and transportation facilities and corridors. This does not include wastewater discharged from recreational and other vessels, or runoff from other activities (e.g. tree clearing).
LOW
MEDIUM
HIGH
VERY HIGH
PRESSURE RATING
Stormwater Affects These Components:
Coquitlam River System
Riparian Areas
Salmon
Human Health and Safety
Resource Industries
Cultural and Spiritual Values
Pressure:
Stormwater
Contributing Factors:
New Development/ Transportation Corridors
Existing Development/ Transportation Corridors
Regional Infrastructure Project Under Separate Approvals and Guidelines
Additional Contributing Factors:
Lack of Awareness:
• Lack of understanding of funding needs by elected officials and citizens.
• Lack of awareness of stormwater problems caused by everyday actions of watershed residents.
Lack of Low Impact Development (LID) Practices Implementation:
• Bylaws do not require best LID practices.
• Local developers lack understanding/ knowledge of best LID practices.
• Residential landowners are not regulated for impervious surfaces/ stormwater.
Issues with Construction Process:
• Natural site hydrology altered by construction.
• Construction can lead to sedimentation and contamination of runoff.
New Development not Sited Well:
• Inadequate landscape planning and analysis:
• Stormwater managed site-by-site, not on a watershed scale.
• Lack of coordinated monitoring and data prevents systematic improvements of stormwater systems.
• No comprehensive strategy for matrix of development, conservation and restoration.
Issues with Permitting:
• Permit loopholes.
• Insufficient enforcement and compliance with permits.
• Variability among local permitting requirements.
• Lack of awareness of voluntary practices.
• Stormwater infrastructure is inadequate:
• Inadequate operations and maintenance/ Lack of funding and capacity.
• Original stormwater systems built for smaller loads/ Thresholds for re-development of stormwater systems too high.
• Lack of stormwater control in older development (pre-bylaw?).
• Retrofit and restoration not targeted well.


Water Extraction
Pressures associated with modification, extraction, or diversion of water supplies. This includes changing water flow patterns, such as in-stream flows, from their natural range of variation either deliberately as a result of water supply or flood management operations.
LOW
MEDIUM
HIGH
VERY HIGH
PRESSURE RATING
Water Extraction Affects These Components:
Coquitlam River System
Salmon
Human Health and Safety
Resource Industries
Cultural and Spiritual Values
Recreation
Pressure:
Water Extraction
Contributing Factors:
Power Generation
Potable/ Treated Water
Commercial/ Industrial Use
Household Use/ Irrigation, Drinking Water, Pools
Public Facilities – Pools, Showers
Flood Control
Non-Consumptive Uses
Additional Contributing Factors:
• Water use plan/ license under renewal – controls power/ extraction.
• Commercial/Industrial.
• No residential water meters.
• No incentive to conserve.
• Development close to river.
• Protection of Kwikwetlem First Nations Lands (IR#1/ IR#2 lands).
• Habitat restoration projects – diversion.


Recreation
Pressures from human activities that alter, destroy, and disturb habitats and species associated with non-consumptive and consumptive uses of biological resources. This includes illegal harvesting of wild and cultivated species (such as fishing and gathering of berries and fiddleheads). This also includes recreational vessels, off-road vehicles, associated air and water pollution, and disobeying bylaws for recreation such as dogs off leash, biking on walking trails, and creating fires where not permitted. This does not include transportation networks associated with recreational activities.
LOW
MEDIUM
HIGH
VERY HIGH
PRESSURE RATING
Recreation Affects These Components:
Coquitlam River System
Riparian Areas
Natural Areas
Salmon
Resource Industries
Recreation
Pressure:
Recreation
Contributing Factors:
Water Activities During Sensitive Salmon Life Stage
Recreation in Inappropriate Areas/ Off-Path Areas Not Intended for Recreation
Recreational Flying
Lost planes, helicopters in dry riparian forest
Partridge Creek dredged/ cleared for landing field
Recreation Areas Not Well -Designed
Poaching
Poor Waste Management
Additional Contributing Factors:
Don't know it's wrong.
Insufficient signage/ information on existing signage.
Multicultural audience/language not understood.
Don't know it's wrong:
Insufficient signage: not enough signs, insufficient info on existing signage, multicultural audience/language not understood.
Weak enforcement of existing regulations.
Few consequences for using sensitive areas inappropriately.
Too many people/ regulated areas overused.
Not enough available areas.
Want to be in other areas (e.g. bikers):
Current trails don't provide desired experience (excitement, berries, solitude).
City green space only includes parks.
Not enough open space (current pace of development)
Sensitive areas are accessible.
Infrastructure not in place for stream crossings.
Insufficient garbage facilities.
Dogs off leash in inappropriate areas and owners not picking up waste:
Weak enforcement of existing regulations.

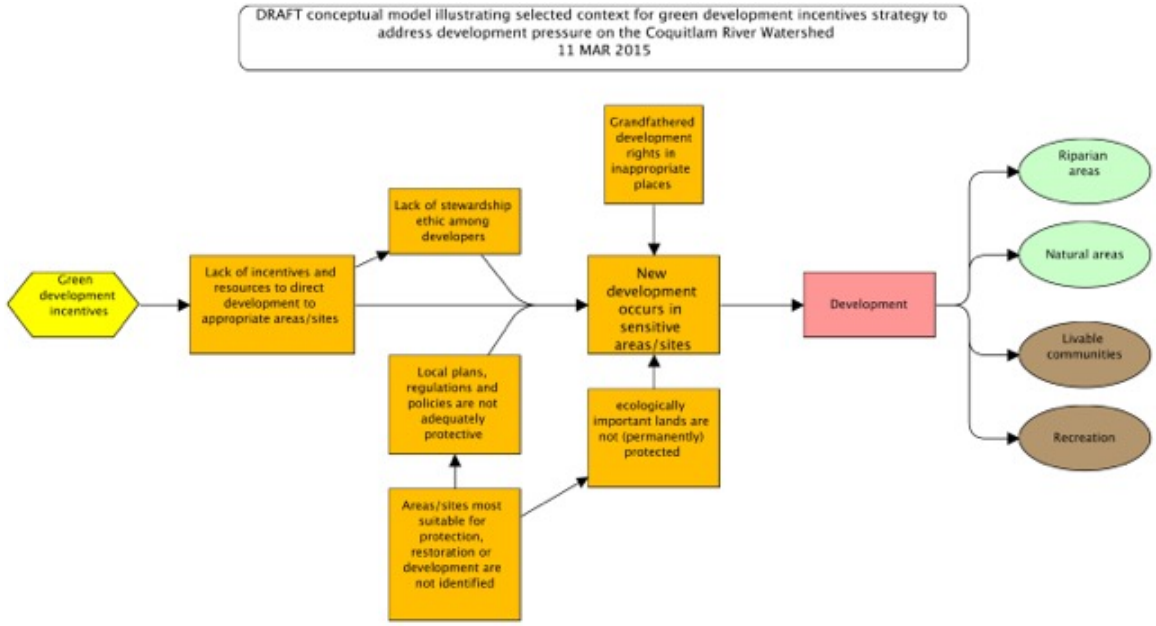

Vandalism/Illegal Activity
Pressures associated with the crime of destroying or damaging natural resources that can also affect human well-being. This includes dumping of garbage, littering, trespassing, vandalizing public and private property, and intentionally harming nature and species such as vegetation, birds, and fish.
LOW
MEDIUM
HIGH
VERY HIGH
PRESSURE RATING
Vandalism/Illegal Activity Affects These Components:
Coquitlam River System
Riparian Areas
Natural Areas
Stewardship
Cultural and Spiritual Values
Recreation
Pressure:
Vandalism/ Illegal Activity
Sub Pressures:
Vandalism/Illegal Activity
Dumping of waste: trash, toxins, fill, construction debris
Drug Use, Partying, Tagging
Poaching, hunting, fishing
Illegal Tree Cutting and Land Clearing
Contributing Factors:
Small Amounts of Things Not Considered Dangerous
Don't Know How to Dispose of Some Things
No Consequences
No Perceived Value in Resale/Reuse or Too Much Effort
Don't Want to Pay Fees
Easy to Dispose of in the Upper Watershed
Desire for View Property
Illegal Construction Practices


Mainstream Cultural Norms
Pressures associated with the disconnection from or lack of understanding of the value of local ecosystem services provided to people by local natural resources. Includes quality/access to environmental education, work-life imbalances, and pervasiveness of media/technology, globalization of culture and products, and materialism/consumerism.
Mainstream Cultural Norms Affect These Components:
Human Health and Safety
Stewardship
Resource Industries
Cultural and Spiritual Values
Recreation
Pressure:
Mainstream Cultural Norms
Contributing Factors:
Limited Generational Transfer of Environmental Traditions and Knowledge
Pervasiveness of Media/ Technology
Disconnect from Neighbours and Community Members
Consumer Choices Unlinked to Local Resources
Work-Life Imbalance
Materialism/ Consumerism
Lack of Opportunities for Hands on Experience in the Educational System
No Forum for Public Environmental Education
Additional Contributing Factors:
Dispersed family and friends.
Lack of access to outdoor programming.
Lack of entry point for outreach/ cultures and languages vary.
Parents don't realize health effects of reliance on technology.
No dependency on local resources/ economies.
Lack of awareness about local natural resources/ value.
Lack of availability of local products.
Non competitive pricing of local resources.
Commuting culture.
Pressure to continually advance professionally.
Pervasiveness of media/ technology.
Social status pressures.
Pressure to continuously advance professionally.
Indoor-focused programs for "activity".
Program available but limited engagement (no lasting ethic fostered).
Programs preach to the converted.
Lack of entry points for outreach.
LOW
MEDIUM
HIGH
VERY HIGH
PRESSURE RATING

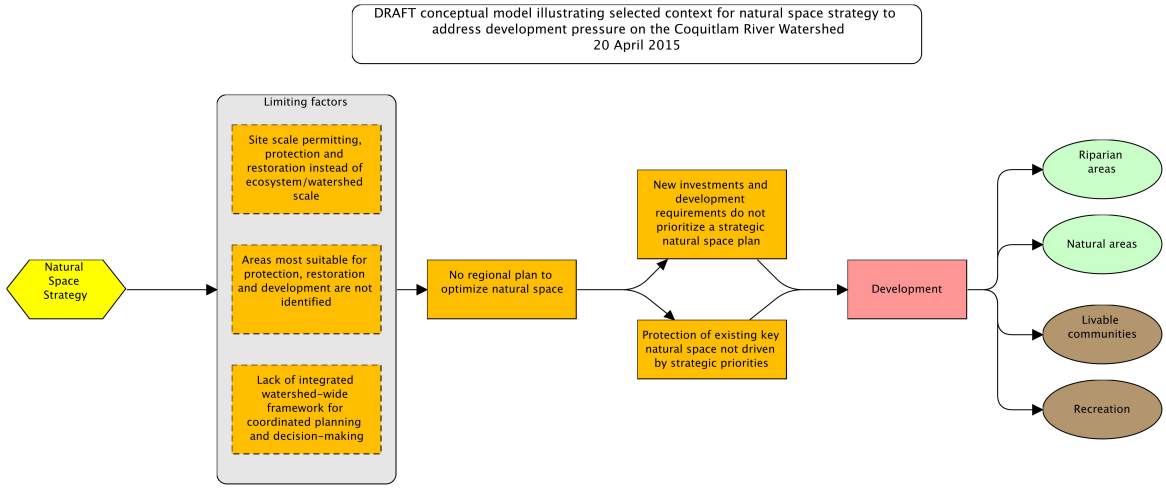

Mining – Draft
Pressures associated with the commercial extraction of non-biological resources. This includes air and water pollution associated with mining and related activities.
Mining Affects These Components:
Coquitlam River System
Salmon
Livable Communities
Pressure:
Mining
Contributing Factors:
Current Mining Operations
Legacy Mining Issues
Note from Watershed Plan Task Group: 15 pressures were identified during the first phase of the process. Conceptual models were completed for the high and medium ranked pressures. Though the overall rating for Mining was low, the perception is that it is high, therefore, a conceptual model was completed for Mining.
Additional Contributing Factors:
Demand for local aggregate supply:
Dependence on aggregate: 14 tonnes/person/year (one dump truck load).
Mines were part of the growth strategy to provide material for roads and developments.
Road networks needed to transport aggregate/ Growth has followed road construction that was intended for mining transport/ Homeowners complain (rarely) about noise.
Revenue source for the city:
Resources pay for road maintenance.
Misconceptions of current operations:
Historically inadequate regulations/ Perceptions of mining haven't changed/ Lack of education and accurate information.
Societal bias against resource extraction industries.
Concerns that government guidelines are not being followed by mining companies.
Relationship between natural erosion, water management regimes and mining is complex:
Upper watershed prone to slides: Heavy rains deliver sediment to river/ For flood control purposes, under the WUP, flow releases are controlled through Coquitlam Dam, preventing flushing flows to help clean the river bed of accumulated sediment; Erosion from transmission line widening.
Historical pre-WUP (Water Use Plan) flow wasn't high enough to support salmonids.
Crown lands contribute flow and sediment to mining properties, placing demand on mining operations to be managed.
Poor water quality in road side ditches appears to go from mines into river.
Gravel was mined in the river until the 1950's:
Historically inadequate regulations.
Perceptions of mining haven't changed/ Relationship between natural erosion, water management regimes and mining is complex.
LOW
MEDIUM
HIGH
VERY HIGH
PRESSURE RATING

Appendix 11. Draft Conceptual Models Illustrating Selected Context for Strategies

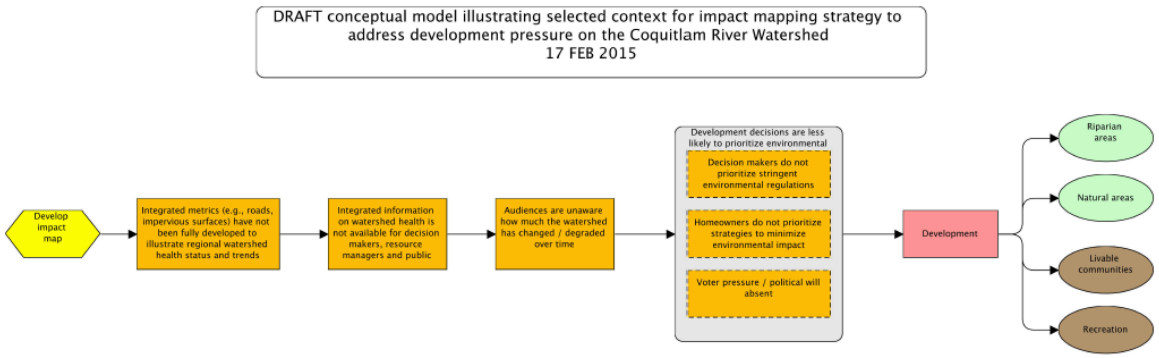
DRAFT Conceptual Model Illustrating Selected Context for Green Development to Address Development Pressure



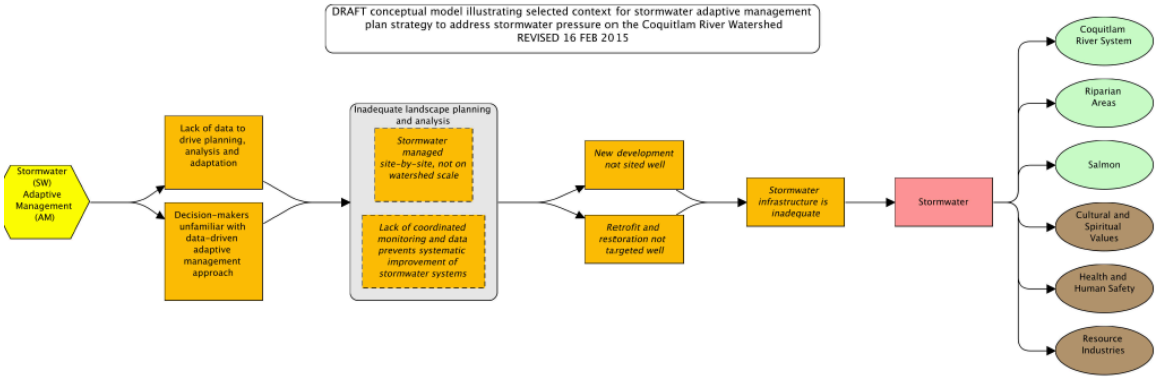
DRAFT Conceptual Model Illustrating Selected Context for Natural Space Strategy to Address Development Pressure



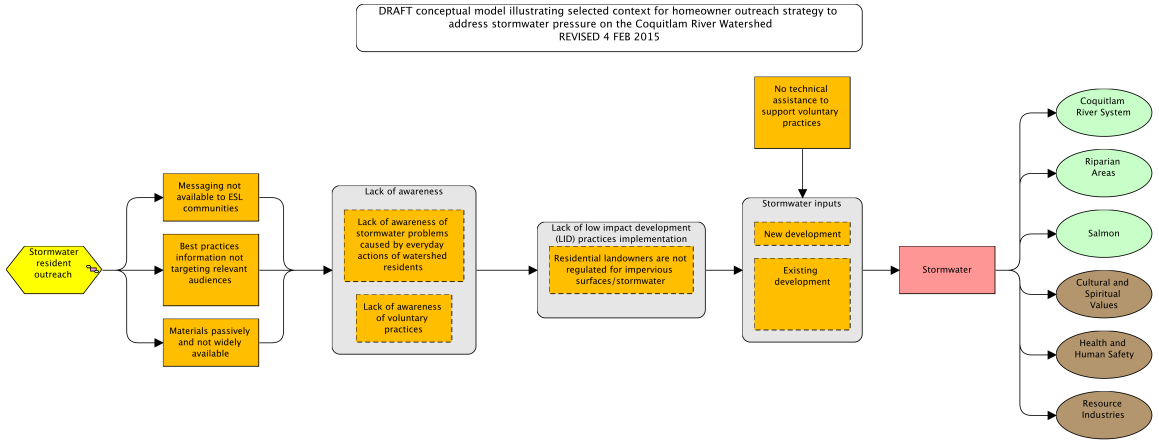
DRAFT Conceptual Model Illustrating Selected Context for Impact Mapping Strategy to Address Development Pressure



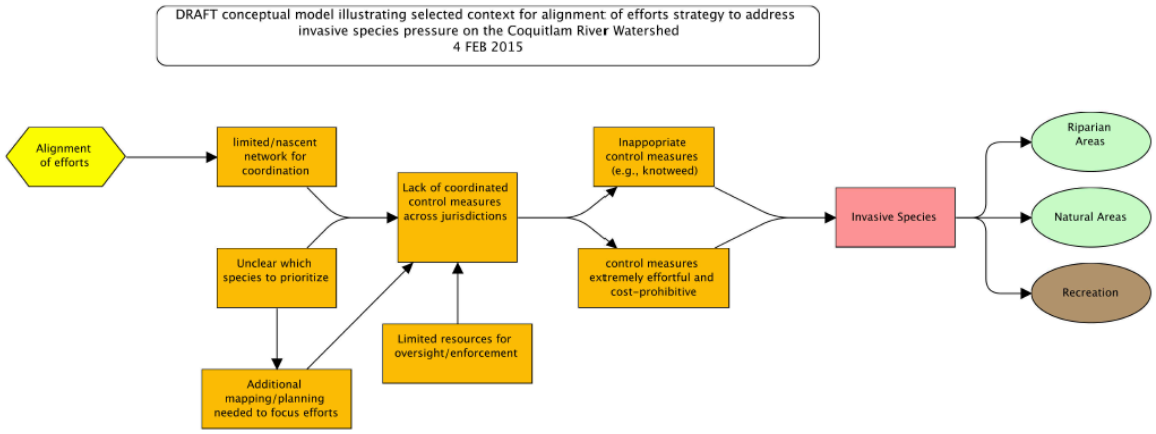
DRAFT Conceptual Model Illustrating Selected Context for Stormwater Adaptive Management Strategy to Address Stormwater Pressure



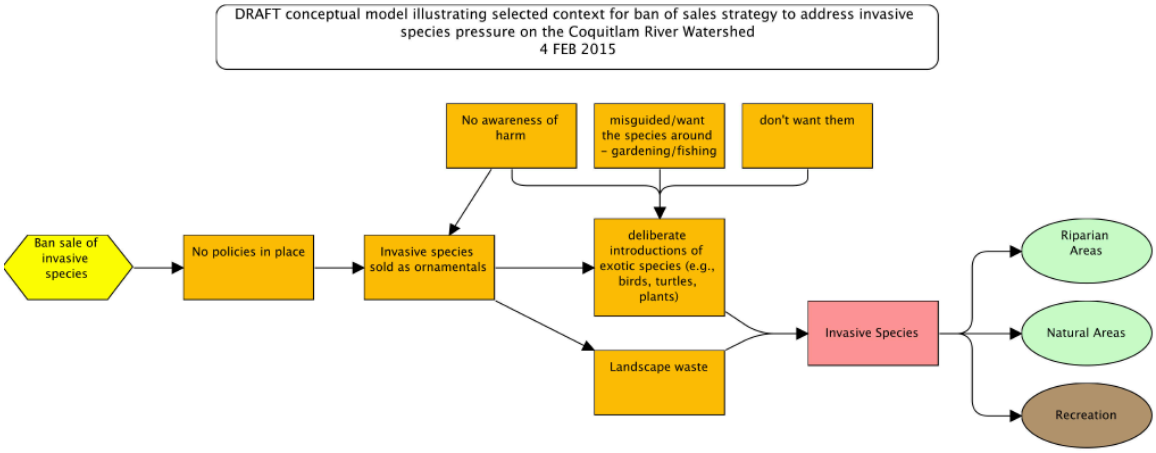
DRAFT Conceptual Model Illustrating Selected Context for Homeowner Outreach Strategy to Address Stormwater Pressure



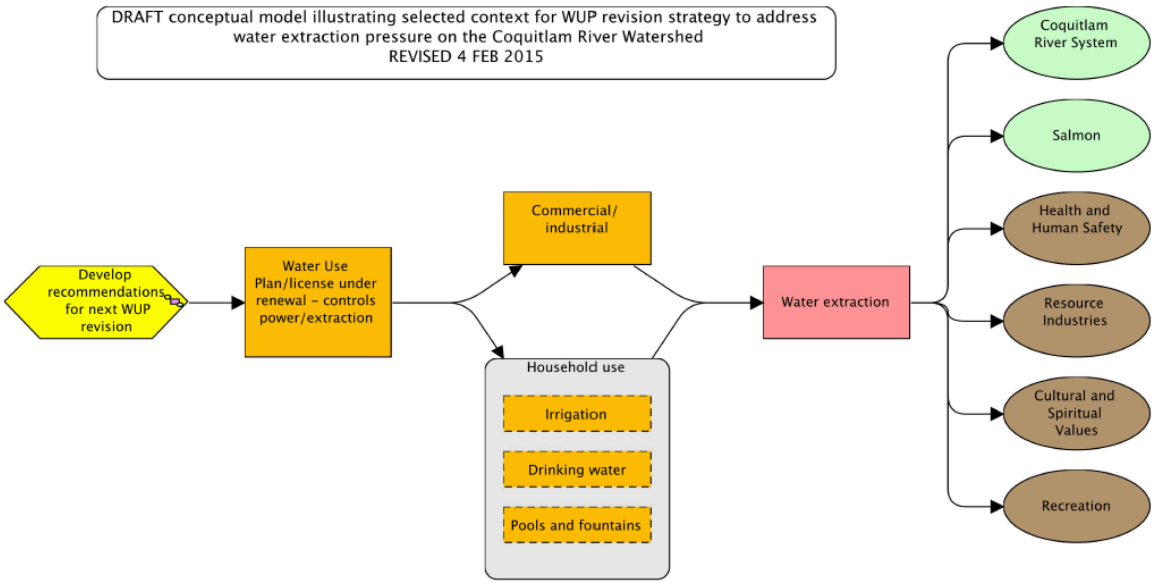
DRAFT Conceptual Model Illustrating Selected Context for Alignment of Efforts Strategy to Address Invasive Species Pressure



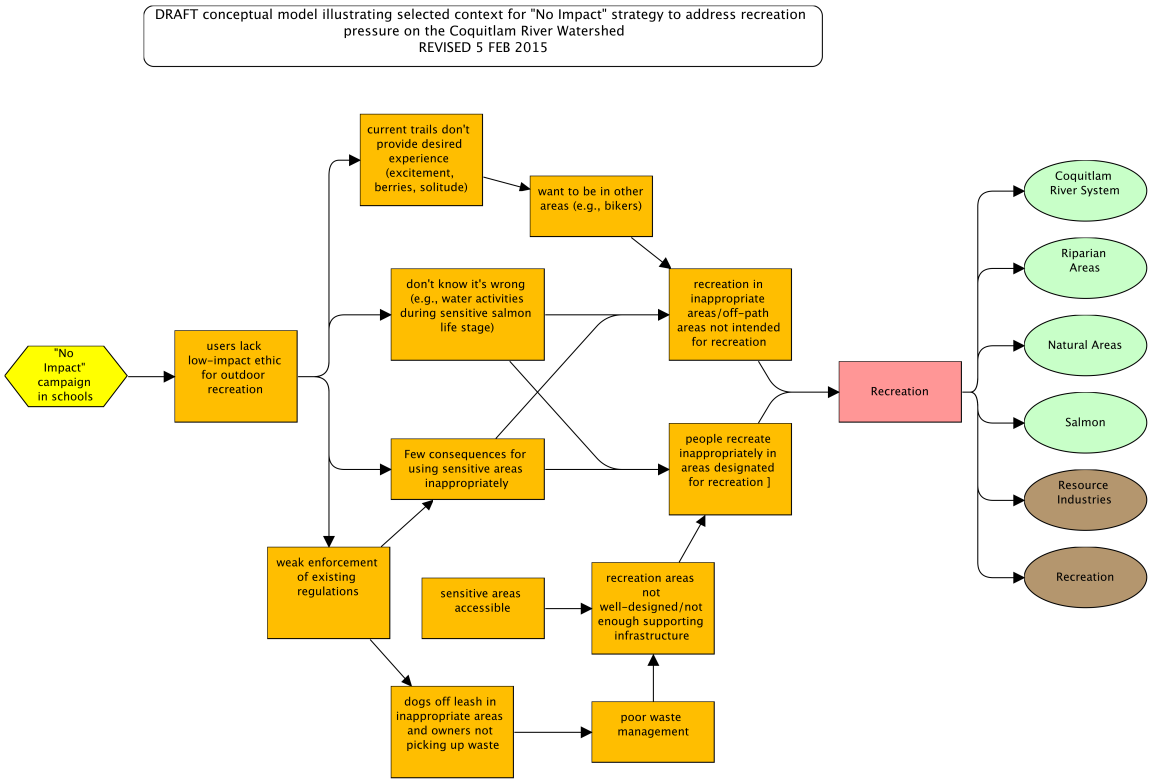
DRAFT Conceptual Model Illustrating Selected Context for Ban of Sales Strategy to Address Invasive Species Pressure



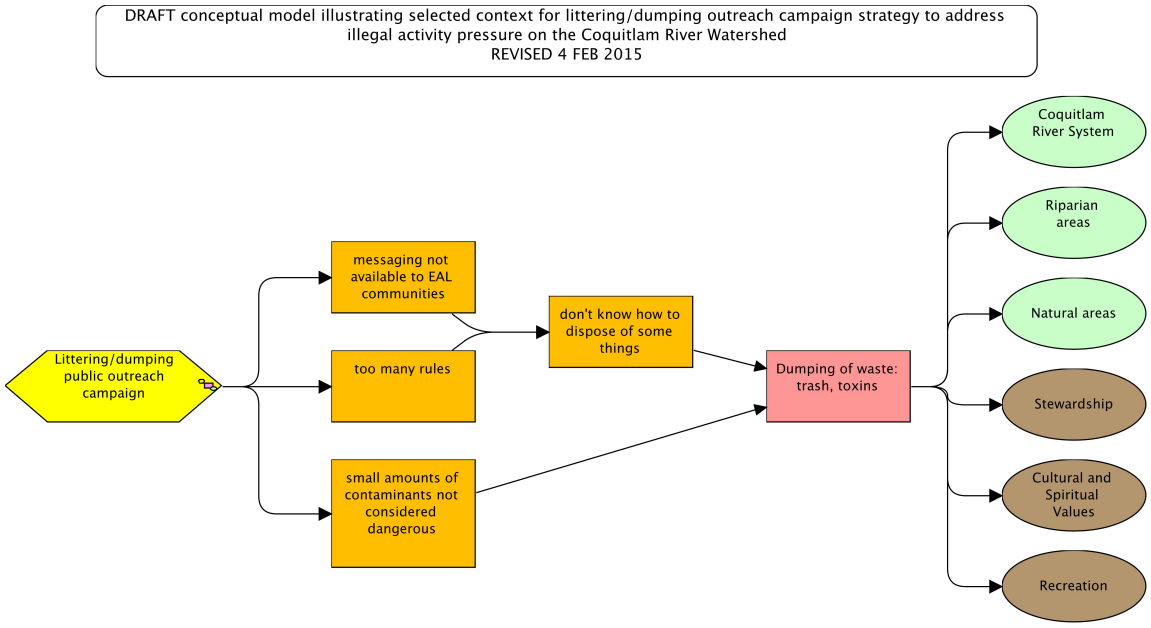
DRAFT Conceptual Model Illustrating Selected Context for WUP Revisions Strategy to Address Water Extraction Pressure



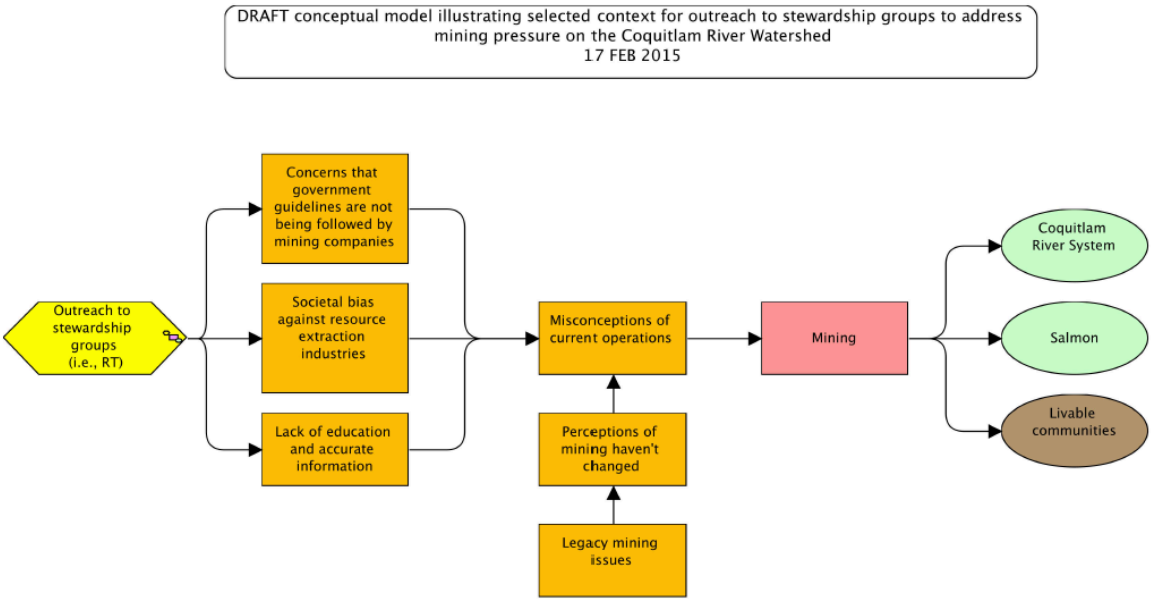
DRAFT Conceptual Model Illustrating Selected Context for "No Impact" Campaign Strategy to Address Recreation Pressure



DRAFT Conceptual Model Illustrating Selected Context for Littering/Dumping Outreach Campaign Strategy to Address Illegal Activity Pressure



DRAFT Conceptual Model Illustrating Selected Context for Outreach to Stewardship Groups Strategy to Address Mining Pressure



Appendix 12. Assessment of Strategies for Identified Watershed Pressures

The Coquitlam River Watershed Roundtable (CRWR) has been developing a watershed conservation plan using the Open Standards framework. During Spring 2014, conceptual models were developed by Task Groups for priority pressures. These conceptual models included existing strategies and ideas for additional strategy opportunities. CRWR hosted a public meeting in late May 2014, during which 59 participants brainstormed strategies for the same priority pressures. Participants were also asked to categorize strategies by type of action. This document provides an assessment of all strategies generated to date, including discussions of each pressure, gaps between sources of strategy ideas, and potential for crosscutting efforts.

Table 1 presents the number of strategy ideas generated by the Task Groups and the Roundtable. Note that this table reflects "raw" data. While the Task Groups developed a consolidated list of strategies through discussion, the Roundtable numbers reflect the input of all participants and do not take into account overlapping or duplicated concepts.

Table 1. Number of strategy ideas by pressure and source.

Pressure	Task Groups	Roundtable	Pressure Rating by WTG
Stormwater	24	32	High
Development	8	25	High
Invasive species	17	25	High
Vandalism / Illegal activities	13	39	Medium
Recreation	12	29	Medium
Mainstream cultural norms	13	29	Medium
Water extraction	18	18	Medium
Mining	8	15	Low

RECREATION- pressure rating: MEDIUM

The recreation pressure is defined as human activities associated with non-consumptive uses of biological resources that alter, destroy, and disturb habitats and species. This includes recreational vessels, off-road vehicles, and associated air and water pollution. The types of stresses caused by recreation include erosion, degraded air quality, degraded water quality, and degraded species conditions. Just over half the Task Group strategies related to outreach and education programs (Table 2). The remaining Task Group ideas included capital investments for infrastructure or acquisition, and policy actions. Roundtable participants also suggested capital investments and outreach/education strategies most frequently.

Table 2. Frequency of strategy types suggested addressing the recreation pressure, by source.

Strategy type	Task Group	Roundtable	Examples
Outreach/ education	7	7	Media, volunteer/self-policing programs, awareness campaigns
Capital investment	3	9	Land acquisition, infrastructure development (trails, trash bins)
Policy	2	5	Recreation licenses, no-use seasons
Enforcement		7	Strict penalties
Research		1	Study optimum recreation activities

Noteworthy gaps

Enforcement was an entire strategy type identified by Roundtable participants and not by the Task Group, with comments focused on strict penalties and funding for enforcement efforts. A research study also was suggested to investigate the optimum recreation activities for a healthy watershed.

Within the overlapping strategy types, the following specific Roundtable strategies differed substantively from the ideas generated by the Task Group:

- Education programming specifically for school youth (Outreach/Education)
- Promoting sustainable recreational fishing by supporting and expanding hatcheries (Capital - Infrastructure)
- Converting the Riverwalk area (northeast river bank) into a park (Capital - Acquisition)
- Setting aside recreational lands spatially (closed areas) or temporally (closed seasons) (Policy)
- A recreational licensing program similar to hunting/fishing licenses that would require orientation (Policy)

VANDALISM / ILLEGAL ACTIVITIES- pressure rating: MEDIUM

The vandalism/illegal activities pressure is defined as impacts associated with the crime of destroying or damaging something for no deliberate reason. This includes dumping of garbage, littering, trespassing, vandalizing private property, and intentionally harming nature, flora and fauna. The types of stresses caused by vandalism/illegal activities include degraded water and habitat quality, reduced species abundance and severe stresses to human values and sense of place. Both the Task Group and the public Roundtable participants focused most of their attention on the issue of dumping trash and recyclable materials in the watershed. Over half of the Task Group strategies focused on two types of programming: waste disposal (trash and recycling) and community engagement for stewardship/vigilance (Table 3). Other Task Group strategies included outreach/education and clean-up activities (categorized as restoration). The Roundtable participants also suggested programs most frequently, with a similar focus on incentives for proper waste disposal and community block watches. Outreach/education strategies were a close second, and there was additional overlap with restoration/clean-up activities.

Table 3. Frequency of strategy types suggested addressing the vandalism/illegal activities pressure, by source.

Strategy Type	Task Group	Roundtable	Examples
Programs	7	12	Recycling/rebate programs, consolidated times/locations; adopt-an-area for vigilance, eco-block watch
Outreach/ education	4	11	More signage, promoting garage sales
Restoration	2	4	Organized clean-up events
Enforcement		8	Strict penalties
Policy		3	Licenses, improved disposal policies
Research		1	Research on apathy

Noteworthy gaps

Enforcement was an entire strategy type identified by Roundtable participants and not by the Task Group, with comments focused on improved enforcement of existing laws and stricter penalties for violations. The Roundtable also produced some specific policy suggestions, including licensing for activities in the watershed and improved disposal policies (closely related to disposal programming ideas). A research study on apathy also was recommended, which relates to themes in the mainstream cultural norms pressure.

Within the overlapping strategy types, the following specific Roundtable strategies differed substantively from the ideas generated by the Task Group:

- Outreach/education about impacts on watershed of dumping behavior and to address apathy and cultural norms (Outreach/education)
- Creating a "party box" or area where normally illegal activities are allowed (graffiti, partying, etc.) but contained so that violators do not degrade other areas

INVASIVE SPECIES- pressure rating: HIGH

The invasive species pressure includes degradation associated with the introduction and distribution of non-native species or genes that are capable of aggressively establishing or causing environmental damage. Stresses to the watershed ecosystem include competition, genetic disruption, predation, and habitat degradation. The Task Group and Roundtable participants recommended strategies in all of the same categories (Table 4). Outreach and education activities were suggested for a wide variety of audiences, including the public, landscape professionals and elected officials. Both sources provided policy suggestions focused on banning the sale of invasive species, with additional ideas for preventative measures. The restoration category was defined as efforts to remove invasive species, with ideas for participants ranging from community groups to school youth to prison inmates.

Table 4. Frequency of strategy types suggested addressing the invasive species pressure, by source.

Strategy Type	Task Group	Roundtable	Examples
Outreach/ education	5	10	Promoting natives/naturescaping, proper green can usage, working with landscape professionals
Policy	5	6	Banning of invasive sales, wheel wash requirements, land-clearing policies
Restoration	3	7	Invasives removal efforts
Programs	3	1	Gardening competitions, temporary gardens in cleared spaces
Research	1	1	Research to prioritize removal efforts

Noteworthy gaps

Within the overlapping strategy types, the following specific Roundtable strategies differed substantively from the ideas generated by the Task Group:

- Building invasive species education and removal service projects into high school curricula/requirements (Outreach/Education, and Restoration)
- Including invasive species outreach in an interpretive centre (Outreach/education)
- Considering the selective use by municipal agencies of appropriate herbicides for invasives control (Policy)

- Specific invasives waste depository at city recycling centre (Program)
- Evaluating the Friends of DeBoville Slough program as a model for the Coquitlam River watershed (Research)

STORMWATER- pressure rating: HIGH

The stormwater pressure is defined as impacts associated with the introduction of exotic or excess material into hydrologic systems due to surface water loading and runoff from the built environment. The "built environment" includes commercial, residential, and industrial lands and transportation facilities and corridors. Stresses to the watershed ecosystem include introduction of toxins, degraded water quality, altered hydrological dynamics, altered nutrient levels, reduced human health, and impaired species/habitat condition. Outreach/education and policy suggestion were the most frequent types of strategies for both the Task Group and Roundtable participants (Table 5). Outreach and education activities focused on residential and development practices that reduce run-off and pollution. Policy ideas related primarily to stormwater management plans and development practices. Program suggestions focused on incentives for voluntary stormwater-reduction practices, such as rain barrels, rain gardens, and permeable surfacing. Capital investments were suggested for stormwater management infrastructure, and both sources identified the need for improved enforcement of existing and/or improved regulations.

Table 5. Frequency of strategy types suggested addressing the stormwater pressure, by source.

Strategy Type	Task Group	Roundtable	Examples
Policy	9	7	Application of integrated stormwater management plans
Outreach/ Education	6	13	Rain gardens and other onsite management approaches; storm drain markings and pollution campaigns
Program	4	3	Tax incentives and green star building program
Capital	3	1	Culverts, settling ponds
Enforcement	1	2	Increased patrols and enforcement
Research	1	2	New low impact development approaches
Restoration		4	Daylighting creeks and river outfalls

Noteworthy gaps

Restoration was an entire strategy type identified by Roundtable participants and not by the Task Group, with comments focused on daylighting creeks and river outfalls, replanting riparian zones, and restoring stormwater abatement ecosystem services provided by these natural habitats.

Within the overlapping strategy types, the following specific Roundtable strategies differed substantively from the ideas generated by the Task Group:

- Ensuring logging policies prevent excessive stormwater run-off and erosion (Policy)
- Education programming specifically targeted at school youth (Outreach/Education)
- Donations of sediment screen by-products to pottery industry/studios to prevent buildup in natural environments (Program)
- Using modern technology to model and re-engineer the city stormwater system layout and management (Research)

- Regular monitoring and reporting of water quality in major outfalls (Research)

DEVELOPMENT- pressure rating: HIGH

The development pressure includes the negative effects of human settlements or other land uses with a substantial footprint, including new and existing residential, commercial, and industrial development. Stresses include reduced habitat extent and quality; reduced forest cover; degraded habitat connectivity, diversity and structure; noise and light pollution; increased solid waste; and increased traffic. The distribution of suggestions across strategy types was markedly different between with Task Group and Roundtable participants (Table 6). For the Task Group, ideas were fairly evenly distributed across outreach, enforcement and program strategies, with only one policy recommendation. In contrast, over half (14 of 25 total) of the strategies suggested by Roundtable participants concerned development policies.

Table 6. Frequency of strategy types suggested addressing the development pressure, by source.

Strategy Type	Task Group	Roundtable	Examples
Outreach/ education	3	5	Outreach on value of tree cover and riparian areas
Enforcement	2		Enforcement of existing regulations
Program	2	2	Tax incentives and community self-policing
Policy	1	14	Requiring neighborhood plans to tie in with watershed plans
Capital - Acquisition		2	Purchasing/setting aside green space
Research		1	Research artistic venues and modalities to enhance outreach
Restoration		1	Daylighting creeks

Noteworthy gaps

The Roundtable participants expressed interest in acquiring Riverview as a public park (Capital – Acquisition) and provided the research and restoration ideas detailed in Table 6.

As described above, while the Task Group did identify a policy recommendation of requiring neighborhood plans to tie in with watershed plans, the Roundtable participants also had numerous additional suggestions in the policy arena. These ideas covered the following themes:

- Increases in setbacks and riparian areas
- Increased protection from development for environmentally sensitive lands (including transfer of rights, fixed percentage of greenspace, etc.)
- Increased requirements for low impact development best practices
- Limitations on additional bridge/transportation development

MAINSTREAM CULTURAL NORMS- pressure rating: MEDIUM

The mainstream cultural norms pressure includes the effects associated with the disconnection from or lack of understanding of the value of local ecosystem services provided to people by local natural resources. This includes reduced quality of and/or access to environmental education, work-life imbalances, and the pervasiveness of media/technology, globalization of culture and products, and materialism/consumerism. The stresses caused by mainstream cultural norms include increased apathy, decreased stewardship, lack of environmental knowledge and awareness, lack of sense of place or connection with nature, lack of time or

value for nature, lack of value for local culture and products, and decreased feelings of wellness. The most frequent strategy type for both the Task Group and the Roundtable participants was outreach and education (Table 7). The Task Group tended to provide more general strategies (e.g., outdoor camps and programs, educating parents, outreach to immigrant communities) while Roundtable comments ranged from general to very specific (e.g., youth story-telling workshops in schools, guided tours along the river). It is recommended that the Core Committee refer to the raw data during the strategy refinement and action planning process to review the many specific outreach ideas generated during the public meeting.

Table 7. Frequency of strategy types suggested addressing the mainstream cultural norms pressure, by source.

Strategy Type	Task Group	Roundtable	Examples
Outreach/ education	13	24	Outreach to a variety of audiences using various tools
Capital - Acquisition		2	Saving Riverview, creating more park space
Research		2	Research on apathy, research on cultures
Policy		1	Water metering

Noteworthy gaps

Acquisition was a strategy type suggested by Roundtable participants and not by the Task Group, and included mention of "saving" Riverview, as well as expanding park and recreation space. Roundtable participants also identified research as an important strategy for understanding cultural norms and apathy in order to change them. Finally, the policy strategy of instituting water metering was recommended to change the public's attitude about the sustainability of water usage. While most outreach suggestions from both sources related to informational campaigns or school/community programs, the Roundtable participants recommended the creation of an interpretive or ecological centre to raise awareness and change cultural appreciation for various aspects of the watershed.

WATER EXTRACTION- pressure rating: MEDIUM

The water extraction pressure is defined as the issues associated with modification, extraction, or diversion of water supplies, includes changing water flow patterns, such as in-stream flows, from their natural range of variation either deliberately as a result of water supply or flood management operations. The stresses caused by the water extraction pressure include reduced volume and groundwater or surface flow, altered flow regime (timing and magnitude of high and low flows) and degradation or loss of habitat. The Task Group and Roundtable participants emphasized similar strategy types in the outreach/education, policy and program categories (Table 8). Outreach and education activities related primarily to water conservation, and programs were defined as campaigns that required more material investments such as efforts to promote rain barrels or grey water systems. Policy suggestions focused either on regional water use plans or on reinstating different forms of individual water metering.

Table 8. Frequency of strategy types suggested addressing the water extraction pressure, by source.

Strategy Type	Task Group	Roundtable	Examples
Outreach/	8	8	Water conservation public and school

education			campaigns – reduced home use, drought-tolerant landscaping, brown lawns
Policy	6	7	Water Use Plan/Water Sustainability Act, increased water rates, water metering
Programs	4	1	Grey water and rainwater programs, incentives for LEED water conservation practices
Research		2	Metering technology, behavior change

Noteworthy gaps

Research was a strategy type suggested by the Roundtable and not by the Task Group. Public meeting participants recommended research into the development of point-of-use (sink taps, toilets, etc.) meters so that users could receive immediately feedback on the amount of water they were consuming. Others suggested research into whether or not metering in fact influences people's water consumption behavior.

MINING- pressure rating: LOW

The mining pressure is defined as the impacts associated with the commercial extraction of nonbiological resources. This includes air and water pollution associated with mining and related activities. The stresses caused by the mining pressure include erosion, altered sediment dynamics, altered hydrology, increased slope instability, degraded air/water quality, habitat loss, and habitat degradation. The Task Group and Roundtable participants both identified outreach/education strategies that centered on updating public perception of modern mining operations (Table 9). Research and restoration efforts were also identified by both sources.

Table 9. Frequency of strategy types suggested addressing the mining pressure, by source.

Strategy Type	Task Group	Roundtable	Examples
Outreach/ education	5	3	Public tours/outreach around responsible mining practices, outreach to mining companies to encourage best practices
Policy	1	7	Improved environmental protections
Research	1	2	Practices that reduce dependence on gravel, ecosystem studies, water quality testing
Restoration	1	1	Remediation and habitat enhancement
Capital		1	Support for sediment ponds
Enforcement		1	Honest regulation

Noteworthy gaps

Capital investment was a strategy type suggested by the Roundtable and not by the Task Group, and included a comment supporting sediment ponds. Enforcement was the other strategy type identified solely by the Roundtable process.

While the Roundtable and Task Group both identified at least one policy strategy, the Roundtable participants generated considerably more ideas in this category. Almost all of these policy suggestions related to improved environmental protections against the impacts of mining operations.

The strategy Task Groups and Roundtable participants generated a wealth of valuable and creative strategy ideas across all Coquitlam River pressures. Generally speaking, there was

significant overlap and alignment among the recommendations offered by each of these sources. Given the nature of the discussions during Task Group meetings, the scale of strategy ideas was intentionally general, with details to be developed during more specific action planning. The public Roundtable format, in contrast, produced ideas at a wide variety of scales, with suggestions ranging from "Policy changes" to detailed descriptions of, for example, using yoga classes by the river to build personal connections with nature.

A few Roundtable comments identified concerns regarding the cumulative effects across multiple pressures. While the scope of this document does not include cumulative impacts, it is an important concept that can be addressed in part during future steps by developing strategies that alleviate multiple pressures.

The most apparent gaps and cross-cutting concepts in strategy recommendations were as follows:

- Enforcement – It is possible that the Task Groups did not consider enforcement within the Roundtable sphere of influence, and therefore did not identify enforcement strategies during discussion. However, there was considerable interest in enforcement issues across multiple pressures from the Roundtable participants, and this may be an arena in which to consider partnership with government agencies to support watershed issues.
- Research – Similarly, the Task Groups may not have considered research strongly within their areas of expertise, but this was another Roundtable-recommended strategy type that surfaced across many pressures and that could be considered with appropriate partners.
- Acquisition – Roundtable participants placed a heavier emphasis on acquiring additional green space to alleviate multiple pressures. Acquisition was most often referred to generally; however, both Riverview and the Riverwalk area were called out specifically as candidate locations.
- Regional centre – The concept of a regional interpretive centre was raised repeatedly by Roundtable participants (though conceivably all comments came from a single participant). The comments focused on a centre dedicated to the river and watershed, with information on history, value and ecosystem services, threats, conservation efforts, etc. The idea easily ties to all pressures, and some suggestions included using a building in the Riverview development for such a centre (linking the recommendation to an acquisition strategy).
- Restoration – For stormwater and development pressures, Roundtable participants emphasized restoration, especially the daylighting of creeks and other water outfalls.
- Policy – The public Roundtable meeting produced many policy recommendations for the development pressure that should be reviewed by the Core Committee during the next phases of conservation planning.

Appendix 13. Strategy Rating Criteria

The following Strategy Rating Criteria helped the Watershed Task Group members plus topic-specific experts begin to prioritize strategies during the Strategy Assessment Workshops held October 2014.

Appropriateness – Degree to which the strategy is consistent with the strengths and sphere of influence of Coquitlam River Watershed Roundtable partners. Rating is based on a score of 1 to 4, with Very High rated, 4.

- **Very High (4) –** The strategy is strongly aligned with the CRWR's strengths and sphere of influence.
- **High (3) –** The strategy is somewhat aligned with the CRWR's strengths and sphere of influence.
- **Medium (2) –** The strategy is weakly aligned with the CRWR's strengths and sphere of influence.
- **Low (1) –** The strategy is not aligned with the CRWR's strengths and sphere of influence

Feasibility – Degree to which your project team could implement the strategy within likely time, financial, staffing, political, and other constraints. Rating is based on a score of 1 to 4, with Very High rated, 4.

- **Very** High (4)– The strategy is politically, technically, AND financially feasible.
- **High (3) –** The strategy is politically and technically feasible, but may require some additional financial resources.
- **Medium (2) –** The strategy is politically feasible, but either technically OR financially difficult without substantial additional resources.
- **Low (1) –** The strategy is not politically, technically, OR financially feasible.

Potential Impact – Degree to which the strategy will lead to desired changes in the situation at your project site. Rating is based on a score of 1 to 4, with Very High rated, 4.

- **Very High (4) –** The strategy is very likely to completely mitigate a pressure or restore a component.
- **High (4) –** The strategy is likely to help mitigate a pressure or restore a component.
- **Medium (3) –** The strategy could possibly help mitigate a pressure or restore a component.
- **Low (1) –** The strategy will probably not contribute to meaningful pressure mitigation or component restoration.

Cross Cutting – Strategy is related to more than one pressure. An extra point of **(1)** will be given for every pressure that cross cutting strategies address.

Niche/Gap – The extent to which your strategy will fill a gap not addressed by another project or organization (extra point). **(0 – 2 extra points)**

- Fills gaps
- Supports existing interest/effort, but CRWR could add meaningful lift
- Duplicative - already in place or mandated for someone else to implement

Alignment - Strongly aligned with CRWR vision and values (extra point) **(0 or 1)**

Appendix 14. Draft Priority Strategies – Revised October 28, 2014

Pressure	Strategy and Type	Implementer(s)	Comments
Stormwater *(High)* *Affects: Coquitlam River System, Riparian Areas, Salmon, Human Health & Safety, Resources Industries, and Cultural and Spiritual Values*	*Policy:* Advocate for a transparent adaptive management process for stormwater regulations, supported by monitoring that would achieve improvements at a watershed-wide scale.	Municipalities, with oversight and support by Metro Vancouver	Currently, ISMPs require adaptive management processes. However, there are different levels at which these processes are being implemented. The goal of this strategy is to request the highest level of implementation with a clear link between data and any needed changes.
Stormwater *(High)*	*Outreach:* Linking homeowner information and education to subsequent behavior change.	Information linked on CRWR website Municipal and Metro Vancouver websites	Many programs already exist to educate homeowners on how they can manage the stormwater on their properties. The goal of this strategy would be to assess the current messaging (by who and what) and attempt to track what behavior change it has resulted in.
Development *(High)* *Affects: Riparian Areas, Natural Areas, Liveable Communities, Recreation*	*Planning:* Watershed Open Space Strategy	Consultant? Development community? Municipalities, Metro Vancouver Parks?	Assess current open space system, identify areas where there are opportunities to acquire new open space and describe multi-benefits that could be derived from a watershed approach, specifically linked to the components.
Development *(High)*	*Outreach:* Develop Impact Map allowing user to see cumulative watershed wide impact	Consultant? Linked to CRWR website Municipal partnership	Impact Map would highlight impervious surfaces, water quality, road lengths, environmental constraints, etc. – target audience – Decision makers
Development *(High)*	*Research:* Conduct feasibility study on potential incentive tools	Real Estate industry? Developers?	The goal of this strategy would be to present potential tools to municipalities and others that could incentivize better environmentally friendly design for neighborhoods.

Pressure	Strategy and Type	Implementer(s)	Comments
Invasive Species *(High)* *Affects: Riparian Areas, Natural Areas, Recreation, and possibly Coquitlam River System, Salmon*	*Policy:* Adopt Metro Vancouver Invasive Species Management Strategy: Implement Policy against the sale of invasives (Goal 3-L and 3-M)	Multiple Jurisdictions (Municipalities, Kwikwetlem, Metro Vancouver) – Create or support an Invasive Species Task Force.	The Metro Vancouver strategy considers invasive plant species only, i.e., targeting garden centres, private growers, addressing appropriate land management, *not* other invasives such as aquatic species introduction, i.e., turtles, bullfrogs – another area that is also a concern for the Roundtable and other researchers are working to address. Champion current municipal and First Nation efforts, UBCM.
Invasive Species *(High)*	*Policy:* Adopt Metro's Invasive Species Management Strategy: Align efforts across municipalities and compile watershed-wide data (Goal 3-L)	Multiple Jurisdictions (Municipalities, First Nations, Metro Vancouver) – Create or support an Invasive Species Task Force.	It fits under the Goal 3, which is to "Develop regionally effective legislation and policy supported by monitoring, enforcement and education. The actions will be various types of strategy form policy/legislation and enforcement to education and outreach. Champion current municipal efforts.
Recreation *(Medium)* *Affects: Coquitlam River System, Riparian Areas, Natural Areas, Salmon, Resource Industries, and Recreation*	*Outreach:* Develop Coquitlam River Mainstem Outreach Campaign	Municipalities? Stewardship entities? RiverWatch? Metro Vancouver Parks	The aim is prevention of unsustainable recreation on the river corridor mainstem that harms riparian areas, aquatic habitat, native plants, aquatic species, Species at Risk. The use of signage, enforcement, and other tools that reward positive behaviour, and encouraging people to contribute to enhancement initiatives, etc. Additional measures may include encouraging self-policing among user groups, seasonal messaging. Remains unclear as to what is the most harmful form of recreation on the river.

Pressure	Strategy and Type	Implementer(s)	Comments
Recreation *(Medium)*	*Education:* "Leave no trace" recreation campaign in schools	Recreational groups. Municipal Parks and Recreation programs? Partners working in watershed, e.g., BCIT, BC Hydro, FWSP partnership	Suggestion was to provide a school program for kids at the location where kids have access and how to recreate without environmental impact. *Further exploration of this strategy is needed to learn about the existing programs underway in the School District # 43, how the Roundtable can complement or fill a gap relevant to the watershed.*
Vandalism/Illegal Activity *(Medium) Affects: Coquitlam River System, Riparian Areas, Natural Areas, Stewardship, Cultural and Spiritual Values, Recreation*	*Education:* Educate residents on cumulative damage of littering/dumping – work with media on local reporting of issue	RT Coordinator to work with media Recreational sector	Specific emphasis put on messaging in languages other than English Project would aim at watershed-wide scale.
Vandalism/Illegal Activity *(Medium)*	*Outreach:* Work to make sure that people know about and understand existing tree management and clearing bylaws	Municipalities	The riparian and tree management bylaws, acts, guidelines and Zoning differs between the two cities, so some more research is needed. Seems like a watershed-wide approach warranted for all strategies – a central theme "What can we do, together."

Pressure	Strategy and Type	Implementer(s)	Comments
Mainstream Cultural Norms *(Medium)* *Affects: Human Health and Safety, Stewardship, Resource Industries, Cultural and Spiritual Values, Recreation*	*Outreach:* Work with Watershed Open Space Strategy (*see Development above*) and Mainstem Corridor (*see Recreation above*) project to make outdoor access easier.	??	More outreach/work recommended before a strategy could be developed. The task group session did not quite capture strategies that get to the root of what the definition of mainstream cultural norms is. Further work to review the binned strategies and compare to Conceptual Model. Rating for this pressure was difficult because the concepts are not traditional enough to rate. We need to pull together existing outreach materials like those that David Suzuki's education programs and ARTicipaction outreach on "unplug and play", get out in nature. One strategy could involve research existing messaging around the issue of mainstream cultural norms. The other area was around outreach to multicultural groups.
Water Extraction *(Medium)* *Affects: Coquitlam River System, Salmon, Human Health and Safety, Resource Industries, Cultural and Spiritual Values, Recreation*	*Research:* Develop recommendations for the next revision of the Water Use Plan, scheduled for 2010 +/- 2 years.	BC Hydro, Metro Vancouver, Municipalities, Educational Institutions - University Level, Fish & Wildlife Compensation Program-funded researchers	In developing recommendations for the next revision of the Water Use Plan (scheduled for 2020 +/- 2 years, research can help determine whether local-area water conservation efforts can make a difference in offsetting water needs in addition to Water Use Plan requirements so as to improve flows needed to support the salmon. The work would identify opportunities for strategic flow management (increase flows earlier - in September rather than October).

Pressure	Strategy and Type	Implementer(s)	Comments
Water Extraction *(Medium)*	*Outreach:* Implement a water conservation Outreach program that focuses on the environmental flow benefits.	Municipalities, Metro Vancouver, BC Hydro	Target communications on how water conservation can directly benefit environmental flows - connect water extraction and reduced consumption of water to stream and salmon health. Current outreach efforts encourage consumers to reduce electricity and water use for personal benefits of reduced utility bills (which can lead to the deferral or reduced cost of future infrastructure enhancements and maintenance, e.g., drinking water treatment costs, expansion of infrastructure to deliver water, new treatment facilities, reservoirs, etc.)
Water Extraction *(Medium)*	*Policy or Program:* Promote "high" standards of water practices for new development, including supporting research to show benefits. NB: this Strategy has crossover with development.	Municipalities, Development Community, Educational Institutions - University Level, local development liaisons of the Urban Development Institute	Promote "high" standards of water practices for new development and retrofits (i.e., LEED certification) to reduce the demand of new development on the watershed. Conduct research to determine the level of water/electricity conservation that could be achievable for new development, at what cost, and what incentives would be necessary to achieve this reduction.

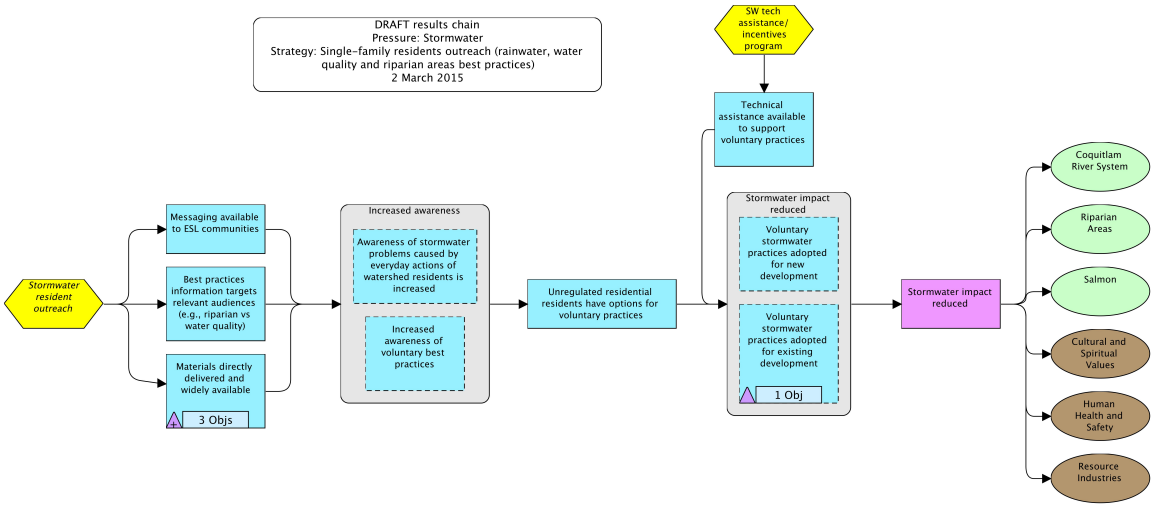
Pressure	Strategy and Type	Implementer(s)	Comments
Mining *(Low)* *Affects: Coquitlam River System, Salmon, Liveable Communities*	*Outreach:* Conduct outreach between the mining community and steward community on current mining operations.	Aggregate industry representatives and other steward representatives	This strategy intends to provide better transparency on mining operations and steward activities through educating both communities. By connecting with the mining community, the Roundtable can provide information about the RT, something already being done, and share more as it relates to the watershed plan. The mining community likewise can demonstrate the role the aggregate industry plays in partnerships with others, education on the dependency for gravel for residential development, roads etc.; and, how their current operations and plans address watershed health. Similar to how the Roundtable connects with all sorts of groups.
Mining *(Low)*	*Outreach:* Make current mining regulation available for review by watershed partners, present water quality status/ trends data (collected by City of Coquitlam and BC Hydro)	Mining Industry Ministry of Energy & Mines Link to mining tour icon on CRWR website	This strategy would present a current "State of Mining Practices" that outlines briefly and clearly, what the regulations are what mining operations are doing to protect the river, and what the water quality trends have been for the last several years.
Lack of Stable Support for Roundtable Coordination *(High)*	*Program:* Pursue an Inter-local agreement to support capacity – 'pay to play' to support staffing capacity	Roundtable Core Committee Funders, businesses in watershed that share a common interest for a healthy liveable watershed community	Various priority strategies require coordination to ensure a base level operational support continues as the Roundtable seeks support and funding to implement its work and roll out watershed action plan strategies, as resources permit. Shaping the Action Plan for the future requires stable operational funding.

Based on October 1 – 2, 2014 Strategy Assessment & Rating Exercise for Identified Watershed Pressures

Appendix 15. Results Chains with Narratives

Results chains are diagrams with a series of "if….then" statements that define how a strategy should work. The graphic describes the logic of the strategy through the identification of intermediate results or outcomes. The hope is that if the strategy gets off course, managers will be able to tell early and course correct quickly. Often, objectives and indicators are developed to describe the intermediate results, thus creating the base of your implementation and effectiveness measures. Note that the results chain graphically represents a limited number of strategies in isolation. It does not take into account other complementary and likely necessary strategies such as control measures and restoration, which will also significantly influence the health of the components.

Pressure: Stormwater
Strategy: Outreach to Single-Family Homeowners (Revised: 2-4-15)

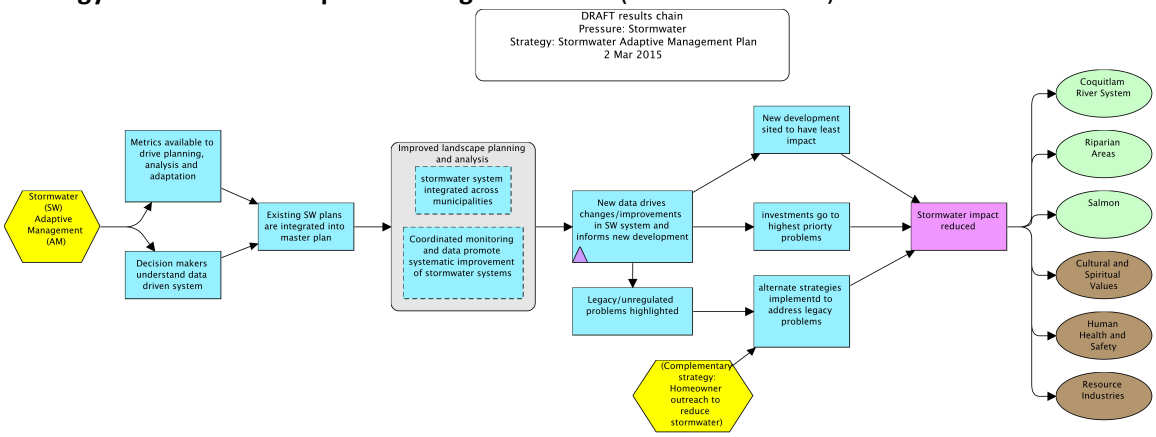


The focal strategy triggering the results chain is to develop outreach materials to help single-family homeowners improve their stormwater practices across municipalities in the Coquitlam River Watershed. The key issue areas for encouraging best practices are rainwater management, water quality and riparian areas. The results chain illustrates the "theory of change" if the strategy is successfully implemented.

- **IF** the outreach campaign is successfully implemented, **THEN** messaging is available to ESL communities, best practices information targets relevant audiences, and materials are directly delivered and widely available.
- **IF** messaging is available to ESL communities, best practices information targets relevant audiences, and materials are directly delivered and widely available, **THEN** awareness of stormwater problems caused by every day actions and awareness of voluntary best practices is increased.
- **IF** awareness of stormwater problems caused by every day actions and awareness of voluntary best practices is increased, **THEN** unregulated homeowners have options for voluntary practices.
- **IF** unregulated homeowners have options for voluntary practices, **THEN** homeowners will adopt better stormwater practices on their property.

- **IF** a complementary technical assistance/incentives program was implemented, **THEN** technical assistance/incentives would be available to support implementation of voluntary practices, further increasing their adoption.
- **IF** homeowners adopt better stormwater practices on their property, **THEN** the stormwater impact on the river system, riparian areas, salmon, cultural and spiritual values, human health and safety, and resource industries will be reduced.

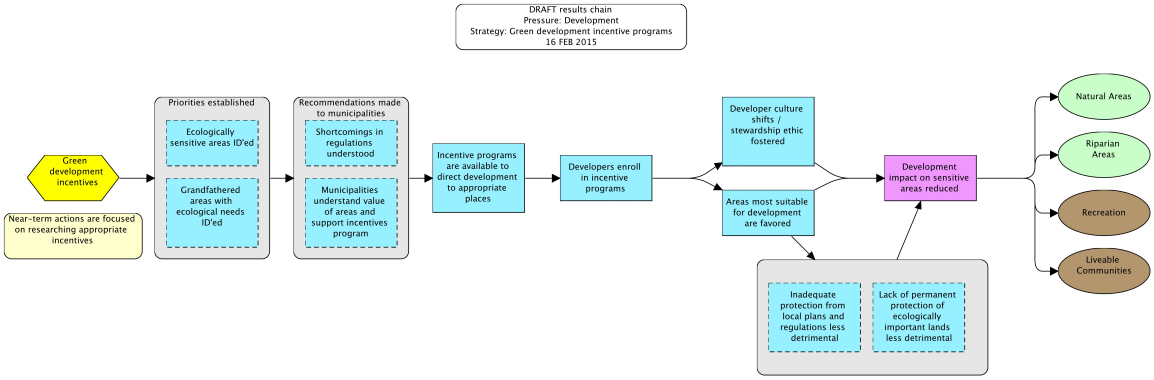
Pressure: Stormwater
Strategy: Stormwater Adaptive Management Plan (Revised: 2-18-15)



The focal strategy triggering the results chain is to develop an Adaptive Management Plan to help monitor and improve their stormwater practices across municipalities at the watershed scale. The results chain below illustrates the "theory of change" if the strategy is successfully implemented.

- **IF** an Adaptive Management Plan is created, **THEN** watershed-scale metrics will be available for adaptive management **AND** decision-makers will understand adaptive management as a data-driven process.
- **IF** watershed-scale monitoring is defined **AND** decision-makers are supportive, **THEN** there will be improved landscape planning and analysis via an integrated stormwater system and coordinated monitoring and data.
- **IF** there is improved landscape planning and analysis, **THEN** new data will drive changes/improvements in the system and will inform the siting of new development.
- **IF** new data drive changes/improvements in the system and inform the siting of new development, **THEN** new development will have a reduced impact, investment will go to the worst problems in the system, and legacy problems will be highlighted.
- **IF** legacy problems are highlighted, **THEN** complementary strategies can be developed to address those problems (example: homeowner outreach).
- **IF** new development has a reduced impact, investment goes to the worst problems in the system, and legacy problems are addressed through new strategies, **THEN** the stormwater impact on the river system, riparian areas, salmon, cultural and spiritual values, human health and safety, and resource industries will be reduced.

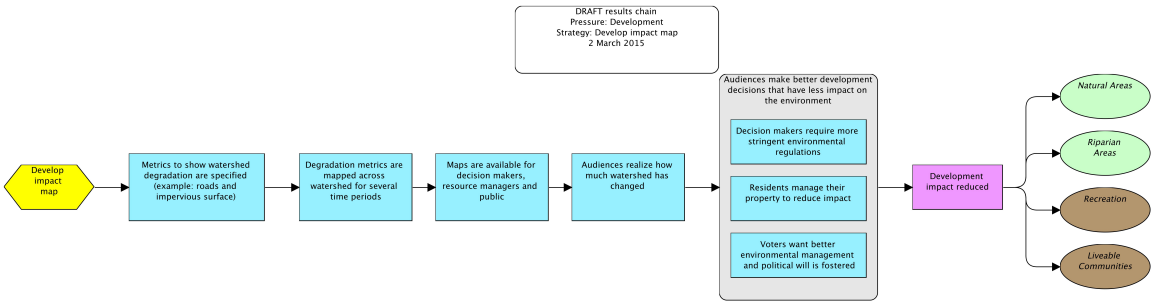
Pressure: Development
Strategy: Incentive Programs for Developers (Revised 2-18-15)



The focal strategy triggering the results chain is to research and implement incentive programs for the development community in the Coquitlam River Watershed. The results chain below illustrates the "theory of change" if the strategy is successfully implemented.

- **IF** green development incentive programs are researched and recommended, **THEN** sensitive ecological priorities in areas that are developable and grandfathered will be defined.
- **IF** sensitive ecological priorities in areas that are developable and grandfathered are defined, **THEN** recommendations for incentive programs that address important areas and areas affected by shortcomings in regulations will be understood.
- **IF** recommendations for incentive programs that address important areas and areas affected by shortcomings in regulations are understood, **THEN** incentive programs will be made available to the development community.
- **IF** incentive programs are made available, **THEN** developers will enroll in those incentive programs.
- **IF** developers enroll in incentive programs, **THEN** developers' culture will shift to support green development practices and a stewardship ethic will be fostered.
- Meanwhile, **IF** developers enroll in incentive programs, **THEN** areas most suitable for development will also be favored.
- **IF** areas most suitable for development are favored, **THEN** current shortcomings in protections of sensitive lands have less of a detrimental effect.
- **IF** developers' culture shifts, **AND** areas most suitable for development are favored, **AND** inadequate protections are ameliorated, **THEN** the development impact on natural areas, riparian areas, recreation, and livable communities will be reduced.

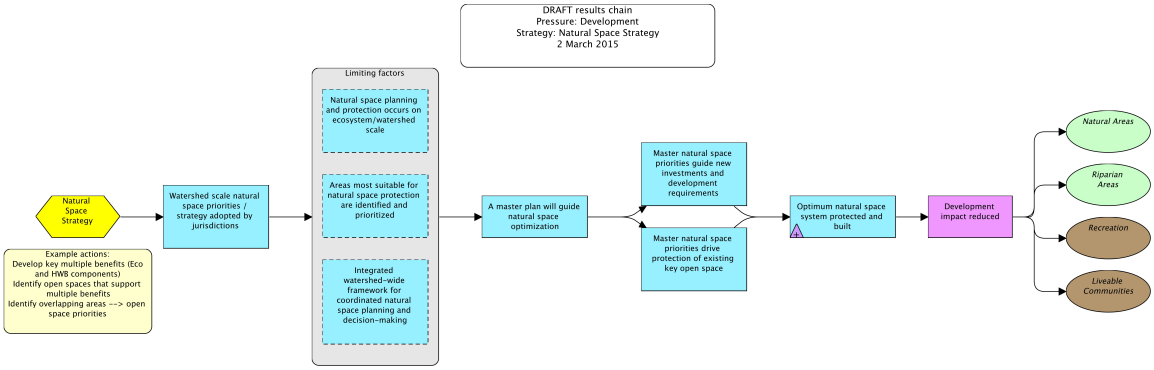
Pressure: Development
Strategy: Development of an Impact Map (Revised 2-18-15)



The focal strategy triggering the results chain is to develop an impact map for the Coquitlam River Watershed, providing an integrated view of factors such as impervious surfaces, water quality, and roads. The results chain below illustrates the "theory of change" if the strategy is successfully implemented.

- **IF** an impact map is developed, **THEN** metrics showing watershed degradation will be specified.
- **IF** metrics showing watershed degradation will be specified, **THEN** they can be mapped across the watershed for several time periods.
- **IF** environmental indicators can be mapped across the watershed for several time periods, **THEN** impact maps will be available for decision-makers, resource managers and the public.
- **IF** impact maps are readily available to these audiences, **THEN** they will recognize how much the watershed has been altered over time.
- **IF** various audiences recognize how much the watershed has been impacted, **THEN** they are more likely to make better development decisions that have less impact on the environment: decision-makers will require more stringent environmental regulations, homeowners will manage their properties to reduce environmental impacts, and voters will want better environmental management (fostering polifical will for watershed protection).
- **IF** various audiences make better development decisions that have less impact on the environment, **THEN** development in general will have less of an impact on the related components.

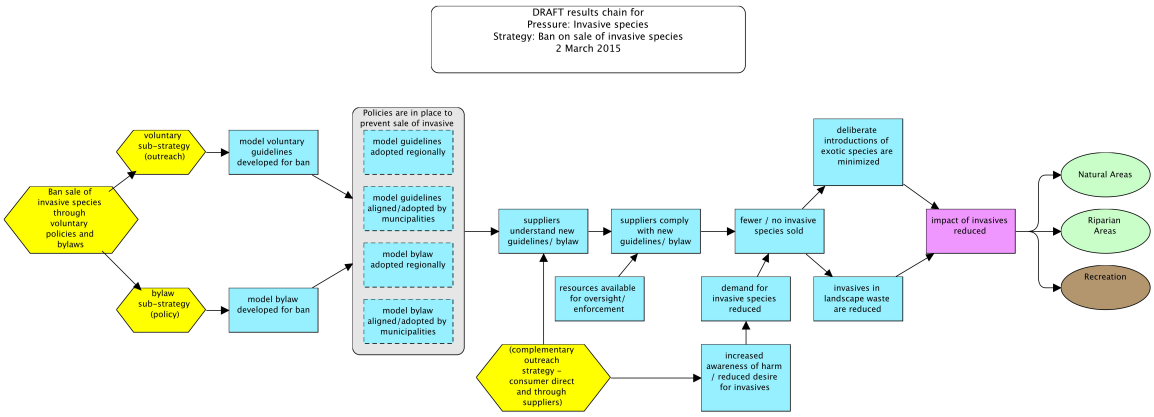
Pressure: Development
Strategy: Natural Space Strategy (Revised 2-18-15)



The focal strategy triggering the results chain is to develop a Natural Space Strategy for the Coquitlam River Watershed by identifying a natural space mosaic that specifically contributes to the health of the components in the system. The results chain below illustrates the "theory of change" if the strategy is successfully implemented.

- **IF** a Natural Space Strategy is implemented, **THEN** watershed-scale natural space priorities will be adopted by local jurisdictions.
- **IF** watershed-scale natural space priorities are adopted by local jurisdictions, **THEN** previously limiting factors will be addressed: natural space planning and protection will occur on an watershed scale, areas most suitable for natural space protection will be identified and prioritized, and there will be an integrated watershed-wide framework for planning and decision-making.
- **IF** the Natural Space Strategy addresses these previous limitations, **THEN** a master plan will be able to guide natural space optimization.
- **IF** a master plan guides natural space optimization, **THEN** strategic natural space priorities will drive new investments, development requirements and protection of existing natural spaces.
- **IF** strategic natural space priorities will drive new investments, development requirements and protection of existing natural spaces, **THEN** an optimum natural space system will be protected and enhanced.
- **IF** an optimum natural space system is protected and enhanced, **THEN** the impacts of development on the Coquitlam River Watershed will be reduced.

Pressure: Invasive Species
Strategy: Ban on Sale of Invasive Species (Revised 2-18-15)

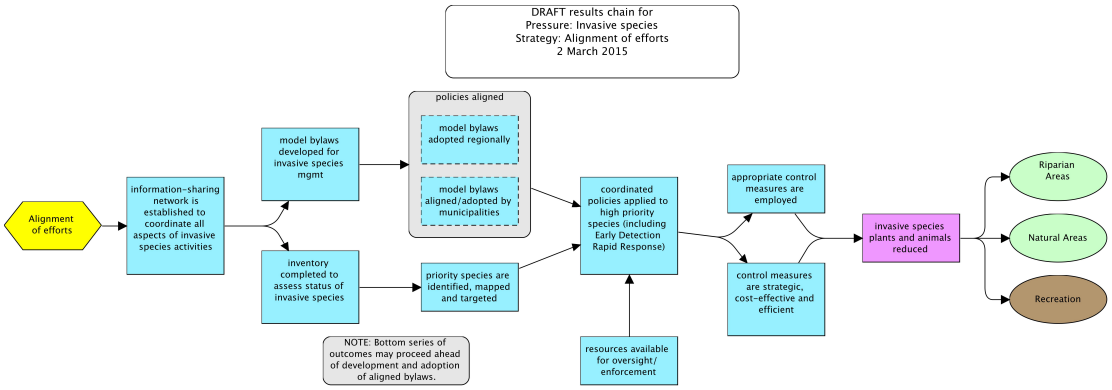


The focal strategy triggering the results chain is to implement a policy to ban the sale of invasive species. The results chain illustrates the "theory of change" if the strategy is successfully implemented. The strategy is divided into two sub-strategies: a voluntary sub-strategy focused on outreach efforts, and a bylaw strategy focused on policy.

- **IF** the voluntary sub-strategy is pursued (top sub-strategy), **THEN** model voluntary guidelines will be developed to discourage the sale of invasive species.
- **IF** model guidelines are developed, **THEN** the model guidelines will be adopted regionally *and* support will be provided to municipalities to adopt or align with the model guidelines as well.
- (Returning to bottom sub-strategy) **IF** the bylaw sub-strategy is pursued, **THEN** a model bylaw will be developed to ban the sale of invasive species.
- **IF** a model bylaw is developed, **THEN** the model bylaw will be adopted regionally *and* support will be provided to municipalities to adopt or align with the model bylaw as well.
- With the adoption of these guidelines and/or bylaws, policies will be in place to prevent the sale of invasive species (grey group box title).
- **IF** policies are in place to prevent the sale of invasive species, *and* a complementary outreach campaign is implemented (yellow strategy below), **THEN** suppliers will understand the new guidelines/bylaw.
- **IF** suppliers understand the new guidelines/bylaw *and* resources are available for oversight/enforcement, **THEN** suppliers should comply.
- Meanwhile, **IF** the complementary outreach strategy reaches consumers as well (either directly and/or through suppliers), **THEN** there will be increased awareness of the harm that invasive species cause and a reduced desire for these particular species.
- **IF** there is a reduced desire for these species, **THEN** demand for invasives should decline.
- **IF** suppliers comply with the new guidelines/bylaw (thereby restricting supply) *and* the demand declines, **THEN** fewer (or ideally no) invasive species will be sold.
- **IF** fewer/no invasive species are sold, **THEN** the number of deliberate introductions of exotic species *and* the incidence of invasives in landscape waste should decline.

- **IF** deliberate release and yard waste contamination are reduced, **THEN** the introductions of invasive species should decline.
- **IF** introductions are reduced (reducing one dimension of the threat of invasive species), **THEN** the impact of invasive species on the related components should decline.

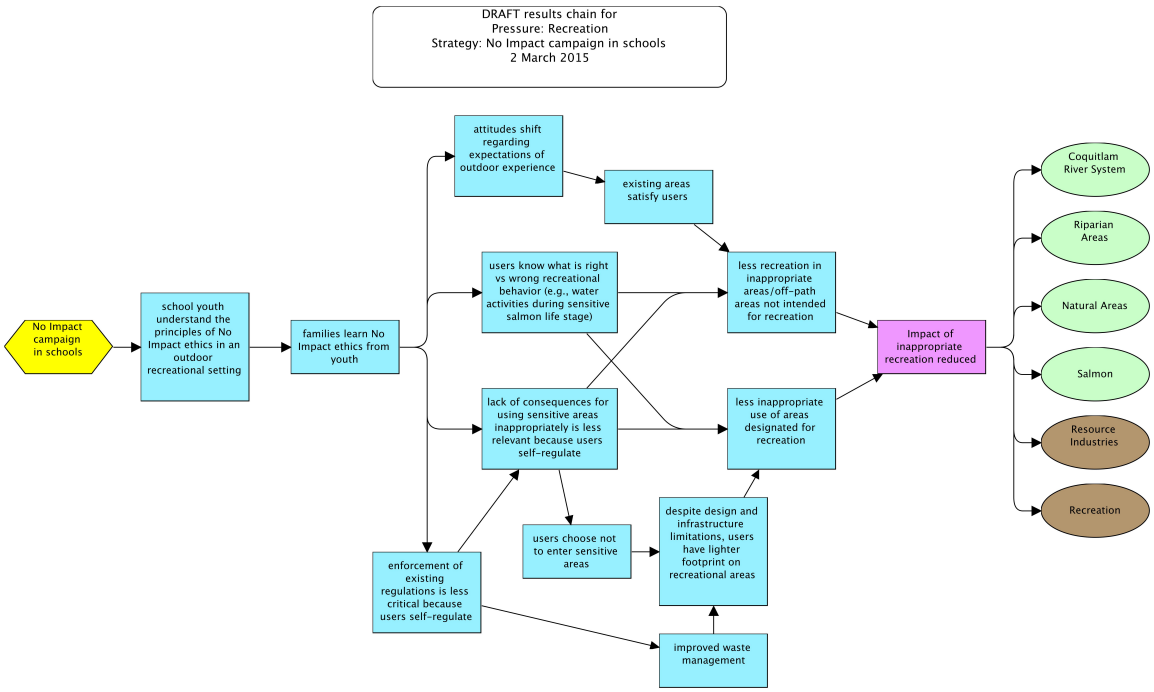
Pressure: Invasive Species
Strategy: Alignment of Efforts (Revised 2-18-15)



The focal strategy triggering the results chain is to develop a coordinated approach to invasive species management for the region. The results chain illustrates the "theory of change" if the strategy is successfully implemented.

- **IF** the alignment strategy is successful, **THEN** there will be an information-sharing network established to coordinate all aspects of invasive species activities.
- **IF** the information-sharing network is established, **THEN** priority coordinated activities will be to develop model bylaws for invasive species management **AND** to complete an inventory of the status of invasive species.
- **IF** model bylaws for invasive species management are developed, **THEN** model bylaws can be adopted regionally **AND** by municipalities (thereby aligning policies).
- **IF** an inventory of invasive species statuses is completed, **THEN** priority species will be identified, mapped and targeted.
- **IF** policies are aligned **AND** priority species are identified **AND** resources are available for oversight/enforcement, **THEN** coordinated policies can be applied to high priority species.
- **IF** there is coordinated management of high priority species, **THEN** control measures will be appropriate **AND** strategic, cost-effective and efficient.
- **IF** control measures are appropriate, strategic, cost-effective and efficient, **THEN** invasive species populations should be contained.

Pressure: Recreation
Strategy: "Leave No Trace" Campaign in Schools (Revised 2-18-15)

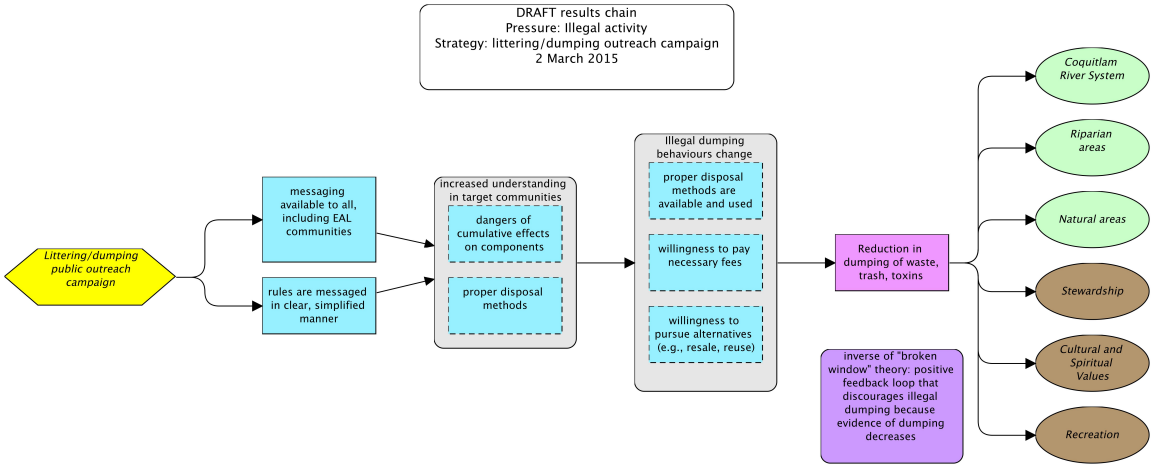


The focal strategy triggering the results chain is to implement an outreach campaign in area schools that will also reach students' families, focused on the concept of "leave no trace" recreational practices. The results chain illustrates the "theory of change" if the strategy is successfully implemented.

- **IF** the "Leave no trace" campaign in schools strategy is pursued, **THEN** school youth will learn and understand the principles of low-impact ethics in an outdoor recreational setting.
- **IF** school youth understand "leave no trace" principles, **THEN** they will teach their families these principles.
- **IF** families understand the importance of these principles, **THEN** several results will follow:
    - Attitudes will shift regarding expectations of outdoor experiences
    - Users will know what is "right" versus "wrong" recreational behavior (for example, whether or not to recreate on the river during sensitive salmon life stages)
    - Users will self-regulate their behaviors, so the current lack of consequences for using sensitive areas will have less of a negative impact
    - Users will self-regulate their behaviors, so the current lack of enforcement of existing regulations will have less of a negative impact
- Taking each of these results in turn, **IF** attitudes shift regarding expectations of outdoor experiences, **THEN** existing recreational areas are more likely to satisfy users.

- **IF** existing recreational areas are more likely to satisfy users, **THEN** there will be fewer people using inappropriate or sensitive areas not intended for recreation. (Return to earlier path)
- **IF** users know what is appropriate recreational behavior, **THEN** there will also be fewer people using inappropriate or sensitive areas not intended for recreation, **AND** less inappropriate behavior in areas that are intended for recreation. (Return to earlier path)
- **IF** users self-regulate their behaviors, **THEN** the lack of enforcement of regulations **AND** the lack of consequences for using inappropriate areas become less problematic factors in the context of the situation.
- **IF** users self-regulate their behaviors, **THEN** there will also be fewer people using inappropriate or sensitive areas not intended for recreation, **AND** less inappropriate behavior in areas that are intended for recreation. (Return to earlier path)
- Meanwhile, **IF** users self-regulate their behaviors, **THEN** there will be fewer dogs in inappropriate areas and more owners will pick up pet waste.
- **IF** there are fewer dogs and owners pick up pet waste, **THEN** there will be improved waste management in recreational areas. (Return to earlier path)
- Meanwhile, **IF** users self-regulate their behaviors, **THEN** they will choose less often to enter accessible but sensitive areas.
- **IF** there is improved waste management in recreational areas **AND** users choose to avoid sensitive areas, **THEN** users will have a lighter footprint on the landscape despite existing design and infrastructure limitation.
- **IF** users have a lighter footprint despite existing limitations, **THEN** there will be less inappropriate use of areas designated for recreation. (Note: for simplicity and consistency with conceptual model, this link is not reflected, but a reduction in use of sensitive areas through this set of links would also benefit areas in which recreation is not appropriate.)
- (Arriving at final two contributing factors/intermediate results) **IF** there is less recreation in inappropriate areas **AND** less inappropriate use of designated recreational areas, **THEN** the impact of recreation on the components will be reduced.

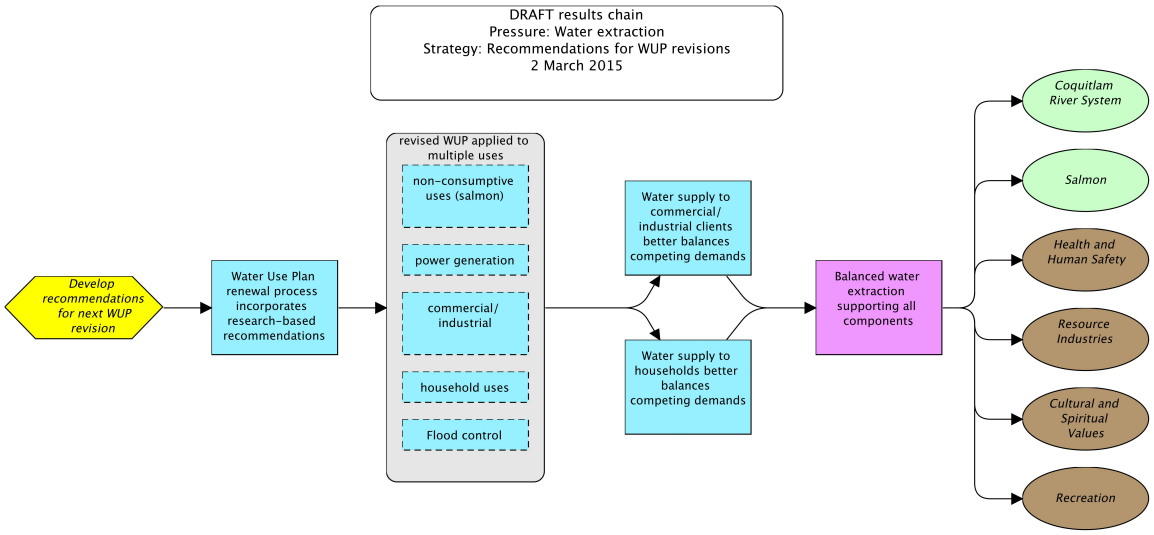
Pressure: Illegal activity
Strategy: Littering/Dumping Public Outreach Campaign (Revised 2-18-15)



The focal strategy triggering the results chain is to implement a public outreach campaign to increase awareness of appropriate disposal methods and the cumulative dangers of environmental contaminants. The results chain illustrates the "theory of change" if the strategy is successfully implemented.

- **IF** the public outreach campaign is successfully implemented, **THEN** the many disposal rules will be messaged clearly and in a simplified, understandable manner **AND** information will also reach ESL communities.
- **IF** disposal rules are clearly understood and received by all members of the community, **THEN** people will understand the cumulative danger of dumping small quantities of contaminants **AND** how to properly dispose of contaminants.
- **IF** people know how to properly dispose of contaminants **AND** they understand the cumulative dangers of improper disposal, **THEN** the public will change its dumping behavior: they will use proper disposal methods, they will be more willing to pay necessary disposal fees, and they will be more willing to pursue appropriate alternatives to dumping.
- **IF** people treat contaminant waste appropriately, **THEN** there will be a reduction in dumping of waste and contaminants that can negatively impact the system.

Pressure: Water Extraction
Strategy: Develop Recommendations for Next WUP Revision (Revised 2-18-15)

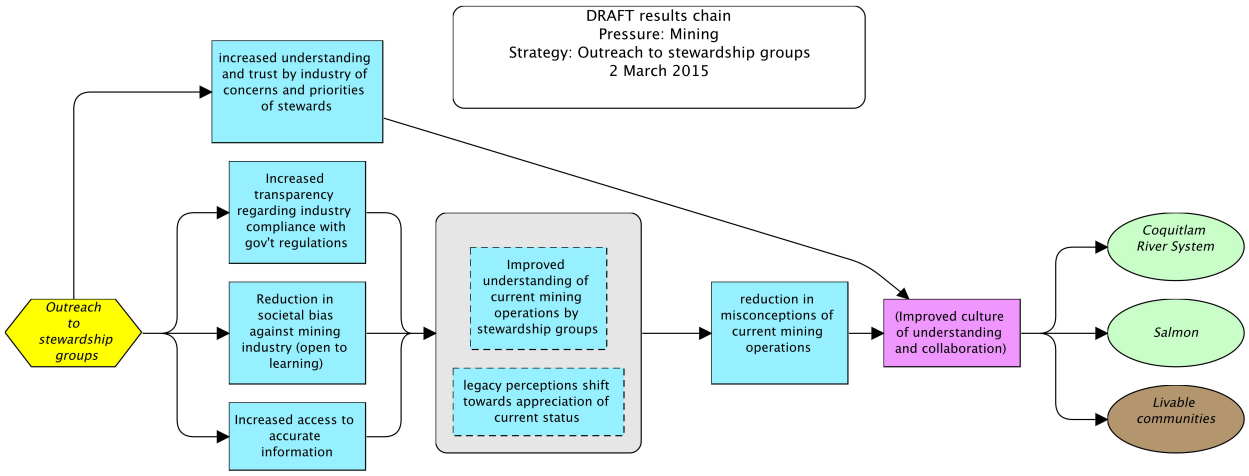


The focal strategy triggering the results chain is to research and develop recommendations to influence the upcoming revisions of BC Hydro's Water Use Plan. The results chain illustrates the "theory of change" if the strategy is successfully implemented.

- **IF** sound recommendations are developed in time for the upcoming WUP revisions, **THEN** ideally the WUP plan renewal process would incorporate the research-based recommendations.
- **IF** the WUP plan renewal process incorporated the research-based recommendations, **THEN** the revised WUP, which applies to multiple uses by commercial and residential

customers, would stipulate a water use regime that balanced the various needs within the system.

Pressure: Mining
Strategy: Outreach to the Stewardship Community (Revised 2-18-15)



The focal strategy triggering the results chain is to implement an outreach campaign regarding current mining practices and to develop a more collaborative relationship with the stewardship community. The results chain illustrates the "theory of change" if the strategy is successfully implemented.

- **IF** outreach to stewardship groups is successfully implemented, **THEN** numerous outcomes would result: increased transparency regarding compliance with regulations, a reduction in social biases against mining, and increased access to accurate information about industry practices.
- **IF** these intermediate results are achieved, **THEN** there will be an improved understanding of current mining operations **AND** perceptions influenced by legacy mining issues will shift towards and appreciation of current practices.
- **IF** current mining practices are better understood and legacy perceptions are updated, **THEN** stewardship groups can communicate this information to broader audiences.
- **IF** stewards disseminate this information, **THEN** there will be a reduction in the misconceptions of current mining operations.
- **IF** there is a reduction in the misconceptions of current mining operations, **THEN** there a culture of understanding and collaboration between stewards and the mining industry can be fostered.
- Meanwhile, **IF** the outreach strategy is successful, **THEN** the mining industry will also better understand the concerns and priorities of the stewardship community, which will **ALSO** contribute to a culture of collaboration between parties.

NOTE: Because this strategy and its context focuses on *perceptions* of the mining industry, successful implementation does not necessarily reduce any actual pressure posed by mining on ecological and human well-being components in the system.

Appendix 16. Resources

Lower Coquitlam River Watershed Action Plan Progress Report #1
http://www.coquitlamriverwatershed.ca/sites/default/files/CITYDOCS-%231960497-v1-Lower_Coquitlam_River_Watershed_Plan_Progress_Report_1_FINAL_for_web_April_2015.PDF

Coquitlam River Watershed Roundtable Website:
www.coquitlamriverwatershed.ca

Coquitlam River Watershed Roundtable Watershed Plan Page:
http://www.coquitlamriverwatershed.ca/content/watershed-plan

Open Standards for the Practice of Conservation
http://cmp-openstandards.org

BC Water & Waste Association article, Watermark Magazine on Watershed Plan
http://www.coquitlamriverwatershed.ca/sites/default/files/Watermark_Winter2014_Coquitlam.pdf

Appendix 17. Reflecting on Successes and Lessons Learned

Goal: Develop a Cost-effective Watershed Plan through a Collaborative Partnership Within a Reasonable Timeframe

- The Lower Coquitlam River Watershed Plan was initiated in 2012, and successfully launched April 22, 2015. Combining the collaboration of diverse partnerships with the application of the Open Standards approach, the Watershed Plan addresses a comprehensive and integrated scope of issues, identifies measurable and achievable goals, and delivers an innovative solution to advance watershed governance in a realistic and timely manner across multiple jurisdictions on a watershed scale.
- Using clearly defined criteria of appropriateness, feasibility (cost, technical, political) and potential impact, partners successfully evaluated and prioritized over 200 strategies generated by the team, local experts and the community through strategy assessment workshops, and developed action plans for the top three strategies that have the greatest potential for successful implementation in the immediate future, describing both the steps that need to be taken to achieve the desired outcomes and the measures and targets to assess progress. Each plan will be monitored, based on set objectives and tracked through indicators to measure success on reducing impacts to improve watershed health.

Goal: Integration of Ecological and Human Values

- The Watershed Plan includes the integration of natural and human systems, such as land-based resources (Coquitlam River system, riparian areas, natural areas, livable communities, resource industry), social development (livable communities, human health and safety, stewardship and recreation), economic development (livable communities, resource industry), and inclusion of cultural and spiritual values. Many types of strategies were developed (i.e. policy, outreach, research); some addressing more than one pressure, and many focusing on actions across the entire lower watershed, regardless of jurisdiction. The strategies will move forward as implementation partners and funding is identified.

Voluntary, Not Mandated

- Unlike other urban watersheds, an integrated stormwater management plan is not required under the Metro Vancouver Liquid Waste Management Plan for the lower Coquitlam River watershed, based on percentage of undeveloped lands in the uppermost watershed. However, because of the many watershed pressures evident in the lower, the partners accessed external funding to develop an alternative, affordable but needed plan for its community.

Attracting Interest from Organizations and Regions

- BC Water Waste Association published an article in Watermark Magazine on the Plan.
- Metro Vancouver's award-winning livable region series has produced two videos about the partnership and the Plan.
- The Roundtable was included in Polis Water Project and Fraser Basin Council publications.
- The Plan was highlighted in the Watershed Planning and Rainwater Management section in the Watershed Blueprint Case Profile Series

Key Benefits of Open Standards

- The approach brings together common concepts, approaches, and terminology in project design, management, and monitoring, including the ability to: better link actions to desired impacts; build in an evaluation framework from the beginning; synthesize all different types of information; use an iterative process allowing for faster implementation; and, account for ecological and human goals, which links through the provision of ecosystem services.
- Many types of strategies were developed (i.e. policy, outreach, research); some addressing more than one pressure, and many focusing on actions across the entire lower watershed, regardless of jurisdiction. The strategies will move forward as implementation partners and funding is identified.

Knowledge Sharing

- A successful watershed management plan involves collaboration, coordination support and the collective buy-in from all sectors, including governments, business, and community. To undertake a project of this magnitude also needs to be paced within a manageable timeframe, where tasks can be shared or delegated, small expert work groups struck to remain efficient and respective of participants' time; and, regular progress updates are used to broadly convey to the community, partners and external funders the ongoing progress being made. This approach provides transparency, watershed-wide inclusiveness and continued support for the project to stay on task and within a budget.
- By developing a watershed plan, a number of strategies and associated actions resulted, and appropriate partners identified, that can be advanced as interest by partners is raised and the required resources become available. Based on the various pressure challenges that have been proposed be addressed, such as stormwater, invasive species or mining, different types of implementers, skills and resources are needed, with various actions, each suited to some and not others. By example, the cities are more inclined to work on stormwater and invasive species management actions to improve watershed health, whereas the development community would better support addressing actions that will ensure sustainable land use development.

Third Party Evaluation

- The Roundtable engaged a Masters Student from the School of Resource and Environmental Management at Simon Fraser University to conduct an evaluation of the Roundtable and the values of Open Standards in watershed planning. Preliminary results indicate the Roundtable organization, and its unique process to develop a cost effective, manageable and realistic watershed management planning process is being delivered successfully based on measureable criteria and is very capable in achieving its goals going forward as operational coordination capacity is formalized. This thesis will deliver important information for others interested in this process, such as an examination of the role of Open Standards framework in structuring watershed management plans within the context of integrated watershed management, and identifying the strengths and weaknesses of using the Open Standards framework for integrated watershed management planning by local organizations. Another objective of this work is to develop an integrated watershed management evaluative framework to evaluate the Roundtable's planning process based on sets of specific criteria related to collaborative

planning, holistic approach, authority and control, and learning and adjusting with experience.

- Success can be attributed to establishing a shared vision that is supported by all partners and the inclusive representation found on the Core Committee and although it has no formal legislative power or authority, the Roundtable has demonstrated its combined influence. Authority and control stems from a common vision, multi-jurisdictional representation and participation, inclusivity and commitment.

Funding and Long Term Financial Sustainability

- The Roundtable partners will continue to apply for grants specific to implementation of the priority strategies identified in the Plan and to support the day-to-day management of the Watershed Plan. Clearly identifying implementation partners and resources (funding and in-kind) is a factor in successful implementation of the plan.
- Base funding from Roundtable partners has enabled the Roundtable to hire a part-time coordinator to assist the Roundtable and secure further funding and community partnerships.

Transparency, Accountability and Continuous Improvement:

- Fully transparent, inclusive process (i.e., meetings are open to the public, notes are posted on the website).
- The Watershed Plan is being led by a Watershed Plan Task Group (WTG) comprised of local government (City of Coquitlam), First Nation (Kwikwetlem First Nation), federal government (Fisheries and Oceans Canada), real estate development (Urban Development Institute), recreation (Port Coquitlam and District Hunting and Fishing Club) and stewardship (TriCity Green Council). The WTG liaises between the Roundtable partners and consultants in coordinating and facilitating the Watershed Plan development (i.e., strategy meetings, Community Roundtable events, Workshops on various components of the plan).
- Third party assessment through Masters level research has provided valuable information for continual improvement, such as outlining the successes (Shared vision/values; Improved relationships; Inclusive representation; Self-design; Consensus-based decision making; Inclusion of human well-being components and cultural/spiritual aspects; and leadership by the City of Coquitlam), as well as areas for improvement like addressing capacity. The plan is based on a continual improvement "plan, do, check, adapt" approach.

Innovation

- Using the Open Standards approach to watershed planning was a cost-effective option compared to the traditional Integrated Stormwater Management (ISMP) process, and the first application of its kind to be undertaken in Canada, though it is actively used throughout the United States and internationally as the focus to effective conservation planning.
- The lower Coquitlam River watershed does not qualify for an ISMP to be completed, due to the disproportionate upper watershed portion that will remain undeveloped, but resulted in a practical watershed plan still being developed, that was supported by the partnership and its implementation of key actions being possible.

- The approach considers both ecological and human well-being values, those "things we care about," as part of the decision-making, making it an appealing and creative to the partnership.
- With the involvement of multiple partners, each meaningfully participating, allowed the decision-making processes to draw on biophysical science, as well as social, scientific, traditional, and economic information, local expert knowledge, including perspectives on past efforts and site-specific information.
- The project engaged a diverse number of sectors in the watershed that ensured buy-in, commitment and support to implement actions that will improve watershed health.
- This work was made possible through the partnerships and grant funding support secured from the Real Estate Foundation of BC, and Watershed Watch Salmon Society (from the Bullitt Foundation). This work is also supported by the generous in-kind support of the member organizations that comprise the Roundtable Core Committee.

Project Benefited both the Partnership and Community

- Relationships between governments, stewardship/community groups, and funders have been strengthened because of the collective participation to develop the watershed plan. Eighteen sectors of interest, 7 funding partners, and 10 supporting partners contributed time, resources and expertise.
- The financial cost to develop the watershed plan was offset by external funding totaling $150,000 cash as well as partnership in-kind contributions of $71,300.
- The watershed plan addressed eight pressures: development, stormwater, invasive species, water extraction, recreation, vandalism/illegal activities, mainstream cultural norms, and mining, to which strategies for action to reduce these pressures were identified; these plans are shelf-ready for one or more partners to implement.
- Both ecological and human well-being components were considered in the watershed plan, strengthening partners' effort to achieve the shared Vision for a healthy watershed, healthy community.
- 90% of Coquitlam residents and 46% of Port Coquitlam residents live in the Coquitlam River watershed. Working to reduce the pressures on the watershed will result in direct and measurable benefits to the community.
- Seven community outreach events held in Coquitlam and Port Coquitlam, with participation from over 2,500 community members, afforded the opportunity for residents to review the plan and contribute input.
- The watershed plan project led to an improved status rating for the Coquitlam River by the Outdoor Recreation Council of BC. After nearly two decades on the Endangered Rivers list, the Coquitlam River was removed off the list in 2014.

Noteworthy

Funding to Develop and Implement the Plan:

- Over $150,000 in cash funding (Real Estate Foundation of BC, Metro Vancouver, the Bullitt Foundation), and $71,300 in-kind support by the cities and others made the project possible to retain the coordination and resource support to guide development of a plan with the multitude of partners.
- Since its formative years, the Roundtable operates through external contributions and grants and the in-kind support of the members of the Core Committee and their organizations. From 2007 to 2011, over $250,000 in funding for the development of the

Roundtable and its first year of operation was provided by BC Hydro, the City of Coquitlam, the City of Port Coquitlam, the former Coquitlam River Watershed Society, Fisheries and Oceans Canada, Fraser Salmon and Watersheds Program, and Kwikwetlem First Nation. The in-kind donation of time and resources by government and non-government organizations has been documented at approximately $90,000.

Identifying Measurable and Realistic Goals, Especially Given the Size of the Watershed:

- The Open Standards approach involves specific steps to ensure measurable and realistic goals are developed that will address the root cause to why a pressure persists. Existing conditions for eight pressures were characterized and 17 strategies to ensure the future health of the watershed were developed. Based on available resources, the strategies were prioritized using criteria to assess potential impact, feasibility and appropriateness. Those strategies that best aligned to the sphere of influence of the Roundtable that could be implemented within reasonable time, and financial, staffing, political, and other constraints addressed were selected. Three action plans: Development, Invasive Species and Stormwater, were developed; and each were assigned a set of measures, targets and indicators from which to report and track progress.

Overcoming Limited Data and Information

- The Open Standards methodology facilitates the use of different knowledge sources available when insufficient information was lacking, i.e., community-based and traditional ecological knowledge, engaging local experts. Participants addressed data gaps with what was available, providing significant savings over the traditional ISMP approach that involves resources for additional data capture.

Partnerships and Collaboration

- Collaborating with the Roundtable provided natural connections to diverse sectors of interests aligned to a common vision for a healthy watershed.
- The Roundtable has been a catalyst for change since its formation in 2011, and shown to foster cross-jurisdictional watershed governance. The cities of Coquitlam and Port Coquitlam, and Kwikwetlem First Nation have Council and staff representation on the Core Committee, which is the Roundtable's administrative body.
- The Roundtable recognized the value in developing a watershed plan that would characterize existing conditions and potential pressures, and identify strategies needed to ensure the future health of the watershed.

Appendix 18. List of Meetings, Workshops and Events

Date	Workshop/ Meeting/ Event	Notes	Details/ Metrics (Number of People)
Summer 2012-June 2013	Research approach, host Community Roundtable (Nov 2012) to identify key components. Undertake health assessment research	What do we care about restoring? Ecological components and human well-being.	How do we measure the health of the components.
June 6, 2013	Community Roundtable: review and provide input on health assessments for ten components; initiate pressure identification	What human activities are causing degradation to the components in the watershed? Which pressures are affecting the components the most?	Attended by sixty-one (61) individuals.
June 2013 – Feb 2014	Finalise health assessment for ten components, complete pressure identification. Begin conceptual modelling for each pressure.	Using established criteria assess and rank the pressures identified for each of the ten ecological and human well-being components	
Feb 2014 – October 2014	Conceptual modeling and strategies development for 8 identified pressures	Which strategies will abate pressures? Which will directly restore components? Where do we start?	
May 2014	Community Roundtable Meeting; review of conceptual models, and input from community on strategies for action;	Presented Conceptual Models, first strategies developed strategies by Task Group	More than 200+ strategy ideas for action assembled for review
October 1-2, 2014	Strategy Assessment Workshops	Watershed Task Group and project-specific experts	Effort to select 2-3 actions for each pressure
January 2015	Core Committee Meeting		
February 2015 February 25 - 26, 2015 Agenda	Action Plan Workshop Watershed Task Group	Strategy Review & Detailed Action Planning	
March 2015	WTG Development Action Plan		
April 22, 2015	Launched Action Plan for the Lower Coquitlam River Watershed		
		LCRWP Progress Report #1	

Appendix 19. List of Partners, Roundtable Friends and Funders

ArtsConnect
BC Hydro
BCIT
Brook Pooni & Associates
BC Energy & Mines
Bullitt Foundation
City of Coquitlam
City of Port Coquitlam
Coquitlam Foundation
Coquitlam River Watershed Society
Fisheries & Oceans Canada
Jack Cewe Ltd
Fraser Salmon & Watersheds Program
Kwikwetlem First Nation
Metro Vancouver
North Fraser Salmon Assistance Program
Pacific Salmon Foundation
Real Estate Foundation of BC
Port Coquitlam & District Hunting & Fishing Club
Riverside Fishing & Tackle
Spirit of Coquitlam Foundation
Tri-City Green Council
Watershed Watch Salmon Society