

Protection of Aquatic and Riparian Habitat by Local Governments

Measures Adopted
in the Lower Fraser Valley
1995

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Foreword

This study surveyed the use of aquatic and riparian protection actions implemented by local government in the Lower Fraser Valley of British Columbia. It was commissioned by the Department of Fisheries and Oceans; Fraser River Action Plan with additional funding contributed by Environment Canada, and was conducted by Quadra Planning Consultants Ltd. of West Vancouver. This study contributes to a larger series of studies and initiatives of senior and local governments to encourage them to work collectively and more effectively to protect streams in urban areas.

This document provides a synopsis of policies, bylaws, and other tools in place by local governments to protect aquatic and riparian habitat. It serves as an inventory of their policies and bylaws, and provides information on the use of other tools such as development permits, covenants, density bonusing, parkland dedications, and land tenure, among others. The information is based on both interviews with local government staff as well as the review of planning documents such as official community plan (OCP) and other bylaws, and environmentally sensitive area (ESA) studies. The study area extends from the mouth of the Fraser River upstream to Hope, and the north shore mountains south to the American border, an area which encompasses 25 municipalities and 4 regional districts.

This online document consists of the following components:

- Report - Provides a full background to study. Consists of the study methodology, overview of findings, and conclusion and suggestions.
- Database (Appendix 1)- Provides the inventory of environmental protection information in detail, and is presented according to each local government.
- Bylaws Respecting Aquatic/Riparian Protection (Appendix 2) - Lists, by local government, the bylaws adopted that in some way take into account aquatic/riparian habitat protection.

The printed version of this document, available from Fisheries and Oceans Canada, includes the following additional information:

- OCP Summary - Provides a listing of all master and sub-area community plans for each local government, with associated information such as the term, revision status, etc.
- Mapping Systems - Provides information on each local governments' mapping systems in use, such as the type (manual or digital), scale, software type, data base, etc.
- Contact List - Provides a list of key contacts within each local government, including telephone and facsimile numbers.

For a number of reasons, this document should be treated as an initial source of information for general reference purposes. Firstly, the information in this report is bound to change over time; the information is of a limited level of detail; and lastly, it represents policies and regulations that have been adopted by local government and does not address the implementation and effectiveness of these measures. If further information is needed, it should be obtained directly from the source, i.e. the local government. The opinions expressed in the report are the views of the consultant and do not necessarily reflect those of the Department of Fisheries and Oceans.

This study was completed by Quadra Planning Consultants Ltd., with review by Emma Child and Melody Farrell of FRAP. The financial contribution of Environment Canada is gratefully acknowledged.

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Acronyms

LDG's	Land Development Guidelines
ESA's	Environmentally Sensitive Areas
OCP's	Official Community Plans
DPA's	Development Permit Areas
DFO	Department of Fisheries and Oceans
MELP	Ministry of Environment, Lands and Parks
GVRD	Greater Vancouver Regional District
FREMP	Fraser River Estuary Management Program
BIEAP	Burrard Inlet Environmental Action Program

SUMMARY

The purpose of this study was to inventory environmental protection measures adopted by local governments in the Lower Fraser Valley to protect aquatic and riparian habitat. Information for this survey was gathered through intensive interviews with local government staff, and review of available official plans and other documents. The inventory was limited to a consideration of adopted policy and regulations, and did not review in detail how these policies are interpreted, applied or implemented. It was also limited by the inherent complexity of municipal regulatory structures, which include a variety of bylaws and programs which combine in various ways to achieve local government purposes. Finally, the study is indebted to the staff who provided their time and information on the status of municipal policies.

In the past decade, local governments have made progress in protecting aquatic and riparian habitat. They have steadily expanded the scope and intensity of their stream stewardship initiatives, and now use many combinations of policies and regulations that protect stream environments. The approach of each municipality in tailoring its policies and regulations on stream stewardship is uniquely adapted to its local circumstances. This diversity in approach provides a rich proving ground for developing new ways to achieve stream stewardship.

The inventory reviewed the measures used by local governments in the functional areas identified in the *Land Development Guidelines*: habitat identification, habitat protection, habitat acquisition and management, stormwater management, erosion and sediment control, instream work, fish passage and culverts, application reviews and inspections, and monitoring and enforcement. Local governments were strongest in the area of habitat identification, protection, acquisition and management where half had substantial initiatives and many of the rest had partial initiatives. Most local governments had partially or substantially addressed aquatic habitat needs in their stormwater management programs and erosion and sediment control requirements. Local governments relied mostly on environmental agencies for implementing environmental measures related to instream work, fish passage and culverts, and monitoring and enforcement. Local governments cooperated with environmental agencies in reviewing applications and conducting inspections, but many also have made substantial efforts of their own to address habitat needs.

The inventory also identified a number of conclusions and suggestions to improve stream stewardship. Local governments were interested in improving partnerships with environmental agencies. Some of their concerns included charges and investigations of local governments for violations of environmental legislation, disagreement about the extent of responsibility local governments should have for habitat, and differences in the value placed on habitat preservation. Local governments stressed the need to increase local public support for stream stewardship as an element in any program to increase local government roles in stream stewardship. They also identified needs for improved habitat identification and stronger habitat management tools. The suggested that there are situations where the *Land Development Guidelines* do not apply, and that these guidelines should be amended or supplemented to make the relevant to special situations, e.g., drainage canals and ditches. Finally, local government officials stated that institutional systems could be improved by faster referral systems, joint project reviews, and use of environmental monitors.

1.0 INTRODUCTION

The purpose of this study was to inventory environmental protection measures used by local governments (regional districts and municipalities) in the Lower Fraser Valley to protect aquatic and riparian habitat. Three important study objectives were:

- to inventory existing environmental protection measures adopted by local governments that may assist in protecting aquatic and riparian habitats.
- to assess the adequacy of these measures for protection of aquatic and riparian habitats.
- to suggest improvements to these measures, including improved ways to protect habitats, training needs, and support requirements from senior governments.

2.0 METHODOLOGY

The consultants gathered information from staff and reports from the four regional districts and twenty-five municipalities in the Lower Fraser Valley. The regional districts included:

Central Fraser Valley Regional District
Dewdney Alouette Regional District
Regional District of Fraser Cheam
Greater Vancouver Regional District

The municipalities covered included the following:

Anmore	Langley City	Port Coquitlam
Belcarra	Langley Township	Port Moody
Burnaby	Maple Ridge	Richmond
Chilliwack	Matsqui (Abbotsford)	Surrey
Coquitlam	Mission	Vancouver
Delta	New Westminster	West Vancouver
Harrison Hot Springs	North Vancouver City	White Rock
Hope	North Vancouver District	
Kent	Pitt Meadows	

The information in this study is based on two primary sources:

- interviews
- review of planning documents.

Interviews

The interviews were held with local government staff to identify environmental measures adopted to protect aquatic and riparian habitat. The interviews were generally in person, but a few were by telephone. The interviews varied in length, averaging about two hours. From one to five municipal staff were present for in-person interviews. A number of followup contacts were made to gather missing information. The interviews were open-ended but organized to cover the topics below. These topics are based on the *Land Development Guidelines*.¹

¹ Barry Chilibeck, Geoff Chislett, and Gary Norris, May 1992. *Land Development guidelines for the Protection of Aquatic Habitat*, produced by the Habitat Management Division of the Department of Fisheries and Oceans and the Integrated Management Branch of the Ministry of Environment, Lands and Parks.

Stream Stewardship

- OCP Goals, Objectives, & Policies
- Referencing of *Land Development Guidelines* in Bylaws

Environmental Bylaws

- Environmental or stream protection bylaws
- Other bylaws applicable to stream protection (tree cutting, soils, untidy premises)

Leave Area Identification and Protection

- Environmental Studies / ESA Mapping
- OCP Designation of streams
- Development Permits
- Special measures to protect habitat, e.g., density bonuses
- Infrastructure Policies affecting leave areas

Leave Area Acquisition and Management

- Land Dedications
- Restrictive Covenants
- Acquisition
- Financing
- Management of Municipally-Owned ESA's

Stormwater Management Policies and Bylaws

- Stormwater Detention
- Stormwater Source Control/Treatment

Erosion and Sediment Control Policies

Instream Work Policies

Fish Passage and Culvert Policies

Application Reviews and Inspections

- Legal Surveys/Environmental Inventories/Impact Assessment Studies
- External Reviews/Advisory Bodies
- Plan Reviews
- Environmental Controls/Enforcement Provisions
- Development Inspections and Enforcement

Monitoring and Enforcement

Training and Information Needs

Review of Documents

A second source of information for this study was the review of planning documents. Available official community plans and other planning documents were gathered and reviewed to identify provisions that could be applied to protect riparian and aquatic habitat. In all, thousands of pages of documents were reviewed.

Limitations

This study inventoried measures adopted by municipalities and regional districts in the Lower Fraser Valley that may serve to protect aquatic and riparian habitat. Interpretation of this information, however, has several limitations.

1. Review Limited to Adopted Policy and Regulations

This study focuses on the policies and regulations that municipalities and regional districts have adopted that parallel the requirements in the *Land Development Guidelines*. It does not detail how these policies are interpreted, applied and implemented in practice.

A bylaw may well be a "paper" regulation only with no substantial effect on municipal actions. In some cases, for example, municipalities have strong OCP policies requiring protection of streams. However, Council may be opposed to using certain measures except in certain situations, e.g., leave area requirements.

Alternatively, a local government may take significant actions in absence of a written policy or regulation. A council may not have a policy on fish passage, for example, but the engineering department may apply the *Land Development Guidelines* in designing stream crossings. One purpose of the interviews was to identify such unwritten policies.

In several situations, municipal staff were unsure how stream environments might best be protected. A municipality may have a written or unwritten policy on stormwater detention, but may not consider options for implementation technically or economically feasible in a specific situation.

2. Local Government Policy and Regulatory Structures are Complex

Local government policy and regulations evolve over time as councils and staff respond to local issues and citizen demands within the context of the *Municipal Act* and relevant common law. As this study shows, each municipality has created a unique combination of policy and legislative tools to address its needs. To accomplish a certain objective, such as protecting a leave area, municipalities may use various combinations of OCP policies, development permits, zoning provisions, large lot zoning, subdivision control requirements, servicing standards, infrastructure plans, tree bylaws, soil removal and/or deposit bylaws, drainage bylaws, and other regulations. To evaluate whether the leave area is protected one must examine the regulatory impact of the *combination of tools* that are used.

Adding to the complexity are the intangible factors in how municipal policies and regulations are applied. Municipal councils and regional boards change over time with elections, and a new council may launch new policies or interpret standing policies differently. For example, one council may adopt an "open streams" policy discouraging enclosing of streams in culverts except in very necessary circumstances. The next council may interpret 'necessary' very liberally.

Staff may also exercise considerable discretion. Subdivision approving officers, for example, have significant authority to interpret municipal policy and determine subdivision requirements. Development permits allow considerable discretion to staff (under council direction) and developers to negotiate tailor-made terms and conditions for a development. Negotiations over land dedications also involve a range of interpretations of regulations that ostensibly appear clearcut.

3. Interpretation of Municipal Policy Varies

Local governments in the study area varied from a handful of staff to several thousand employees. In medium and large size municipalities, implementation of policy may be highly specialized. Interpretation and application of environmental standards may involve dozens of staff. In addition, given complex policy and regulatory structures, a new staff member may not be able to describe the nuances of overall municipal policy for quite some time. He or she may

have little knowledge of policies in other departments, and communication among departments is not always strong. Policy may differ and even be in conflict among departments. In some cases, staff were not aware of policies that were stated in OCP's, zoning, or other policies. Furthermore, council policy is stated in minutes and past decisions, and changes over time. To address these limitations, the consultants attempted to identify knowledgeable spokespersons. Many very busy and senior staff were exceptionally cooperative in extending their time, information, suggestions, and courtesy to the consultants.

3.0 FINDINGS

Overall Progress

In the past decade, local governments have made progress in establishing measures to protect stream environments. These trends began as a result of growing environmental consciousness of councils, staff, and local citizens. In some cases, "green policies" have originated decades ago when land was subdivided and stream corridors were reserved as parks, open space and natural areas.

Present trends are positive. Several local governments in the Lower Fraser Valley are actively expanding the scope and intensity of their stream stewardship initiatives. For example, as regular reviews of OCP's are conducted, they are conducting studies to identify Environmentally Sensitive Areas (ESA's), designating Development Permit Areas (DPA's), and incorporating other stream stewardship initiatives. Over time, these policies are percolating through to other bylaws and policies. There are a significant number of municipalities and regional districts that are making the transition to strong stream stewardship. At the same time, staff of several municipalities stated they are not willing to assume what they consider new or additional responsibilities.

From an environmental agency perspective, it would be helpful if municipalities could standardize their approach to stream stewardship. However, some municipal staff stressed that each municipality is unique and will approach stream stewardship in its own way. They suggest that any approach for improving stream stewardship must allow flexibility to enable municipalities to tailor their approaches to local circumstances. Local policy and legislation has evolved in very different ways in individual municipalities. Environmental agencies must work with this diversity, and build upon it. A diversified approach allows for testing of approaches and adaptation to local issues.

Functional Areas

The study focused on the following stream stewardship functions as outlined in the *Land Development Guidelines*:

- Habitat Identification
- 5. Habitat Protection Measures
- 6. Habitat Acquisition and Management
- 7. Stormwater Management
- 8. Erosion and Sediment Control
- 9. Instream Works
- 10. Fish Passage and Culverts
- 11. Application Reviews and Inspections
- 12. Monitoring and Enforcement

An overview of the findings within each of these areas is discussed below.

1. Habitat Identification

Identification of aquatic and riparian habitat is an important first step in the process of managing and protecting this habitat. The responsibility for identifying habitat is a shared responsibility. Federal and provincial agencies have a primary responsibility for identifying habitat because they manage fish and wildlife resources. Local governments need to identify habitats to ensure that these areas are considered in their community planning and development policies. To fulfill this responsibility, several municipalities have taken the initiative to identify sensitive habitats and natural areas as part of their planning and development control processes.

Status

In general, local governments have made progress in identifying important habitats. The survey found that

- About half of the local governments in the study area (14 or 48%) have identified and designated aquatic and riparian habitats in a manner that would enable them to establish comprehensive policies and regulations for management and protection.
- Most of the rest have either partially identified this habitat (9 or 31%) or are in the process of identifying this habitat (3 or 10%). Of these, the municipalities have:
 - identified habitat for parts of the municipality, and/or
 - identified habitat in areas expecting significant development pressures, and/or
 - identified major streams only.

Approaches

Local governments have used a variety of approaches for identifying and designating aquatic and riparian habitat. To be effective, each municipality must choose a package of approaches that best fits its local circumstances. For example, a small municipality might be able to identify important habitat through local knowledge of staff and protect this habitat by simple OCP designation. A sparsely populated district municipality or regional district might rely on more strategic information, with detailed study to confirm designations at the time of development. Some of the identification and designation methods used include the following:

- Using information provided by DFO or MELP to identify important habitat.
- Conducting comprehensive or area-specific municipal studies to identify Environmentally Sensitive Areas (ESA's).
- Using environmental inventories prepared by non-government environmental organizations.
- Identifying ESA's broadly, with detailed boundaries to be determined at time of development (e.g., Maple Ridge).
- Identifying potential habitat areas based on topographic mapping and other available information, with follow work at the time of development to identify habitat areas (e.g., Maple Ridge).
- Preparing State-of-the-Environment Reports that include environmental planning strategies (e.g., Burnaby).
- Designating ESA's in Official Community Plans (OCP's) or other local area planning documents.
- Designating habitat within Development Permit Areas (DPA's) in OCP's.
- Identifying habitat within Comprehensive Development Zones or Areas in OCP's or zoning.
- Coordinating municipal policy with Fraser River Estuary Management Program (FREMP) designations or Burrard Inlet Environmental Action Plan (BIEAP) designations.

- Recommending important natural areas for the GVRD Green Zone.
- Identifying habitat in conservation bylaws (North Vancouver District, Coquitlam).
- Designating natural areas as "Conservation", "Open Space and Recreation" or other green designation in the OCP.
- Identifying and designating watercourses by name (e.g., Central Fraser Valley Regional District).
- Establishing fixed setbacks (7.5 to 30m) from named watercourses in OCP or zoning bylaw.
- Including important habitats within parks, greenbelts, greenways, wildlife corridors, open space plans, or other green designations.
- Identifying important watercourses in stormwater drainage studies and plans.

Municipalities have relied on more informal or ad hoc methods to identify habitat:

- Relying on local knowledge (for small municipalities).
- Establishing a policy that every stream is considered important.
- Requiring developers to undertake environmental inventories that includes identification of any watercourses.
- Relying on staff or commissioned site inspections or inventories to identify habitat.

2. Habitat Protection

Local governments use a variety of measures to protect aquatic and riparian habitat depending on the circumstances. No single approach in isolation is likely to be effective in all situations, and the most effective and appropriate approaches depend on the circumstances in the local municipality. Protection measures are used in various combinations. For example, a municipality might designate important habitat as a conservation area or open space area in its OCP. This would signal private owners and developers that the community may wish to acquire or protect the area with other regulations. The OCP could also declare the area a Development Permit Area,² thus signaling that any development would require special measures to protect habitat. While zoning cannot be used to prohibit all development, it could establish conditions for development, including setbacks and siting rules. Municipalities could also combine various provisions allowable under the *Municipal Act* into a conservation bylaw that would regulate the cutting of trees, the removal or deposit of fill, and the obstruction, impeding or fouling of the watercourse. In examining municipal environmental protection provisions, the important point is not whether a municipality uses one method or another, but whether *in combination* the methods would effectively safeguard the environmental integrity of important habitats.

Status

In general, local governments are making progress toward protection of aquatic and riparian habitats. There is still much to be done, however. The survey found that:

- Less than half (13 or 45%) of local governments have established objectives for protecting riparian and aquatic habitat, backed up by regulatory guidelines and measures that could be implemented to protect this habitat.
- Over a third (10 or 34%) have established objectives, but regulatory guidelines and implementation measures are incomplete or are evolving.
- Over one fifth (6 or 21%) have not established objectives or means to protect this habitat.

Approaches

² Development Permits may be one effective tool for some municipalities, but some municipalities have provided substantial protection without using them.

The tools considered below exclude habitat acquisition and management tools that involve changes to land tenure and control. These are discussed in the next section.

Some of the tools that municipalities use in various combinations to protect habitat include the following:

- Strong policies and guidelines in the OCP for protection of stream environments.
- Stream protection provisions within Conservation and Open Space designations within the OCP that have been used to designate stream environments.
- Negotiation of habitat protection provisions during rezonings or other development applications.
- DPA guidelines to regulate siting, vegetation protection, erosion control and other issues.
- Comprehensive Development Zones with provisions for urban design to preserve streams.
- Zoning provisions regulating setbacks from streams.
- Zoning provisions regulating permitted uses near streams and sensitive lands.
- Creek Preservation Zones within DPA's with strong provisions for control by municipality (e.g., West Vancouver).
- OCP, Zoning or DPA provisions allowing bonusing, clustering, multiple dwellings per lot, common property accesses, flexible lot sizes, area density variation, or other flexible provisions in exchange for habitat protection.
- Zoning density calculations that include dedicated or covenanted areas (thus allowing density to be developed outside of these areas), e.g., Burnaby, Coquitlam.
- Preparation of waterfront plans that include habitat management plans (e.g., Burnaby).
- ESA Design Manuals that provide detailed design guidelines and/or plans for individual stream corridors.
- Guide plans with stream protection strategies.
- Infrastructure policies that keep roads and services away from streams.
- Comprehensive environmental protection bylaws that combine various provisions of the *Municipal Act* into an integrated bylaw (e.g., North Vancouver District, Coquitlam).
- Watercourse bylaws prohibiting fouling, obstructing or impeding streams.
- "Open Streams" policies that sharply limit culverting streams (e.g., Burnaby).
- Soil deposit and removal bylaws with application to sensitive lands.
- Tree cutting bylaws with application to sensitive lands. Tree management policies applying to public lands.
- Combining hazardous land protection measures with stream protection, including provisions for protection from geotechnical and flood hazards.
- Cooperation with environmental agencies in joint programs to protect habitat, either on a bilateral municipality-agency partnership, or through FREMP or BIEAP.
- Coordination of development application reviews with environmental agencies through referrals or joint project review mechanisms.

3. Habitat Acquisition and Management

One of the best approaches for protecting aquatic and riparian habitat is to re-acquire habitat from private owners and to manage it directly. Habitat can be acquired through a variety of approaches, including dedication by owners, purchase, or expropriation. Where land is not acquired in full, rights to protect the land can be acquired through restrictive covenants or lease. Funding for purchase of habitat can come from the municipality's capital budget, from parkland acquisition fees or development cost charges, land exchange, or senior government funding.

Status

Local governments have long recognized the value of natural areas to the quality of life and character of the community. The provision of parks, open space and green belts has been a municipal priority for decades. Municipalities see several functions for these areas, including creating a green urban character, providing for outdoor recreation, protecting urban development from flood and geotechnical hazards, and protection of habitat. The survey found that:

- Half of the local governments (14 or 52%) have made or are making substantial efforts to acquire aquatic and riparian habitat and manage this habitat for protection through requiring of dedications and/or covenants, purchase, or other means. Another four municipalities (14 %) have made some efforts toward acquisition and management of this habitat.
- Over one-third of local governments (10 or 34%) do not have strong policies for acquisition or management of habitat.

Approaches

Local governments use a variety of tools to acquire and manage riparian and aquatic habitat:

- Developing acquisition strategies as part of a park acquisition program or OCP.
- Requiring 5% dedications of areas within leave areas identified by the municipality or environmental agency staff.
- Negotiating and/or acceptance of dedications greater than 5%.
- Requiring restrictive covenants where necessary to protect areas within leave areas not included within dedications.
- Requiring developers to produce evidence of approvals of their plans from environmental agencies, including leave area dedication and/or covenants.
- Use of Development Cost Charges to purchase lands not acquired by dedication or protected by covenant.
- Use of capital budget funds to by natural areas as part of community or regional parks.
- Reserving municipal lands with habitat values from development.
- Exchange of municipal lands for habitat areas on private lands, e.g., Burnaby.
- Purchase of important habitat with funding support from environmental agencies.
- Formulating guidelines and policies for human activities near streams.
- Using municipal staff to inspect leave areas before and during development to ensure requirements are met.
- Managing leave areas through removal of dead, dying and dangerous trees.
- Developing pathways or access points in consultation with environmental agencies.
- Encouraging local organizations to become involved in stream protection and enhancement, including "adopt-a-stream" initiatives, catch basin marking.
- Cooperation with Salmonid Enhancement Program.

4. Stormwater Management

Local governments have primary responsibility for stormwater management. Their activities include the development of stormwater management policies and bylaws, development of storm sewerage systems, maintenance of drainage ways to ensure free flow of water and reduce flood risks, regulation of the discharge of contaminants to storm drainage systems, and monitoring of water quality. These activities can have a significant effect on fish resources. Two program objectives need to be achieved to minimize these effects. First, stream flows need to be maintained at normal flow levels to ensure a sufficient quantity of water for all fish life cycles. Second, water quality in streams must be maintained to ensure a healthy environment for fish.

Status

While municipalities have been effective at stormwater management, there is considerable room for reducing the impacts of stormwater drainage systems on fish. The survey found that:

- Only three local governments (10%) had substantial policies, plans and programs to maintain natural stream flows, control pollutants at source, and promote stormwater quality through proactive monitoring, enforcement and treatment programs. Another 14 (48%) have partially developed these initiatives or are in the process of developing them.
- At least four municipalities are special situations with drainage systems on low-lying lands drained by canals and ditches. Many of these lands lie behind dykes.
- The remaining eight local governments either do not have significant initiatives to mitigate the effects of stormwater drainage on fisheries, or they believe it is not part of their mandate.

Approaches

For Natural Flows:

- Comprehensive stormwater management studies to identify natural drainage systems.
- Stormwater management plans and policies addressing natural flows.
- OCP or other strategic policy to maintain natural flow rates in streams.
- OCP policies that require stormwater to be handled in a comprehensive fashion when development takes place near watercourses.
- OCP policies to encourage detention on site.
- DPA policies to discourage alternation of natural drainage.
- Subdivision and servicing bylaws requiring maintenance of natural flows during development and construction, including surface infiltration, subsurface disposal, and storage.
- Requirements to manage runoff from construction sites for building permits or other approvals.
- Construction and maintenance of municipal detention facilities for maintaining natural flows and/or water quality.
- Maintenance of drainage canals and ditches to maintain natural flows.

For Water Quality:

- OCP policies on water quality with supporting studies, policies and bylaws.
- OCP policies to discourage water polluting industries.
- Storm sewer bylaws to prohibit discharge of polluted runoff to storm sewer.
- Bylaws to prohibit "fouling, obstructing or impeding" a watercourse.
- OCP policies that waste material not be placed where it might leach or runoff into watercourses.
- Subdivision/servicing requirements that prevent release of silt, raw concrete, leachate, and other deleterious substances into drainage systems.
- Zoning restrictions to keep pollution generating activities away from streams, e.g., swine operations.
- Integrated environmental protection bylaws to address pollution.
- Business licence requirements concerning source control.
- Oil and grit separators for new subdivisions, industrial and commercial developments.
- Catch basin and oil intercept required for parking lots.
- Catch basins, interceptors, containment barriers or berms, and roofs required for on-site contaminants.
- Bylaws to prohibit cattle intrusion into watercourses.
- Stormwater treatment through vegetation biofilters, ponds, and leave areas.
- Monitoring and analysing water quality of lakes and streams.

- Programs to restore water quality of streams and lakes, e.g., nutrient sink ponds.
- Education programs
- Marking catch basins with yellow fish signs.
- Involvement of educational institutions in monitoring and cleanup.
- Encouraging the public to report pollution incidents.
- Referring runoff issues or problems to environmental agencies.

5. Erosion and Sediment Control

Local governments have a significant role in controlling erosion and sediment runoff from development and other human activities. In regulating development, municipalities can prohibit development on lands subject to serious erosion problems, ensure that site plans include sediment control measures, require developers to retain professional advice in the design and management of a project, and monitor sediment control in periodic development inspections. For non-development situations, municipalities can enforce various bylaws including provisions preventing the fouling, obstructing or impeding of a watercourse, and soil deposit and removal bylaws.

Status

Eight local governments (28%) had substantial policies and regulatory measures in place to address erosion and sediment control. Another seven (24%) had partial measures in place.

Seven local governments (24%) had limited measures in place, and another six (21%) relied primarily on referrals to address erosion and sediment control.

Approaches

Approaches used include:

- Establishing OCP policies to discourage practices that increase erosion and sedimentation.
- Protecting leave areas. Requiring snow fences.
- Prohibiting discharge of silt, dirt or debris to watercourses.
- Refusing subdivisions where land would be subject to erosion.
- Establishing silt and erosion control through Development Permits.
- Including silt control requirements in subdivision/servicing bylaws and/or building permits, e.g., temporary settling ponds, gravel access pads.
- Requiring designs be designed and installed as approved by a Professional Engineer.
- Requiring developers to prepare siltation control plans.
- Requiring revegetation plans.
- Applying tree cutting bylaws in erosion prone areas.
- Requiring developers to demonstrate how siltation control proposals work.
- Requiring that siltation control facilities be well-located and maintained.
- Addressing erosion/sedimentation issues in inspections.
- Adopting and enforcing no fouling, obstructing or impeding bylaw provisions.

In addition to the above approaches, local governments also cooperated with environmental agencies through referral approaches by:

- Referring developers and designers to LDG's.
- Forwarding all proposals affecting watercourses to environmental agencies.
- Including requirements of environmental agencies in development approvals.
- Requiring developers to meet requirements of environmental agencies.

6. Instream Work

On occasion, land development requires construction-related work to be carried out in the aquatic environment. The objective of instream work guidelines is to promote careful planning and construction practices to limit the potential for impacts on stream habitats. Some instream work occurs as municipalities develop infrastructure, e.g., road crossings, development servicing. Other instream work may occur when drainage watercourses are cleaned to improve drainage capacity. In some cases, private developers also require access to a stream to develop a site. Municipalities exercise some control over instream work through bylaws that prohibit the fouling, obstructing or impeding a stream. They regulate deposit and removal of soil. They regulate servicing design, construction, and site remediation. They also cooperate with environmental agencies by referring proposals to these agencies for review and enforcement, particularly works that involve the *Water Act*.

Status

Over two-thirds of the local governments (20 or 69%) relied on referrals to environmental agencies for addressing instream stream work, though in many cases the municipality did have some measures in place.

Four local governments (14%) had substantial initiatives of their own to address instream work.

Three municipalities (10%) were special cases where the major watercourses were drainage ditches or canals. These municipalities, as well as others with similar situations, indicated that instream work was required to remove silt and some vegetation from streams to maintain drainage and flood protection works. Concern was expressed that the municipality might be held liable for flood damages and risks to people if they do not maintain flood works adequately.

Approaches

Municipal approaches include:

- Inclusion of instream policies in OCP.
- Requiring Development Permits for works near streams.
- Inclusion of timing and standards for ditch maintenance in OCP.
- Respecting fisheries timing/seasonal windows in planning instream work.
- Using the LDG's as a reference when planning instream work.
- Incorporating requirements for instream work in subdivision bylaw, e.g., maintenance of stream flows, construction of ditch walls.
- Inspecting watercourses to identify and address obstructions to flow that can cause flooding problems.
- Forcing landowners to remove private obstructions or alterations.

Referral approaches include:

- Including OCP policies requiring that stream areas in accordance with federal, provincial and regional guidelines, regulations and bylaws.
- Referring development proposals to environmental agencies for review.
- Consulting with environmental agencies in regular meetings.
- Referring development proposals to joint project review mechanisms, e.g., FREMP.
- Ensuring developers have permits from B.C. Water Management Branch for any instream work.
- Building DFO stream requirements into engineering agreements.
- Requiring developer's engineer to work with environmental agencies for instream work.
- Checking for environmental agency approvals before giving final approvals.

- Arranging onsite meetings with developer, municipal staff and environmental agencies to agree on requirements.
- Relying on developer's engineers or monitors to supervise instream work.
- Consulting with environmental agencies on any municipal instream work.
- Consulting with environmental agencies on stream relocation and enhancement projects, e.g., Burnaby.

7. Fish Passage and Culverts

The objective of fish passage and culvert guidelines is to maintain the ability of fish to move freely through watercourses at all life stages. Municipalities can have significant impacts on fish migration with the establishment of a single culvert, if this culvert blocks fish migration. Large areas of potential habitat can be denied to fish, with significant impacts on fish populations. To address these issues, municipalities can ensure that public and private infrastructure is designed to ensure easy fish passage. In addition, municipalities can survey existing infrastructure and schedule replacement of culverts that block passage.

Status

Twenty local governments (69%) relied on referrals for addressing fish passage and culvert work, though in many cases the municipality did have some measures in place.

Five local governments (17%) had substantial initiatives of their own to address fish passage and culvert work, in addition to making referrals.

Two local municipalities (7%) were special cases where the major watercourses were drainage ditches or canals. These municipalities and several others suggested the fish passage and culverting guidelines needed to be adapted to their situation.

Approaches

Municipal approaches include:

- Referencing LDG's in OCP as guidelines.
- Adopting municipal or OCP "open streams" policies discouraging enclosing of streams.
- Adopting policies to minimize stream crossings.
- Addressing fish passage in stormwater drainage plans.
- Adopting fish passage provisions in subdivision and development bylaws.
- Requiring culverts, drains and ditches to be replaced in a condition at least equal to that which existed before construction.
- Requiring developments affecting watercourses to incorporate designs to enhance fish passage, e.g., baffles, flapgates, fish ladders.
- Surveying streams to identify obstacles to fish passage.
- Replacing culverts with bridges or larger culverts. (In some cases this is to allow debris to pass rather than fish, but it has a dual benefit.)
- Retrofitting or replacing culverts to improve fish passage and/or extend migration.
- Using culverts without bottoms to protect natural stream beds.
- "Daylighting" culverted streams or watercourses.
- Retrofitting flood control pumps with fish-friendly pumps and flood boxes.
- Cleaning drainage ditches and canals of silt, debris and weeds to improve stream flow for drainage purposes. (This may also extend fish migration.)

Referral approaches are the same as for instream work. Proposals affecting watercourses involve seeking advice from environmental agencies.

8. Application Reviews and Inspections

Local governments can exercise strong stream stewardship in development through several actions. They can ensure that aquatic and riparian habitat is identified and defined as part of the application documentation. They can ensure that development plans include provisions that conform to the *Land Development Guidelines* or equivalent requirements. They can ensure that development plans are reviewed by staff and environmental agencies to verify that all development designs and procedures are sound. They can cover LDG compliance in their inspections, and either enforce municipal provisions or refer deviations to environmental agencies for enforcement.

Status

Eight local governments (28%) had substantial procedures of their own in place to ensure consideration of aquatic and riparian habitat issues in their application review and inspections processes. Another five (17%) had partial initiatives. These municipalities also relied in part on referrals processes to provide information and requirements.

Thirteen local governments (45%) relied on referrals for addressing aquatic and riparian habitat issues in development applications review and inspections, though in many cases the municipality did have some procedures in place.

Two local governments (7%) had limited procedures for addressing aquatic and riparian habitat.

Approaches

Municipal approaches include:

- Relying on "local knowledge" of staff to identify streams.
- Using procedures to check municipal inventory maps and ESA maps to determine if watercourses might be affected.
- Requiring watercourses to be identified in sketches or survey plans submitted with applications.
- Requiring survey or sketch plans prepared by a surveyor showing (depending on the municipality): watercourses, natural boundaries, tops of banks, contours, building envelopes, services, and proposed covenant and leave areas.
- Requiring site inventories that include watercourses as well as other information, e.g., structures, significant trees.
- Requiring developers to conduct special studies before subdivisions or building permits are approved near sensitive areas.
- Requiring environmental impact assessments for larger developments.
- Including environmental requirements in development permits, e.g., settling ponds.
- Negotiating development conditions at time of rezoning.
- Requiring environmental plans as part of development plans to address site-specific impacts, e.g., Burnaby. This might include methods to protect vegetation, prevent erosion, protect designated trees.
- Requiring developers to retain specialist expertise, e.g., biologists, engineers, hydrologists, landscape architects.
- Review of development plans for stream requirements and/or conformance with LDG's.
- Requiring development permits, development plans and construction drawings to show LDG requirements and/or other written requirements so that developers and inspectors consider them in their work.
- Inspecting developments based on site plans to determine compliance with municipal requirements that may include some LDG requirements.

- Inspecting developments based on site plans to determine specific compliance with LDG requirements.
- Employing specialist staff to do inspections, e.g., environmental officers, biologists, landscape architects, parks planners, arborists.
- Retaining consultants to carry out inspections, e.g., consulting engineer.
- Relying on developer's engineers or environmental monitors to supervise instream work.
- Issuing stop work or remediation orders if developers violate conditions.
- Using money from bonds, letters of credits or other securities to finance remediation of any problems developers do not address.

Referral approaches are the same as for instream work. Proposals affecting watercourses involve seeking advice from environmental agencies.

9. Monitoring and Enforcement

Many impacts on stream environments are not associated with approved development and construction. For example, homeowners sometimes believe they are enhancing a stream by clearing out brush and landscaping, or building landscape structures in the watercourse. All too frequently, a backyard mechanic disposes of refuse oil in a storm drain. Construction contractors may clean their trucks near a storm drain. Municipalities do have some capability to identify and correct such abuses of stream environments. A few municipalities have developed environmental, conservation or watercourse bylaws that enable municipal staff to protect streams. In most cases, however, municipalities rely on environmental agencies to take action, and refer complaints directly to these agencies.

Status

Twenty-six local governments (90%) relied on environmental agencies to take the lead in monitoring and enforcement to address aquatic and riparian habitat issues when development is not involved. Most of these will report violations to environmental agencies if they receive complaints or observe problems. Some will take action in certain situations, but minimal time is allocated to proactive enforcement.

Only two municipalities (7%) had substantial or partial monitoring and enforcement programs of their own in place to address aquatic and riparian habitat issues.

Approaches

Most municipalities leave monitoring and enforcement to environmental agencies. Approaches include the following:

- Referring complaints from citizens to environmental agencies.
- Conducting surveys to identify problems or violations of guidelines or regulations.
- Conducting monitoring programs to assess water quality.
- Encouraging education and involvement of the public in environmental protection.
- Enforcing municipal regulations.
- Enforcing source control programs.

4.0 CONCLUSIONS AND SUGGESTIONS

Strengthening Partnerships

Municipalities have long had an interest stream issues, and preserved stream corridors in public ownership many decades ago. Municipalities are aware of the importance of stream stewardship to municipal interests (green space, urban character, recreational fishing, recreation, drainage).

At the same time, municipal staff expressed many concerns about frictions between municipalities and environmental agencies. These frictions appear to revolve around three concerns:

- Enforcement Actions Against Municipalities
- Lack of Agreement on Mandate
- Different Valuations of Habitat

Enforcement Actions Against Municipalities

Some level of friction is perhaps not surprising considering that several municipalities have been charged or investigated for alleged violations of environmental regulations for pipe failures, illegal filling of a foreshore, or other infractions. The merits of the issues will be weighed in court. Enforcement of regulations is essential, and charges have resulted in an impetus to discuss and deal with some issues. However, another effect on municipalities is to increase resistance and hostility, and possibly undermine a spirit of cooperation.

Several municipal staff expressed frustration about a perceived eagerness of environmental agency staff to prosecute. They expressed fear that they could be charged for a variety of accidents that could occur or for carrying out necessary municipal responsibilities for removing dangerous trees or cleaning flood drainage facilities. Several municipal staff also suggested they would not want to take on the interpretation or application of the *Land Development Guidelines* because their interpretations may differ from that of government biologists. Some have also stated that environmental officials have made what they believe are unrealistic or uneconomic requirements for preventing or remediating accidents. It has also been suggested that the money going to heavy fines and court costs might be more beneficially used for correcting impacts of any habitat damage.

Resolutions from the Union of B.C. Municipalities that municipalities be immune from *Fisheries Act* charges has been rejected by environmental agencies. For legal and fairness reasons, all entities must conform to the same standards, including municipalities. Where there is discretion, this must be tempered by equal treatment of all entities, and intelligent promotion of due diligence and improved compliance with regulations. In respect of municipalities, discussion of mutual perspectives on the standards and interpretation of requirements might clarify some of the outstanding issues.

Lack of Agreement on Mandate

Some friction also results from differing perceptions about how much responsibility municipalities should assume for stream stewardship. Environmental agencies believe municipalities have the most direct powers for effectively protecting stream environments. Municipalities generally believe that environmental agencies have the primary mandate and

funding for habitat protection, and that present initiatives are an attempt to download more work and responsibility on already burdened local governments.

Most local governments in the study area do implement some habitat protection measures. Some suggest that their role in habitat protection is incidental to other functions they carry out, such as land use planning and public works. The *Municipal Act* states that a community plan may designate Development Permit Areas for the "protection of the natural environment". (Section 945 (4) & 976). In addition, there are provisions that give municipalities powers to prohibit a person from fouling, obstructing, or impeding a watercourse (S. 587) which can be used to protect habitat. They can also include restrictions on the use of land that is environmentally sensitive (S. 945). It is clear that a municipality may use various powers to protect habitat, *if that is their objective*. However, several municipal staff stated that this means while they are empowered to protect habitat, they are not given the *primary responsibility* to do so. In other words, while the *Municipal Act* gives them certain specific powers that may be used to protect the natural environment, these provisions do not *require* them to protect habitat.

In addition, some municipal staff stated that the *Municipal Act* does not mention habitat protection as a purpose for using certain other municipal powers. For example, the Act does not identify fisheries habitat protection as a purpose for acquiring parkland or requiring parkland dedications to protect habitat, regulating tree cutting, regulating soil removal and deposit, or regulating drainage systems. There is concern this could expose the municipality to challenge of its actions on the basis that it is exceeding its legislated authority.

Although some staff suggested the local government mandates for habitat protection could be strengthened, a significant number were wary of taking on additional responsibility and liability for habitat protection. There is prevalent concern about "downloading" of responsibility to local governments without giving them a say on policy. For example, some local government staff stated they have had no input into the drafting habitat protection standards (e.g., Land Development Guidelines), but are expected to implement them. Some argue that the Guidelines conflict with some municipal policies, e.g., provision of recreation in stream corridors.³

There is also concern about downloading of the cost of implementing these new responsibilities without providing additional funds to cover this cost. Municipalities must, by law, balance their budgets. Local taxpayers resist increased property taxes. Many councils therefore tend to limit their staff to statutory responsibilities.

Municipalities are in a position to take the most proactive, efficient and effective role for habitat management and protection. However, at this point, not all municipalities have accepted this is their responsibility. The issue of local government mandates is being discussed among environmental agencies and municipalities as part of the Partners in Protecting Aquatic and Riparian Resources (PPARR) initiative. In addition, a Memorandum of Understanding between the Union of B.C. Municipalities and the Ministry of Environment, Lands and Parks has been negotiated and signed to guide the future evolution of municipal and MELP relationships in implementing environmental programs. Cooperation of municipalities in habitat management is essential, given their extensive responsibilities and powers for overall regulation of land use and community development.

³ Where local governments acquire land in stream corridors either by dedication or purchase, several stated their purpose is to provide for active-use parkland, not solely for preservation of fisheries habitat. When they require developers to dedicate leave areas, they suggest the land should meet municipal objectives as well as objectives of environmental agencies.

Different Valuations of Habitat

A more subjective issue is a concern among municipalities that *some* habitat areas are *over-valued* by environmental agencies. Municipalities have a role of balancing often conflicting objectives, e.g., recreation, environment, land owner concerns, budgets. While local governments rely on environmental agencies to provide specialized environmental advice, they also want to understand the scientific basis for this advice so they can weigh habitat vs. other municipal needs. Several local government staff were concerned about the criteria for evaluating habitat as important. They suggest that environmental agency biologists:

- consider every stream sensitive and important.
- impose unrealistic leave areas on developers.
- are inconsistent in identifying what areas should be included within leave areas.
- impose requirements that make infrastructure unduly expensive, e.g., stream crossings, water purification.

Some municipalities believe they are constrained because they have not been advised on the habitat values of certain types of areas, e.g., drainage ditches and canals in Richmond and other municipalities.

Suggestions

Local governments are generally willing to work toward partnerships with environmental agencies. There is a strong interest in dialogue to reach agreements on issues of mutual concern. This would include discussion of broad objectives and strategies for stream stewardship as well as particular approaches.

1. Continue dialogue under the Partners in Protecting Aquatic and Riparian Resources (PPARR). PPARR is an informal coordinating and networking process that has been organized to promote intergovernmental communication. This mechanism should be continued with a strong municipal leadership role.
2. Arrange forums among municipal staff for exchange of information and experiences on special issues through issue-specific workshops or field tours. This would address, for example, best technologies for stormwater management, erosion control, etc.
3. Provide scientific information and conduct workshops and field tours to explain and clarify the environmental functions and values of different types of habitat and the need for stream stewardship requirements.
4. Consider alternative dispute resolution for some enforcement situations. Court procedures are often expensive and counter-productive. Courts sometimes use community service requirements as alternatives to fines and punishment. One municipal staff member suggested municipal resources could better be devoted to stream rehabilitation and enhancement than court costs and fines.
5. Provide police-community relations training for habitat enforcement and protection programs. Police forces in other arenas are using a variety of techniques to be firm, yet positive in their relations with the public. The result has been better relations and better enforcement.

Developing Public Support

Local governments are extremely close to their electorates. A council that adopts policies in opposition to perceived local interests will face stiff resistance in public meetings and elections. In some municipalities, groups interested in stream stewardship have a strong voice. Not surprisingly, these councils usually support stream stewardship. In other cases, the municipalities have shown leadership in promoting conservation and educating their electorates in spite of weak support from the public. Unfortunately, in some municipalities, stream stewardship initiatives have been derailed by vocal opponents. Because a municipality is close to its electorate, major changes in municipal policy *cannot* occur without strong awareness and support of voters.

Public support, however, should not be narrowly defined as voting. One municipal official stated that if anything happened in one creek over the weekend (e.g., a shopping cart in the creek) the phone was ringing as soon as the office opened on Monday. Citizens "owned" the stream and monitored and reported all activities that would affect it. No municipal or environmental agency budget could afford such detailed surveillance.

Some municipalities and environmental agencies have used field inventories conducted by non-government organizations to assist in identifying habitat. Many of these organizations have significant expertise. For example, the Federation of B.C. Naturalists is implementing the Land for Nature Project which has identified wetland habitats in the Lower Fraser. Where guidelines and standards exist for habitat identification, non-government organizations can provide consistent and reliable information on habitats. Such information can be reviewed in public meetings to identify areas of disagreement by other interests. Detailed studies can then be focused on these areas.

Suggestions:

1. Non-government initiatives should be supported as one of the key avenues for improving stream management. (The PPARR initiative is identifying grassroots initiatives.)

Improving Habitat Identification

Aquatic and riparian habitat is one of several issues municipalities consider in identifying ESA's. They are also concerned with wildlife habitat and corridors, forest buffers, significant landscapes and views, and open space. They are also concerned with identifying hazard lands, including flood and geotechnically unstable areas. They are also concerned with the integration of green areas with their recreation system.

Municipalities suggest that the primary onus and capability for identifying important riparian and aquatic habitat lies with the environmental agencies. Municipal staff usually do not have fisheries experts on staff. Furthermore, municipal staff are wary of taking the lead in defining what needs to be protected because their interpretation of what might be important might conflict with environmental agencies.

In the past, senior governments have provided municipalities with inventory information when seeking municipal action to address land use issues. The Province has provided maps indicating flood risk areas, and prescribed provincial requirements that must be included within municipal bylaws to reduce flood hazards. TRIM maps with information on fish presence/absence have now been digitized at 1:20 000 scale for the Lower Mainland. FREMP has prepared habitat classification mapping for the Fraser Estuary. The Agricultural Land Commission defined the Agricultural Land Reserves. Federal and provincial agencies have cooperated in the Lower

Mainland Wetland Planning Group to identify wetlands that are important to waterfowl. For their part, municipalities in the Greater Vancouver Region have recommended lands for inclusion in GVRD Green Zone.

Suggestions:

1. Develop a habitat technical assistance program that provides inventories of important habitat, technical advice and comments on municipal ESA studies, and/or funding for municipal environmental studies. This input should be coordinated with OCP revision schedules. The program would not have a regulatory role in assessing development proposals, but would work in a consultative role similar to the Salmonid Enhancement Programme. It could include training as part of its mandate.
2. Developing an integrated strategy to develop an interagency database among all environmental agencies (e.g., DFO, MELP, DOE) that could be used by municipalities and other agencies for identifying habitat. (Work toward this suggestion is already underway.)

Strengthening Habitat Management Tools

Several municipal staff stated that the tools they use to protect habitat are often not designed for that purpose. Development Permits are a key tool for protecting habitat, but this provision is limited to new developments.⁴ It is not designed for regulating habitat abuses on existing developed sites. There is also concern about the effectiveness of certain requirements they are being asked to impose, such as detention, restrictive covenants, fencing and setbacks.

The ineffectiveness of restrictive covenants was one of the most frequently raised issues in the interviews. In most cases, leave areas are respected during development, but are immediately violated once inspections are complete. Enforcement responsibility rests with the Ministry of Environment, Lands and Parks, which does not have the staff or resources to carry out effective enforcement. Municipal staff suggest that developers and homeowners know that the leave area requirements will not be enforced so they ignore them. Municipal staff are also criticised by developers for making unenforceable requirements. Staff suggest that the ineffectiveness of covenants is weakening effectiveness of other requirements. The problem is sufficiently serious that some municipalities have stopped requiring covenants, and are leaving the issue completely up to environmental agencies.

Dedication requirements are another important issue to municipal officials. There is a broad range of positions on this issue. Some municipalities state they cannot legally take more than 5%, and to require more would expose them to claims for compensation in the future. Other municipalities "accept" dedications greater than 5% in the "public interest". Still others bargain with various incentives such as density bonuses, bare land stratas, and clustering to achieve larger dedications.

Municipalities also differ on how they take the dedication. Some take the dedication as contemplated in the Municipal Act with the dedication labeled "Park" on survey plans. However, others believe this exposes them to management costs and potential liability. For example, some staff expressed concern that they are liable for damages for failure to remove of dead, dying and dangerous trees, and incur management costs for exercising due diligence and meeting administrative requirements for removal of trees on Crown land. As an alternative, some municipalities mark the dedication "Returned to Crown" on survey plans. Such a marking means

⁴ Municipalities also are limited in the extent to which they can deny any beneficial use of a site through regulation. For example, municipalities can be liable for compensation if their zoning constitutes a "taking" of private property.

the site is Crown land, and the municipality does not accept responsibility for it. At the other extreme, some municipalities take the site as a parcel in fee simple, meaning they have all of the authority of a private land owner to manage the land as they see fit. This is often done to ensure the right to use the land for part of their recreation system.

Most municipalities argue that they are fronting for environmental agencies that are really making the requirements for dedications or restrictive covenants. This concern is especially salient when the land cannot be used for municipal purposes such as outdoor recreation that can be rationalized by a municipality as a community benefit.

Suggestions:

1. The PPARR initiative should continue to engage local governments in discussions to identify legislative changes that would strengthen municipal habitat protection tools, e.g., tree cutting, soil removal and deposit, zoning, drainage system management.
2. The enforceability of restrictive covenants should be improved. Partly in response to preliminary feedback from this survey, a study is being organized to review the effectiveness of restrictive covenants. This survey should provide a basis for discussion of ways and means to improve the effectiveness of future covenants, as well as address a backlog of already violated covenants. Some new tools are now available, such as assigning conservation covenants to environmental groups.
3. Dedication requirements should be reviewed. The present 5% generally means that much of a leave area must be protected by restrictive covenant. The covenant is a no man's land -- privately owned and publicly "managed". The area is largely untouchable by either the owner or the government. Enforcement must be exercised through cumbersome civil court action. Some municipal staff suggested that the best alternative may be improved authority to require full dedication of leave areas. However, there are several concerns about appropriate tenure ("park", "Returned to Crown", fee simple), liability for injury or property damage, risks to public safety, leave area enforcement permitted uses such as trails, and management costs. Because this tool is used continuously, perhaps it is time for a review by municipalities as part of the PPARR process, with suggested legislative changes if any.

Supplementing Guidelines to Address Special Situations

The broad nature of the guidelines make them difficult to interpret in certain local situations.⁵ Some examples suggested by municipalities include concerns about:

- stormwater detention requirements increasing the risk of floods.
- the implementation of a gravel drainage pads for sediment control on very small, pre-existing urban lots that are redeveloped, e.g., 33 foot frontage. When the site is developed, virtually the whole site is excavated and finding space for the pads may be impossible. (City of North Vancouver).
- the feasibility of developing settling ponds or detention ponds on steeply sloping lots.
- settling ponds that might not be necessary on very flat lots where silt settles out quickly.
- certain types of soil, such as Haney Clays, which make sediment control difficult to establish and monitor.
- the applicability of the Guidelines to drainage canals and ditches.

⁵The *Land Development Guidelines* state that "the recommendations contained in these guidelines are generalized and, as such are applicable to a wide range of situations."

The concern about drainage canals and ditches was shared by several municipalities where large areas of low lying, flat land are situated behind dykes. These lands are drained by drainage canals and ditches. Often water levels are regulated by floodboxes or pumps. Over time, vegetation grows within these drainage ditches. Low stream gradients and vegetation can slow canal flows and cause silt to settle out. Eventually the ditches are clogged with vegetation and silt and no longer serve their initial function of draining runoff from farms and urban areas. Some of these drainage facilities may have fisheries value, but municipalities consider them essential to the protection of people, property and farms from flood hazards. Failures to maintain these ditches could leave the municipality liable for serious damages in the event of a flood. If a municipality does not maintain drainage facilities, and loss of property or life results, the municipality may be liable for compensation. A number of municipalities expressed an interest in working with environmental agencies to develop strategies or supplementary guidelines for managing canals or ditches to address effective flood protection and drainage system maintenance as well as fish habitat management.

Suggestions:

Staff generally accept the objectives of the *Land Development Guidelines* and are looking for effective solutions for implementing them. Collectively, the municipalities have experimented with various approaches. This information should be shared.

1. Establish a regular forum for municipal staff to discuss new approaches to stormwater management, erosion and sediment control, instream work and fish passage and culverts. As ideas are proven, information and design suggestions could be published and circulated. This would include model bylaw provisions and explanations.
2. Sponsor and/or publicize demonstration projects for new techniques for implementing the *Land Development Guidelines*.
3. Organize an ad hoc working group of municipal and environmental agency staff to develop a strategy and/or supplementary guidelines for drainage and habitat protection for drainage canals and ditches.
4. Future drafts of the Guidelines or supplements could be published to include a broader range of approaches to address local situations.

Streamlining Institutional Systems

Institutional arrangements for interagency cooperation are under active consideration by PPARR, the Fraser Basin Management Program, Fraser River Action Plan, and other entities. Some suggestions were brought up again during the interviews.

Faster Referral Processes

Local governments rarely have staff with biological expertise. They tend to rely on environmental agencies and consultants to identify development requirements associated with streams. For example, municipalities may rely on information from an environmental agency and a B.C. Land Surveyor to identify a leave area. Normally municipalities refer development proposals to environmental agencies and await a response before proceeding with approvals. Approvals are either incorporated directly into municipal approval requirements, or are appended with a requirement that developers conform to environmental agency requirements.

The difficulty occurs when responses to referrals are delayed. Municipal staff stated that in some cases responses have required four to eight weeks. Environmental agencies, already short of staff, review thousands of applications. As a result, applications often do not get the attention they should.

Initiatives are underway to address these delays by streamlining applications reviews. The federal and provincial governments, for example, have introduced the *Stream Stewardship: A Guide for Planners and Developers* (1994). One purpose of this guide is to have habitat protection provisions built into the municipal planning process and thus allowing screening of routine projects for fisheries issues. This will provide municipalities the necessary information and guidelines to handle many decisions internally without the need for referral. This should reduce the number of referrals to environmental agencies and reduce time delays for municipalities and developers. It will also allow environmental agency staff to focus on key referrals, improve environmental inventories, and provide input to planning processes and official community plans.

Joint Project Review

The PPARR initiative suggests that regular meetings could be held between municipal and environmental agency staff to review development applications. A similar approach is used in the FREMP and BIEAP processes to coordinate reviews among environmental agencies. Joint review processes are also underway successfully in municipalities such as Coquitlam and North Vancouver District. Several municipalities expressed interest in this approach, provided that review meetings were held for each municipality. There is less interest in meetings involving more than one municipality.

Joint project review approaches can be effective in promoting partnerships. Regular meetings can improve relationships. It can encourage sharing of information and provide advance notice of problems and upcoming plan reviews. More important, case-by-case discussion can improve mutual understanding as staff of environmental agencies become more familiar with the issues and constraints facing municipal staff, and vice versa.

Environmental agencies may not have sufficient staff to meet regularly with all municipalities. Perhaps some combination of referrals for slow developing municipalities and joint project review for faster growing municipalities would be the most cost effective approach. As fast developing municipalities become more familiar with environmental agency requirements, municipal staff can provide better advice to developers and reduce the time needed for review of applications. This will save time for environmental agencies, municipalities and developers.

Expanded use of Private Environmental Monitors

Another alternative is to expand use qualified fisheries biologists, environmental engineers or other professionals in private practice as an "environmental monitors" to advise on development requirements and supervise or inspect work. This alternative has been tried in many cases already, with developers being required to hire environmental monitors during the construction phase as a condition of approval. An environmental monitor can advise on leave area requirements and land uses within a leave area, e.g., pathways, drainage facilities, road crossings.

Expanded use of environmental monitors is being studied by PPARR as a means for expediting approvals processes while minimizing municipal and environmental agency time, and reducing delays for developers. The environmental monitor could be retained by the developer, or retained by the municipality but paid for by application fees. In either case, the monitor should have the confidence of environmental agencies, and might have some form of registration with

environmental agencies as a qualified monitor. While the work of the monitor might be audited and evaluated to retain registered status, the decisions of the monitor should carry considerable weight with all agencies.

APPENDIX 1
Municipal Environmental Protection Measures Inventory

Municipal Environmental Protection Measures Inventory

Abbotsford

Type: City

Area (km²): 345

Population: 104,000

Housing Starts: 1593

Density/km²: 301

Pop Growth (5yr.):

Land Forms:

- Fraser Lowland uplands with streams
- Extensive low lying agricultural areas.

Development:

- Urbanized area surrounded by farmland.
- Extensive growth potential

Leave Area Identification

Approaches:

- Former District of Matsqui prepared an environmental inventory based on existing data. Their map is generalized, with watercourses identified based on topographic mapping. The map provides a key for where streams might be, but better identification for this area is needed. Mapping of watercourses in the former District of Abbotsford area is required.
- OCP identifies need to map ESAs.
- OCP includes some ravines and natural open spaces as part of recreation system.
- OCP DPA policies state that streams in Sumas Mountain area should be left in a natural state and preserved through dedication, acquisition or easement. DPA guidelines require a 15m 'no development' setback for all watercourses.
- Zoning bylaw includes some setbacks for flood hazards.

Comments:

- Staff states that MOE/DFO mapping is too general.
- Former Matsqui District did one study and identified setbacks. After survey, owners lobbied and MOE changed the setback requirements. "Even when they are defined, they are indefinite." City still need DFO to advise on a case-by-case basis.
- OCP process currently underway for the new amalgamated Abbotsford City municipality.
- Newly formed Abbotsford Stream Conservation Committee, consisting of Council member, staff, and citizens. This Committee has recognized the need to map the municipalities' ESAs.

Leave Area Protection

Approaches:

- Several DPA's include guidelines re stream protection, though these are not consistent with LDG's.
- Some multi-family zones include clustering provisions to protect sensitive lands.
- Former District of Abbotsford protected any ravines or streams it felt were significant habitat through land dedication (e.g. creek East of Munroe, creek W. of Gable Court, creek through Regal Peak/Carrington projects, Straiton).
- Former District of Abbotsford protected any lands with slope >30% through s.215 covenants.
- DFO/MELP invited to comment on those rezonings where existing data indicates a watercourse is likely.
- Tree bylaw allows city to negotiate the place within a property and density of development in order to minimize tree disturbance.

Comments:

- Width of protection zones is dictated by circumstance, but tends to be top-of-bank.
- OCP process currently underway for the new amalgamated Abbotsford City municipality.
- Newly formed Abbotsford Stream Conservation Committee, consisting of Council member, staff, and citizens.

Leave Area Acquisition/Management

Approaches:

- City accepts either dedications of 5% or money in lieu, but this does not include fisheries sensitive zones City prefers to obtain dedications of active use parkland that contributes to park system.
- City occasionally uses covenants, but prefers dedications.
- Subdivision bylaw allows City to require statutory right-of-way to preserve watercourses and drainage ways, of a width determined by the Approving Officer.
- City's trail system includes several stream corridors, e.g. Fishtrap Creek, Horn Creek, McKee Park, Matsqui trail.
- Council has asked staff to look at trust areas to accept land donated for green trust.
- If development property is subject to rezoning, application can be rejected if there is no dedication of stream leave area.

Comments:

- Major parks tend to have watercourses. Staff states that City is becoming aware of habitat planning needs.
- Sometimes City does not take dedications because the land would become a maintenance problem; the dedicated land is "returned to Crown" and is not identified as "park" because of the maintenance issue. City does not want to add to its enforcement responsibilities.
- Some staff feel that covenants are not working at all.
- OCP process currently underway for the new amalgamated Abbotsford City municipality.
- Newly formed Abbotsford Stream Conservation Committee, consisting of Council member, staff, and citizens.

Stormwater Management

Approaches:

- City has high standards for detention. OCP identifies detention areas. DPA's require protecting watercourses and downstream development from erosion, sloughing, flooding, land slip, excessive runoff and siltation.
- Subdivision bylaw requires onsite detention and sediment/erosion control.

Comments:

- In response to court decisions to which the former District of Matsqui was a party, City has increased detention standards.
- OCP process currently underway for the new amalgamated Abbotsford City municipality.

Erosion and Sediment Control

Approaches:

- DPA's are primary means of managing erosion areas, and City addresses erosion where erosion is an issue.
- Certain DPA's require silt-settling facilities, and prohibit development that would result in erosion, sloughing, land slip, and excessive runoff or siltation that would be detrimental to fish.
- Subdivision Bylaw s.2.3.5 addresses erosion/sediment control.

Comments:

- OCP process currently underway for the new amalgamated Abbotsford City municipality.

Instream Work

Approaches:

- City refers proposals to DFO/MOE.
- City respects windows for stream work.
- City states municipal requirements for instream work in development permits.
- In the case of private developments, City places onus on private engineers to protect fisheries.

Comments:

- OCP process currently underway for the new amalgamated Abbotsford City municipality.

Fish Passage and Culverts

Approaches:

- Subdivision bylaw requires approval of DFO/MOE for culvert crossings.

Comments:

- DFO/MELP approval for culverts are generally difficult to obtain.
- OCP process currently underway for the new amalgamated Abbotsford City municipality.

Application Reviews and Inspections

Approaches:

- Staff checks environmental inventory maps. If a watercourse is present, a survey is required. City can require an inventory. City requests an environmental assessment for major projects.
- City refers only those applications to DFO/MOE where existing data indicates a watercourse is present.
- City includes development requirements in development permits.
- Various departments inspect during development, e.g., building inspections, engineering.
- When City reviews development plans (including building permits) City ensures Fisheries concerns will be addressed before approval issued.

Comments:

- Staff recommends that time limits be established for answers to referral letters. Slow responses are difficult to consider in applications process.
- Staff find DFO comments hard to interpret, as responses to referrals are not map- or sketch-based.
- DFO/MOE mapping is too general.
- City cannot levy fines under DPAs. District has limited enforcement authority after bonds returned.
- Fisheries monitors is a promising idea.
- City calls for reviews by environmental consultants and monitors their work. If City has a significant problem with a project/owner, DFO staff are called directly for assistance.
- City staff are trained to keep abreast of current issues/trends.
- City generally conforms to LDGs.
- Joint project review meetings are being set up with City, DFO, and MOE.

Monitoring and Enforcement

Approaches:

- City receives and refers complaints.
- Inspectors and office staff continually monitor existing and potential problems with sedimentation and erosion control.
- Monitoring is carried out on Municipal facilities.

Anmore

Type: Village

Area (km²): 5

Population: 741

Housing Starts: 4

Density/km²: 154

Pop Growth (5yr.): 65%

Land Forms:

Development:

Leave Area Identification

Approaches:

- OCP identifies two ESAs. These two were identified based on watercourses and steep slopes.
- OCP designates community watershed for protection.

Comments:

- Village plans to do a master drainage study soon. This study will address creeks.

Leave Area Protection

Approaches:

- OCP identifies two areas for protection by setbacks to be established in zoning.
- Zoning bylaw requires 15m setback from natural watercourses.
- Tree retention policy in OCP states retention is desirable along natural watercourses, and notes DFO may require retention at subdivision.
- OCP states local roads should minimize extensive cuts and fills and avoid crossing Anmore and Mossom Creeks where possible.

Comments:

- Village does not use DPAs.
- Village has only single family houses.

Leave Area Acquisition/Management

Approaches:

- OCP states Approving Officer will encourage developers to establish covenants to protect vegetation along watercourses.
- Village takes money in lieu of land for parks. No acquisition of parks will be made.

Stormwater Management

Approaches:

- All drainage is to natural watercourses. Village does not have an enclosed pipe drainage system, and does not plan to install one.
- Village has no detention, source control, or treatment policies.

Comments:

- Village plans to do a master drainage study soon.

Erosion and Sediment Control

Approaches:

- Village states its policies generally reflect LDGs, but are applied on a case-by-case basis at various stages in the development process.

Instream Work

Approaches:

- Village states it works closely with MOE, and refers some developments to DFO.

Fish Passage and Culverts

Approaches:

- Village requires developers to contact DFO/MOE.
- Staff states infrastructure generally conforms to LDG's.

Application Reviews and Inspections

Approaches:

- Village refers applications to MOE/DFO.
- Village may require special studies for ESAs during processing of subdivision and building permit applications.
- Consulting engineer reviews plans for conformance with LDGs.
- Village requires hiring of biologist or engineer for some plans, at the request of MOE.
- Building inspector and consulting engineer carry out inspections.

Comments:

- No special requirement to identify fish habitat.
- Because Village area is small, staff have local knowledge of streams.
- Village is frustrated with provincial and federal delays in reviewing development referrals.
- Environmental committee and APC consider broad issues rather than specific developments.

Monitoring and Enforcement

Approaches:

- Village relies on senior environmental agencies for habitat enforcement.

Comments:

- Minimal post-development monitoring.

Belcarra

Type: Village

Area (km²): 3

Population: 586

Housing Starts: 1

Density/km²: 202

Pop Growth (5yr.): 7%

Land Forms:

- Rocky uplands rising over Belcarra Bay, Burrard Inlet, and Indian Arm
- Rocky foreshores

Development:

- Streamside and upland single family housing.
- Limited infill and housing re-construction potential

Leave Area Identification

Approaches:

- Naturalists have done an inventory of intertidal foreshore.
- Burrard Inlet Environmental Action Program/Vancouver Port Corporation have studied foreshore.
- OCP identifies Bedwell Bay and community watershed for protection.
- Village and GVRD jointly plan for natural areas of Belcarra Regional Park.

Comments:

- Staff have local knowledge of environmental areas.

Leave Area Protection

Approaches:

- Bedwell Bay is limited to passive uses. This will be included in zoning bylaw.
- The Zoning Bylaw includes policies that govern construction of wharves and docks on the foreshore.
- Village states that watershed protection and flood control requirements for Ray and Sasamat Creeks require a 15m setback and 7.5m setback for the sea, swamps, ponds or high tide areas.
- Tree Cutting Bylaw deals with landslip and erosion on private lands, though not specific to fish habitat. It is being extended to Farrer Cove and Twin Islands

Comments:

- OCP does not have specific leave area protection measures as yet.
- Village is considering a strong stream protection bylaw.

Leave Area Acquisition/Management

Approaches:

- Subdivisions are very rare, thus dedications and covenants are not an issue.
- Road ends are protected for public access.
- Village has no capital funds or DCC's for parkland acquisition.
- Some SEP work has been done on Windermere/Sasamat Creek.

Stormwater Management

Approaches:

- Village has no policies for detention, source control, or treatment.

Comments:

- Development is primarily single family.
- Runoff paths to Indian Arm are very short, so detention is not warranted.

Erosion and Sediment Control

Approaches:

- Roads and Traffic Bylaw includes provisions for controlling erosion and sediment.
- All servicing must be designed and installed as approved by a Professional Engineer.
- Staff state that site drainage control usually involves site revegetation requirements.
- Tree Cutting Bylaw deals with landslip and erosion on private lands, though not specific to fish habitat. It is being extended to Farrer Cove and Twin Island.

Instream Work

Approaches:

- DFO/MOE approval is required for any instream work.

Fish Passage and Culverts

Approaches:

- DFO/MOE approval is required for any instream work.

Comments:

- No specific policies or regulations. No major culverts in municipality.

Application Reviews and Inspections

Approaches:

- Village does not require environmental inventories or impact assessments.
- BIEAP would review any foreshore developments.
- APC reviews applications for developments, but was not established to review environmental matters.
- Village does not review applications in detail for environmental matters.
- Building inspector does inspections for building code.

Comments:

- Village uses contract planning and engineering services.

Monitoring and Enforcement

Approaches:

- Village relies on senior environmental agencies to do monitoring and enforcement.

Comments:

- Staff are not trained for monitoring and enforcing the LDGs.
- Village does not conduct regular monitoring, but is a small municipality and staff have local knowledge of creeks.

Burnaby

Type: City

Area (km²): 88

Population: 158,858

Housing Starts: 1165

Density/km²: 1796

Pop Growth (5yr.): 9%

Land Forms:

- Burrard Peninsula, with hills, ridges and valleys
- Highest point is Burnaby Mountain
- Streams flow to Burrard Inlet or Fraser River.
- Central Valley in interior drained by Still Creek system, including Brunette River, Burnaby Lake and Deer Lake.
- South slope cut by several ravine stream systems.

Development:

- Relatively urbanized with limited land for new development
- Future development through redevelopment and densification

Leave Area Identification

Approaches:

- An ESA strategy involving protection and management of Green Zone areas, including waterways, has been adopted by Council and is implemented by staff.
- DFO has provided creek maps to show areas and creeks where they have concerns.
- State-of-the-Environment Report (SOER) identifies lakes and major watercourses with goals, programs and initiatives for urban runoff management, source control, sewage reduction and sewage treatment.

Comments:

- Staff would like more detailed information on the identification and classification of streams and DFO requirement, as promised by DFO. This would be a highly useful resource for staff.

Leave Area Protection

Approaches:

- City retains natural watercourses in an open state by an OCP policy to restrict enclosure of streams and protect them from negative impacts of urban development.
- OCP designates extensive foreshore areas on Burrard Inlet and Fraser River as parks and, within special purpose park areas, as conservation areas.
- FREMP designations include Fraser River foreshore in Burnaby. City and DFO have enhanced extensive areas along Fraser for salmonid, fish and wildlife habitat protection.
- City's tree management policy for public lands discourages tree cutting.
- City can use Comprehensive Development Zones to establish detailed site development plans; including setback for stream protection, clustering, etc. This does not apply to single family subdivisions, where it is handled through s.215 Covenants, Land Title Act.
- In certain situations, regulatory controls permit the inclusion of environmental areas within gross base area calculations, thus allowing density to be developed on area of site that lies outside sensitive area.
- Watercourse Bylaw prohibits discharge of contaminants and fouling, obstructing or impeding of watercourses and drainage systems.
- FREMP guidelines affect Burnaby's Fraser River foreshores which encourage environmental protection and sensitive management.
- City cooperates with BIEAP on Burrard Inlet foreshores for environmental protection and management.

Comments:

- City does not employ DPAs, and uses Comprehensive Development (CD) Zoning.
- City is currently preparing a tree protection bylaw affecting private and public lands.

Leave Area Acquisition/Management

Approaches:

- City obtains dedications at rezonings and subdivisions. Sometimes developers offer more than 5%. City usually takes dedications as legal lots which gives the City more control.
- City keeps a right-of-way along watercourses in favour of the City to allow City to take action to manage corridor. Covenants protect existing watercourses, including adjacent vegetation.
- City has acquired extensive natural areas in Still Creek-Brunette River system, and Fraser River and Burrard Inlet foreshores These areas are used for conservation and active recreation.
- City is seeking public ownership/retention of several conservation areas, including south slope ravines. City intends to acquire all significant stream corridors.
- Capital plan includes provision for acquisition, and parkland acquisition fees are levied. City also uses federal and provincial funds and has exchanged developable City land for private natural areas.
- Some dykes on Fraser River have been relocated back from foreshore to allow wetlands & marshes. Some streams were re-developed to allow enhancement and protection with DFO and NFHC assistance.

Comments:

- City prefers control and maintenance achieved via dedication of legal lots. Such lots are firmly controlled by OCP and other preservation policies.
- Staff believe that covenants have generally been effective.
- Acquisition initiatives described in State of the Environment Report.

Stormwater Management

Approaches:

- City works to mitigate the effects of urban runoff on natural watercourse, including flow rates and water quality.
- City requires management of runoff from development and construction sites. Siltation ponds and occasionally detention facilities are used in certain conditions to manage stormwater during construction.
- Several measures are employed to protect water quality, e.g., catch basins and oil interceptors in parking lots; catchbasin, interceptors and containment barriers for addressing on-site contaminants.
- Various other measures are employed to protect water quality including instituting education programs, installation of stream and fish habitat signs, encouraging public to report pollution incidents to City or environmental agencies, etc.
- City monitors and analyses water quality of some lakes and streams, in cooperation with various agencies and institutions.
- Watercourse Bylaw prohibits discharge of contaminants and fouling, obstructing or impeding of watercourses and drainage systems.

Erosion and Sediment Control

Approaches:

- Watercourse Bylaw prohibits fouling (incl. sediment), and establishes an enforcement regime.
- City requires developers to design and construct an approved, engineered sediment control pond to collect runoff from construction.
- City will refuse subdivisions if site is subject to erosion.

Instream Work

Approaches:

- City requires developer's engineer to work with DFO, MOE, and City Engineering Department on any activities within streams.
- City requires permits from Water Management Branch (MOE) for any work in a stream.
- City requires that fisheries windows be respected and consults with environmental agencies on its stream relocation and enhancement plans.

Fish Passage and Culverts

Approaches:

- City has an open waterway policy to retain all natural streams in an open state.
- City requires that plans for development of lands containing watercourses incorporate design to enhance fish and wildlife habitat.
- City has retrofitted some culverts to improve fish passage and/or extend migration.
- City uses baffles, side-mounted flapgates, etc.

Application Reviews and Inspections

Approaches:

- City requires developer to provide an identification of the top of bank prepared by surveyor.
- City follows an 'environmental planning approach' to consider site specific impacts in development plans. Projects are reviewed by an interdisciplinary staff including an environmental planner to identify site-specific requirements.
- Subdivision technicians, planners, and Building and Engineering staff review plans for City's stream requirements.
- City refers developers directly to DFO and MOE to obtain requirements. For large developments, City prefers site meeting with developer's team, agencies, and City staff.
- City appends DFO and MOE requirements to permits after the developer provides them.
- Advisory Planning Commission reviews rezonings. Environment and Waste Management Committee reviews issues and environmental policies and some projects.
- Various City departments conduct inspections. Health and Engineering Departments enforce bylaws affecting watercourses and other natural areas. City Landscape Development technician (Bylaw Enforcement), ensures building sites comply with City landscape requirements.

Comments:

- Applicants should be notified about stream protection requirements at earliest opportunity possible, i.e. as per City's Building Information bulletin.
- Replies to referrals frequently come very slowly, and sometimes developers are at the final design stage before responses are received from DFO and MOE on requirements.
- City staff are reluctant to enforce Land Development Guidelines directly as there is concern that their interpretation may differ from DFO and MOE, and liability is of concern. MOE interpretation may differ from DFO and MOE, and liability is of concern. MOE interpretations and support have been inconsistent. DFO and MOE responses are not always consistent with one another.
- Building permit may have to be issued prior to DFO and MOE approval subject to direct communication between applicant and DFO/MOE.

Monitoring and Enforcement

Approaches:

- Environmental Health Department and Engineering Department enforce all bylaws affecting watercourses and other natural areas.
- Burnaby Watercourse Bylaw allows City staff to investigate handling of contaminants and fouling, obstructing or impeding of streams or drainage systems.

Comments:

- City staff are reluctant to enforce Land Development Guidelines directly as there is concern that their interpretation may differ from DFO and MOE, and liability is of concern. MOE interpretations and support have been inconsistent. DFO and MOE responses are not always consistent with one another.

Central Fraser Valley

Type: Regional District

Area (km²): 385

Population: 87,360

Housing Starts:

Density/km²: 227

Pop Growth (5yr.): 32%

Land Forms:

- Electoral Area includes Sumas Mountain.

Development:

- Very few development applications are received.

Leave Area Identification

Approaches:

- Sumas bylaw identifies key streams by name: Poignant, Clayburn, Wade, and Chadsey Creeks.
- Sumas bylaw designates lands for parks, heritage sites, trails and creek-side greenbelts as recreation.

Leave Area Protection

Approaches:

- Sumas bylaw encourages owners to retain as much natural vegetation as possible when clearing for housing sites. For designated creeks, bylaw notes that LDG's should be taken into account.
- Approving Officer may require dedication of land if MOE considers an area important wetland for protection.
- Sumas bylaw requires flood setbacks prohibiting building within 30m of Fraser or Sumas Rivers and 15m of other watercourses. Fill to raise floor elevations may not be placed in the setback.
- Sumas bylaw promotes flexible approach to parcel sizes through density averaging, while limiting development to one dwelling for five acres with the majority of the parcel left undisturbed.

Leave Area Acquisition/Management

Approaches:

- Sumas Bylaw states that land should be acquired next to creeks to accommodate trails where this does not pose a financial burden.

Comments:

- RD does not have subdivision control function. MOTH is responsible for subdivision control, so dedications and covenants are their responsibility.

Stormwater Management

Approaches:

- Sumas bylaw states that a cooperative effort will be undertaken with appropriate agencies to plan for storm water runoff.
- Where a significant amount of vegetation is removed for house construction, drainage improvements to handle runoff may be required on a case-by-case basis during rezoning or subdivision.

Erosion and Sediment Control

Approaches:

- MOTH supervises subdivisions.

Instream Work

Approaches:

- MOTH supervises subdivisions.

Fish Passage and Culverts

Approaches:

- MOTH supervises subdivisions.

Application Reviews and Inspections

Approaches:

- RD requires a sketch plan showing watercourses.
- Planning consultant reviews all rezoning applications and inspects for rezoning issues.
- RD refers rezonings to DFO and MOE.
- MOTH supervises subdivisions.

Comments:

- RD receive very few development applications.

Monitoring and Enforcement

Approaches:

- RD considers monitoring as a responsibility of MOE/DFO.

Comments:

- RD has no staff for monitoring.

Chilliwack

Type: District Municipality

Area (km²): 261

Population: 49,531

Housing Starts: 849

Density/km²: 189

Pop Growth (5yr.): 20%

Land Forms:

- Flat and low-lying Fraser Valley lands

Development:

- Rapidly developing regional centre.

Leave Area Identification

Approaches:

- Environmental studies identifying fish sensitive zones and habitat have been undertaken for District and specific neighbourhood areas. Environmentally significant areas (ESAs) are mapped and identified in OCP.
- ESAs will be mapped as new areas are planned for development.
- 6 of the District's 7 DPAs address environmental concerns including fish habitat.
- District includes fish habitat in park and greenway plans.

Leave Area Protection

Approaches:

- OCP has objectives and policies for protection of fish-bearing watercourses, but no specific setback requirements. Policies address pollution, riparian vegetation, and instream works.
- Zoning bylaw includes setback provisions: 30m from Fraser, Chilliwack and Vedder Rivers and community supply watercourses, 15m from Nelson, Camp, Shelford, Gravelly, and Hope Sloughs and from Town, East Town, and Elk Creeks; and 7.5m from other watercourses.
- Staff state that the District requires servicing and infrastructure to avoid fish habitat, and generally follow LDGs.
- 6 of 7 of the District's DPAs deal with environmental concerns including fish habitat. Guidelines include protection of habitat of fish bearing streams.
- There are 21 Comprehensive Development Areas (CDAs) and these address environmental concerns.
- District uses density bonus zones within CDAs to protect fish habitat. It also uses clustering and bare land strata developments. Some lot consolidation and replotting has occurred with some land returning to the Crown.

Leave Area Acquisition/Management

Approaches:

- District takes 5% dedication for parkland, where parks are needed. This may or may not include fish habitat. They require cash if no park land is required. District also uses highway dedications to develop pedestrian trails.
- District does not require covenants for protection of fish, but does occasionally for erosion control.
- District collects Parkland DCC's.
- District allows low impact, low maintenance, passive recreation activities along streams and watercourses.
- District is considering management guidelines for some areas, and these may address slope and vegetation retention.
- District is interested in volunteer support, e.g., adopt a stream/park.

Comments:

- District acquires parks for park purposes, but there may be incidental protection benefits. They will accept donations. They do not expropriate.

Stormwater Management

Approaches:

- OCP endorses integrated stormwater management. Regulation is through Storm Sewer Connection Bylaw and Subdivision Bylaw.
- District considers detention on a case-by-case basis, rather than as an overall policy. District has two wet detention ponds and an infiltration basin. Detention is required through the Development Control Bylaw.
- District requires oil/water separators and traps. District has an infiltration basin.

Erosion and Sediment Control

Approaches:

- District establishes most controls at the development permit stage.
- District relies on developer's consulting engineers to ensure proper erosion and sediment controls.
- District refers developments for Water Act approvals.

Instream Work

Approaches:

- District refers instream work to senior environmental agencies.

Comments:

- Staff indicates policies generally conform to LDG's for instream work.

Fish Passage and Culverts

Approaches:

- District refers proposals to MOE/DFO where required.

Comments:

- Staff indicates policies generally conform to LDG's.

Application Reviews and Inspections

Approaches:

- District requires identification of natural water boundaries. District requires environmental inventories for applications within DPA's. District does not require impact assessments.
- District refers plans to DFO and MOE (Water Management Branch). It requires approvals from these agencies in writing, and the responses are usually incorporated into approvals.
- District reviews servicing and infrastructure to ensure compliance with LDG requirements.
- District may require developers to retain engineers, biologists, or other professionals.
- Public has input through planning hearings, APC, and committees, but do not review each development application.
- Various staff conduct inspections.

Comments:

- District does not have enforcement provisions to protect fish habitat.
- District leaves post-development monitoring to developer or DFO.

Monitoring and Enforcement

Approaches:

- District leaves post-development monitoring to developer or DFO.

Coquitlam

Type: City

Area (km²): 123

Population: 97,356

Housing Starts: 1974

Density/km²: 789

Pop Growth (5yr.): 21%

Land Forms:

- Upland and mountain areas cut by ravines.
- Lowlands with streams and Coquitlam River.
- Frontage on Fraser River

Development:

- Uplands of southwest largely urbanized, with some infill and densification potential
- Lowlands and mountainsides of northwest rapidly developing around town centre.
- Northeast (Burke Mountain) planned for extensive future urban development.

Leave Area Identification

Approaches:

- City is conducting ESA studies as it prepares OCPs for areas in the community. City has completed one ESA study covering the Northeast sector.

Comments:

- No further ESA studies are planned at this time.

Leave Area Protection

Approaches:

- OCP designates stream corridors as Open Space and Sensitive Lands, with policies to maintain these in a natural state, to be used for passive recreation and protection of critical natural habitat. Sensitive Lands are to be protected by Conservation Bylaw and dedicated at time of subdivision.
- OCPs require leave strips for fisheries habitat along several creeks and Coquitlam River. Requirements vary depending on area within the City and date of OCP. Stream corridors are to remain in natural state except for trails and road crossings. (Westwood area was used in part to develop LDG's)
- City policy discourages roads and infrastructure in leave areas.
- Conservation Bylaw which applies to all areas of City limits disturbance, requires a permit for soil removal or deposit, and prohibits fouling, obstructing or impeding watercourses; also requires MOE and DFO review and comments on applications adjacent to watercourses.
- Zoning Bylaw prohibits construction or fill within 30m of certain rivers, 15m from natural boundary of any other watercourse, and 7.5m from any lake.
- Tree Cutting Bylaw is being drafted to include sections of the LDG's.
- Dedicated areas can be included in density calculations.

Comments:

- City leaves small streams for MOE to regulate. These are often designated except for covenants.

Leave Area Acquisition/Management

Approaches:

- City seeks acquisition of most stream areas in new development.
- City requires dedications plus covenants to 15m from top of bank, determined in consultation with MOE.
- OCP requires 5% dedications or cash in lieu along streams and ravines with subdivisions.
- Covenants are required in other areas than the 5% dedication.
- City uses primarily DCC money to acquire stream corridors, but may use Land Sale Reserve (LSR) funds in areas where additional active parkland is required next to stream corridors.
- City monitors and assesses hazard trees and conducts some maintenance, e.g., removing dead, dying or dangerous trees, and replanting. Tree Cutting Bylaw is being drafted to include sections of the LDGs.

Comments:

- MOE varies requirements by reducing leave areas in some cases, defining leave areas on a case-by-case basis.
- The City does not pay for leave areas, they usually end up as covenants,. Senior govts. could help by providing funds for purchase of leave areas.
- Staff say that covenants do not work, MOE does not have staff to enforce.

Stormwater Management

Approaches:

- Subdivision Control Bylaw requires detention if watercourses are adversely affected. Bylaw requires the drainage design to convey the 1:100 year storm event with overland and piped systems; to convey the 1:10 year storm event in a closed system; to ensure the quality of minor flows do not adversely affect the receiving watercourses; and if downstream capacity will be exceeded detention/retention methods of controlling runoff is required.
- City requires a mitigation plan if there is reasonable grounds to anticipate discharge of contaminants, pollutants or toxic materials to watercourses.
- Conservation Bylaw which applies to all areas of City prohibits fouling, obstructing or impeding watercourses.

Comments:

- A stormwater plan and amendments to the Subdivision Control Bylaw, the Building Bylaw, and the Tree Cutting Bylaw are being drafted to include sections of the LDGs.

Erosion and Sediment Control

Approaches:

- Westwood area has its own guidelines that were the basis for LDGs.
- Under Conservation Bylaw, the City can refuse permits if cutting creates a danger of erosion.
- Under Tree Cutting Bylaw, the City can refuse permits if cutting creates a danger of erosion.
- Under Subdivision Control Bylaw, the City can refuse subdivisions if site subject to erosion. Sediment control is required in the Subdivision Control Bylaw by the mitigation plan requirement. Standards for design and implementation are as defined in the LDGs.

Comments:

- Staff shortages limit inspections. Siltation monitoring is being put into bylaw.

Instream Work

Approaches:

- City refers instream work to MOE for approval and management.

Fish Passage and Culverts

Approaches:

- City refers stream crossings to MOE for approval.

Comments:

- Staff state that City tries to ensure fish passage.

Application Reviews and Inspections

Approaches:

- City requires a pre-survey or plot plan showing natural watercourses, high water mark, building envelopes and services. Contour plans can be required showing toe and top of bank and natural boundary. City can require additional information for subdivision applications, including information on natural watercourses, methods to protect vegetation, prevent erosion, etc. City may require tree surveys. City can require environmental impact statement for larger developments.
- City refers applications to appropriate agencies. It refers the survey plan to MOE who indicate what they want and provide requirements. City will not approve development without allowing MOE to review and agree on requirements.
- Conservation Bylaw requires MOE and DFO review and comment on applications adjacent to watercourses.
- Enforcement provisions are put on construction drawings or written requirements.
- Inspectors inspect development based on plans. If requirements are not met, the job is shut down.
- City puts onus on developer to provide monitoring. Monitor must be acceptable to City.

Monitoring and Enforcement

Approaches:

- City staff monitor and enforce all infractions relating to City bylaws.
- Any infractions in violation of Provincial or Federal regulations result in the violator/owner and appropriate agency being notified.

Comments:

- Staff state that MOE does not take enforcement actions when notified of violations.

Delta

Type: City

Area (km²): 169

Population: 88,978

Housing Starts: 321

Density/km²: 528

Pop Growth (5yr.): 12%

Land Forms:

- Delta is a peninsula surrounded by the Fraser River, Roberts Bank and Boundary Bay.
- Linear wetlands and marshes along drainage ditches and sloughs.
- Ravine creeks.
- Peat bog environments.

Development:

- Development is focused on nodes of urban development surrounded by farmland and estuary.

Leave Area Identification

Approaches:

- Municipality is doing ESA studies incrementally as part of Area OCP planning process.
- Master OCP includes major ecological areas in Major Parks and Recreation Areas designation on the Future Land Use Map.
- Area OCPs will include some ESA designations and protection policies as they are updated.
- Municipality includes many natural areas in park reserves (areas set aside for future park).

Comments:

- Municipality is interested in incorporating ESA information to GIS.

Leave Area Protection

Approaches:

- Municipality discusses environmental issues during rezonings and development permit reviews.
- Development Permit guidelines require leave strips within DPAs. Most stream corridors and ravines in north are designated as DPAs in OCP.
- OCP requires 30m setback from Fraser and 6m from other water bodies for flood protection.
- OCP policies require transportation and utilities to give attention to open space needs.
- OCP allows clustering of density without altering density in several DPAs.
- Delta Waterways Protection Bylaw (an old bylaw) prohibits fouling and obstruction.

Comments:

- Drainage ditches are important for drainage storage and are being defined by DFO as habitat. They need to be cleaned. Guidelines are needed to allow cleaning. Discussion with DFO on this issue is beginning.
- Trees: Council has balked at adopting a tree bylaw because of liability for damages and practicality of enforcement.

Leave Area Acquisition/Management

Approaches:

- Municipality requires dedications supplemented by covenants to designate leave areas.
- Municipality considers additional density during rezonings if developer dedicates land for parks.
- Municipality has acquired some park reserves that are not developable for recreation, e.g., steep slopes, ravines, ecological areas.
- Municipality calls its ESAs "Environmental Reserves." These ERs are managed by the Parks Dept. The policy is to leave them alone.

Comments:

- Staff state that Municipal act does not allow full 15m dedication, so covenants are necessary. Act allows 5% or 7m on either side of stream.
- Staff state that people "thumb their noses" at covenants. They suggest that perhaps they should be allowed to require the whole area to be dedicated. Developers sometimes use requirements to argue for more density.
- Most stream corridors are privately owned and already subdivided.
- There are no specific plans for purchase of ESA areas.
- Senior governments could help with providing acquisition money.

Stormwater Management

Approaches:

- Drainage policy requires that development not increase runoff excessively over natural flows.
- Some DPAs state there should be no alteration of natural drainage.
- Storm Sewer Bylaw prohibits discharge of anything but unpolluted drainage water to storm sewer.
- Delta Waterways Protection Bylaw (an old bylaw) prohibits fouling and obstruction.
- Municipality considers source control matters at the time of business licence application or development proposal.
- Municipality requires oil and grease interceptors, sometimes roofs over pollutants, berming, etc.

Comments:

- Drainage ditches are important for drainage storage and are being defined by DFO as habitat. Staff argue that they need to be cleaned. Discussion with DFO on this is beginning.

Erosion and Sediment Control

Approaches:

- Municipality builds DFO requirements into development approvals.
- Though Soil Removal and Deposit Bylaw is not used for fisheries, it does include a clause that would require anyone involved in a soil removal or deposit operation who causes damage to a drainage facility to repair such damage to near original condition. Staff can order a stop to removal or deposit.
- DPs require energy dissipation to avoid scouring

Instream Work

Approaches:

- Municipality builds DFO instream work requirements into engineering agreements.

Comments:

- Drainage ditches are important for drainage storage and are being defined as habitat. They need to be cleaned. This is a 'municipal security issue.' Discussion with DFO on this is beginning.
- OCP policy is to enclose ditches in non-agricultural areas.

Fish Passage and Culverts

Approaches:

- For municipal work, municipality works with DFO.
- For private developments, developers must satisfy DFO and MOE requirements that are built into engineering agreements.

Application Reviews and Inspections

Approaches:

- Applicants must provide survey plans with inventories of trees, location of structures that will remain, watercourses and top of bank.
- OCP requires impact analysis for any development that is seen to affect natural habitat. This would include areas around ravine ESAs in North Delta. EIAs will require help of environmental agencies.
- Staff state that environmental requirements can be built into development permits, e.g., settling ponds. These would then be inspected by staff.
- Municipality refers applications to MOE/DFO.
- Environmental Advisory Committee reviews some developments.
- Inspections are carried out by various departments, e.g., building inspections, engineering.

Comments:

- Staff resources are already strained, and staff are not trained for LDG tasks. Budgets are very tight.
- In some areas, municipal authority is weak, e.g., trees.

Monitoring and Enforcement

Approaches:

- Enforcement is by complaint or referral to senior environmental agency.
- Municipality enforces source control of pollution of watercourses on complaint.

Comments:

- MOE has limited teeth re water pollution; you have to prove damage, i.e., a dead fish law. It can only get involved with special wastes.
- City has two bylaw enforcement officers, mostly engaged in business licence enforcement.

Dewdney-Alouette

Type: Regional District

Area (km²): 3,156

Population: 89,968

Housing Starts:

Density/km²: 29

Pop Growth (5yr.): 30%

Land Forms:

- Extensive mountain areas.
- Extensive low-lying flood plain areas below dykes

Development:

- RD boundaries changing with two municipalities moving to GVRD and remainder of RD likely merging with RDFC and CFVRD.
- Urban areas are within incorporated municipalities.
- Predominantly rural development in electoral areas.

Leave Area Identification

Approaches:

- Some local OCPs identify ESAs, or include text descriptions of fish resources, or include policies to establish buffer strips along watercourses to protect natural flows and prevent erosion, sedimentation or damage to fish habitat.
- Local OCPs include open space designations to designate natural features. Rural designation can also include ESAs.

Comments:

- Regional Board has decided not to use DPAs within its OCP.

Leave Area Protection

Approaches:

- Some local OCPs include policies that the Regional District should support senior government agencies in their efforts at fisheries enhancement and attempts to conserve fish habitat when considering development proposals.
- Zoning Bylaw establishes some setbacks.

Comments:

- Protection measures used would depend on the situation.
- RD has a water supply function. RD disagrees with DFO position on chloramines.
- RD does not have a road function. MOTH administers road function.
- Board has rejected any use of DPAs.

Leave Area Acquisition/Management

Approaches:

- MOE establishes covenants through MOTH. DARD does not use covenants.
- DARD acquires parks for active recreation, not environmental protection. Some local OCPs suggest unique natural and biological features should be developed as parks.

Comments:

- RD does not have subdivision control function. MOTH administers subdivisions.
- RD does not give priority to dedication of creek corridors if these cannot be used for active recreation. Staff state that Municipal Act does not authorize dedications for environmental purposes.
- Staff state that covenants are not effective because they are not enforced by MOE, and are thus ignored by land owners.

Stormwater Management

Approaches:

- Some local OCPs cover areas behind dykes.
- The public and RD has expressed concern about water quality, e.g. Hatzic Lake.

Comments:

- RD does not have a drainage function. Drainage issues are handled by improvement districts.
- RD disagrees with DFO position on chloramines.

Erosion and Sediment Control

Approaches:

- Some local OCPs address land slippage, erosion and flooding issues, designating them environmental hazard areas and prohibiting construction in unsafe areas.
- Building inspector considers geotechnical stability.

Comments:

- MOTH administers road development and subdivision.
- OCP designations addressing environmental hazard areas are designed to protect people, not fish.

Instream Work

Approaches:

- RD refers applications to MOE (not DFO). MOE also refers applications to RD for comment.
- RD does not check to see if developer has permit. RD refers applicant MOE. Some local OCPs require developers to comply with regulations of MOE.

Fish Passage and Culverts

Approaches:

- MOTH has responsibility for roads.

Comments:

- RD expressed concern that DFO/MOE requirements for rebuilding road crossings are uneconomic, and inhibit any improvement of road system.

Application Reviews and Inspections

Approaches:

- RD requires that watercourses be shown on plans submitted for rezoning. Developers can also be required to show that stormwater drainage, environmental impacts on aquatic environments, and other issues are resolved.
- MOTH administers subdivision, but consults with RD on design. MOTH does not always take RD suggestions.
- RD refers applications to MOE
- APC reviews applications referred to them.
- RD is not involved in construction of public works.
- Building inspectors may or may not deal with violations of leave areas.

Comments:

- MOE takes too long in providing comments. This creates cascading delays, and comments come too late to be effective.
- Wherever land is rezoned for development, the developer has legal rights to develop as long as she/he complies with zoning and other bylaws.
- RD cannot stop developers from clearing vegetation on existing lots except through development process.

Monitoring and Enforcement

Approaches:

- RD leaves responsibility for monitoring and enforcement of LDGs to MOE.

Fraser Cheam

Type: Regional District

Area (km²): 10.798

Population: 68,681

Housing Starts:

Density/km²: 6

Pop Growth (5yr.): 19%

Land Forms:

- Extensive mountainous areas with river valleys and canyons.
- Extensive Fraser valley areas.

Development:

- RDFC may merge with DARD and CFVRD in 1996.
- Developed urban areas are mostly incorporated in municipalities.
- Most unincorporated private lands are agricultural.

Leave Area Identification

Approaches:

- Area OCPs discuss fish resources.
- Some Area OCPs have maps identifying fish habitats.
- Some Area OCPs include a limited use designation for rural areas with environmental constraints, or ESA areas. Such a designation can be reduced if studies show development can occur without damage. In other cases, a conservation use is included, which includes preservation of natural areas in a natural state, including fish habitat, etc.
- Some Area OCPs have mapped FSZs within DPAs.
- Zoning bylaw recognizes some streams.

Comments:

- RD has not done special ESA studies for its territory. RD has no funds for ESA studies. RDs have smaller tax base, and their territories are too large and population too sparse for such studies on a cost basis. Focus is on individual development problems.
- RD relies on MOE assistance and good planning practice to protect streams.

Leave Area Protection

Approaches:

- Area OCPs include objectives to plan and develop land use and access to protect fish, etc.
- Some Area OCPs include policies that development standards should implement stream setback and leavestrip protection, or should encourage protection of leave strips. This includes maintaining vegetated leave strips, and prohibition of placement of fill in channels. Leave strip would be determined by MOE/DFO.
- Some Area OCPs note specific fish protection measures may be established through Fisheries Act or development permits.
- Some Area OCPs include policy that LDGs should be used as a guideline for establishing adequate protective measures for watercourses.
- While subdivision is the responsibility of MOTH, setbacks apply to infrastructure.
- Some DPAs include fish oriented guidelines, e.g., 15m setback, variable to 7.5m, with retention of vegetation as requested by MOE.
- OCPs include provisions allowing clustering and bonusing.

Leave Area Acquisition/Management

Approaches:

- RD takes parkland dedications primarily for community parks function.
- Some Area OCPs state that acquisition and development of parkland should facilitate protection and recreational use of fish resources This can include park dedication.
- RD has no funds to purchase habitat, but some parks include habitat areas

Comments:

- Staff state that dedications cannot be taken specifically for fish habitat.
- Staff state that DCCs cannot be used for non-parkland acquisition (e.g. Fish habitat).
- Staff state that RD has no authority to require covenants except for geotechnical or flood hazards, but will accept them if offered.

Stormwater Management

Approaches:

- Subdivision Bylaw states that community drainage systems should normally be designed to replicate natural, predevelopment drainage systems. This would include some detention and exfiltration.
- MOTH administers installation of stormwater infrastructure at the time of subdivision.
- Some detention has been implemented in drainage system, but generally on a small scale.
- Storm drain plans are required to minimize discharge of sediment, oil and grease, and other contaminants into watercourses. Some source control measures have been implemented, e.g., grease traps

Erosion and Sediment Control

Approaches:

- OCPs and DPAs have policies for erosion control and discharge of silt to watercourses.
- Subdivision Bylaw requires developers to ensure there will be no discharge of silt, dirt or debris into existing drainage facilities (which includes creeks) at any time.

Instream Work

Approaches:

- RD requires review and approval by MOE and DFO, and approvals under BC Water Management Act (MOE).
- RD requires a development permit for work near a stream
- Area OCPs encourage developers to design proposals in accordance with LDGs.

Fish Passage and Culverts

Approaches:

- Area OCPs reference LDGs, but MOTH approves and regulates road works.

Application Reviews and Inspections

Approaches:

- RD refers applications to MOE. RD relies on MOE advice for protection of streams.
- RD generally does not require inventories, but can require them for major developments.
- RD specifies requirements in development permits.

Monitoring and Enforcement

Approaches:

- RD leaves responsibility for monitoring and enforcement to senior environmental agencies.

Greater Vancouver

Type: Regional District

Area (km²): 2473

Population: 1,542,744

Housing Starts:

Density/km²: 624

Pop Growth (5yr.): 15%

Land Forms:

- Extensive foreshores on Fraser Estuary and Burrard Inlet.
- Outside of incorporated areas, most territory is remote and mountainous.
- See municipalities for their landforms.

Development:

- Most of urbanized territory is within incorporated municipalities.
- Electoral Areas include areas of Indian Arm, Howe Sound, Barnston Island, and mountain areas, which include some GVWD watersheds. These areas have minimal development potential.
- Bowen Island is covered by Island Trust planning.

Leave Area Identification

Approaches:

- Municipalities nominated regionally important ecological sites for inclusion in the GVRD Green Zone. The Green Zone also includes watersheds, outdoor recreation and scenic lands, renewable resource lands (e.g., agriculture, fisheries). The Green Zone includes 2/3 of the GVRD territory.
- Livable Region Strategy includes Green Zone and parks and open space plan that encourage municipalities to include environmentally sensitive areas in their OCPs.

Comments:

- GVRD has not done ESA studies for electoral areas, but sensitive areas are identified within the Green Zone. (Much of ESA land in electoral areas would be Crown land. RD discourages all new development in its Electoral Areas.)

Leave Area Protection

Approaches:

- Zoning Bylaw considers new development inappropriate in all unincorporated electoral areas, and discourages rezonings and subdivisions in these areas.
- Board maintains 20 acre zoning in electoral areas that discourages development.
- Zoning Bylaw requires a 100 ft (30) setback from streams for all buildings. This can be changed by variance permits for small streams.
- Livable Region Strategy seeks to protect Green Zone by limiting the extent and impact of transportation corridors within it, and by managing urban growth to minimize pressure on Green Zone areas.
- GVRD will be reviewing whether Green Zone lands are adequately protected from urbanization, and suggest actions to improve their level of protection, including use of existing and new tools.

Comments;

- GVRD does not have OCPs for electoral areas. Policy is to discourage any new development. Most of the developable land is in scattered places, and on non-conforming parcels.
- Zoning Bylaw is being redrafted.

Leave Area Acquisition/Management

Approaches:

- GVRD manages an extensive regional park system. The parks are managed for conservation as well as recreation They have implemented plans for trails along stream corridors.
- GVWD manages 585 sq. km in watersheds. They are studying ecological processes to design watershed management practices that work within and are supportive of these processes.

Comments:

- There have been very few subdivisions in recent years in electoral areas, so dedications and covenants have not come up as an issue.

Stormwater Management

Approaches:

- GVRD Liquid Waste Management Plan addresses water quality, combined sewer overflow and urban runoff, source control, sewage treatment upgrades and sludge disposal. Existing conditions are being reviewed and options are being looked at.

Comments:

- No information on detention.

Erosion and Sediment Control

Approaches:

- For electoral areas, the GVRD has a part time building inspector who looks at erosion problems if there is a geological hazard issue. They are more concerned about unstable sites.

Instream Work

Approaches:

- No information.

Fish Passage and Culverts

Approaches:

- No information.

Application Reviews and Inspections

Approaches:

- GVRD would refer plans to DFO, if there were proposals.
- Developers must show any streams on plans they submit.
- APCs look at rezonings.
- Part-time building inspector carries out inspections.

Comments:

- GVRD rarely receives building permit applications near streams There have been no such developments in recent years. One development application near a stream near Howe Sound was received a few years ago; it was referred to DFO.

Monitoring and Enforcement

Approaches:

- Responsibility for monitoring and enforcement for stream protection is generally left to environmental agencies.

Comments:

- GVRD has only a part time building inspector. Staff too small to carry out regular inspections to monitor for violation of zoning and development controls.

Harrison Hot Springs

Type: Village

Area (km²): 6

Population: 655

Housing Starts: 2

Density/km²: 110

Pop Growth (5yr.): 5%

Land Forms:

- Flatbottom valley at head of Harrison Lake.
- Outlet of Miami Creek and slough.

Development:

- Urbanized resort development.
- Some infill and densification capacity.

Leave Area Identification

Approaches:

- Village requires 'adequate' setbacks in consultation with MOE.
- Village consults with MOE for infrastructure work.
- Village cooperated with DFO and MOE in the Miami Creek Study.

Comments:

- New OCP has been adopted (March 1995). A draft was referred to MOE.
- OCP does not include DPAs for stream protection.

Leave Area Protection

Approaches:

- Zoning Bylaw established setback requirements.

Comments:

- New OCP has been adopted (March 1995). A draft was referred to MOE.
- OCP does not include DPAs for stream protection.

Leave Area Acquisition/Management

Approaches:

- Dedications are at the discretion of developers. Village usually takes cash in lieu.
- Village took a 7.5m 'highway' dedication along Miami Creek for walkway. It also converted a street right-of-way to a park along Miami Creek.
- Village and MOE requires a 9m covenant along streams to protect vegetation.

Comments:

- Village does not have a parkland DCC and has no capital plan for acquisition. One study is now underway.
- Village has constructed trails along Miami Creek. Staff state that the adjacent properties complained, and MOE then changed its position and now wants to more formally review plans for the trails.

Stormwater Management

Approaches:

- Village cooperated with DFO and MOE in the Miami Creek Study which reviewed drainage policies.

Comments:

- Staff indicates that stormwater detention is not an issue because drainage system is very short and all water ends in Miami Creek (the level of which is related to Harrison Lake).
- Village is concerned with quality of water coming from upstream agriculture in Kent and about discharges from hotel pool.

Erosion and Sediment Control

Approaches:

- Covered through referrals to DFO/MOE.

Comments:

- Village does not expect any large developments.

Instream Work

Approaches:

- Village refers proposals for instream work to DFO.

Comments:

- Council is concerned about fill on a campground.
- There are no new cases of instream work.

Fish Passage and Culverts

Approaches:

- Miami Creek study recommended new flood boxes. These were installed in 1993/94.
- Village has worked with MOTH to get culverts replaced. MOTH has replaced one culvert with a bridge which will improve fish passage.

Application Reviews and Inspections

Approaches:

- Village requires EIAs for applications to place fill in Harrison Lake.
- Village refers applications to Crown Lands, and relies on referrals to DFO and MOE for advice.
- Village relies on developers to supply engineering and architectural supervision for larger developers.
- Building inspector inspects smaller developments. For civil engineering work, Village contracts with independent consultant who is paid by the developer.

Comments:

- Village is small so staff have local knowledge about streams.

Monitoring and Enforcement

Approaches:

- Enforcement is referred to environmental agencies.

Comments:

- Village does not conduct systematic monitoring, but Village is small and staff have local knowledge.
- DFO has brought charges against the Village for placing fill on Harrison Lake foreshore.
- A landowner has placed fill at a campground on the foreshore of Miami Creek over the objections of the Village Council. The fill was apparently approved through referral system over Village objections.

Hope

Type: Town

Area (km²):

Population: 6,500

Housing Starts:

Density/km²:

Pop Growth (5yr.): 3%

Land Forms:

- Fraser River, Coquihalla River, Silverhope Creek frontage.
- Mountain, hill and valley topography.

Development:

- Urbanized village core. Mostly single family residential.
- Recently amalgamated territory.

Leave Area Identification

Approaches:

- District cooperated with environmental agencies in a study of Coquihalla River, established river corridor and setbacks.

Comments:

- New OCP adopted (March 1995) that consolidates former Town of Hope and portions of Regional District electoral areas.

Leave Area Protection

Approaches:

- District policy is to protect leave areas.

Comment:

- Staff state that there are a number of streams, plus major rivers (Fraser, Coquihalla), and Kawkawa Lake which are fish-bearing.
- New OCP adopted (March 1995) that consolidates former Town of Hope and portions of Regional District electoral areas.

Leave Area Acquisition/Management

Approaches:

- MOE wants 60 to 70m along Coquihalla River.
- District is seeking covenants around Kawkawa Lake.
- RD acquired regional park along Sucker Creek before this area became part of District.

Comments:

- District does not have DCC or capital plan items for streams.

Stormwater Management

Approaches:

- Through referrals to senior government.

Comments:

- District has a small staff, and it relies on other agencies to protect water quality.

Erosion and Sediment Control

Approaches:

- Through referrals to senior government.

Comments:

- District has a small staff, and it relies on other agencies to protect water quality.

Instream Work

Approaches:

- District instream work issues to MOE.

Fish Passage and Culverts

Approaches:

- District refers applications to MOE.
- Subdivision Bylaw includes fish passage rules.

Application Reviews and Inspections

Approaches:

- Where streams are involved, staff make referrals to environmental agencies.
- District negotiates development conditions at time of rezoning.
- Engineering and buildings staff carry out inspections. Special issues are referred to engineering consultant.

Comments:

- Staff have local knowledge of stream locations.

Monitoring and Enforcement

Approaches:

- District does not have a special monitoring program. It relies on senior environmental agencies.
- District has not received complaints about stream problems.

Kent

Type: District Municipality

Area (km²): 160

Population: 4322

Housing Starts: 0

Density/km²: 27

Pop Growth (5yr.): 16%

Land Forms:

- Mountain uplands.
- Low lying floodplain areas, with dyking and drainage canals/ditches

Development:

- Urban core at Agassiz with extensive lightly developed rural/agricultural and mountain areas.
- Most development expected within Agassiz.

Leave Area Identification

Approaches:

- District has agreed with DFO to identify habitat.
- OCP states that protective leave strips and vegetation should be maintained with new development, with width to be determined on site specific basis in cooperation with District and MOE.
- Zoning Bylaw includes provisions to allow Council to issue Development Permits to require preservation or dedication of natural watercourses, and construction of works to preserve or beautify them.
- Rockwell Drive DPA includes guidelines for maintaining leave area.

Comments:

- District has not done ESA studies; there is limited interest and few resources to do them.
- There are no streams in the urbanized area where development could occur Rural areas cannot be developed because they are covered by ALR. District does not consider DPAs necessary near streams because these areas have no development potential.

Leave Area Protection

Approaches:

- OCP states protection of fisheries resources is implemented through coordination of development proposals with senior environmental agencies.
- OCP encourages developers to use LDGs for establishing adequate protective measures for watercourses.
- OCP states leavestrip may be provided by dedication, covenant, 7m leavestrip, building and fill setbacks, DPA designation, strata subdivision.
- Background information to the OCP states OCP should contain policies to encourage farms to permit establishment of buffers and vegetated stream setback areas where feasible.
- District is hoping to establish drainage bylaw to prevent cattle intrusion in to watercourses.

Comments:

- Officials state drainage ditches and canals are part of flood protection system that needs to be cleaned of weeds, silt, and brush. Otherwise District is liable for lack of due diligence for flood protection.
- Officials state that the District has several policies in place concerning streams, but District objects to requirements for leave areas and states that it is not promoting them. (The requirements are identified in 'Approaches' above.)
- There are no watercourses in urbanized area, so the key issue is how streams are managed in farm areas. District is opposed to loss of 15m swath of farmland for fish habitat protection on large agricultural parcels.
- District has two types of streams: unmanaged mountain streams, and drainage ditches on flat farmland. District does not consider LDGs to be relevant to either because these streams are not in developing areas.
- Rural areas cannot be developed because they are covered by ALR. District does not consider DPAs necessary near streams because these areas have no development potential.

Leave Area Acquisition/Management

Approaches:

- Officials state that it is against District policy to require dedications or covenants for stream protection. Ditches are in rural areas, and District does not consider dedications or covenants necessary because there is no development activity.
- District has no funding for purchase of leave areas, and acquisition of streams is not an objective.

Comments:

- Farmers and Council would be strongly opposed to dedication or covenant requirements.
- Because District does not own any stream areas, management is not an issue.
- OCP notes on public input indicates support for protecting a/o acquiring stream corridors.

Stormwater Management

Approaches:

- OCP includes policies requiring stormwater be handled in a comprehensive fashion where new development takes place near watercourses.
- OCP states effluents should not be permitted to enter any watercourse if they will impair water quality. This policy is to be implemented through liaison with Min. of Health and MOE.
- OCP states waste material should not be placed adjacent to watercourse where it can leach or result in siltation.

Comments:

- District has its own dyking and drainage legislation, and it maintains drainage ditches. Officials state that ditches need to be cleaned of silt, weeds and brush. Vegetation traps silt and fills up ditches.
- Officials state that key issue is not detention. Instead, they need drainage to protect farms from flooding. Agriculture requires good drainage.
- District is hoping to pass bylaw to prevent cattle intrusion into watercourse.
- Officials state that DFO wants to restore habitats, even where ditches have been well maintained. They state that DFO is naming ditches as creeks. Many ditches are dry all summer.
- Staff state that there are few sources of pollution in the urban area, e.g., garages, urban runoff.

Erosion and Sediment Control

Approaches:

- OCP prohibits placing of material including silt where it could be introduced to a watercourse.

Comments:

- No development is planned near watercourses.

Instream Work

Approaches:

- District instream work issues to DFO.
- OCP states stream diversions and instream activities that harm fish will not be supported.
- OCP requires regulation of timing and standards for ditch maintenance.

Comments:

- Maintenance of ditches is a big issue. Officials state that District needs to clean silt, weeds, and brush from ditches to allow maintenance. They state that DFO has refused approval of some work. District is concerned about liability for flood damage if ditches are not maintained.

Fish Passage and Culverts

Approaches:

- OCP states that District will not support stream diversions that harm fish.

Comments:

- District's main streams are drainage ditches. Officials argue that cleaning ditches allows fish passage, and that drainage ditches are choking up with silt and weeds.
- Bridges would be less likely to choke up drainage ditches, but are expensive to construct.
- Culverts are difficult to replace because environmental reports are required.
- Extending fish passage extends fish habitat, which would make more area subject to DFO requirements.

Application Reviews and Inspections

Approaches:

- OCP states development permits will be referred to environmental agencies for input and recommendations regarding concerns under their jurisdiction.
- Staff state that the municipality does not make referrals because they are not required to.
- Staff inspect for municipal requirements only.

Comments:

- Staff cannot interpret LDGs because they do not have the expertise and interpretation is subjective.

Monitoring and Enforcement

Approaches:

- District leaves enforcement of non-municipal environmental legislation to DFO and MOE.

Langley City

Type: City

Area (km²): 10

Population: 22,500

Housing Starts: 627

Density/km²: 2210

Pop Growth (5yr.): 19%

Land Forms:

- Nikomekl River divides city into northern and southern areas. River corridor is publicly owned and dedicated to recreation and conservation.
- Some creeks and ravines, e.g., Murray and Logan Creeks.

Development:

- City almost entirely urbanized.
- Development potential limited to infill and densification.

Leave Area Identification

Approaches:

- City has conducted a floodplain management study for Nicomekl corridor that addressed floods, recreation and conservation.
- City does not have ESA studies for the rest of the City.
- CCP designates Nicomekl and some of its tributaries (e.g., Logan and Murray Creeks) for recreation and open spaces uses.
- City embraces GVRD Green Zone. Nicomekl corridor is included in Green Zone.

Comments:

- Some existing watercourses are on private, already subdivided lands.
- City has small, long-serving staff with detailed local knowledge of creeks.

Leave Area Protection

Approaches:

- OCP goal is to preserve, protect and enhance natural environment, including open space, wetlands, and habitat. OCP contains policies that require creek preservation.
- City would use innovative policies to protect natural features, e.g., more than one dwelling per lot, common property accesses, flexible lot sizes, and non-traditional building sites.
- Most of the city is designated as a DPA, and most creeks are covered by DPAs.
- Provincial flood setbacks apply (7.5m).
- City would require dedications of stream areas, but new subdivisions are rare. In a recent industrial development, they took a 40 foot dedication.
- City prohibits fill on floodplains.
- OCP includes drainage studies and recreation plans that partially protect watercourses.
- Infrastructure largely already exists, so there is no policy on avoiding watercourses.

Comments:

- Much of Nicomekl corridor is municipally-owned (and is designated for conservation and recreation).

Leave Area Acquisition/Management

Approaches:

- Much of Nicomekl corridor and some tributaries are publicly-owned. There are no plans for further acquisitions.
- City receives DCCs and sometimes dedications as well.
- City supports multiple use of stream corridors (for trails and bridges and preservation).
- City has a ditch elimination program.

Comments:

- As subdivisions are rare, City has no experience with covenants.
- City's lawyers advise that covenants should not be used because they would not stand up in court. Developers know this.

Stormwater Management

Approaches:

- OCP encourages retention/detention of stormwater on site, wherever possible both in new and renewal projects. However, detention is not generally required because soil has good seepage.
- City plans to conduct a stormwater drainage study soon. The study will look at detention.
- City is implementing a stormwater network plan.
- OCP policy is to install pollutant interceptors on an annual and priority basis.
- City has required some water quality measures for underground parking and service stations through building permit process.
- City has addressed runoff issues on a site-by-site basis, and refers any problems to Province or GVRD.

Comments:

- Staff state that there is little merit to detention because City soils have good seepage.

Erosion and Sediment Control

Approaches:

- City considers erosion and sedimentation measures on site-by-site basis, but has no set policies.
- OCP policy is to manage stream areas in accordance with federal, provincial and regional guidelines, regulations and bylaws.
- City requires temporary settling ponds as necessary.
- City can require geotechnical studies for areas subject to erosion.
- City informs developers to liaise with DFO or MOE concerning development.

Instream Work

Approaches:

- City informs developers to liaise with DFO or MOE concerning development.
- OCP policy is to manage stream areas in accordance with federal, provincial and regional guidelines, regulations and bylaws.

Fish Passage and Culverts

Approaches:

- City informs developers to liaise with DFO or MOE concerning development
- OCP policy is to manage stream areas in accordance with federal, provincial and regional guidelines, regulations and bylaws.

Application Reviews and Inspections

Approaches:

- City refers applications affecting watercourses to DFO/MOE. City relies on DFO to set requirements for streams.
- City would consider watercourses in developments and subdivisions.
- City has an Advisory Planning Commission and Technical Design Panel that review applications (but not specifically for stream protection).
- City staff inspect for implementation of plans.

Comments:

- City has small staff, and this limits what responsibilities they can take on. Staff have local knowledge of watercourses.
- DFO has been readily available to advise.

Monitoring and Enforcement

Approaches:

- City would respond to complaints and refer these to DFO.

Comments:

- City is a major landowner, so staff state that it could respond to many complaints.

Langley Township

Type: District Municipality

Area (km²): 303

Population: 66,040

Housing Starts: 785

Density/km²: 218

Pop Growth (5yr.): 24%

Land Forms:

- Fraser Lowlands, an area of extensive uplands separated by wide, flat-bottomed valleys.
- Drained by several rivers & streams

Development:

- Urbanized areas surrounded by farmland.
- Rapidly developing urban areas.
- Extensive agriculture.

Leave Area Identification

Approaches:

- A major ESA study in 1993 identified watercourses, fish resources and fish habitat. The Township is reviewing the study to determine which areas to add to areas already designated for protection in OCPs.

Comments:

- Policies concerning location of infrastructure near streams is evolving.

Leave Area Protection

Approaches:

- OCP includes policies to protect watercourse environments, including stream protection and no net loss of ESAs. It includes a policy to enhance aquatic environments of the Salmon River, Campbell River and creeks, and natural amenities along the Fraser.
- Local CPs require that creek and river areas be protected for drainage courses, open spaces and habitat, and not be developed for urban purposes. Vegetation removal is restricted.
- Local CPs designate 'Conservation Areas' along streams and ravines, and have policies to protect stream environments. These are designated DPAs. Setbacks are defined in consultation with MOE.
- Zoning Bylaw requires 30m setbacks from streams, including 30m from Fraser, Nicomekl, Salmon and Campbell Rivers; 20m from Murray Creek; 15m from top of bank of Anderson Creek; 15m from natural boundary of any other creeks, 7.5m from any lake, swamp or pond.
- Zoning Bylaw requires 100 setback from watercourses for feed lot structures.

Comments:

- There are many CPs in Township (e.g. Aldergrove, Walnutgrove) and also many neighbourhood control plans which is where setbacks are established and stormwater detention issues, etc. are addressed.
- Township is considering increased protection for streams in response to ESA study.

Leave Area Acquisition/Management

Approaches:

- Township requests dedications where land contributes to walkway or conservation corridor.
- OCP encourages development of walkways in greenbelts. Township policy is to encourage trails at top of bank, in consultation with MOE.
- Local CPs state Township may require lands to be dedicated or covenanted to ensure protection of stream conservation areas
- Covenant areas are defined after consultation with MOE.
- Township may acquire stream areas as part of recreational parkland purchases, but not independently as habitat protection purchases.
- District has a parkland DCC, but it is not primarily used for stream protection.

Comments:

- Dedications are preferred to covenants because people are less likely to encroach with grass clippings, etc.
- Staff have not monitored covenants. MOE is responsible for enforcement.

Stormwater Management

Approaches:

- OCP requires stormwater management systems within urban development areas. All drainage systems must consider regulatory requirements and natural environments. Intent is to prevent flooding and recharge groundwater supplies.
- Municipal policy is to construct detention ponds in urban areas to increase quality of runoff from development.
- Local CPs include policies to impound or temporarily delay runoff to provide zero runoff increase due to urbanization.
- Subdivision Bylaw requires that plans for site drainage include techniques such as surface infiltration, subsurface disposal, storage, and other methods to reduce rate of runoff. It identifies requirements for stormwater storage and detention.
- Subdivision Bylaw requires measures to prevent release of silt, raw concrete, leachate, and other deleterious substances into ditches, storm seers, watercourse, or ravines.
- Some CPs require facilities to inhibit introduction of filter pollutants and hydrocarbons into streams.
- Zoning Bylaw contains provisions to address swine operations.

Erosion and Sediment Control

Approaches:

- Subdivision Bylaw requires silt control for building and development. It requires that sites be properly drained. It prohibits discharge of any silt, dirt or debris into any existing drainage facility or watercourse. It requires that siltation facilities be carefully located and maintained. Designers must demonstrate how siltation control works will function.
- Subdivision Bylaw requires designers to refer to LDGs and consult with DFO and MOE concerning siltation controls.
- Township forwards all proposals affecting natural watercourses to MOE and DFO.

Instream Work

Approaches:

- Township forwards all proposals affecting natural watercourses to MOE and DFO.
- Subdivision Bylaw identifies requirements for work on structures within streams, including maintenance of stream flows, drainage and construction of ditch walls.
- Designers are referred to LDGs where drainage designs require instream works.

Fish Passage and Culverts

Approaches:

- Township has looked at fish ladders and other improvements to fish migration. Fish passage has been improved at several crossings. Township has plans for replacing some culverts with bridges.
- Township reviews stream crossings. Private crossings are referred to MOE.
- Subdivision and Development Bylaw requires that culverts, drains and ditches be replaced in a condition at least equal to that which existed before constriction.
- Township forwards all proposals affecting natural watercourses to MOE and DFO.

Application Reviews and Inspections

Approaches:

- Applicants must identify watercourses. Where identified, owners must contact MOE and provide a survey showing the top of bank.
- Staff checks its own maps that now include ESA study areas. Where creeks are nearby, they investigate further.
- Township requires environmental reviews for larger developments, subdivision or golf courses.
- Township forwards all proposals affecting natural watercourses to MOE and DFO.
- Township builds its own environmental requirements into approval requirements for developments. LDGs are considered in drafting these requirements. Developers are also required to comply with requirements of other authorities.
- Various departments conduct inspections, e.g., building inspections, engineering.

Comments:

- Township does not review applications specifically for compliance with LDGs. They rely on environmental agencies to determine compliance.

Monitoring and Enforcement

Approaches:

- Township cooperates in requiring dedications and covenants, but leaves enforcement up to environmental agencies.

Maple Ridge

Type: District Municipality

Area (km²): 260

Population: 48,422

Housing Starts: 585

Density/km²: 186

Pop Growth (5yr.): 34%

Land Forms:

- Upland mountain streams, lowland streams.
- Some low-lying areas.
- Frontage on Fraser River.
- Alouette River, Kanaka Creek.

Development:

- Extensive urban core and neighbourhoods.
- Extensive urban growth potential
- Extensive rural and agricultural areas.
- Extensive forested areas.
- Soon to be under GVRD

Leave Area Identification

Approaches:

- OCP Schedule includes all fisheries streams identified by MOE/DFO in 1981
- OCP designates all fisheries streams as DPAs.
- District conducted ESA studies for three OCP sub-plans (Cottonwood, Silver Valley, Albion).
- OCP designates fisheries streams, with extensive buffers, as 'sensitive lands'.

Comments:

- ESA studies are being done as area OCPs are prepared or updated.
- OCP Schedule of streams identified in 1981 should be updated.
- Identification and designations of fisheries streams as DPAs should be updated.

Leave Area Protection

Approaches:

- OCP has a strong set of policies for stream preservation.
- OCP identifies fish streams as DPAs, including 50m from top of bank. Guidelines regulate siting, vegetation, erosion control, and setbacks to protect watercourses.
- Tree Cutting Bylaw defines tree protection area 9m from top of bank.
- District requires tree cutting permits for sensitive lands designated in OCP.
- District requires covenant areas as identified by a BCLS surveyor in consultation with MOE.
- District requires security deposit and snow fencing during construction, and also requires signage and, in most cases, permanent chain link fencing.
- District considers stream protection in preparing its guide plans for subdivisions and location of services.
- District requires 15 m building setbacks for flood protection from watercourses.
- Watercourse Bylaw prohibits fouling, obstructing and impeding streams.
- District allows higher densities and compact housing in some areas in exchange for dedications.
- District allows bare land stratas via development permit for protection of watercourses.

Comments:

- 15m building setback appears to be the MOE requirement.
- Watercourse Bylaw is out of date and needs to be revised.

Leave Area Acquisition/Management

Approaches:

- District receives dedications for "park" of 5% or cash in lieu. It often accepts dedications of 5% to 15%.
- District requires covenants for stream protection. Boundaries are established by BCLS in consultation with MOE and District staff.
- DCCs are collected for acquisition of neighbourhood, community, and municipal parks. Acquisitions for watercourse protection come from the Parkland Acquisition Account.
- District has a capital fund to acquire lands in excess of 5% dedications.
- Public recreation is encouraged in natural areas.

Comments:

- District has not been requiring covenants for last two years because covenants have failed miserably. Staff state that owners consider the leave area their land and ignore covenants. MOE does not enforce.
- MOE is inconsistent in identifying boundaries of leave areas.
- There is public opposition to establishing stream corridors that cannot be used for trails, bridle paths, etc. Recreation is a rationale for designation.
- The 5% parkland provisions of the Municipal Act are distinct from the DCC parkland acquisitions.

Stormwater Management

Approaches:

- OCP policy is to implement stormwater management plans that maintain natural runoff rates in creeks based on sound stormwater management objectives driven by watershed goals.
- District has completed stormwater studies in some areas, e.g., Cottonwood. Stormwater studies are underway in other areas, e.g., Silver Valley and Albion.
- Watercourse Bylaw prohibits fouling, obstructing and impeding streams.

Comments:

- District has encouraged consultants for stormwater study areas to consider LDGs.
- Staff are aware of water quality issues, but state that they have no mandate to recommend stormwater quality infrastructure at present. Maple Ridge anticipates that quality issues will be introduced in future.

Erosion and Sediment Control

Approaches:

- District requires developers to have sediment control plan for subdivision, multi-family or commercial developments.
- Staff try to address sediment runoff in inspections.

Comments:

- Staff state that runoff from Haney clays is hard to control (nothing works, constant maintenance required). The water looks bad even when runoff meets requirements.

Instream Work

Approaches:

- District relies on referral agencies to advise on design of municipal works and to regulate private parties.

Comments:

- Staff state that referral agencies provide poor information (maps, descriptions for developments).

Fish Passage and Culverts

Approaches:

- Relies on referral agencies and consultants to advise on designs of municipal works and to regulate private parties.

Comments:

- Staff know requirements but still need to go to referral agencies.

Application Reviews and Inspections

Approaches:

- District requires survey plans for stream areas, under Subdivision and Development Servicing Bylaw. Plans must include contours, watercourses and proposed covenant areas. District may also require tree surveys and/or geotechnical studies.
- District refers applications to relevant agencies.
- District includes some provisions for habitat protection in development approvals, e.g., security deposits and snow fencing required for leave areas.
- District carries out inspections for compliance with site plans.

Monitoring and Enforcement

Approaches:

- District has its own environmental technician investigate complaints.
- District staff do conduct some enforcement actions.

Comments:

- District receives complaints about leave area violations and refers these to MOE, but MOE does not enforce. Most people know MOE will not enforce.
- Staff enforcement is weak because of limited legal authority and high legal costs of prosecution.
- MOE inconsistent in supporting municipal actions.

Mission

Type: District Municipality

Area (km²): 225

Population: 31,000

Housing Starts: 295

Density/km²: 138

Pop Growth (5yr.): 19%

Land Forms:

- Upland and mountain areas with ravines and streams.
- 200-year floodplain designated lands adjacent to Fraser River.
- West municipal boundary on Stave Lake, east boundary on Hatzic Lake, south boundary on Fraser River.

Development:

- Urbanized core community of residential, commercial and industrial land uses.
- Extensive rural areas.
- Forested mountain areas, much of which is covered in a District tree farm.

Leave Area Identification

Approaches:

- Present OCP designates parts of major stream corridors as park.
- District has just completed ESA study. District is reviewing the ESA study, and will include approved ESAs in the OCP.
- OCP designates one watercourse (Windebank Creek) as DPAs in areas where development pressures are expected.

Comments:

- OCP under review; completion scheduled for autumn 1995.

Leave Area Protection

Approaches:

- Present OCP states development should be planned compatibly with natural attributes of the site, including watercourses. OCP requires careful layout and design of roads to ensure roads are compatible with natural features for scenic purposes.
- Windebank DPA requires minimizing alteration of natural drainage, protecting a 15m area by covenant, retaining or planting trees as requested by MOE, respecting timing, and clustering of development.
- In rural areas District protects streams by large lot subdivisions. Each lot must have a building envelope entirely outside of any leave areas required by MOE, but density calculations include the ESA area.

Comments:

- OCP under review; completion scheduled for autumn 1995.
- District does not have a tree bylaw at present; new OCP will address.
- District does not use the Soils Bylaw for streams. It instead relies on referral comments from MOE.

Leave Area Acquisition/Management

Approaches:

- District takes dedications where land is usable for parks.
- District takes dedications where site is identified as DCC parkland or usable for parks. Developers sometimes dedicate more than 5% where land is not developable. Another option is for the District to take cash in lieu in order to collect enough funds to purchase parkland properties along Silver Creek DCC corridor. Active property acquisition is ongoing.
- District also has neighbourhood parkland acquisition strategy in place.
- District requires covenants and fences for leave areas, as per MOE referral requirements. MOE is responsible for enforcement.
- Capital plan includes funds for purchase of some parks that includes ESAs. District has previously scheduled some of potential ESAs for acquisition, e.g., 2 or 3 of the several dozen creeks.
- A comprehensive natural areas trail system is an important objective of the District. It has plan for trails in park areas that include watercourses, as well as in the Municipal Tree Farm. In building trails, the District seeks MOE approval and uses an environmental consultant. It encourages developers to build trails. A new initiative will include getting the public involved in trail maintenance and supervising.
- A Fraser River linear parkway trail is also being pursued through securing of right-of-ways at time of subdivision and through acquisition of available foreshore properties.

Comments:

- Staff generally believe that covenants and leave areas are a 'band aid approach' to development that is not working. A more proactive approach by MOE should be taken, including public education, signage, wildlife interpretation focal points.
- District also has concerns about fencing requirements, including who is responsible for location, maintenance, enforcement, liability, etc. Similarly, there are concerns about the impact of fences on wildlife corridors.

Stormwater Management

Approaches:

- Present OCP recognizes Silver Creek and other ESAs as fish habitat, and requires drainage works to be designed to reduce environmental impacts.
- In existing developed areas, stormwater systems are an extension of old systems, and there are no detention facilities. In new areas, detention is a definite requirement.
- District implements source control on an 'as needed' basis. It requires oil skimmers, etc. at building permit stage.

Comments:

- District is not actively looking at existing areas for source control.
- MOE invited to sit on Technical Review committee whose mandate would be to evaluate the development requirements/issues for new development areas.

Erosion and Sediment Control

Approaches:

- District refers all plans to MOE.
- In their letter of approval, District requires developers to meet MOE requirements.

Comments:

- MOE has expertise in this field.

Instream Work

Approaches:

- District refers all plans to MOE.
- In their letter of approval, District requires developers to meet MOE requirements.

Comments:

- MOE has expertise in this field.

Fish Passage and Culverts

Approaches:

- District refers all plans to MOE.
- In their letter of approval, District requires developers to meet MOE requirements.
- District goes to MOE for advice on culverts installed by District or developers.

Comments:

- MOE has trained personnel to oversee this issue.

Application Reviews and Inspections

Approaches:

- District refers all development applications that are adjacent or in close proximity to watercourses to MOE and relies on environmental agencies for advice.
- MOE requires identification of top-of-bank and leave area by BC Land Surveyor before covenant is issued. Discussion between developer and MOE may be required for identification of leave areas.
- District incorporates MOE comments into approvals. and requires developers to abide by these requirements.
- District tries to enforce MOE requirements in inspections process by making developers aware of requirements and making sure they stay outside of leave areas. It does not check if fence is installed.
- District sometimes requires inventories, and does not generally require EIAs.

Comments:

- Staff state that MOE is usually slow in responding to referrals, and as a result receives numerous negative comments about the inefficiencies of the development review process.
- The municipality deems inspections of fencing of leave areas the responsibility of MOE, because MOE requests the fences and because MOE has the biologists on staff, unlike the District.

Monitoring and Enforcement

Approaches:

- District does not have an active monitoring Program.
- District relies on environmental agencies to enforce legislation since these agencies have the in-house expertise to conduct monitoring.

New Westminster

Type: City

Area (km²): 15

Population: 43,585

Housing Starts: 581

Density/km²: 2834

Pop Growth (5yr.): 9%

Land Forms:

- Burrard Peninsula uplands.
- Fraser and Brunette River frontage.

Development:

- Mostly urbanized community.
- Development potential includes redevelopment, infill, and some new development areas.

Leave Area Identification

Approaches:

- City has environmental studies only for the Brunette River corridor and Queensborough plan area.
- FREMP habitat classifications and designations cover the Fraser River shorelines.

Comments:

- The Fraser and Brunette Rivers are the only fish-bearing watercourses.
- City does not designate ESAs as DPAs.
- City currently reviewing OCP.

Leave Area Protection

Approaches:

- City's main controls over development in environmental areas are FREMP, Tree Cutting Bylaw, rezoning and subdivision.
- City has identified special conservation zones for Brunette River and Poplar Island and red-coded FREMP habitat.
- City could use Tree Cutting and Soils Bylaws to protect fish habitat. It requires tree cutting permits within 30m of Brunette River and Poplar Island. Staff consulted LDGs in drafting Tree Bylaw.

Comments:

- The Fraser and Brunette Rivers are the only fish-bearing watercourses.
- City currently reviewing OCP.

Leave Area Acquisition/Management

Approaches:

- City has taken dedications for park, but usually takes 5% cash in lieu.
- Queensborough plan calls for shoreline dedications for public access and views in accordance with the Land Title Act.
- City has considered some acquisitions, but funds are limited.
- DCCs are in place for parkland. DCCs are anticipated to be in place in the near future in Queensborough.
- City Parks department has arborist to advise on tree retention and streamside vegetation management.

Comments:

- The Fraser and Brunette Rivers are the only fish -bearing watercourses.
- City has not used covenants for fish habitat.
- City currently reviewing OCP.

Stormwater Management

Approaches:

- City does not have detention policies, except in Queensborough.
- City regulates hazardous substance runoff from private property and requires oil/water separators if deemed appropriate.
- Most of the City has combined sewers and storm drains. Separate sewers are required for major new subdivisions and exist in a few areas.

Comments:

- GVS&DD administers Brunette River.
- City currently reviewing OCP.

Erosion and Sediment Control

Approaches:

- Tree Bylaw indirectly controls erosion and sediment and thereby protecting fish habitat on Brunette by controlling tree cutting.

Instream Work

Approaches:

- City does not refer all instream work to MOE/DFO for requirements.
- Developers must obtain FREMP approvals for any work along the Fraser foreshore.

Comments:

- GVS&DD administers Brunette River.

Fish Passage and Culverts

Approaches:

- No information.

Comments:

- City is looking at fish-friends pumping stations for Queensborough area.

Application Reviews and Inspections

Approaches:

- FREMP requires environmental inventories and may require impact assessments. City may require inventories in the Queensborough plan area where ESAs have been identified.
- FREMP provides review process.
- City environment committee and APC review environmental issues.
- City relies on environmental agencies for inspections of LDG-type requirements.
- City conducts normal inspections for compliance with landscape and building plans.

Comments:

- Most streams are covered by inventory requirements for FREMP, Queensborough and Brunette.

Monitoring and Enforcement

Approaches:

- City relies on senior environmental agencies.

North Vancouver City

Type: City

Area (km²): 13

Population: 40,000

Housing Starts: 275

Density/km²: 3077

Pop Growth (5yr.): 10%

Land Forms:

- Moderately sloping mountain slopes.
- Some creeks and ravine areas.
- Many historic creeks were enclosed many years ago.

Development:

- Mostly urbanized.
- Development potential in infill and densification.

Leave Area Identification

Approaches:

- City assumes every creek is a fisheries streams.
- City has not completed specific ESA studies.

Comments:

- The City's territory is small, so staff have local knowledge of the locations of streams.

Leave Area Protection

Approaches:

- Most unenclosed creeks have OCP designations of 'Park, Recreation and Open Space'. These are largely publicly owned. Some have substantial leave areas, while others have public use near creek channels.

Comments:

- Creek areas are largely publicly owned which provides a basis for protection. Only a few streams are on previously subdivided private property. Some of these smaller creek areas are not all designated for protection.
- OCP does not designate creeks as DPAs.
- Tree and Soil Bylaws would not apply to creeks.

Leave Area Acquisition/Management

Approaches:

- Most major creek corridors are already owned as parks. Remaining creeks are on small existing urban lots.
- Because subdivision is extremely rare near creeks, the City has rarely used a 5% dedications to acquire creek areas or covenants to protect them.
- City policy allows some public use in publicly owned creek corridor areas. OCP recommends management for a balance of environment and recreation.
- City refers proposals for expansion of recreation activities in creek areas to senior environmental agencies.

Comments:

- Creek areas are already largely publicly owned.
- Some buried services are present in parks.

Stormwater Management

Approaches:

- City is in the process of doing a master drainage study.
- Most of drainage infrastructure has been in place for many years.
- City does not advocate small-scale detention plans.
- Detention ponds have been used, e.g. Tempe Heights, Wagg Creek Park. However, large new subdivisions are rare.
- Vancouver Port Corp. have implemented some water quality facilities on waterfront.

Comments:

- Where small scale private detention has been tried, the City is concerned that sites have not been maintained.
- Detention is difficult to implement on steep slopes.
- GVRD is evaluating drainage of parkades.

Erosion and Sediment Control

Approaches:

- City tries to address siltation at the plan review stage. Siltation has not been addressed as a major concern.
- City attempts to encourage sediment control, but circumstances are difficult on very small lots.
- City did act against one contractor who was cleaning his trucks and polluting a creek.

Comments:

- Many building sites are very small, e.g., 33' frontage. The LDGs are not practical in these cases because the whole site is excavated in construction of a house. In such a case, it is difficult to design a silt-catching facility, e.g. gravel pad. Staff would like more information on how to handle these situations, and hand-out material to developers and excavators.

Instream Work

Approaches:

- Bank stabilization is needed in some areas, but these are referred to MOE.
- City is working with MOE and District of North Vancouver on creek management policy for Mosquito and Lynn Creeks.
- City did act to force landowner to remove what he thought was an improvement to a creek.

Comments:

- City is concerned about capacity of streams to carry drainage, given considerable flows on north shore. Flow obstructions must be minimized.

Fish Passage and Culverts

Approaches:

- City policy is to bridge creeks where practical to allow natural passage of debris. This incidentally enhances fish passage.
- Drainage plan will address fish passage.
- In a few cases, streams run through middle of small lots. City refers owners to MOE when they seek to culvert and build over creeks.

Application Reviews and Inspections

Approaches:

- City assumes that all creeks are fisheries creeks.
- City requires legal surveys for developments, and these surveys must show the location of any streams.
- City refers applications affecting creeks to MOE.
- City APC reviews applications, but not necessarily for streams.
- City Works Inspector (Engineering Depts) and building inspectors inspect sites.

Comments:

- Developments are rarely near creeks.
- Staff have local knowledge of stream locations.
- Staff are aware of LDGs and advise developers to follow.

Monitoring and Enforcement

Approaches:

- City occasionally inspects culverts and drainage ways for obstructions.
- City receives complaints from public, especially because public uses creekside trails. City has acted on complaints.
- Because creeks are publicly owned, they are under direct City management in many cases.

North Vancouver District

Type: District Municipality

Area (km²): 162

Population: 75,157

Housing Starts: 245

Density/km²: 465

Pop Growth (5yr.): 10%

Land Forms:

- Upland mountain streams.
- Marine foreshores.

Development:

- Extensive urbanization.
- Development potential on mountain slopes and urban infill.
- Undevelopable mountain areas above 1200'.

Leave Area Identification

Approaches:

- District has done comprehensive stream surveys and inventories, and has mapped all the information.

Leave Area Protection

Approaches:

- OCP identifies environmentally critical areas for conservation and protection. Major watercourses are designated 'Park, Recreation and Wilderness.'
- OCP designates most streams as DPAs with guidelines for protection of natural environment. DP guidelines require an environmental impact statement that identifies negative impacts and mitigation options, specifies limited use for creek and ravine areas, and sets out objectives of managing runoff, minimizing terrain disturbance and following natural topography in urban development patterns. Development in stream areas is restricted to fences, pathways, erosion control, bridges, utilities and maintenance access roads.
- A comprehensive Environmental Protection and Preservation Bylaw applies to all streams. It includes environmental policies; tree, soil, and stream provisions of Municipal Act; and relevant provisions of LDGs. The Bylaw requires setbacks of 15m for non-fish-bearing streams and 30m for sensitive/fish-bearing streams. Bylaw defines streams broadly, e.g., watercourses, ditches, wetlands.
- EPP bylaw applies to infrastructure and servicing.
- Rezoning is required for most development, and stream protection is negotiated during rezoning.
- District owns extensive land areas and reserves creeks when land is developed.

Leave Area Acquisition/Management

Approaches:

- District owns most undeveloped land in municipality, and retains ownership of leave areas.
- OCP states neighbourhood and subdivision plans should retain watercourses and ravines in municipal ownership.
- District requires dedication of 15m or 30m with private developments.
- District requires covenants,
- District is acquiring land in some cases, and sets aside funds in capital plan.
- District plans linear parks and trail systems for stream corridors.

Comments:

- Covenants (s.215 Land Title Act) are an effective tool for identifying and establishing protective mechanisms for sensitive areas, but monitoring and enforcement is arduous and expensive.
- District consults MOE re. any municipal activities affecting watercourses, e.g., trail systems.

Stormwater Management

Approaches:

- Some detention has been implemented for flow control and settling, e.g., golf course development. This has not been extensive.
- OCP states District should develop a new water quality policy.
- District requires oil and grit separators for new subdivisions, industrial and commercial developments.
- Environmental Protection and Preservation Bylaw states no person should directly or indirectly foul, obstruct or impede a stream.
- DFO, MOE and District review applications in monthly meetings.

Comments:

- Staff state that topography is often too steep to allow detention ponding.

Erosion and Sediment Control

Approaches:

- As the largest land owner and developer, the District uses LDGs for its own construction and development.
- Environmental Protection and Preservation Bylaw states no person should directly or indirectly foul, obstruct or impede a stream. Staff inspect private developments for compliance with this.
- DFO, MOE and District review applications in monthly meetings.

Comments:

- Sometimes difficult to get adequate settling pond sizes on sloping land, and ensure maintenance and cleanout of ponds.

Instream Work

Approaches:

- District uses LDGs as guide for instream work.
- DFO, MOE and District review applications in monthly meetings.

Fish Passage and Culverts

Approaches:

- District's stream inventories have identified obstacles to fish passage. District is replacing culverts that impede fish passage. District is enhancing fish habitat.
- DFO, MOE and District review applications in monthly meetings.

Application Reviews and Inspections

Approaches:

- District requires detailed plans, inventories, and impact assessments, including identification of mitigation measures.
- District's Environmental Protection Officer reviews development applications.
- DFO, MOE and District review applications in monthly meetings.
- District requires copies of federal and provincial approvals.
- District requires review of development permits and rezoning applications by public information meeting and Advisory Planning Commission.
- District lists development conditions in development permits. Developments are subject to Environmental Protection and Preservation Bylaw review.
- Several staff are involved in inspections and enforcement. District can ticket and fine developers under EP bylaw for infractions.

Comments:

- District has a development and design section whose staff design and supervise the construction of municipal infrastructure done by contractors.

Monitoring and Enforcement

Approaches:

- District conducts surveys of creeks to identify problems and will act itself or refer to appropriate agencies to take action.
- District considers education and involvement of public important to environmental protection. This is enhanced by trails and 'Adopt a Stream' programs.

Comments:

- District has been named in fisheries charges for a valve failure. Staff suggest litigation will not contribute to stream protection.

Pitt Meadows

Type: District Municipality

Area (km²): 51

Population: 11,147

Housing Starts: 170

Density/km²: 218

Pop Growth (5yr.): 39%

Land Forms:

- Low lying land behind dykes.
- Frontage on Pitt, Fraser and Alouette Rivers.

Development:

- Largely agricultural, with development nodes.
- Soon to be under GVRD.

Leave Area Identification

Approaches:

- District has not done overall ESA studies or mapping. It hopes to undertake environmental studies in 1996.
- OCP does not include specific mention of leave areas or setbacks to protect fish habitat.

Leave Area Protection

Approaches:

- OCP does not include specific mention of leave areas or setbacks to protect fish habitat.
- Parks and open space policies/plans address environmental areas generally.
- Zoning Bylaw requires setbacks from drainage ditches.
- Soil Bylaw requires applicants to ensure there is no impact on water bodies or watercourses.
- Staff state that some clustering may be allowed for hazardous lands.
- MOE has required developers to establish covenants. It is not District policy to require these.

Comments:

- Subdivision and Servicing Bylaws do not include anything specific to protect fish habitat.

Leave Area Acquisition/Management

Approaches:

- District just began collecting 5% cash in lieu of dedication.
- OCP has been amended to allow acquisition of foreshore lands along Pitt/Fraser Rivers.
- District does not have funds or policies to purchase ESAs.

Stormwater Management

Approaches:

- District requires on-site retention in urban areas.
- District requires oil/water separators for parking lots; grease pits.

Comments:

- The Drainage Regulation Bylaw is rurally-oriented, so does not include detentions, etc.
- Most watercourses are drainage ditches, with exception of Alouette, Pitt, and Fraser Rivers.
- District does not use stormwater treatment.

Erosion and Sediment Control

Approaches:

- District does not have overall policies on erosion and sediment control. However, most of municipality is relatively level.
- A siltation pond was required on a development near Katzie Slough.

Instream Work

Approaches:

- District refers all instream work to MOE/DFO for review and approval.

Comments:

- Most watercourses are drainage ditches, with exception of Alouette, Pitt, and Fraser Rivers.

Fish Passage and Culverts

Approaches:

- District refers all infrastructure and culverting involving fish habitat work to MOE/DFO.
- District has no specific regulations for culvert design. There are some box culverts.

Comments:

- Most watercourses are drainage ditches, with exception of Alouette, Pitt, and Fraser Rivers.

Application Reviews and Inspections

Approaches:

- District requires applicants to identify watercourses and trees.
- District has required impact assessments for larger developments through zoning process.
- District requires developers to get MOE/DFO approval at subdivision and development permit stages. Staff do cursory review to ensure no impacts on fish habitat, and refer plans to MOE/DFO for input.
- District refers developments on Pitt and Fraser Rivers to FREMP.
- Advisory Design Panel reviews applications.
- District hires engineers, hydrologists, and arborists as needed to assist in reviews.
- Bylaw enforcement officer carries out inspections.

Comments:

- Staff state that their resources are not adequate; they must work in a reactionary mode.

Monitoring and Enforcement

Approaches:

- District carries out some periodic post-development monitoring.
- District leaves monitoring and enforcement to senior environmental agencies.

Comments:

- Staff state that their resources are not adequate; they must work in a reactionary mode.

Port Coquitlam

Type: City

Area (km²): 27

Population: 36,773

Housing Starts: 871

Density/km²: 1367

Pop Growth (5yr.): 26%

Land Forms:

- Fraser Valley lowlands.
- Frontage on Coquitlam and Pitt Rivers.

Development:

- Suburban community.,
- Industrial land available (~16% of total land base is industrial).

Leave Area Identification

Approaches:

- City completed environmental study of entire municipality in 1992, entitled "Environmental Assessment of Port Coquitlam."
- OCP designates high sensitivity areas as DPAs.
- City is within FREMP area which includes area designation maps.

Leave Area Protection

Approaches:

- OCP contains policies to protect fish habitat and waterbodies, including protection of streamside vegetation.
- OCP policies state that development in high sensitivity areas must not have any negative impact, and must meet DFO/MOE approval. Buffer areas are mentioned but specific leave areas are not defined.
- OCP states development or major infrastructure is not to disturb ESAs. It requires that all infrastructure that could impact on fish habitat/watercourses be approved by MOE/DFO.
- DPA setbacks must meet MOE specifications. Guidelines include specific reference to mitigation of impacts on fish habitat and ways to enhance it.
- Waterways Protection Bylaw prohibits fouling, obstructing, or impeding flow of any waterway (stream, creek, etc.).
- City has a riverfront control plan which outlines planning and management options for portions of Fraser and Pitt Rivers, and a control plan for the Dominion Triangle Area which addresses the Pitt River between the Lougheed Hwy and Dominion Ave. only. These plans cover sensitive fish habitat.
- City is within FREMP area which includes area designation maps.

Leave Area Acquisition/Management

Approaches:

- City uses 5% dedication to acquire parkland, which may coincidentally include ESAs. City does not acquire ESAs specifically.
- City manages fisheries areas as part of park plans. City has no special guidelines for streams, except as outlined in DP guidelines.
- City only requires covenants if required by senior government agency.
- Waterways Protection Bylaw prohibits the fouling, obstructing, or impeding of flows of any stream, creek, etc.

Stormwater Management

Approaches:

- City does not have specific detention plans, although there is some detention in urban areas, e.g. Dominion Pump Station has a detention pond as part of its design.
- City requires oil/water separators for parking lots and industrial areas.
- City has some stormwater treatment on a case-by-case basis, but there is no overall policy.
- Storm drains have been marked with yellow fish symbols (DFO Storm Drain Marking Program).

Erosion and Sediment Control

Approaches:

- DPA guidelines require that uses impacting on fish and wildlife habitat must be controlled. Staff indicate this would apply to erosion and sediment control, but there are no specific policies.

Instream Work

Approaches:

- City refers all instream work to MOE/DFO.

Comments:

- Staff indicates City conforms to LDGs.

Fish Passage and Culverts

Approaches:

- City refers all applications to MOE/DFO.
- Staff indicate policies conform to LDGs.
- City is looking at ways to make pump stations fish friendly.

Application Reviews and Inspections

Approaches:

- City requires developers to identify watercourses and fish habitat. It requires environmental inventories and impact assessment for developments affecting ESAs.
- City refers most plans involving ESAs to MOE/DFO for approval. Developers must submit these approvals in writing.
- City requires applicants to retain biologists, etc. as required, as part of DP requirements.
- City refers developments involving Fraser and Pitt Rivers to FREMP.
- City building inspectors and engineers do inspections for City requirements. However, there are no special environmental inspections.

Monitoring and Enforcement

Approaches:

- Engineers do some monitoring of engineering systems, however, there is no special monitoring for environmental agency concerns.

Comments:

- Staff state that environmental agencies have primary responsibility for monitoring and enforcement.

Port Moody

Type: City

Area (km²): 23

Population: 20,000

Housing Starts: 115

Density/km²: 861

Pop Growth (5yr.): 11%

Land Forms:

- Burrard Inlet foreshores.
- Mountain streams.
- Lowlands.

Development:

- Existing urban development on valley floor and extending up mountainsides on 'northshore'.

Leave Area Identification

Approaches:

- City has mapped fish habitat as part of neighbourhood plans. City has not done an overall ESA study, but staff state that current ESAs cover most important areas.
- Several environmental groups have undertaken ESA studies. These have been provided to the City.
- OCP and Zoning Bylaw identify specific streams, watercourses and ravines for protection.

Comments:

- Most ravines are publicly owned.

Leave Area Protection

Approaches:

- OCP requires leave areas. Zoning Bylaw requires setbacks from 15 to 30m.
- Tree retention is a key OCP policy.
- OCP enables use of clustering for protecting ESAs.
- City uses Comprehensive Development Zones to plan and protect ESAs.
- As part of development plans, some lots can be consolidated and/or resubdivided to protect habitat.
- DPA text include provisions to protect fish habitat.
- City covers fish habitat in open space, park, natural area, and greenway plans.
- Special conservation zones are dedicated parkland.
- City requires that servicing and infrastructure avoid fish sensitive habitat.

Leave Area Acquisition/Management

Approaches:

- OCP policy requires dedication of ESAs as parkland. City seeks full ownership of ESAs.
- City might consider expropriation in some cases.
- City uses capital funds and DCCs for parkland acquisition, but not specifically for ESAs unless part of park.
- City manages ESAs as parks through parks and open space plans, which include environmental guidelines. Many leave strips include provision for trails, to be designed under design guidelines for watercourses.
- City has shoreline park system for Burrard Inlet.

Comments:

- Staff state that their parkland DCCs cannot be used to purchase ESAs.

Stormwater Management

Approaches:

- City has no specific policies for stormwater detention. It does have policies for the 'north shore' which address base flows, peak flows and peak development flows.
- City has policies and bylaws to prevent hazardous substance runoff. Oil/water separators required for parking lots.
- Volunteers have completed marking storm drains with yellow fish symbols (DFO Storm Drain Marking Program).
- Stormwater is treated through vegetation biofilters and leave areas.
- City permits only clean stormwater to enter Noons Creek on north shore.

Erosion and Sediment Control

Approaches:

- City includes some provisions from LDGs in development approvals.
- City has required sediment control plans for all developments, to specifications required by DFO and MOE.
- City has required sediment detention ponds for north shore developments.

Instream Work

Approaches:

- City refers all instream work to MOE.
- Under Soil Removal Bylaw permits, no natural watercourse may be altered or diverted.

Comments:

- Staff state that all instream work generally conforms to LDGs.

Fish Passage and Culverts

Approaches:

- City requires all designs to be approved by MOE and DFO.

Comments:

- City requires that culvert designs facilitate fish passage.
- City has opened a few previously culverted streams to daylight.

Application Reviews and Inspections

Approaches:

- City requires developers to identify watercourses and fish habitat. City often requires environmental inventories and sometimes requires impact assessments. City requires developers to hire consultants as required. City reviews their work.
- The public can review applications through hearings and committees.
- City requires environmental plans for zoning and development, including mitigation measures for protecting fish habitat.
- City appends DFO/MOE requirements to approvals or incorporates these requirements into approval documents.
- Building inspectors and engineers do inspections during development, but resources are not adequate to do proper inspections and enforcement. Staff do have adequate training in LDGs.
- City employs outside consulting engineers to advise as needed.
- Building inspectors or planning engineering staff do post-development inspections and monitoring. No real problems have been found.

Comments:

- Staff state that LDG requirements are picked up as part of bylaw requirements.

Monitoring and Enforcement

Approaches:

- City states that responsibility for monitoring and enforcement is with senior environmental agencies
- Municipal staff carry out some post-development inspections.

Richmond

Type: City

Area (km²): 124

Population: 126,624

Housing Starts: 878

Density/km²: 1020

Pop Growth (5yr.): 17%

Land Forms:

- Located on an island.
- Surrounded by the Fraser River and Sturgeon Bank foreshore and dykes.
- Interior is drained by canals and drainage ditches (no streams), and flood gates.

Development:

- An urbanized core, with extensive commercial, residential and industry
- Extensive farmland.

Leave Area Identification

Approaches:

- OCP identifies Fraser River and Sturgeon Bank foreshores as ESAs.
- City has updated its ESA studies over past two summers, and includes Swishwash Island and various foreshore areas, sloughs, and canals on Lulu Island.
- FREMP has designated habitat areas on the estuarine perimeter of the City. City supports FREMP process.

Comments:

- Certain canals and sloughs have been given ESA designations.
- Staff state that the scope of habitat protection should be broader, to include wildlife and birds as well as fish.

Leave Area Protection

Approaches:

- OCP states that ESAs will not be developed for any purpose unless in accordance with regulations of all responsible senior government agencies.
- OCP designates all ESAs as DPAs.
- OCP requires an average dedication and preservation of 30m above high-water mark of Fraser River and estuary foreshore areas.
- OCP requires an average dedication and preservation of 15m along certain natural sloughs and canals.
- DPA guidelines require no net loss of natural areas, and for buildings to be located on portions of a site that are not environmentally sensitive where possible. Compensation may be required for loss of habitat.
- City may allow some development within ESAs based on further review. An ESA design manual provides guidelines for development within ESAs. The manual indicates setbacks can be averaged to preserve important vegetation. The manual recommends covenants, but City does not use covenants widely.
- If subdivisions are allowed near ESAs, the City requires a dedication, the width of which depends on type of ESA.
- OCP contains a policy to cover major ditches and canals, and to maintain dykes. Fisheries values have not been determined.

Comments:

- City does not use covenants widely because they fear the City will be liable if someone is injured. Enforceability is also an issue.
- There is no Tree Bylaw in place yet.

Leave Area Acquisition/Management

Approaches:

- OCP mandates a natural areas acquisition program. DCCs are collected for parks, but funds in capital plan are not specifically designated for ESAs. ESAs are purchased when opportunity arises.
- City is acquiring some foreshore areas for trails.
- OCP requires that public recreation access to waterfront be designed to protect natural values of sites.

Comments:

- ESAs are not necessarily "do not touch" zones, but require permission for use. Some ESA lands have been used for construction or leased to industry. If you need access to water, you can get it.

Stormwater Management

Approaches:

- City policy is to maintain natural flows (OCP, ESA design manual), but this requires clearing of canals or enclosing.
- OCP contains a policy to discourage water polluting industries.
- Stormwater Protection Bylaw prohibits discharge of contaminants to stormwater, requires storage and handling of contaminants in a manner to prevent discharge or leakage, requires containment barriers, and requires site cleanup before vacating premises.
- City has required runoff treatment for use of hog fuel. Use of hog fuel has been restricted by bylaw due to leachate concerns.

Comments:

- Staff suggest that Richmond is a special case because it is surrounded by dykes, and drained by canals and ditches (not streams). For the City, stormwater management is a huge issue. Staff do not believe the LDGs address Richmond's drainage system maintenance problems.
- City believes it is addressing stormwater management, but needs DFO to provide information on the fish values of drainage canals.

Erosion and Sediment Control

Approaches:

- OCP states development designs should minimize erosion and sedimentation in stormwater runoff.

Comments:

- Silt settles rapidly because of the low flow gradients in Richmond's flat topography.

Instream Work

Approaches:

- Projects in river/estuary are referred to FREMP.
- At present, instream policies do not exist for interior canals. However, City needs to clear canals and drainage ditches to maintain their flood control functions.

Comments:

- City is currently reviewing maintenance options for slough channels

Fish Passage and Culverts

Approaches:

- Drainage canals are generally large and City maintains channels to allow passage of storm water.

Application Reviews and Inspections

Approaches:

- City requires legal surveys. It also require environmental inventories in some cases. It requires environmental impact statements for industrial developments near ESAs.
- City refers applications to FREMP for perimeter area
- DPA guidelines cover ESAs. City reviews development plans under the DP process. It establishes development requirements in the Development Permit.
- Planning and Environmental Control staff monitor compliance with environmental requirements during development.

Comments:

- Staff state municipalities need stronger deterrents to ensure compliance.
- Staff state municipalities do not want to put undue delays or cost burdens on development.

Monitoring and Enforcement

Approaches:

- City enforces bylaws by responding to complaints, or refers complaints to senior environmental agencies.

Comments:

- Staff state that municipalities do not have sufficient enforcement resources.
- Staff state that municipalities need greater enforcement powers and deterrents if they are to protect environmental resources.

Surrey

Type: District Municipality

Area (km²): 302

Population: 245,173

Housing Starts: 2798

Density/km²: 812

Pop Growth (5yr.): 35%

Land Forms:

- Fronts on Fraser River, and Mud, Semiahmoo, and Boundary Bays.
- Three upland land masses sloping down to flood plains.
- Upland areas have poor water retention and water releases quickly.
- Lowlands have high water tables and are subject to flooding
- Three river systems - Serpentine, Nicomekl and Campbell - drain toward Boundary Bay.

Development:

- Development is concentrated in urban centres surrounded by farmland.
- Rapid growth with considerable additional growth potential.

Leave Area Identification

Approaches:

- City has identified and mapped ESAs throughout Surrey (1990 ESA study). ESA study rates all streams as high value.
- OCP policy states that natural habitats are to be identified and protected. OCP identifies and maps streams as development constraints, greenspace, and parks.

Comments:

- City currently reviewing OCP.

Leave Area Protection

Approaches:

- OCP requires ravines and significant watercourses be preserved in their natural state.
- Council intends to adopt a conservation designation in OCP and to prescribe zoning categories for that designation.
- City has a process with MOE to jointly review and establish protected leave areas adjacent to watercourses at the time of subdivision applications.
- City can allow density bonusing and clustering if land is dedicated for parks or natural areas. Development would proceed by comprehensive development plan. Zoning can be supplemented by DPs to achieve clustering and watercourse protection.
- Surrey Bend is the only DPA intended for natural area protection.
- City generally requires covenants during subdivision to protect watercourses.
- When the need arises to cross a watercourse, the OCP encourages the design of the crossing to take into account the protection of the integrity of the watercourse and fish passage.

Comments:

- Tree bylaws can protect trees but are not able to protect scrub trees or other vegetation. City is considering a new tree bylaw.
- Leave areas are often subject to vandalism. Police want leave areas cleaned out to aid crime prevention. City receives many calls from public to maintain these areas. There is a public safety issue with the risk of blow down on freshly exposed tree cover edges. Surrey is in court on public safety issue.
- Planning and Development Dept met vehement opposition from farmers at a public information meeting proposing DPAs be established to protect riparian zones on properties bordering the Little Campbell River. As a result, DPAs for this purpose have yet to be established.
- Staff state that abuse of covenant areas is extensive and enforcement by senior environmental agencies is lacking. This has been confirmed by a consultant study cosponsored by the City and DFO to determine the effectiveness of covenants in protecting the riparian leave strips along creeks. The study confirmed a high rate of encroachment and noncompliance with the conditions of the covenants. The City is therefore now considering different methods to protect these areas such as dedication of creek land to the City. For e.g., Staff suggest that the problem of non-compliance with covenants could be addressed by giving municipalities the authority to require dedication in fee simple.
- City currently reviewing OCP.

Leave Area Acquisition/Management

Approaches:

- City would require dedication of 5% of site to protect watercourses.
- City encourages dedication by density bonuses and clustering where developer provides more than 5% dedication.
- The park acquisition program defines dedication areas.
- City considers purchases of parkland where linkages are desired or purchases are required to protect the full watercourse area.
- City can use DCCs for purchase of ESAs.
- Park policies favour use of corridors for trails or access points, where this does not disturb fish.

Comments:

- City requires that dedications be taken in favour of Crown directly without "park" designation. This means that the Province has responsibility for enforcement.
- Staff state that abuse of covenant areas is extensive and enforcement by senior environmental agencies is lacking. This has been confirmed by a consultant study cosponsored by the City and DFO to determine the effectiveness of covenants in protecting the riparian leave strips along creeks. The study confirmed a high rate of encroachment and noncompliance with the conditions of the covenants. The City is therefore now considering different methods to protect these areas such as dedication of creek land to the City. For e.g., Staff suggest that the problem of non-compliance with covenants could be addressed by giving municipalities the authority to require dedication in fee simple.
- Leave areas sometimes do not allow sufficient building envelopes, allowing buildings too close to the covenant area.
- City currently reviewing OCP.

Stormwater Management

Approaches:

- OCP requires control of quantity and quality of water to protect watercourse environments (natural drainage policy). It recommends staggering outfalls and use of detention control measures. New developments must have drainage detention systems to delay runoff in a manner similar to natural drainage.
- City Utilities Division has undertaken Master Drainage Plans for the upper drainage areas of Hyland Creek and the Serpentine River .
- City has new drainage bylaw and drainage study underway.

Comments:

- City has natural drainage policy, and continues with many of its original concepts, namely keeping flows similar to natural levels and the retention of watercourses as part of the City's drainage system. However, the methods of implementation have changed since the policy was originally introduced. More discussion is needed on detention issues.
- Water from some drainage catchment areas serving large commercial or industrial areas have experienced water quality problems. City is addressing this issue through a variety of programs, including proactive education campaigns and complaint follow-ups.
-City currently reviewing OCP.

Erosion and Sediment Control

Approaches:

- OCP encourages use of temporary settling ponds at construction sites to detain and clean stormwater.
- City requires gravel access pads and other measures.
- City references LDGs in approvals, but puts onus on developers/builders to comply with LDGs and determine what to do.

Comments:

- City has experienced frequent siltation problems with development. Builders do not maintain siltation controls.
- City currently reviewing OCP.

Instream Work

Approaches:

- City refers instream work to MOE/DFO.

Fish Passage and Culverts

Approaches:

- City refers instream work to MEO/DFO.
- OCP encourages bridges for crossing of ravines and waterways, where crossings are necessary. It discourages use of culverts (recognizing bridges are more expensive). Staff state that culverts disrupt recreational use.

Application Reviews and Inspections

Approaches:

- City requires tree surveys, topographic and watercourse information with development applications. It requires surveys later in the process. Staff obtain some information from air photos. City may require impact assessment for some developments, such as developments affecting fish habitat.
- City refers applications to MOE and DFO for review.
- City provides guidelines to applicants to control site development. This can include protection of trees.
- City puts onus on developers/builders to comply with and implement LDGs.
- City requires developers' consultants to identify the top of bank. City, DFO, and MOE then negotiate the location of the top of bank.
- Various departments inspect for compliance with City requirements, e.g., gravel pads, etc. City puts onus on developers/builders to comply.

Comments:

- Staff inspections are intermittent, e.g., twice a month during construction. City puts onus on the developer/builders to comply with LDGs.

Monitoring and Enforcement

Approaches:

- City relies on environmental agencies for monitoring and enforcement, since dedications and covenants are in favour of the Crown.
- Most enforcements originate with public complaints. Local residents should be involved in monitoring and controlling. Trails through corridors allow citizens to police use of corridors.

Comments:

- Staff state that abuse of covenant areas is extensive and enforcement by senior environmental agencies is lacking. This has been confirmed by a consultant study cosponsored by the City and DFO to determine the effectiveness of covenants in protecting the riparian leave strips along creeks. The study confirmed a high rate of encroachment and noncompliance with the conditions of the covenants.
- Enforcement of covenant abuse has been shown to be difficult and lacking by MOE and DFO. This issue requires public education to prevent encroachments, while enforcement action by MOE and DFO may be required with the more difficult cases.

Vancouver

Type: City

Area (km²): 113

Population: 471,844

Housing Starts: 4298

Density/km²: 4172

Pop Growth (5yr.): 9%

Land Forms:

- Burrard Peninsula.
- Most streams have been covered. Some open streams include Still, Musqueam, Vivian, Tatlow, and Jericho Creeks. Also creeks in Stanley Park.
- Extensive foreshores on Burrard Inlet, English Bay, and North Arm Fraser River.

Development:

- Largely urbanized.
- Most new development through infill and densification.
- Extensive shoreline developments planned.
- Majority of waterfront is publicly owned, especially around English Bay.

Leave Area Identification

Approaches:

- City has no city-wide ESA studies or fish habitat policies (most streams have been enclosed).

Comments:

- Staff state that they have local knowledge of the location of streams and foreshores.
- City has nearly completed an overall strategic plan for stream stewardship and has contacted agencies and interested public groups for input.

Leave Area Protection

Approaches:

- City has developed policies for shorelines as they prepare plans. These plans include some fish habitat policies. City has policy to create urban seawalks on foreshores and/or a landscape setback on the North Fraser between Angus and the Knight Street Bridge.
- Council leans toward keeping streams open, e.g., Still Creek.
- CDA zones contain guidelines to enhance and keep Still Creek open.
- Local Area plans have addressed water habitat.
- City works with FREMP, BIEAP, DFO, and MOE on shorelines.

Comments:

- Most historic streams were enclosed in the early history of the City. Few streams remain open.
- City has its own Charter and is not under Municipal Act. Accordingly, it does not designate DPAs. Planning Dept. has significant discretion to control design through its own development permits under the Charter, except when use is outright with a zone.

Leave Area Acquisition/Management

Approaches:

- City has required dedication of upland areas for walkways and bicycle paths. City has policy to create urban seawalks and/or landscape setbacks.
- City requires open space and banks to be enhanced (Still Creek).
- City owns creeks in Stanley Park, Jericho Park, Tatlow Park, Renfrew Park, Renfrew Ravine Park, Fraserview Golf Course, and elsewhere.

Comments:

- Vancouver Park Board, with public input, is planning the enhancement of streams in Hastings, Renfrew Ravine, and Trout Lake Parks.
- Vancouver Park Board has provided support for salmon enhancement project in Beaver Lake Creek and has been approached regarding salmon enhancement in Spanish Banks Creek.

Stormwater Management

Approaches:

- City is developing a stormwater bylaw; it will deal with detention and water quality to a greater detail than under the existing Sewer Use Regulation Bylaw.
- City administers GVRD Liquid Waste Management Plan and source control program within City and monitors for certain contaminants, e.g. in Still Creek.
- City is considering parking lot interceptors. City has street sweeping, catch basin cleaning program and catch basin marking program.
- City is actively replacing combined sewer as part of their sewer replacement program.

Erosion and Sediment Control

Approaches:

- City does not like silt going into catch basins because this creates maintenance problems and carries contaminants.
- City did issue desist order when contractor was cleaning a truck on a construction site and Still Creek was contaminated.

Comments:

- Staff states that City does not have steep grades or developments that would cause erosion. They state that erosion/sedimentation has not been a significant problem.
- Erosion and sediment control policies will be considered for construction sites and excavation pump outs.

Instream Work

Approaches:

- City refers proposals to DFO and MOE. City requires approvals in writing from DFO/MOE for any shoreline work.
- For City work, staff consult with DFO.

Comments:

- City rarely has to work around streams, e.g., once every five years
- Good practice is required of work crew.

Fish Passage and Culverts

Approaches:

- City rarely removes culverts to uncover creeks.

Comments:

- Most streams are enclosed.
- Staff state that City would work toward improving fish passage, but don't know what to do. City is facilitating requests from community groups to uncover creeks. DFO staff have been involved with groups, and could give the groups technical advice.
- GVS&DD administers Still Creek.
- Vancouver Park Board, with public input, is planning the enhancement of streams in Hastings, Renfrew Ravine, and Trout Lake parks
- Vancouver Park Board has provided support for salmon enhancement project in Beaver Lake Creek and has been approached regarding salmon enhancement in Spanish Banks Creek.

Application Reviews and Inspections

Approaches:

- City sometimes requires site inventories
- City requires review of impacts only when water is involved.
- Development permit board reviews some proposals.
- Landscape architect in Planning Dept. carries out some inspections.

Comments:

- Staff suggest they have local knowledge.

Monitoring and Enforcement

Approaches:

- City does not do long term monitoring except for Still Creek. City did issue desist order when contractor was cleaning a truck on a construction site and Still Creek was contaminated.
- City actively monitors new connection permits for correct connection procedures.
- City responds to public complaints re pollution in creeks regularly and attempts to locate the source of the pollutants and rectify the problem.
- Senior environmental agencies do monitoring and enforcement.

West Vancouver

Type: District Municipality

Area (km²): 89

Population: 38,783

Housing Starts: 168

Density/km²: 435

Pop Growth (5yr.): 7%

Land Forms:

- Upland mountain streams.
- Marine foreshores.

Development:

- Extensive urbanization.
- Development potential on mountain slopes and urban infill.
- Current policies restrict urban development to elevations below 1200'.

Leave Area Identification

Approaches:

- District has prepared an inventory of creeks above Upper Levels Highway.
- Some areas identified in 1973 drainage report.
- Creek Preservation Area must be determined as part of the Development Permit approval process in newly developing areas. Creek Preservation Area is defined by OCP as area directly associated with creek environment on the basis of ecological sensitivity, aesthetics, recreational potential, and other factors. Creek Bylaw defines Creek Protection Area extending 7.6m from top-of-bank. Definition of top-of-bank is based on engineering criteria, i.e., 100-year flood levels, stability of creek bed, and degree of slope.

Leave Area Protection

Approaches:

- OCP designates newly developing areas above the upper Levels Hwy as DPAs to protect development from hazardous conditions and to protect the natural environment.
- Creeks Bylaw purpose is to prevent the fouling, obstructing or impeding of the flow of any creek. Under the bylaw, Creek Preservation Areas are set (within 25 feet of top of bank).
- District policy prohibits development within Creek Preservation Areas except for unavoidable works such as road crossings and public works. Trails are encouraged.
- OCP encourages retention of trees in sensitive areas. Securities (\$7,500 to \$10,000 per lot) may be taken to ensure trees are maintained within the protected creek area during construction. Park staff review tree cutting requests and typically require replacement of unavoidable tree cutting.
- Creek Protection Areas may be required in subdivision plans.
- District uses innovative subdivision approaches such as Area Density Variation (i.e. variation in lot sizes and configuration, transfer of development potential) to protect natural features.
- Approving Officer can refuse subdivisions under Creek Bylaw if the developer cannot define a building envelope lying outside of the creek zone .
- District requires protective fencing to be erected and maintained on the boundary of all Creek Protection Areas/Creek Preservation Zones before development begins. The fencing is kept in place until final inspection on building permits.

Comments:

- Covenants registered pursuant to the Creeks Bylaw regulate activities within creek zones but do not prohibit development. Covenants registered pursuant to a Development Permit approval are used to preserve the watercourse in accordance with the terms of the DP.
- District does not have an adopted tree bylaw.

Leave Area Acquisition/Management

Approaches:

- District requires dedications and/or covenants at time of subdivision approval to protect Creek Protection and Preservation Zones.
- District collects DCCs for parkland. Capital plan include parks acquisition plans. Parks may include creeks, but parks are not acquired specifically to protect creeks.
- District seeks public control or ownership of creek areas.
- District policy (and precedent) is that creeks form the framework for the provision of open space, and trails are located within creek corridors.

Comments:

- There are concerns about the "don't touch" approach of LDGs to leave strips. District policy is that creeks with trails should be publicly owned, whereas creeks without trails are protected by covenants only.
- Resident access to creek areas is encouraged to promote local proprietary interest in maintaining the creek zones.

Stormwater Management

Approaches:

- Subdivision Bylaw requires that the rate of runoff not be increased with subdivision development.
- District requires that engineers design detention facilities to minimize impacts on creeks.
- District requires stormwater detention for new developments where necessary to minimize flood hazards.
- Creeks Bylaw purpose is to prevent the fouling, obstructing or impeding of the flow of any creek.

Comments:

- Staff believe that in many situations, detention can aggravate flooding problems. They suggest that it would be helpful for municipalities to share their experiences to identify when detention is appropriate.
- Staff suggest that stormwater quality measures are not justified due to the District's low density, single family pattern of development. Stormwater is under discussion at GVRD.

Erosion and Sediment Control

Approaches:

- Creeks Bylaw prohibits fouling, obstructing and impeding of creek or drainage system, and removal of soil without permission.
- District staff informally suggest to developers that they use LDGs for new construction or servicing work.

Comments:

- Building permits do not address erosion on building sites.

Instream Work

Approaches:

- City refers municipal instream work to MOE.
- Creeks Bylaw prohibits fouling obstructing and impeding of creek or drainage system, and removal of soil without permission.

Fish Passage and Culverts

Approaches:

- District uses culverts without bottoms to protect natural stream bed in sensitive areas.
- OCP requires creek crossings to be designed to minimize disturbance of Creek Preservation Areas. Disturbances are to be restored to natural creek form.
- OCP includes policy to continue upgrading of drainage facilities, and replacing culverts with bridge or larger culverts.

Comments:

- In newly developing areas, there are few areas where fish passage is an issue.

Application Reviews and Inspections

Approaches:

- In Development Permit applications, District requires legal surveys and inventories with identification of streams, environmental and visual impact reports, including identification of features for retention and measures and plans for restoration of disturbed areas.
- Applicants and/or District staff may involve MOE/DFO in application review process. Applicants are advised to obtain approval for works in watercourses from MOE/DFO.
- The review of plans for sites which include creeks is typically by Parks, Planning, and Engineering staff for sites subject to development applications and by Engineering and Building staff for sites only subject to building permit applications.
- Parks staff review tree cutting requests and typically require replacement of unavoidable tree cutting.
- District specifies environmental conditions in development permit and servicing requirements.
- District staff will inspect restoration of creek banks where required, ensure creek protection measures are in place and monitor throughout development.

Monitoring and Enforcement

Approaches:

- District refers complaints to environmental agencies.
- Engineering dept inspectors enforce fencing along Creek Protection Areas/Creek Preservation Zones. The fencing is kept in place until final inspection on building permits.
- Securities (\$7,500 to \$10,000 per lot) may be taken to ensure trees are maintained within the protected creek areas during construction. Park staff review tree cutting requests and typically require replacement of unavoidable tree cutting.

Comments:

- District has no staff for enforcing fisheries regulations.

White Rock

Type: City

Area (km²): 5

Population: 16,314

Housing Starts: 60

Density/km²: 3230

Pop Growth (5yr.): 13%

Land Forms:

- Sloping upland.
- Most streams were enclosed historically. Remaining ravine largely in public ownership.

Development:

- Largely urbanized.
- Development potential limited to infill and densification.

Leave Area Identification

Approaches:

- City has not done ESA studies or environmental inventories.
- City has only one ravine and it is largely in public ownership.

Comments:

- City administers Semiahmoo Park on the Campbell River (within Surrey). City must resolve the future of Semiahmoo Park with Semiahmoo Band and City of Surrey.

Leave Area Protection

Approaches:

- OCP designates DPAs for flood hazard protection from the ocean and Campbell River.
- Semiahmoo Park on the Campbell River is maintained for preservation of open space and active recreation.

Comments:

- City has only one ravine and it is in public ownership.
- City administers Semiahmoo park on the Campbell River (within Surrey). City must resolve the future of Semiahmoo Park with Semiahmoo Band and City of Surrey.

Leave Area Acquisition/Management

Approaches:

- OCP states ravines and natural areas do not require major enhancements, but some walkways, trails and wildlife areas are planned.
- City owns major ravine, and it is designated for retention in a natural state.
- OCP states most of open space system is in place already. Acquisitions will occur for parkland through DCC process.
- The public uses the beach heavily for recreation. City continues to develop the foreshore promenade. City prohibits commercial development south of Marine Drive. The public wants the beach preserved.

Stormwater Management

Approaches:

- OCP states infrastructure is in need of repair, upgrading or replacement. This includes storm sewers.

Comments:

- Existing storm drainage system is already in place, and changes will involve only repair, upgrading or replacement.

Erosion and Sediment Control

Approaches:

- City's only ravine is in a park and is managed as a natural area.

Instream Work

Approaches:

- City's only ravine is in a park and is managed as a natural area.

Fish Passage and Culverts

Approaches:

- City's only ravine is in a park and is managed as a natural area.

Application Reviews and Inspections

Approaches:

- City's only ravine is in a park and is managed as a natural area.

Monitoring and Enforcement

Approaches:

- City's only ravine is in a park and is managed as a natural area.

APPENDIX 2
Bylaws Respecting Aquatic/Riparian Protection

Abbotsford

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	Yes
Soil:	No
Zoning:	Yes
Subdivision/Dev't Control or Servicing/Roads:	Yes
Stormwater/Sewer:	No
Other:	

Anmore

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	Yes
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

Belcarra

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	Yes
Soil:	No
Zoning:	Yes
Subdivision/Dev't Control or Servicing/Roads:	Yes
Stormwater/Sewer:	No
Other:	

Burnaby

Comprehensive/Conservation:	No
Watercourse:	Yes
Tree:	No
Soil:	No
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

Central Fraser Valley

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	Sumas Bylaw (Rural Land Use)

Chilliwack

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	Yes
Subdivision/Dev't Control or Servicing/Roads:	Yes
Stormwater/Sewer:	Yes
Other:	

Coquitlam

Comprehensive/Conservation:	Yes
Watercourse:	No
Tree:	Yes
Soil:	No
Zoning:	Yes
Subdivision/Dev't Control or Servicing/Roads:	Yes
Stormwater/Sewer:	No
Other:	

Dewdney-Alouette

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	Yes
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

Delta

Comprehensive/Conservation:	No
Watercourse:	Yes
Tree:	No
Soil:	Yes
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	Yes
Other:	

Fraser Cheam

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	Yes
Subdivision/Dev't Control or Servicing/Roads:	Yes
Stormwater/Sewer:	No
Other:	

Greater Vancouver

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	Yes
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

Harrison Hot Springs

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	Yes
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

Hope

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	Yes
Stormwater/Sewer:	No
Other:	

Kent

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	Yes
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

Langley City

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

Langley Township

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	Yes
Subdivision/Dev't Control or Servicing/Roads:	Yea
Stormwater/Sewer:	No
Other:	

Mission

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

Maple Ridge

Comprehensive/Conservation:	No
Watercourse:	Yes
Tree:	Yes
Soil:	No
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	Yes
Stormwater/Sewer:	No
Other:	

North Vancouver City

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

North Vancouver District

Comprehensive/Conservation:	Yes
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

New Westminster

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	Yes
Soil:	Yes
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

Port Coquitlam

Comprehensive/Conservation:	No
Watercourse:	Yes
Tree:	No
Soil:	No
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

Pitt Meadows

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	Yes
Zoning:	Yes
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

Port Moody

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	Yes
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

Richmond

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	Yes
Other:	

Surrey

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	Yes
Soil:	No
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

Vancouver

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	Yes
Other:	

White Rock

Comprehensive/Conservation:	No
Watercourse:	No
Tree:	No
Soil:	No
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	No
Stormwater/Sewer:	No
Other:	

West Vancouver

Comprehensive/Conservation:	No
Watercourse:	Yes
Tree:	No
Soil:	No
Zoning:	No
Subdivision/Dev't Control or Servicing/Roads:	Yes
Stormwater/Sewer:	No
Other:	