

Burrard Inlet



January 2002



Consolidated Environmental Management Plan for Burrard Inlet





How to be involved in the continuing implementation of this plan.

Public input and consultation are important to the Burrard Inlet Environmental Action Program (BIEAP) and its partner agencies. For further information about public consultation opportunities surrounding this Plan or to order any of our publications, please contact us at the:

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January, 2002

Foreword

The Burrard Inlet Environmental Action Program (BIEAP) was established in 1991 to provide a management framework to protect and improve the environmental quality of Burrard Inlet's ecosystem. The Burrard Inlet Environment Action Program provides environmental assessments of development projects within Burrard Inlet, delivers action plans to engage the local community in shoreline clean-up activities and provides education, training and funding for environmental stewardship. BIEAP's partners are: Environment Canada, Fisheries and Oceans Canada, the British Columbia Ministry of Water, Land and Air Protection, the Vancouver Port Authority and the Greater Vancouver Regional District (GVRD).

To ensure the continued sustainability of Burrard Inlet, the partners involved in the Burrard Inlet Environmental Action Program undertook an intensive planning process to prepare this Consolidated Environmental Management Plan. Prepared by the Plan Development Committee of BIEAP in consultation with a broad range of stakeholders, the Plan is a consolidated policy document focused upon environmental management of the Inlet's ecosystem. It brings together, in one policy document, all the environmental management policies and initiatives now in place and identifies new priorities to manage activities that affect the environment of Burrard Inlet.

The recommendations and actions identified to improve and enhance Burrard Inlet's ecosystem will serve as a framework for coordinating the partners' respective programs and activities pertaining to Burrard Inlet and its drainage basin. Accordingly, the Burrard Inlet Consolidated Environmental Management Plan will act as a mechanism to achieve positive environmental outcomes now and in the future.

Acknowledgements

The following individuals assisted in the development and preparation of the Consolidated Environmental Management Plan for Burrard Inlet:

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Executive Summary

Most residents of the Lower Mainland are familiar with Burrard Inlet as a water body within the growing metropolitan community of Greater Vancouver. But Burrard Inlet means different things to different people. To visitors, Burrard Inlet is the foreground to the scenic natural setting of Vancouver and its suburbs. To the business community, the Inner Harbour is home to Port Vancouver - Canada's Pacific Rim gateway.

For residents, English Bay, False Creek and Indian Arm provide recreational opportunities close to home. To developers, the Inlet and surrounding drainage basin provide building sites to accommodate a growing population in amenity rich locations. For First Nations, Burrard Inlet represents a rich cultural and spiritual heritage. For birds, fish and wildlife, the Inlet's shorelines and uplands provide valuable natural habitats.

Above all, Burrard Inlet is a complex ecosystem requiring environmental stewardship to remain sustainable for future generations.

The *Consolidated Environmental Management Plan for Burrard Inlet (the Plan)* builds on the previous work of the Burrard Inlet Environmental Action Program (BIEAP) and provides a framework for improving the environmental quality of the Burrard Inlet ecosystem. The Plan consolidates all of the BIEAP partners' respective environmental management systems - Port, federal, provincial and regional government policies, legislation and initiatives - pertaining to Burrard Inlet. The Plan provides recommended actions to improve and enhance the Burrard Inlet ecosystem over time. These actions focus on facilitation, research, and information sharing. In approving this Plan, BIEAP's partners are formally recognizing links in their environmental management activities and committing to the coordination of future policy development.

The main purpose of the Plan is to provide an environmental policy framework to achieve:

- Improved water quality;
- A reduction of the effects of historical contaminated lands and sediments;
- Enhancement and preservation of biodiversity, and
- An emphasis on human and economic development activities that protect and enhance the environmental quality of Burrard Inlet's ecosystem.

The Consolidated Plan contains maps of Burrard Inlet's sub-areas or sub-basins illustrating the location of selected macro features and areas of ecological significance. These maps will form the basis for preparing a habitat inventory of Burrard Inlet. They will also provide a context for future development and for the coordinated environmental review of projects.

As a tool for managing the environment in Burrard Inlet, the Consolidated Environmental Management Plan will work in concert with other strategic, economic, social and land use plans such as the Vancouver Port Authority's *Port 2010 Land Use Plan*, The Greater Vancouver Regional District's *Livable Region Strategic Plan* and the *Official Community Plans* of Burrard Inlet's eight municipalities. The Consolidated Plan will help ensure that environmental values are integrated with economic and social considerations in decision-making activities affecting the Inlet.

To guide the implementation of this Consolidated Plan, a Plan Implementation Committee will be created to prepare and oversee detailed annual work programs and budgets and to monitor Plan goals, objectives and actions. This Plan contains a series of ecosystem indicators that will be used to help track and monitor the overall performance of the Plan. The Plan also includes commitments for ongoing program funding and identifies agreed-upon strategies for future education and communication programs. The BIEAP Implementation Committee will be charged with creating an annual public reporting system on the environmental quality of the Burrard Inlet ecosystem and the work achieved by the BIEAP partnership.

The *Consolidated Environmental Management Plan for Burrard Inlet* will be revisited at the end of the first five years to determine whether the goals and actions contained within the Plan have been achieved, and whether they remain relevant or whether new challenges and opportunities require the attention of the BIEAP partners.

How to Read This Plan

The Consolidated Environmental Management Plan for Burrard Inlet contains four parts and seven appendices:

PART A: SETTING THE CONTEXT contains an introduction to the Burrard Inlet Environmental Action Program. It outlines the purpose and rationale for a Consolidated Environmental Management Plan for Burrard Inlet, and provides background on Burrard Inlet's ecosystem, its six sub-basins and oceanography.

PART B: EXISTING ENVIRONMENTAL MANAGEMENT outlines the existing environmental management systems in Burrard Inlet. It identifies who is managing the Inlet, describes the key environmental responsibilities and summarizes the policies and programs of the BIEAP partners.

PART C: ENVIRONMENTAL MANAGEMENT - SHARED GOALS, OBJECTIVES AND RECOMMENDED ACTIONS contains the shared goals, objectives and recommended actions that the BIEAP partners have agreed to pursue through the next decade and beyond. The shared goals and objectives and the partnership's actions are organized around several environmental management directions pertaining to:

- Water Quality/ Waste Water Management and Air Quality;
- Historically Contaminated Lands and Sediments, and
- Healthy Ecosystems and Biodiversity

Key environmental policy directions are identified for the entire Burrard Inlet Basin as well as for each of the six sub-basins within the Burrard Inlet. The sub-basins of Burrard Inlet are the Outer Harbour, False Creek, the Inner Harbour, the Central Harbour, the Port Moody Arm and Indian Arm.

A series of maps highlight selected ecological features in Burrard Inlet. These maps provide an inventorial basis from which decision-making mechanisms and implementation activities can be established.

PART D: IMPLEMENTING THE PLAN focuses on the implementation and monitoring aspects associated with achieving the BIEAP partners' shared goals and objectives. This section also identifies communication and education strategies to implement the Consolidated Environmental Management Plan.

PART E: CONTAINS APPENDICES to the Plan with special reference to how the Consolidated Environmental Management Plan corresponds to the environmental goals and policies of the municipalities and First Nations surrounding the Burrard Inlet.

Summary of Recommendations and Actions

GOALS AND OBJECTIVES FOR ENVIRONMENTAL MANAGEMENT OF BURRARD INLET

The following summarizes the overall environmental goals and objectives for Burrard Inlet.

Goal #1: Improve water quality in Burrard Inlet.

Objectives:

- Reduce the levels of contaminants entering marine and freshwater systems.
- Limit the potential for adverse impacts from future discharges into the environment.

Goal #2: Minimize the effects of contaminated soils and sediments on human and ecological health.

Objectives:

- Provide management and remedial options to deal with historically contaminated sediments in Burrard Inlet.
- Continue to facilitate the remediation of historically contaminated lands and sediments within Burrard Inlet.

Goal #3: Maintain and enhance productive fish and wildlife habitat and the natural biodiversity of Burrard Inlet.

Objective:

- Identify sites for future habitat protection, rehabilitation, restoration and enhancement.

Goal #4: Encourage human and economic development activities that enhance the environmental quality of Burrard Inlet.

Objectives:

- Pursue environmental objectives in recreation and development planning and land management.
- Develop appropriate guidelines for human activities affecting the environmental quality of Burrard Inlet.

PARTNERSHIP ACTIONS FOR THE ENTIRE BURRARD BASIN

The following summarizes the actions that the BIEAP partners will undertake for the entire Burrard Inlet basin in the short, medium and long term.

Water Quality, Waste Water Management and Air Quality

1. Continue to coordinate the management of liquid waste in Burrard Inlet.
2. Develop and implement a coordinated ambient water quality monitoring program in Burrard Inlet.
3. Review and make recommendations on the provincial permit discharge standards for industrial wastes.
4. Share information and contribute to the effort to eliminate non-point source pollution in Burrard Inlet.
5. Develop and enhance Industrial Best Management Practices (BMPs) and strengthen partnerships with the industrial sector.
6. Share information and explore ways BIEAP could contribute to air quality initiatives in the region.

Historically Contaminated Lands and Sediments

1. Develop and implement a risk-based sediment management plan for False Creek.
2. Develop a database to monitor historically contaminated lands and sediments in Burrard Inlet.
3. Develop risk-based sediment management plans for historically contaminated areas of Burrard Inlet as required.
4. Make use of global research efforts to provide management options for contaminated lands and sediments.

Healthy Ecosystems and Biodiversity in Burrard Inlet

1. Confirm and acknowledge existing “protected” areas in Burrard Inlet.
2. Assist the Greater Vancouver Biodiversity Conservation Strategy by identifying areas of ecological significance in Burrard Inlet for future protection and enhancement.
3. Use legislative tools such as Marine Protected Areas, Wildlife Management Areas and ecological corridors to protect and enhance valuable areas in the Burrard Inlet ecosystem.
4. Provide information and resources to all municipal, regional and port planning initiatives along the shoreline and in adjoining watersheds.
5. Coordinate and provide support and technical expertise to stewardship and community stakeholder groups in their efforts to improve the environment.
6. Identify areas for habitat compensation banking.
7. Develop environmental guidelines for recreation access, and park development and maintenance.
8. Update and promote the BIEAP Shoreline Development Guidelines.
9. Develop pilot projects in cooperation with the public and private sectors to showcase innovative environmentally sensitive designs.
10. Develop an inventory of archeologically significant sites.
11. Explore and develop models to deal with the cumulative effects of development within Burrard Inlet.

PARTNERSHIP ACTIONS FOR THE SUB-BASINS OF BURRARD INLET

The following summarizes the actions that the BIEAP partners will undertake for each of the sub-basins within the Burrard Inlet Basin in the short, medium and long term.

- Outer Harbour**
 1. Support the municipal planning initiatives of the City of Vancouver and the District of West Vancouver and work cooperatively with them to develop plans that coordinate community environmental goals with BIEAP’s environmental goals for Burrard Inlet.
 2. Remediate combined sewer outfalls in the Outer Harbour.

- False Creek**
 1. Develop and implement a risk-based sediment management plan for False Creek.
 2. Identify habitat areas for future enhancement and support community stewardship efforts to restore and enhance False Creek’s shoreline.
 3. Remediate combined sewer outfalls in False Creek.

- Inner Harbour**
 1. Remediate combined sewer outfalls (such as the one at Clark Drive) in the Inner Harbour.
 2. Continue to advance habitat enhancement, mitigation and preventive programs associated with Port development to provide for biodiversity within the Inner Harbour.
 3. Determine suitable sites for future compensation banks.
 4. Support the municipal land use planning initiatives of the Cities of North Vancouver and Vancouver, and the District of North Vancouver, by working cooperatively with them, and help to develop community environmental plans that correspond with BIEAP’s environmental goals for Burrard Inlet.

- Central Harbour**
 1. Continue to advance habitat enhancement, mitigation and preventive programs to retain natural lengths of shoreline and to provide for biodiversity within the Central Harbour.
 2. Determine sites for future habitat compensation banks.
 3. Support the municipal planning initiatives of the District of North Vancouver and the City of Burnaby by working cooperatively with them and help to develop community environmental plans that correspond with BIEAP’s environmental goals for Burrard Inlet.
 4. Remediate combined sewer outfalls in the Central Harbour.

- Port Moody Arm**
 1. Support the Cities of Burnaby and Port Moody’s efforts to determine and establish environmentally sensitive areas.
 2. Identify habitat areas for future enhancement and support community stewardship efforts to restore and enhance productive shoreline in Port Moody.
 3. Establish guidelines to protect marine shoreline areas in Port Moody and Burnaby in consultation with the Vancouver Port Authority.

- Indian Arm**
 1. Develop strategies to maintain the water quality conditions at recreational swimming beaches in Indian Arm.
 2. Support the environmental stewardship of Indian Arm through the conservation and protected area measures being developed by BIEAP partners and First Nations.
 3. Establish guidelines to protect marine shoreline areas.

Burrard Inlet

Part A:



Setting the
Context



Setting the
Context

Part A: Setting the Context

Introduction



About the Burrard Inlet Environmental Action Program (BIEAP)

Burrard Inlet is a tidal salt-water body occupying 11,300-hectares in the heart of the Greater Vancouver region. It comprises 190 kilometres of marine foreshore and many diverse sub-areas. Its surrounding natural drainage basin consists of 98,000 hectares extending from the North Shore mountains to the lowlands to the south. IAs shown on Map 1, Burrard Inlet's drainage basin and study area encompass the upland areas and watercourses flowing into the Inlet, the Outer Harbour, False Creek, the Inner Harbour, the Central Harbour, Port Moody Arm and Indian Arm. The northeast extent of the Inlet (Indian Arm) is a deep-water fjord with limited human settlement. The remainder of the Inlet has been developed for industrial, residential, commercial and recreational uses.

Burrard Inlet is a significant component of one of Canada's most productive marine and terrestrial ecosystems. At the same time, the area is home to a large urbanized population in eight municipalities, and the Port of Vancouver, Canada's gateway to the Pacific Rim.

In 1991 the Burrard Inlet Environmental Action Program (BIEAP) was established to provide a management framework to protect and improve the environmental quality of this important drainage basin. BIEAP's program partners are: Environment Canada, Fisheries and Oceans Canada, the BC Ministry of Water, Land and Air Protection, the Vancouver Port Authority (VPA) and the Greater Vancouver Regional District (GVRD).

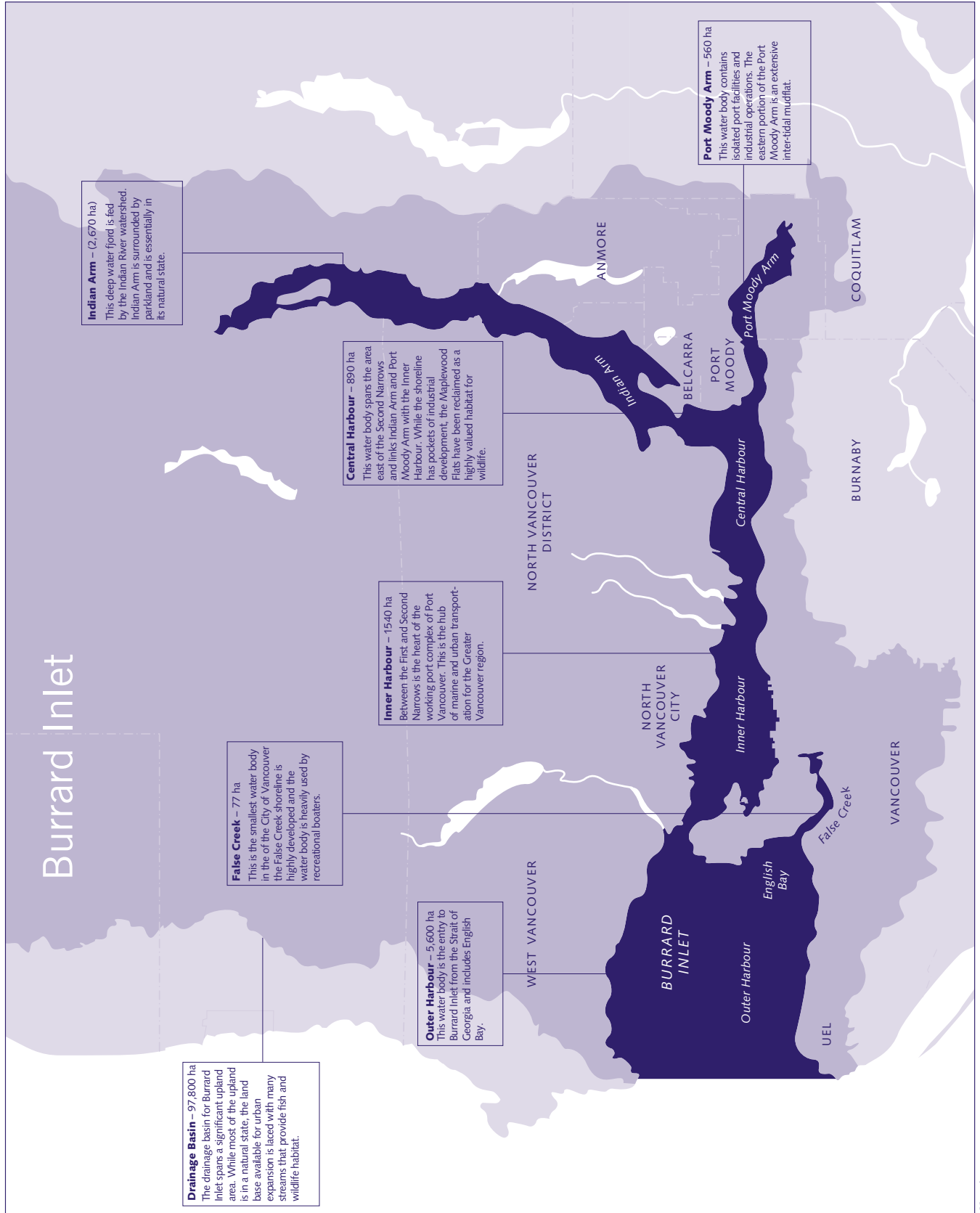
BIEAP functions through a Memorandum of Understanding¹ which establishes the framework for the coordination of the partners. BIEAP is a forum that brings together all parties to work collectively in the best interests of the ecosystem and to find solutions to environmental problems specific to Burrard Inlet. The Program strives to cultivate a common understanding of issues and to stimulate consensus among government agencies. BIEAP's overall vision for Burrard Inlet is one of *"a thriving port and urban community co-existing with a healthy environment"*.

While many other of BIEAP's initiatives involve scientific and technical aspects of the Inlet, this Consolidated Environmental Management Plan focuses on the environmental condition of the Inlet and on ways that environmental management and procedures can be improved.

**BIEAP'S OVERALL
VISION FOR BURRARD INLET IS:**

***"a thriving port and urban community
co-existing with a healthy environment."***

¹ See Appendix 6 for a copy of the Memorandum of Understanding.



BIEAP's Business: Policy Development and Operational Activities

The BIEAP partnership exists to coordinate initiatives to protect and improve the environmental quality of Burrard Inlet while recognizing the important economic and social role that the area plays in the national, regional and local economies. To this end, the business of BIEAP falls into two broad categories: policy development and operational activities.

BIEAP's policy development work includes:

- Strategic management and priority setting;
- Influencing the development and application of policies and regulations as they pertain to Burrard Inlet and the Program's objectives;
- Setting goals and objectives and monitoring progress toward their achievement, and
- Maintaining a high level of commitment and sufficient funding.

BIEAP's operational work includes:

- Managing the coordinated project review process;
- Coordinating specific action programs to meet prescribed goals and objectives, and
- Providing technical support and input on policy issues.

BIEAP Partners:

Environment Canada
 Fisheries and Oceans Canada
 The BC Ministry of Water, Land and Air Protection
 The Vancouver Port Authority
 The Greater Vancouver Regional District

Although BIEAP works to resolve policy issues for the good of the environment, the partners recognize each other's mandates, responsibilities and authority. The partnership is not intended to fetter mandates, but to encourage information sharing, understanding and cooperation in the development and application of environmental policy and regulations affecting Burrard Inlet.



COOPERATION, COORDINATION AND INFORMATION SHARING

“The BIEAP partners work together to maintain and enhance the ecosystem health of Burrard Inlet”.

Burrard Inlet Environmental Action Program - Accomplishments 1991-2001

The vision of Burrard Inlet Environmental Action Program for Burrard Inlet is “*a thriving port and urban community co-existing with a healthy environment.*” The mandate of the program is to promote a sustainable balance between the environment and the economy. The overall goals of BIEAP include:

- REDUCING EXISTING CONTAMINANT DISCHARGES TO **BURRARD INLET**;
- CONTROLLING POTENTIAL AND LIMITING ADVERSE IMPACTS TO THE ENVIRONMENT;
- PURSUING THE PROTECTION AND ENHANCEMENT OF HABITAT VALUES FOR THE OVERALL BENEFIT OF THE ENVIRONMENT, AND
- IDENTIFYING MEASURES TO REMEDIATE ENVIRONMENTAL IMPACTS WITHIN THE **INLET**.

Collectively and individually, BIEAP and its program partners have made significant improvements to Burrard Inlet’s water quality over the past ten years by reducing the amount of pollution entering the Inlet’s receiving waters. The BIEAP partners have also completed a number of research activities, provided ongoing project review and managed public consultation initiatives.

RESEARCH AND ABATEMENT

Over the past ten years, BIEAP’s efforts have concentrated on gathering scientific evidence to understand Burrard Inlet. Since 1992, the BIEAP partners have conducted and co-sponsored a number of research studies examining contaminated discharges (e.g., point source inventories), patterns of recent and historical contamination (e.g., sediment core profiling and sampling) and sediment movement within the Inlet. The partners have also developed and promoted abatement strategies to reduce and control pollution discharges in the Inlet, including best management practices or voluntary guidelines to reduce the potential for contamination.

BIOPHYSICAL INVENTORY OF THE INLET

To better assess the components of the Burrard Inlet ecosystem, BIEAP compiled a biophysical inventory for Burrard Inlet’s subtidal, intertidal and backshore areas over the 1995-1996 period. Using an underwater sled and a Global Positioning System, divers inventoried substrates and flora and fauna at varying depths. BIEAP also conducts annual bird surveys with the Wild Bird Trust of BC. With the help of volunteers, information is collected and used to assess bird habitat requirements, species diversity, seasonal abundance and movement.

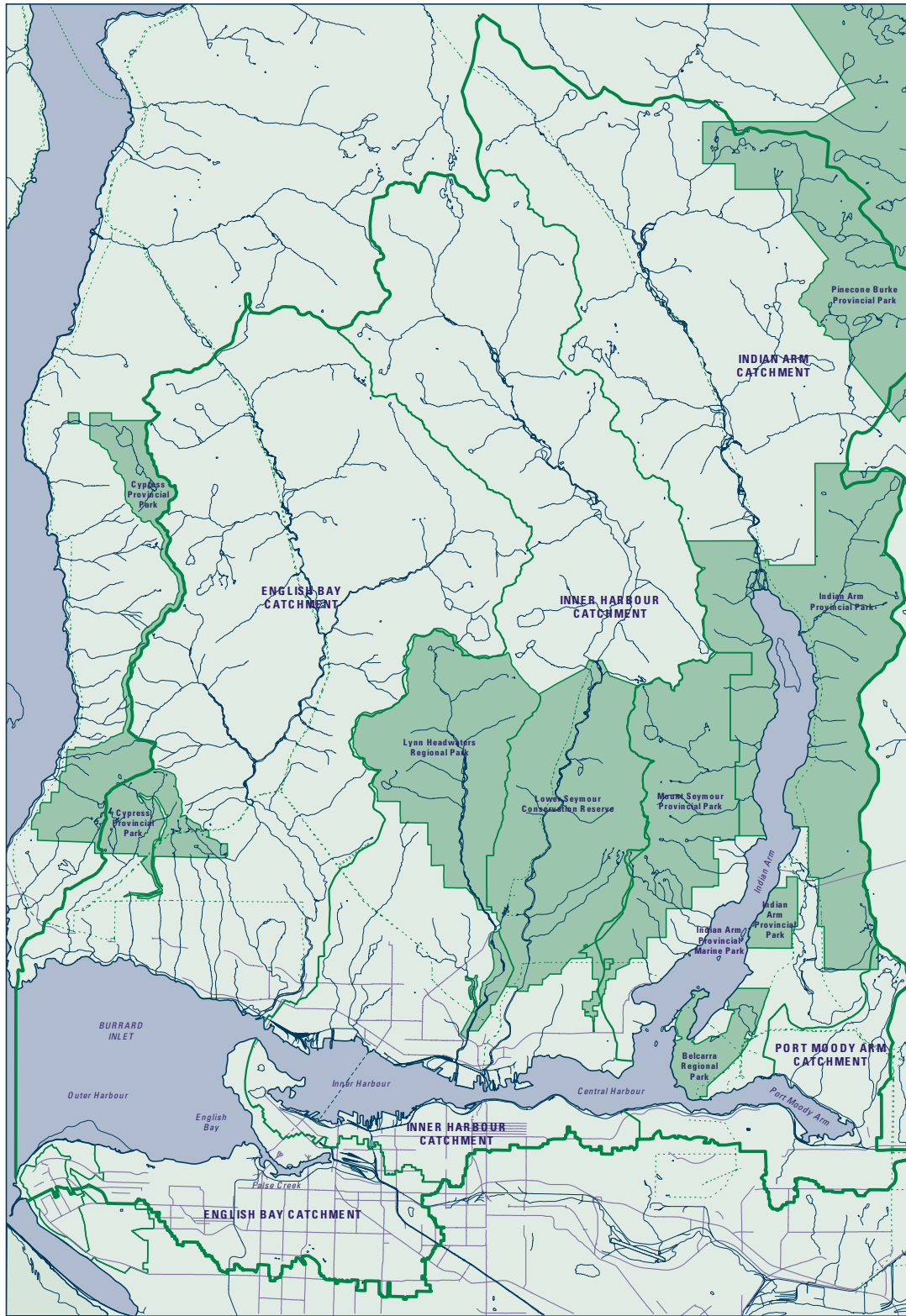
ENVIRONMENTAL ASSESSMENT

Since 1991, the Burrard Environmental Review Committee (BERC) has conducted coordinated environmental reviews for all new developments and projects within BIEAP’s boundaries. Since the Program’s inception, BERC has reviewed over 900 development applications.

PUBLIC INVOLVEMENT

BIEAP has provided education programs, such as *Voices for Choices*, as well as funding for training, environmental stewardship and study. BIEAP has involved volunteers from community and industry groups in Adopt-a-Shoreline clean-up programs and quadrat studies, and has published several newsletters.

BURRARD INLET CONSOLIDATED ENVIRONMENTAL MANAGEMENT PLAN
 Burrard Inlet Plan Boundaries



LEGEND	
	BIEAP Zone Boundary
	Burrard Inlet Catchment Boundary
	Watershed Boundary
	Provincial and Regional Parks
	Coastline, Stream, Lake
	Road
	Rail Line
	Light Rail Transit Line
	Ferry Route
	Transmission line

N
 W —+— E
 S

Scale - 1:20,000

0.5 0 0.5 1 Kilometers

Map 2

Planning for Burrard Inlet: The Consolidated Environmental Management Plan

Since its inception in 1991, the Burrard Inlet Environmental Action Program has focused on a series of projects to deal with specific environmental issues pertaining to Burrard Inlet. Most of these projects are directed at examining and abating pollution discharges into the marine environment.

In 1998, a Technical Summary Report ² was completed which documented the rationale for and results of the various activities that the Fraser River Action Plan and the Burrard Inlet Environmental Action Program participated in relative to Burrard Inlet. The report made the following four recommendations:

The Goals of the Plan are:

- Improved water quality.
- A reduction of the effects of harmful historically contaminated lands and sediments.
- Enhancing habitat and preserving bio-diversity.
- An emphasis on human and economic development activities that protect and enhance the environmental quality of Burrard Inlet's ecosystem.

1. The Inlet Management Plan under development by BIEAP should be completed and implemented.
2. Subject to the goals established through the Inlet Management Plan, the need for an intergrated monitoring program should be further considered and implemented to address data or other information needs.
3. The coordinated project review process should continue with ongoing monitoring of process efficiencies and effectiveness, including post-project monitoring to verify that the conditions of approval are being implemented.
4. Sediment quality guidelines should be developed for the Inlet in order to provide guidance to proponents of development projects and regulatory agencies.

In 1999, the BIEAP Management Committee endorsed the idea of developing a more comprehensive environmental policy framework for the Burrard Inlet ecosystem. Recognizing that there are a number of existing economic, social and land use plans currently used to manage and plan the ongoing activities in Burrard Inlet, the Committee undertook to consolidate the various policies, legislation and regulations into a common document. The result of this initiative is this Plan document entitled *"The Consolidated Environmental Management Plan for Burrard Inlet."*

Purpose of the Consolidated Plan

The purpose of this Consolidated Plan is:

- To describe the existing regulatory environmental management system in Burrard Inlet, and
- To identify environmental issues, informational gaps and opportunities for the BIEAP partners to work together under a shared series of goals, objectives and actions.

By documenting the partners' various regulatory roles and jurisdictions, the Plan is intended not only to promote an understanding of the environmental management system in Burrard

THE CONSOLIDATED PLAN:

"establishes a common environmental framework and identifies ways to improve environmental management of the Inlet over time".

Inlet, but also to identify new opportunities for creating program synergies and aligning environmental management processes over time. The goals and objectives of this Plan are synonymous with those agreed to through the BIEAP Memorandum of Understanding. These goals are supported by the legislation administered by individual BIEAP partners.

² See Burrard Inlet Technical Summary Report, October, 1998. Environmental Protection Branch, Environment Canada.



The Consolidated Plan illustrates the commitment of the partners to *work together to maintain and enhance the ecosystem health of Burrard Inlet*. The Plan will be used as a working guide to assist agencies with implementing their respective environmental programs and initiatives. Combined with other strategic plans in the region – the Vancouver Port Authority’s *Port 2010 Land Use Plan*, Greater Vancouver’s *Livable Region Strategic Plan* and the eight *Municipal Official Community Plans* – the Consolidated Plan will ensure that the environmental values of BIEAP’s partners are considered in decision-making processes associated with the development of Burrard Inlet and its drainage basins.

Why a Consolidated Plan Now?

Planning for the future provides opportunities to maintain Burrard Inlet’s valuable ecosystem features for the use and enjoyment of future generations. Managing the impacts of increased growth in a coordinated fashion through effective working relationships between government agencies will help to lessen the impact of human activities on the natural environment. Planning also provides opportunities to remedy harmful environmental actions of the past.

Managing the effects of economic and population growth on the natural environment is important for all levels of government.

Changing Context and Legislation

Since BIEAP’s inception, environmental management practices associated with the Burrard Inlet ecosystem have changed. New initiatives, programs and departments at the federal, provincial and regional government levels have evolved during the last ten years and continue to adapt to Canada’s environmental priorities. New pollution prevention and environmental stewardship programs have been introduced and the *Canadian Environmental Protection Act* and the *Canadian Environmental Assessment Act* have been revised and updated. The introduction of the *Canada Marine Act*, the *Canadian Shipping Act* and GVRD’s Liquid Waste Management Plan prepared under the *BC Waste Management Act*, have influenced the work and priorities of the BIEAP partnership. BIEAP’s environmental initiatives are also sensitive to the ongoing request by governments to “do more with less.”

In view of this new and revised legislative and regulatory framework, a useful compilation of the applicable and new legislation in the form of this Consolidated Plan supports a disciplined approach to shared goal setting, responsibilities and performance measurement for Burrard Inlet.

Urban Pressures on the Burrard Inlet Ecosystem

Greater Vancouver is one of the fastest growing areas in North America and is expected to reach a population of three million by 2021. The southern portion of Burrard Inlet is designated as part of the regional growth concentration area in the GVRD’s *Livable Region Strategic Plan* and will likely absorb a considerable share of the new population growth. In addition, the Vancouver Port Authority needs to meet the future demand for increased trade and transportation services. The Consolidated Plan will help ensure the continued sustainability and ecological health of Burrard Inlet within this rapidly growing urban context.

An Ecosystem Approach

The geographical framework for this Consolidated Plan comprises the entire Burrard Inlet - the waters east of Point Atkinson and Point Grey, including English Bay, False Creek, the Inner Harbour, Port Moody Arm and Indian Arm - together with the upland drainage basin as shown on Map 2. Using this drainage basin as the basis for this Consolidated Plan is consistent with the ecosystem approach embraced by the BIEAP partnership - an approach that recognizes and addresses the connectivity of all parts of the natural ecosystem.

Ecosystem management approach

An ecosystem management approach is a long-term strategy aimed at preserving, protecting and/or restoring the integrity of the ecosystem. This approach will help to maintain sustainable societies and economies, and is necessarily pro-active in order to uphold resources before crises arise.

By its very nature, an ecosystem approach is flexible and collaborative. It involves a comprehensive geographic perspective and encourages innovation.

Building the Plan: The Planning Process and Participants

Principles of Ecosystem Planning include:

- A focus on the connectivity of geographical areas
- Working collaboratively with stakeholders
- Protecting and restoring the quality of water, land, and living resources
- Integrating environmental, economic and social objectives
- Taking action using most appropriate tools
- Using adaptive management

The following ecological tenets are embodied in the Plan and stem from BIEAP's approach to managing the environment:

- Take an ecosystem approach to resource management to improve overall ecosystem health;
- Articulate goals and resource management objectives;
- Utilize remedial measures and strategies for improving the environment based on an appropriate assessment of risk;
- Manage habitat and document habitat values in a way that is responsive to temporal and spatial change, and
- Inform and provide guidance for regional environmental stewardship initiatives, policies and plans.

BIEAP's *Consolidated Environmental Management Plan* will be used in conjunction with the region's other strategic plans to link the management and operation of the natural and built environments. The BIEAP partners will continue to play a role in integrating social, economic and environmental considerations in decision-making affecting the Burrard Inlet ecosystem.

The process to develop the Consolidated Environmental Management Plan for Burrard Inlet began in 1999 when the BIEAP/FREMP Steering Committee approved the work program and funding to commence the policy consolidation and planning process. The first phase of the process involved researching and compiling information on Burrard Inlet. Throughout January and February 2000, a series of interviews with BIEAP partners and stakeholders was conducted. The main purpose of these interviews was to determine the scope of expectations for the Plan among a range of government, community, business and environmental groups.

In early 2000, the Management Committee appointed representatives to the BIEAP Plan Development Committee to provide advice on the development of the Consolidated Plan. The BIEAP Plan Development Committee is made up of 19 partner and municipal representatives, who met regularly to review options and provide direction for the preparation of the Plan.

The initial public consultation process for the development of the first draft of the Consolidated Plan occurred in late 2000. BIEAP hosted four regional community forums in Burnaby, Port Moody, Vancouver and on the North Shore. There were also a number of meetings with specialized stakeholders including agency staff and environmental groups. A forum involving representatives from industry and trade associations was held in late November in Vancouver.

The ideas and input received through this consultation process proved useful in confirming environmental issues important to the citizens of the region. The synthesis of this input was valuable in determining existing and emerging environmental priorities and actions for the future.

The initial draft of the Plan was prepared in May 2001. It was widely circulated for review and comment in a second round of community consultation, and the input received over the summer of 2001 was incorporated into the second draft. The second draft was distributed for review in the Fall of 2001 and a public open house and forum were held to present the revised Plan to the public. The Plan was approved in principle by the BIEAP/FREMP Management Committee in December 2001, and subsequently will be approved by the BIEAP partners. It will then be forwarded to the municipalities for endorsement.



Background Introduction to Burrard Inlet: Past and Present



Burrard Inlet's natural deep-sea harbour and lowlands have been a setting for successive waves of human settlement. Centuries ago, Burrard Inlet constituted part of the traditional territories of many Coast Salish peoples, including the Tsleil-Waututh, the Squamish and the Musqueam First Nations. These people utilized the region's rich resources such as salmon, clams, mussels, and eulachon for food. They used Douglas Fir, western red cedar and bark to make homes, canoes, clothes and other items. A range of berries and aquatic plants also formed important parts of their traditional diet. Recent discoveries of cultural artifacts at Locarno Beach and shell midden sites testify to the presence of First Nations in Burrard Inlet as early as 500 BC (Douglas College, Institute of Urban Ecology).

Close Up on Port Vancouver:

As Canada's largest and most diversified port, Port Vancouver provides significant social and economic benefits to the national, provincial and local economies. Trading more than \$30 billion in goods with 90 nations per year, the Port generates a value of about \$1.68 billion to the Canadian economy annually and creates the equivalent of 10,700 full-time jobs. In 2000, the Port handled a record 76.5 million tonnes of cargo through its facilities.

As the third largest cruise ship market in the world, the Port welcomes over one million passengers to Vancouver annually. Each cruise ship that stops at Port Vancouver contributes approximately \$1.5 million to the provincial economy. In 2000 alone, Vancouver's cruise ship industry added over \$500 million to the provincial economy.

European settlement of Burrard Inlet began in the mid-1800s. The Inlet's natural deep harbour accommodated ocean-going vessels and the flat topography of the surrounding lowlands provided an ideal location for urban settlement and industrial expansion. In 1863, the first industrial plant in the Lower Mainland, Pioneer Sawmills, appeared on the north shore of Burrard Inlet. A year later the harbour's first export cargo was a shipment of lumber from Pioneer Sawmills to Australia (FRAP 1998). With the extension of the transcontinental railway to BC in 1886, the transformation of Burrard Inlet into one of the largest port operations in North America began.

Today, Burrard Inlet is at the core of a regionally diverse area, with heavily developed industrial and commercial shorelines, pockets of residential and recreational activity and expansive protected natural areas. As one of the region's largest open areas and framed by the North Shore mountains, Burrard Inlet provides Vancouver with its reputation as one of the most scenic cities in the world. The Burrard Inlet ecosystem includes portions of eight municipalities, and is home to over 600,000 residents or one third of the population of Greater Vancouver. The municipalities in Burrard Inlet include the Cities of Burnaby, North Vancouver, Port Moody, and Vancouver, the Districts of West Vancouver and North Vancouver, and the Villages of Anmore and Belcarra.

To many people, Burrard Inlet is most closely associated with the working terminals, deep-sea docks and activities of the Vancouver Port Authority. As the largest landholder in the inner and central harbours, the Port is responsible for the administration, planning and environmental management of much of Burrard Inlet. All together, the Vancouver Port Authority administers 460 hectares of water and 166 kilometres of shoreline.

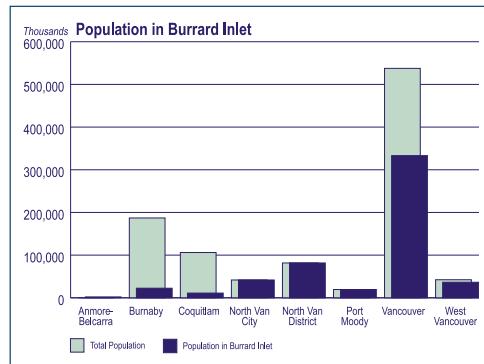


figure 1

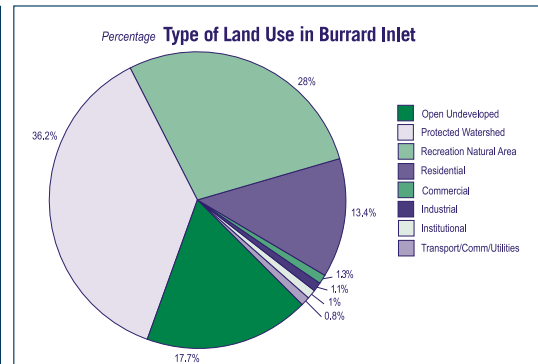


figure 2

The Burrard Inlet Ecosystem

Amidst all this human activity, Burrard Inlet's natural environment continues to be highly diverse and productive. The Burrard Inlet ecosystem is part of the larger Pacific Maritime ecozone, which extends along the BC coast. This ecosystem includes all of Canada's Pacific coastal waters and the larger Georgia Basin. Characterized by a temperate marine climate, and defined in part by the Coastal Mountains, the Burrard Inlet ecosystem is an area of rugged peaks, magnificent old growth forests, fjords and rich aquatic life.



The Burrard Inlet ecosystem includes diverse marine, estuarine and terrestrial environments which provide habitat to a wide range of species. The Inlet's shorelines, intertidal areas, mudflats and salt marshes are home to an estimated 200 varieties of marine organisms, including 70 different species of fish and over 100 species of invertebrates.

The Inlet's drainage basin is also laced with streams that provide essential rearing habitat for salmon. Five types of Pacific salmon, as well as steelhead trout and other commercial and recreational fish species use the Inlet. The area acts as a significant fish migration corridor, and each year millions of salmon return to the area's major salmon rivers, the Indian, the Capilano and the Seymour Rivers. These fish stocks in turn attract many large marine mammals such as harbour seals and sea lions, as well as the occasional whale.

The Burrard Inlet ecosystem is home to numerous species of waterfowl, including ducks, geese, songbirds, shorebirds, herons, cormorants, grebes and large raptors such as eagles, owls and hawks. Many of these species feed and roost along the forest edges, on the muddy or rocky shorelines or in the waters close to shore. As part of the Pacific Flyway, Burrard Inlet attracts tens of thousands of migratory birds each year.

While a significant amount of natural shoreline has been altered and eradicated, the ability of nature to adapt, use and colonize man-made and artificial environments has also played a key role in maintaining Burrard Inlet's biodiversity. Birds are especially adept at colonizing artificial habitats. For example, the urbanized central basin has the highest number of waterfowl of any area in Burrard Inlet. Bridges and docks, and dolphins and floats provide homes to large communities of algae and edible invertebrates (animals without backbones). Similarly, rip-rap placed along the shoreline for bank stabilization is readily colonized by common intertidal species such as rockweed and other algae, and provides shelter and food sources for fish and invertebrates.

The Burrard Inlet drainage basin contains parks and protected wilderness areas that provide habitats for a variety of native mammals, reptiles and amphibians, ranging from bears and bats to voles, raccoons and coyotes. Some of the larger mammals that exist in the upper portions of the drainage basin include Columbia Black Tailed deer, black bear and cougar.



Burrard Inlet at a Glance: The Six Sub-basins

The Burrard Inlet ecosystem encompasses 109,300 hectares and includes six distinct geographical sub-areas or basins.

The Outer Harbour

The Outer Harbour is the largest sub-area or basin within Burrard Inlet, comprising the English Bay waters between the Strait of Georgia and the First Narrows near Lions Gate. It is the transition area between the Strait of Georgia and the rest of Burrard Inlet. The shoreline has been significantly altered by the construction of sea walls and the placement of fill associated with residential development. These developments have also resulted in the radical alteration of backshore areas with consequent changes in the shoreline character.

At lower tide levels, the south shores of English Bay are characterized by sand beaches. The eastern shores of the Bay have historically been augmented by the placement of sand to facilitate recreational use. In their original natural state, the eastern shores may have been characterized by cobble or rock beaches. In Point Grey, extensive intertidal zones of sand and mudflat with benches of soft sediment exist.

In contrast, the shoreline of West Vancouver is primarily rocky and lower tides expose important feeding sites for wildlife. Rock and cobble or gravel beaches are more common along the North Shore, although beach augmentation has occurred there as well.

False Creek

The False Creek basin is the smallest of the Inlet areas. It adjoins the Outer Harbour near the Burrard Bridge at Vanier Park in Kitsilano and extends east to the Vancouver Science Centre on Quebec Street. Much of the shoreline has been hard surfaced for seawalls and public paths, and there is a significant amount of residential and commercial development. The False Creek basin is famous for the Granville Island public market, which is set against a backdrop of marinas, sailboat masts, and small passenger ferries travelling back and forth across the water.

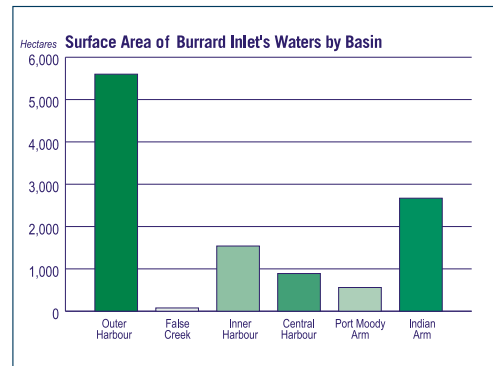


figure 3

The Inner Harbour

Burrard Inlet's Inner Harbour extends from the First to the Second Narrows. Most of the harbour's industrial activity is concentrated here, and very little of the original shoreline is present in an unaltered form. The shores are characterized by marine and intermodal transport facilities and infrastructure, including bulk and container terminals and the rail and road services that connect them to the rest of the continent. In some areas, such as Coal Harbour near Stanley Park, redevelopment of the older industrial waterfront has created new high amenity residential and recreational areas. The Squamish First Nation has three reserves on the Inner Harbour; one at the mouth of the Capilano River, one surrounding the mouth of Mosquito Creek and one at the mouth of the Seymour River.

The Central Harbour

Burrard Inlet's Central Harbour consists of the area bounded by Second Narrows on the west, Admiralty Point to the east, and Turtle Head to the north. Bordering North Vancouver District, the City of Burnaby and the Village of Belcarra, the harbour contains both modified and natural shoreline. The Maplewood Wildlife Conservation Area is located on the North Shore. The Tsleil-Waututh First Nation also has a reserve on the Central Harbour's north shore.

Port Moody Arm

Port Moody Arm is the most eastern portion of Burrard Inlet. Surrounded by the City of Port Moody, the Arm is less developed and more suburban in nature. While the southern coastline of this Arm of the Inlet contains some significant industrial uses, trails, parks and recreational marinas border much of the basin. The area includes the important recreational areas of Admiralty Park and Belcarra Regional Park. The eastern end of Port Moody Arm contains extensive mud flats that have important habitat values for fish and other organisms.

Indian Arm

Indian Arm is the most pristine area of Burrard Inlet. It is a steep-sided, 30-kilometre long fjord that branches north from the Central Harbour, east of the Ironworkers Memorial Second Narrows Bridge.

Indian Arm Provincial Park protects the shores of the Indian Arm fjord. This 6,821-hectare park encompasses old-growth forests, several alpine lakes, a 50m high waterfall (Granite Falls), a large alluvial fan, numerous creeks and the Indian River estuary. The Indian River estuary is a vital protected habitat for species of prawn, crab, salmon and waterfowl. Harbour seals also frequent the area. Indian Arm Marine Provincial Park consists of Raccoon and Twin Islands. Sparse vegetation, open cover, and exposed rocky ledges characterize these islands which are each about 2-hectares in size.

Indian River enters the extreme north end of Indian Arm and creates a marshy delta that attracts wildlife. The Tsleil-Waututh First Nation has a reserve in the Indian River estuary at the head of Indian Arm.

Oceanography of Burrard Inlet

Glacial activity, tidal action, currents and erosion created Burrard Inlet's six natural basins. The basins themselves are divided by a series of naturally occurring sills or deposits of sand caused by the processes of sediment transport (accretion and deposition) and tidal and current movement and wind.

From the Outer Harbour on the seaward side, Burrard Inlet's water depths decrease steadily eastward from a maximum of 100 metres at the mid-channel south of Point Atkinson, to about 10 metres in Port Moody Arm. The Outer Harbour receives considerable fresh water from the Fraser River.

The Inner Harbour is separated from the Outer Harbour by an 18-metre sill at First Narrows and from the Central Harbour by a 14.5-metre sill at Second Narrows. The Central Harbour extends to the southern tip of Indian Arm. The waters of both the Inner and Central Harbours are well circulated and receive most of their direct fresh water from the Capilano and Seymour Rivers.

In contrast, False Creek and Port Moody Arm are shallow tidal areas with average water depths of approximately 10 metres. Because of the low velocity of the water exchange, particulate matter is not easily flushed and therefore contributes to the potential for contaminated sediments in the area.

Approximately 80 percent of the shoreline in the Inner Harbour and False Creek has been modified. These modifications include the construction of docks, piers, rip-rap and seawall. The Outer and Central Harbours and Port Moody Arm have lower proportions of modified shoreline. The Outer and Central Harbours and Port Moody Arm include a range of artificial and natural substrate types including mixed fines (mud, sand, mud sand, mud gravel, sand gravel), cobbles, gravel, bedrock and boulders.

The Indian Arm fjord has an average depth of 120 metres. Broad shallows at the mouth of the Arm restrict water exchange with Burrard Inlet and it is estimated that the deep waters are only exchanged every seven to ten years. The Indian River estuary at the head of Indian Arm and the Coquitlam watershed are the main sources of fresh water. Over half of Indian Arm's shoreline is made up of consolidated bedrock and boulder, while a delta exists where the Indian River enters the Arm.

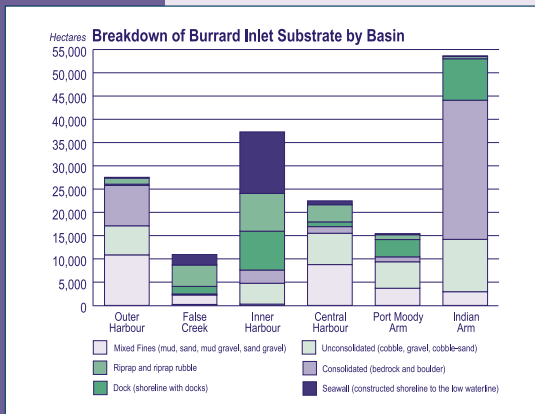


figure 4

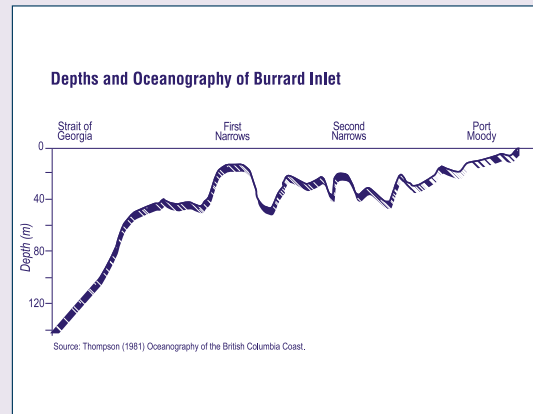


figure 5