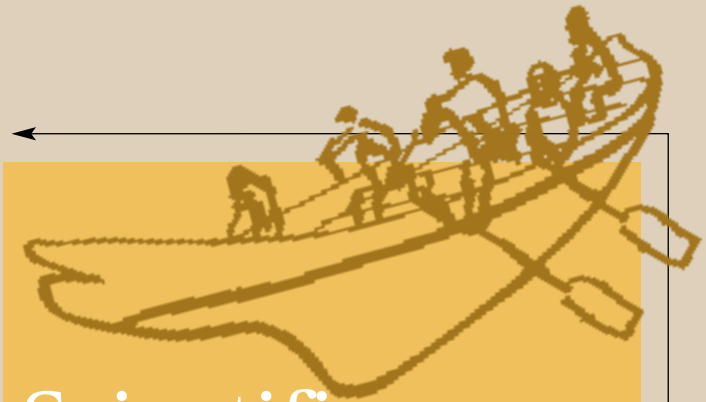
ECOSYSTEM MANAGEMENT



Scientific & Indigenous Knowledge

Stewardship

RESTORING ECOSYSTEMS

THE GEORGIA BASIN ACTION PLAN

HIGHLIGHTS 2003 — 2008

WORKING TOGETHER FOR THE GEORGIA BASIN
AU TRAVAIL POUR LE BASSIN DE GEORGIA

Government of Canada
Gouvernement du Canada

BRITISH COLUMBIA

Message From the Steering Committee

We are pleased to provide this "snapshot" of key projects and actions we will be undertaking over the coming years through the Georgia Basin Action Plan (GBAP). The results from these projects, and the partnerships that have been developed to deliver them, demonstrate our continued commitment to actions that will support our shared vision of "healthy, productive and sustainable ecosystems and communities in the Georgia Basin."

We will support the development of and access to, stewardship tools and integrated resource and land-use data through our continued support of the Stewardship Centre, the development of interagency data-sharing agreements, and improved reporting of water quality data and information. In 2005, we will release our second Georgia Basin-Puget Sound Transboundary Indicators Report.

Collaborative processes will be implemented for the North Cascades Grizzly Bear Recovery Plan, and in the development of a feasibility study for the Strait of Georgia National Marine Conservation Area. Support for the implementation of ecosystem-based planning processes will include two coastal management area plans, the Chilliwack River Fish Sustainability Plan, and the Biodiversity Conservation Strategy for Greater Vancouver.

Through scientific research, we will improve our understanding of a range of impacts from atmospheric deposition in the Basin, study the effects of municipal wastewater impacts on ecosystems, update emissions of over 200 hazardous air pollutants, including estimating human health risks, and implement a toxics management strategy jointly with our U.S. colleagues in the Georgia Basin–Puget Sound. The importance of combining Coast Salish traditional knowledge with science to support the best decisions will be an integral part of all our planning processes.

We will also continue to take direct action to protect critical ecosystems and species through the Georgia Basin Steelhead Recovery Strategy, the Estuary Prioritization Project, the remediation of coastal shellfish harvesting areas, development of rapid response plans for non-indigenous species, and partnered acquisition and protection programs for priority sites. In addition to the projects and actions identified in this report, GBAP partners will continue to add and refine projects through collaborative planning processes, and we will keep you informed through our website and annual reports on progress.

Our vision cannot be delivered alone, so we will continue to strive towards effective partnerships built on cooperation and communication. Together, we can make the Georgia Basin a model of sustainability for the world.

For more information on the Georgia Basin Action Plan, please visit our website at http://www.pyr.ec.gc.ca/georgiabasin.

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Working Together for the Georgia Basin

Few parts of the world can match the Georgia Basin–Puget Sound region for its temperate climate, its beauty and its ecological diversity.

A growing population proves that more and more people are discovering the rewards of living in the area made up of the Straits of Georgia, Puget Sound and Juan de Fuca and the shores that surround these waters. Increasing growth, however, places increasing stress on the ecosystems that make up the region. Many of them are fragile and all of them are complex. If people are to continue to expand the urban areas and develop the rural ones, we need to manage the impacts of this growth.

The Framework for Collaboration

The Georgia Basin Action Plan (GBAP) builds upon the work of the Georgia Basin Ecosystem Initiative (GBEI) (1998-2003). Over the next five years, the Georgia Basin Action Plan will strengthen the collective capacity to protect and restore ecosystem health while working cooperatively to provide economic opportunities and enhance human well-being.

The Action Plan is built upon a vision of "healthy, productive and sustainable ecosystems and communities in the Georgia Basin" that is shared by Environment Canada, Fisheries and Oceans Canada, Parks Canada, the BC Ministry of Water, Land and Air Protection, and the BC Ministry of Sustainable Resource Management. In support of this vision, these partners are collectively applying their mandates, values and resources to address the challenges confronting the Georgia Basin ecosystem.

Collaborative Goals and Actions

The Georgia Basin Action Plan commits us to work toward the achievement of the following goals:

- Collaborative stewardship actions support the sustainability of the Georgia Basin
- Sustainable land, aquatic and resource use planning and management support the conservation, protection and restoration of the environment, enhance human and social well-being, and contribute to a strengthened economy
- Scientific and indigenous knowledge supports improved decision-making by advancing the understanding of key ecosystem stresses
- Targeted ecosystems are protected and restored

These goals will be accomplished through strategies that integrate environmental, social and economic considerations. We aim to generate new knowledge and develop relevant tools for decision-makers at all levels. By optimizing outreach and stewardship, government programs and collaboration, and by strengthening partnerships and strategic alliances, we will promote best practices throughout the Georgia Basin. Above all, we will work together, knowing that cooperation and communication will help us move toward a sustainable future.

Contents

Supporting Collaborative Stewardship

Collaborative stewardship actions support the sustainability of the Georgia Basin. The Georgia Basin Action Plan is supporting initiatives that promote stewardship and optimize collaboration. Many of these undertakings were supported by the GBEI, such as the development of mapping tools, best management practices, education and outreach strategies, indicators and data management systems. In this section, we highlight some examples of information management and sharing, indicators and trends and community approaches.

We will undertake actions that:

- Support the development of and access to stewardship tools, and integrated resource and land-use data and information for the Georgia Basin and Puget Sound
- Influence decisions and actions that support the sustainability of the Georgia Basin Ecosystem through the development of ecosystem health and community progress indicators
- Promote and support shared leadership roles in stewardship, sustainable best practices and eco-efficiency amongst governments, non-government organizations, First Nations, the private sector, communities and individuals

Information Management and Sharing

Stewardship Centre

www.stewardshipcentre.bc.ca

Strongly supported by the GBEI and continuing under the GBAP, the **Stewardship Centre** is a successful decision-making tool that provides online technical guidance and information on land, water, fish and wildlife habitat. It also brings together a wide range of publications and case studies, making them accessible to the public.

In early 2004, the Stewardship Centre will launch the 19th publication in its **Stewardship Series** of technical guides and manuals *Coastal Shore Stewardship: A Guide for*

Planners Builders and Developers on Canada's Pacific Coast, along with a guide to low-impact shoreline structures entitled *Shoreline Structures Environmental Design: A Guide for Structures along Estuaries and Large Rivers*. The Centre is currently working with the BC Lake Stewardship Society to develop a document on caring for BC's lakes.

To involve more non-government organizations in the Centre, the Centre's steering committee will host a meeting of 40 organizations to help design a new governance model for the Centre by the end of 2004. This will allow the programs it supports to be shaped to fit the needs of the organizations involved. The partners will evaluate the Centre by monitoring projects generated, partnerships formed and the actual use of the website. The Centre will also be used to implement aspects of Canada's Stewardship Agenda, a national plan for collaboration that identifies stewardship objectives and priority actions. GBAP partners will continue to support the Centre as an important mechanism to share scientific and technical information, and promote collaborative stewardship.

Partners: Environment Canada; Fisheries and Oceans Canada; BC Ministry of Water, Land and Air Protection; Habitat Conservation Trust Fund; Non-Government Organizations

Data Management and Sharing

Environment Canada has accumulated a wealth of information relevant to Georgia Basin ecosystems. To ensure that this data is managed and stored in a format accessible to users, Environment Canada is implementing a data access tool to securely store and manage all data sets. For example, once data relating to wildlife marine areas frequented by migratory birds is digitized with this tool, it can be readily accessed and used to track habitat and distribution trends and monitor the health of these ecosystems. This process will also facilitate posting of selected information on the Internet, such as the Canadian Wildlife Service Areas of Interest database, which is currently being updated. By 2005, the database will be completed, improving ready access to information for land-use planners, environmental assessment officers and other decision-makers.

Environment Canada is also working to improve data transfer between agencies operating within the Georgia Basin–Puget Sound. Establishing data-sharing agreements would increase the timely exchange of, and access to, environmental information. An interagency sharing agreement between Environment Canada and the BC Ministry of Water, Land and Air Protection is currently in the draft stage.

Partner: Environment Canada

Land Information BC

Land Information BC, under the direction of the BC Ministry of Sustainable Resource Management, is the overarching initiative that will deliver the government's vision of integrated land, resource and geographic information through improvement of content, access, and business process support. In order to do this, the Ministry has embarked on a series of large-scale projects intended to make data web-accessible to improve the business climate in British Columbia. These include Provincial cadastre of private and Crown land; Land and resource data warehouse; Integrated land and resource registry project; Geodetic reference and base maps, and Electronic exchange projects. A Provincial Digital Base Atlas will include base reference maps, a digital road atlas, watershed boundaries, rivers, lakes and streams, and a digital image. The Land and Resource Data Warehouse will store this base, resource, ownership and tenure data, and provide the necessary on-line tools to access and manipulate this data.

Partner: BC Ministry of Sustainable Resource Management

Indicators and Trends

Georgia Basin Water Index and Water Quality Data Publishing and Reporting

Over the next five years, Environment Canada and the BC Ministry of Water, Land and Air Protection will initiate trend assessment monitoring in four Georgia Basin watersheds. Through the development of site-specific Water Quality Objectives in the watersheds, data will be summarized and reported using the Water Quality Index developed by the Canadian Council of Ministers of the Environment. Between 2005-2008, water quality data, assessments and the indices for these watersheds will be reported to the public annually through Environment Canada's Water Quality Website.

Community watershed monitoring will provide the knowledge needed to sustain healthy aquatic environments in the Basin. To further our ability to track conditions in community watersheds, Environment Canada is developing new approaches. These include biological stream assessment (see **Community Approaches**, page 5), and a protocol for sampling water in the tidal freshwater–saltwater interface of the Fraser Estuary.

Partners: Environment Canada; BC Ministry of Water, Land and Air Protection

Fraser Estuary Monitoring

Water quality in the Fraser Estuary—an important habitat for wildlife and fish—has long been a concern. Research to improve the methods used for sampling in the estuary, and their application, will increase understanding of the estuary's water quality, and of the types and amounts of contaminants entering the Strait of Georgia. This will help determine the sources of persistent organic pollutants (POPs) that have been measured in harbour seals and other marine life in the Basin (see **Georgia Basin POPs Loading**, page 10).

This project will conduct research to develop improved methods for water quality sampling in the Fraser Estuary by 2005. By 2008, a report on the status of estuary water quality, developed with the new approach, will be provided to the public over the Internet.

Partner: Environment Canada

Air Quality Reporting

Developing strategies to manage the quality of the air we breathe depends on understanding the sources of air pollution, and the present and future trends of these pollutants. GBAP partners will analyze air quality data and compare it to objectives and standards that have been put in place for air quality in the region. We will also analyze the data in light of emission management measures implemented over the past few years, and apply computer models to assess the impact of future emission management strategies. As well, we will work to improve understanding of the relationship between visibility, common air pollutants and associated economic impacts.

The goals of the **Air Quality Reporting** project are to provide sound scientific advice to the development of an airshed management strategy, trends in ambient air quality to the public via the Internet, and ultimately to assess the effect of reducing pollution on the region's airshed. One product of this project will be the characterization of

the Georgia Basin–Puget Sound airshed, which will be completed in June 2004.

Partners: Environment Canada; BC Ministry of Water, Land and Air Protection; Greater Vancouver Regional District; Fraser Valley Regional District; Fraser Basin Council; Environmental Protection Agency; Washington Department of Ecology; Northwest Air Pollution Authority; Puget Sound Clean Air Agency

Transboundary Indicators

In 2002, GBEI partners, working with U.S. federal and state agencies, helped establish six transboundary ecosystem indicators: population, air quality, solid waste, persistent organic pollutants, species at risk and terrestrial protected areas. These indicators measure progress toward sustainability by drawing attention to the challenges communities face, and by clarifying the responses needed to protect the shared Georgia Basin–Puget Sound ecosystem.

Under the auspices of the Georgia Basin–Puget Sound Transboundary Indicators Working Group, GBAP partners will work with the U.S. Environmental Protection Agency, the Washington State Department of Ecology and Puget Sound Action Team to update some of the previous indicators and develop as many as six new ones. The intent is to develop an intensive suite of indicators that measure environmental health and community well-being. In 2004, the partners will expand the Transboundary Indicators website, and work toward the production of a second *Georgia Basin–Puget Sound Ecosystem Indicators Report*.

Partners: Environment Canada; Fisheries and Oceans Canada; BC Ministry of Water, Land and Air Protection; U.S. Environmental Protection Agency; Washington State Department of Ecology; Puget Sound Action Team

Community Approaches

Community-based projects pave the way toward sustainability. Recognizing this, GBAP partners will, over the next five years, collaborate to support partnerships that build capacity for local community action. For example, we will continue initiatives carried out under the GBEI, such as **Septic Socials**, community gatherings which raise public awareness of the effects fecal coliform contamination has on shellfish harvesting areas, and encourage environmental stewardship. We will also continue to support initiatives that promote smart growth, development approaches that develop existing urban areas, discourage sprawl and balance rural and urban spaces.

Other initiatives include the **Shorekeepers and Streamkeepers Program**. Led by Fisheries and Oceans Canada, the immediate goal of this initiative is to equip community groups with resources for monitoring intertidal and freshwater habitat. As the program continues, it will provide standardized data which can inform decisions concerning the region's shorelines and streams. **Biological Stream Assessment** is another ongoing project, which helps communities determine the health of waterways through use of a predictive model. By 2004, this model will be installed in the Canadian Aquatic Biomonitoring Network (CABIN) website. Working with the National Water Research Institute and various community groups, Environment Canada will support training on the assessment tools.

Partners: Environment Canada; Fisheries and Oceans Canada; National Water Research Institute; Ecological Monitoring and Assessment Network (EMAN)

Integrated Ecosystem-based Management

Sustainable land, aquatic and resource planning and management support the conservation, protection and restoration of the environment, enhance human well-being and contribute to a strengthened economy. Over the next five years, GBAP partners will support the development of integrated ecosystem-based management plans for coastal areas, the Georgia Basin–Puget Sound airshed, urbanized environments, inland watersheds and aquatic and terrestrial resource use. In this section, we highlight some projects that involve planning tools and approaches and sustainability management, and seek to understand socio-economic impacts.

We will undertake actions that:

- Provide tools to implement ecosystem, airshed and watershed-based approaches in aquatic, land and resource use plans
- Advance our understanding of socio-economic and health impacts of poor air, water, or habitat quality
- Support the sustainable use of the ecosystem by aquatic and terrestrial resource-based industries

Planning Tools and Approaches

Provincial Coastal Management Plans

To support informed decisions for land tenuring in coastal areas, the BC Ministry of Sustainable Resource Management has been leading the development of two multiple-use **Coastal Management Plans** (Johnstone-Bute and Malaspina-Okeover Inlet systems). Due for completion by March 2004, these plans are designed to address land and resource conflicts, environmental protection and conservation needs, and economic development in selected watersheds, estuaries, harbours and bays within the Georgia Basin.

The Ministry will integrate these provincial plans (and two completed provincial Coastal Plans for Shellfish Aquaculture/Baynes Sound and Cortes Island) with Integrated Management (IM) Plans for Coastal Management

Areas, currently being developed by Fisheries and Oceans Canada. This includes recommending areas for future conservation assessment and possible marine protection during the IM process.

Partners: BC Ministry of Sustainable Resource Management; BC Ministry of Agriculture, Food and Fisheries; BC Ministry of Water, Land and Air Protection; Land and Water BC Inc.; Environment Canada; Fisheries and Oceans Canada

Watershed-based Fish Sustainability Plan

To ensure that fish populations remain sustainable, we need to establish guidelines and planning principles. Fisheries and Oceans Canada and the BC Ministry of Water, Land and Air protection have initiated a pilot **Watershed-based Fish Sustainability Planning** process for the Chilliwack River. This plan will guide resource management in this critical Fraser Valley watershed, and will also establish priorities for the protection, restoration and enhancement of both fish and fish habitat.

The project involves gathering information, identifying issues through focus groups in the local community, and assessing this material. The intent is to work with First Nations, local government and the community to develop a watershed profile, including management objectives and strategies and a monitoring framework. By 2005, we will set up a web-based information system for community use.

Partners: Fisheries and Oceans Canada; BC Ministry of Water, Land and Air Protection; BC Ministry of Sustainable Resource Management

Biodiversity Conservation Strategy for Greater Vancouver

The Greater Vancouver Regional District is working with partners to develop a **Biodiversity Conservation Strategy for Greater Vancouver**. Initiated under the GBEI, this project involves assessing biodiversity regionally, and developing coordinated measures to conserve and enhance it within the context of diverse land uses, economic and social considerations.

This includes identifying the network of areas and features that contributes to biodiversity regionally such as streams, riparian areas, wetlands, forests, agricultural lands and urban greenspaces. As well, it involves developing tools and incentives to conserve critical areas, connect them through greenways, and help guide development in a manner that supports biodiversity.

In 2003, the partners completed studies on "Issues and Strategic Directions" and "Indicator Species and Habitat Quality," and launched a project website. Regional habitat mapping and analysis is underway, and a framework and tools for biodiversity conservation will be prepared with stakeholder consultation in 2004. The Strategy will be complete by early 2005.

Partners: Greater Vancouver Regional District; Environment Canada; BC Ministry of Water, Land and Air Protection; BC Ministry of Sustainable Resource Management; Burrard Inlet Environmental Action Program/Fraser River Estuary Management Program

The Water Balance Model for BC

www.waterbalance.ca

Urban development creates an increase in stormwater runoff, since impervious surfaces such as roofs and roads do not absorb rainfall. In 2002, the BC Ministry of Water, Land and Air Protection published *Stormwater Planning: A Guidebook for BC*, with support from Environment Canada through the GBEI. Building on the guidebook, a consortium of partners have developed the **Water Balance Model for BC**. This web-based modelling tool produces scenarios around rainfall-runoff relationships that can be used to determine which stormwater management solutions will be most effective in a particular area. By entering information on climate, soils and land use, and potential source controls such as green roofs, the user can determine the effect on stormwater runoff volume.

Developed by CH2M Hill Canada and Lanarc Consultants, the model should eventually become an integral part of land-use decision-making in BC. In 2004, the partners will improve the overall usability of the model, refine its graphic user interface, undertake case studies and calibration work, and conduct hydrology engine enhancements. We will also provide training workshops for decision-makers and others involved in stormwater management.

Partners: Members of the Inter-Governmental Partnership, including four levels of government representing four regions of BC

Strait of Georgia National Marine Conservation Area Feasibility Study

Parks Canada is working with other partners to establish a National Marine Conservation Area in the southern portion of the Strait of Georgia. Adjacent to the Gulf Islands National Park Reserve (established in 2003), the National Marine Conservation Area will combine multiple-use areas with one or more core strict conservation areas, conserving the marine environment, and allowing for ecologically sustainable use.

Before the Strait of Georgia National Marine Conservation Area can be created, the partners need to conduct a feasibility study, addressing environmental, social and economic implications. We will engage First Nations, stakeholders from government agencies and local communities in this process, and then develop a common vision for management. Through this study, we will also determine potential boundaries. Due to the complex nature of the area and the fact that it is used for many purposes by many groups, the study will take three years to complete (2004-2007).

Partners: Parks Canada; BC Ministry of Sustainable Resource Management; BC Ministry of Water, Land and Air Protection; Fisheries and Oceans Canada; Transport Canada

Human Settlement History and Historical Ecology of the Gulf Islands National Park Reserve and Greater Ecosystem

Parks Canada is studying non-Aboriginal settlement and land-use in the Gulf Islands National Park Reserve. Charting the history of the area through archival information, oral sources, unpublished texts and photograph collections, they will obtain an understanding of how human occupation has changed the landscape of the park reserve over the past 150 years. The study will include the impacts of economic pursuits, such as logging and farming, and of infrastructure, such as roads and trails. It will also seek to determine the history of particular buildings and assess their cultural value.

This study will be complete by July 2004. Parks Canada will then expand the initiative to include the Aboriginal history of the area. By consulting with First Nations over the next five years, they will build a picture of what the park region looked like before non-Aboriginal peoples settled there. The study will contribute to the management plan for the park reserve, as well as provide an overview of how the region as a whole has evolved, and how human choices have shaped the present ecosystem.

Partner: Parks Canada

Gulf Islands National Park Reserve Interim Management Guidelines

In 2003, Parks Canada and the BC Ministry of Water, Land and Air Protection established the Gulf Islands National Park Reserve. Consisting of 29 properties on 16 islands, as well as a number of reef areas and islets, this is one of Canada's most at-risk parks.

To ensure that its management is ecosystem-based and visitor-oriented, Parks Canada is developing guidelines which will encompass a vision for the park reserve, as well as the goals, targets and policies that apply to this unique corner of the Georgia Basin. They will determine what information exists, and will consult with island communities, First Nations and other stakeholders to incorporate available knowledge into this planning process. The guidelines will cover issues such as ecological integrity, cultural resource management, public understanding, visitor experience, and species at risk. Parks Canada plans to have the guidelines drafted by the end of 2004. They will also establish a Park Advisory Board.

Partner: Parks Canada

Sustainability Management

Develop Sustainable Resource Management Plans

Sustainable Resource Management Planning is a new consolidated approach that the Government of British Columbia is using on provincial Crown lands. Planning at the landscape level will allow the Ministry of Sustainable Resource Management to establish strategic objectives to manage a wide range of resource values, including biodiversity. These plans will include land-use, and will help the Ministry identify economic opportunities, design efficient sustainable development and conserve the environment.

Partner: BC Ministry of Sustainable Resource Management

Socio-Economic Impacts

Benefits and Costs of Air Quality Objectives

Environment Canada is conducting research on the benefits and costs of a range of air quality targets in the Fraser Valley. Knowledge of the benefits and costs of attaining various air quality targets is important information for air quality managers and the public in proposing air quality objectives for ozone and particulate matter that are appropriate for the climate and mix of urban and rural activities in the Fraser Valley. Most improved air quality benefits are related to human health. The economic value of these health benefits is being determined, and will be compared to the costs of achieving or staying within the specified air quality levels.

Partner: Environment Canada

Building Scientific and Indigenous Knowledge

Scientific and indigenous knowledge supports improved decision-making by advancing the understanding of key ecosystem stresses. Under the GBAP, a variety of models will be developed to advance understanding on issues such as air quality and water quality. GBAP partners will also facilitate workshops and forums where research findings can be shared, and where indigenous knowledge can be integrated into future plans for the region. In this section, we highlight some examples of sharing traditional ecological knowledge, and studying ecosystem impacts and climate change.

We will undertake actions that:

- Improve scientific understanding and share indigenous knowledge of ecosystem stresses resulting from human activity
- Improve understanding of climate change impacts and adaptation
- Further identify links between human health and environmental conditions

Ecosystem Impacts

Traditional Ecological Knowledge Conferences and Workshops

Building from our first Traditional Ecological Knowledge conference in November 2003, GBAP will support ongoing dialogue with Coast Salish First Nations in the Georgia Basin and Puget Sound through a series of conferences and workshops. These dialogues will help to increase our collective knowledge of ecosystem functions and impacts in the region.

Georgia Basin POPs Loading

Environment Canada and the Fisheries and Oceans Canada Institute of Ocean Sciences have initiated a project to measure concentrations of persistent organic pollutants (POPs) in air and precipitation. POPs—such as PCBs and DDT—are found in the environment worldwide, even though their use has been banned or severely restricted. While many POPs enter the Georgia Basin's aquatic and marine ecosystems from diffuse sources like historically contaminated sediments and soils, a potentially large source is the ongoing deposition of POPs transported here by the atmosphere from other parts of the northern hemisphere. The magnitude of this will be assessed in 2005.

Working with Simon Fraser University, partners will evaluate the results with an input-output budget model, which can be used to compare the relative size of the sources, and identify where many POPs are being stored. When the budget is completed in 2006, it will be used to assess the significance of various sources to the levels seen in marine mammals, birds and fish in the Georgia Basin.

Partners: Environment Canada; Fisheries and Oceans Canada; Simon Fraser University

Critical Acid Loads from Atmospheric Deposition

Environment Canada is working to determine the threshold (critical load) above which the acids and nitrogen that settle out of the air can damage sensitive ecosystems. This atmospheric deposition can result in acidification and fertilization of lakes, streams and forests, particularly in sensitive watersheds where rocks, soils and vegetation have low capacities to neutralize acid or immobilize nitrogen. A significant proportion of the Georgia Basin is known to be highly sensitive to acidity, and the little work done in the past on deposition loadings and effects indicates that these ecosystems are at risk from episodic acidification and nitrogen saturation. Our goal is to determine how much acid and nitrogen is being deposited, and how sensitive the ecosystems are to these levels.

Partner: Environment Canada

Municipal Wastewater Impacts

Effluents from wastewater treatment plants in the Georgia Basin contain pharmaceuticals and personal health care products (PPCPs) that scientists suspect are responsible for endocrine disruption in fish and other organisms, which can affect gender, growth, development and reproduction. Environment Canada has developed a molecular tool that will allow the study of gene expression in salmonids that have been exposed to effluents and other suspect PPCPs. In early 2004, we will begin the first in a series of related studies, taking samples from Greater Vancouver Regional District and Capital Regional District wastewater treatment plants. This first study will be a full life cycle test using chinook eggs. In addition to testing various concentrations of municipal wastewater, testing will also involve fragrance compounds typically found in personal-care health products. These studies will aid in demonstrating the effects wastewater effluents could be having on organisms in the Georgia Basin. The effluents that cause gene alterations will also be analyzed for the presence of certain potentially deleterious pharmaceuticals using in-house analytical capabilities.

Partners: Environment Canada; Greater Vancouver Regional District; Capital Regional District; Fisheries and Oceans Canada; University of Victoria; University of Western Washington

Coastal Waterbird Inventory

Waterbirds spend a significant amount of time on the Georgia Basin's coasts, due to the region's mild climate and extensive areas of wetlands and near-shore areas. Under the GBEI, Environment Canada, in partnership with Bird Studies Canada, led the development of a **Coastal Waterbird Inventory,** which aimed to monitor numbers and trends of waterbirds in the Georgia Basin, as well as the sites they use. The reason for collecting this data was to establish a framework that could be used to support their conservation.

GBAP continues to support work on the inventory, so that priority areas and actions for future conservation can be identified. This will involve monitoring migratory bird populations and distribution, as well as diversity. Over the next five years, the project will engage naturalist groups to conduct regular inventories for waterfowl and other waterbird populations around the Georgia Basin's shorelines.

Partners: Environment Canada; Bird Studies Canada

Protecting and Restoring Key Ecosystems

GBAP partners will work to protect and restore sensitive ecosystems in the Georgia Basin through a number of initiatives. Many of these are long-term strategies and recovery plans that will reduce pollutants in air and water, and ensure safe drinking water and biodiversity protection.

We will undertake actions that:

- Reduce loadings and emissions of toxics and contaminants in air and water
- Protect drinking water sources
- Conserve, protect and restore important aquatic and terrestrial species and habitats

Reducing Pollutants in Air and Water

Toxic Chemical Management Strategy

Working collaboratively with the Puget Sound–Georgia Basin International Task Force, GBEI partners established a BC working group on toxic chemicals in 1998. This group has been developing an action plan to control toxic substances found in the Georgia Basin. By the winter of 2004, they will finalize a report to the Task Force, which will contain chemical profiles on priority substances in the Basin, identify research and monitoring needs to improve our understanding of the fate, distribution and effects of these substances, and recommend management actions and mitigative measures to reduce the release of toxic substances to the Basin. By 2005, the Canadian Toxics Work Group will develop a joint toxics

management strategy with the U.S. Toxics Work Group for the Georgia Basin and Puget Sound.

Partners: Environment Canada; BC Ministry of Water, Land and Air Protection

Air Toxics Inventory and Evaluation

Environment Canada and the Greater Vancouver Regional District are leading the update of a toxics emissions inventory for the Lower Fraser Valley, which will estimate emissions of over 200 hazardous air pollutants. This inventory, initially developed for 1990, will focus on the year 2000, and will be completed in 2004. It will also forecast emissions for 2005, and for five-year increments to 2025.

Another aspect of this project involves estimating human health risks from specific air toxics, and developing a list of priority air toxics. This will help decision-makers in the Lower Fraser Valley address the emissions releasing the hazardous substances into the environment. This project will also design methods for improving future estimates and expanding the analysis to other parts of British Columbia and Washington State.

Partners: Environment Canada; Greater Vancouver Regional District; Health Canada; BC Ministry of Water, Land and Air Protection

Agriculture Pest Management Options

While the effects of pesticides are not fully understood, a number of priority pesticides are known to be harmful to the environment, humans and other species. In the Georgia Basin, a temperate rainforest zone presents unique considerations that mean pesticide regulations for the rest of Canada may not apply here. Working with the BC Ministry of Water, Land and Air Protection and the University of Victoria, Environment Canada plans to research the risks caused by these priority chemicals in the Lower Fraser Valley, an area that uses more than 90% of the triazine herbicides sold in BC.

Over the next two years, scientists will verify the concentrations of these pesticides in fields and adjacent waterways. They will then study how these substances affect organisms such as salmonids and amphibian tadpole, determining acute toxicity, and measuring any cell disruptions. By 2007-08, researchers will use their results to offer alternate agricultural pest management options for the area, and will provide data that can be used to help decision-makers protect key ecosystems.

Partners: Environment Canada; BC Ministry of Water, Land and Air Protection; University of Victoria

Mitigation of Pollution in Shellfish Growing Areas

Due in part to the negative effects of urbanization, recreational boating, industrial activity, failing septic systems, stormwater runoff, and other point and non-point sources of pollution processes, a growing number of viable shellfish growing areas along the BC coast have been closed to the direct harvesting of shellfish product. The GBAP wishes to develop, implement, and support shellfish remediation initiated through the GBEI, addressing the long-term goal of upgrading existing closed classifications within the Georgia Basin. Through field monitoring and community based outreach initiatives, the GBAP will address sewage contamination into surrounding marine and freshwater environments and work towards the depuration and/or direct harvest of shellfish resources by the public, industry, and First Nation communities.

The GBEI was very successful in establishing partnerships with local governments, industry stakeholders, communities, and First Nations to address mutual shellfish restoration interests. For example, a comprehensive remediation project was undertaken jointly by the GBEI and the Snuneymuxw First Nation in 1999 to remediate the intertidal area of Nanaimo to allow for future harvesting of shellfish product for food, ceremonial, and economic purposes. As a result of four

years of commitment by both parties, a small portion of the harbour was upgraded to allow for the controlled depuration of shellfish product by spring 2003.

Under the GBAP, Environment Canada will continue to work with government, industry, community and First Nation stakeholders to address the remediation of shellfish growing areas within the Georgia Basin and Puget Sound for recreational, economic, and traditional benefits.

Partners: Fisheries and Oceans Canada; Canadian Food Inspection Agency; Health Canada; Snuneymuxw First Nation; Capital Regional District; Comox-Strathcona Regional District; Comox Valley Watershed

Ballast Water Management

The International Maritime Organization (IMO) is developing legislation to regulate the ballast water taken on and discharged by marine vessels around the world. By early 2004, there will be a standard in place for the international shipping industry. Transport Canada and Fisheries and Oceans Canada are working with port authorities, the Canadian Coast Guard and the Chamber of Shipping on Canadian regulations that will be compatible with and can contribute to the IMO's legislation. These partners want to minimize the introduction of non-indigenous species to Georgia Basin waters and shores, and to ensure that any chemicals used to treat ballast water are at levels that will not harm the environment. Current trends toward the use of biocides in ballast treatment technologies may heighten the need for regulatory measures over the next few years.

By 2006, there will be reforms to the Canadian Shipping Act that will address these concerns.

Partners: Transport Canada; Fisheries and Oceans Canada; Canadian Coast Guard; Chamber of Shipping

Biodiversity Protection

North Cascades Grizzly Bear Recovery Plan

At present, grizzly bears in the transboundary North Cascades area are threatened. Over the next five years, the BC Ministry of Water, Land and Air Protection will coordinate cross-border efforts to monitor population size and distribution, mortalities and habitat conditions, including the impacts humans are having on natural bear habitat. The project will ensure there is adequate habitat to support population recovery, and will also attempt to prevent population fragmentation, and to minimize human-bear conflict. Its ultimate goal is to return the grizzly bear population to viable status, a process that will take decades.

Raising public awareness of the plight of grizzly bears is a key component of recovery. The agencies involved in this initiative will improve limited knowledge by encouraging research, and by putting outreach programs in place.

Partners: BC Ministry of Water, Land and Air Protection

Georgia Basin Steelhead Recovery Strategy

The **Georgia Basin Steelhead Recovery Strategy** is a long-term plan developed by the BC Ministry of Water, Land and Air Protection and others to address the continuing decline of valuable steelhead stocks in the Georgia Basin. Ongoing stock assessment will continue on some of the 58 priority systems (identified under the Steelhead Recovery Plan as part of the GBEI). As well, habitat restoration work is underway to help steelhead become more productive, which could potentially remediate poor marine survival conditions. Over the next five years, the partners also hope to increase awareness of the plight of steelhead in the Georgia Basin.

Extending the strategy would involve developing recovery plans for key watersheds, and would include other species. The partners are currently working with communities on the Englishman and Squamish Rivers, and plan to carry out similar efforts on the Cowichan River. This work includes managing habitats to ensure spawning success, and developing ways to manage sustainable populations of steelhead into the future.

Partner: BC Ministry of Water, Land and Air Protection

Provincial Species at Risk and Rare Ecosystem Recovery Strategies

Information gathering is vital to the overall goal to conserve species and recover threatened ecosystems. The BC Ministries of Water, Land and Air Protection and Sustainable Resource Management are working with the Conservation Data Centre to provide information that contributes to species assessment and

recovery strategy decisions. This is part of an ongoing strategy to monitor the health of ecosystems and the status of species at risk. Annual assessments are carried out, and information is gathered on numbers, threats to a species, geographical occurrences, population size and overall quality of a population to determine whether it will be viable into the long-term.

Partners: BC Ministry of Water, Land and Air Protection; BC Ministry of Sustainable Resource Management; Conservation Data Centre

Georgia Basin Ecosystem Conservation Partnership

Between 1998 and 2003, Environment Canada and other GBEI partners helped to set aside, for conservation purposes, four sites containing Garry Oak and ten other rare or sensitive sites. These initiatives, which include habitat important to migratory birds and to biodiversity, will be continued under the GBAP. The **Georgia Basin Ecosystem Conservation Partnership** catalogue contains a number of priority sites that GBAP partners hope to secure through purchase, convenant, ecological gift or Crown Land transfer. This project will update the catalogue to reflect current priorities, which will ensure that collective acquisition efforts are harmonized. Through the Partnership, Environment Canada will continue to contribute to priority acquisitions from the catalogue over the next five years.

Partners: Environment Canada; BC Ministry of Water, Land and Air Protection; Ducks Unlimited Canada; BC Conservation Data Centre; Nature Conservancy of Canada; Land Conservancy of BC; Capital Regional District Parks; Islands Trust Fund; Nature Trust of BC; Habitat Acquisition Trust; Habitat Conservation Trust Fund

Estuary Prioritization Project

The Georgia Basin's estuaries support thousands of birds that migrate each year along the Pacific Flyway, and are also critical spawning and rearing habitats for many marine aquatic species. Securing these estuaries for conservation purposes will ensure that birds continue to make use of vital habitats. To determine which area should be given land-securement priority, we need to study the types and numbers of waterfowl supported by particular estuaries. We also need to establish the current status of the various estuaries. For example, if an estuary is being used for commercial purposes, setting it aside for conservation may not be possible. Once the land status information is compiled, this information, together with information about waterfowl use of the estuaries will be used to set priorities for future conservation purchases.

This survey of land status can also be used as an indicator of land-use pressures. Combining these two factors will provide a vital indicator of estuary function and well-being. Environment Canada, as leader of this project, aims to produce this indicator by 2006.

Partners: Environment Canada, Ducks Unlimited Canada. For other contributors please see Environment Canada's website www.pyr.ec.gc.ca

Develop Rapid Response Plans and Monitor Non-Indigenous Species

Fisheries and Oceans Canada are leading the development of rapid response plans which can be used to monitor and control non-indigenous species, introduced from elsewhere and now established in nearby areas. They are focusing on *Spartina anglica*, commonly known as cordgrass. This invasive aquatic plant, which spreads quickly in intertidal zones, reducing bird and fish habitat, has invaded large portions of Washington State. Cordgrass has also recently been discovered in the Fraser River delta.

Working with other GBAP partners, Fisheries and Oceans Canada will have the action plan ready by spring 2004. Under this plan, they will investigate occurrences of this invasive plant, and will attempt to control its spread. Fisheries and Oceans Canada is also concerned about other non-indigenous species, such as Chinese mitten crab and European green crab, and will be developing rapid response plans for these species later in 2004. They will also produce fact sheets to help the public identify these species, and respond in a manner that will prevent further spread.

Partners: Fisheries and Oceans Canada; Environment Canada; BC Ministry of Water, Land and Air Protection; Corporation of Delta; Vancouver Port Authority; Ducks Unlimited Canada


Vancouver Island
Whistler
Georgia Basin
Comox
Strait of Georgia
Vancouver
Canada
USA
Nanaimo
Bellingham
Victoria
Juan de Fuca Strait
Pacific Ocean
Puget Sound
Seattle
Tacoma
Olympia
Georgia Basin–Puget Sound Boundary
International Boundary

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www.pyr.ec.gc.ca/GeorgiaBasin/

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