

Notes from the Thursday June 15, 2006 Meeting of the Scientific Advisory Panel

Burns Bog Ecological Conservancy Area

SAP Members Present: Richard Hebda, Alan Dakin, Geoff Scudder (by phone), Hamish Kimmins, John Jeglum and Bob Peart

Planning Team Members: Greg Paris, Verne Kucy

Guests: Sarah Howie, Paul Whitfield, Hugh Fraser

1. The notes from the May 18, 2006 meeting were approved.

2. Fire Management Plan.

Deputy Fire Chief Bryon Funnell was thanked for attending. Today's meeting is a follow-up to the November 17, 2005 discussion about the 2005 fire in Burns Bog. Bryon distributed a draft Fire Management Plan and SAP members were briefed. Discussion focused on management approach, detection and suppression, legal rights and mandates, recovery after suppression and follow-up monitoring. Key points were:

- The mandate of the Delta Fire Department is to put a fire out as soon as possible and keep it from the interface edge. In short they need to put it out. The question then is: "How can a fire be put out with as much care for the ecology of the Bog as possible?"
- Preplanning for people and equipment access and the availability of bog water.
- The mapping of trails, roads, vegetation and bog water ponds.
- The high fire hazard season usually coincides with the latter part of summer when the bog water table is lowest.
- The value in removing the trees to reduce the fire load; this is also good for bog management.

There is this balance between fire risk and doing what is best for the Bog. In an effort to be as proactive as possible in preparing for the next fire in an attempt to reduce its spread and extent there was discussion about developing an approach that linked both fire contingencies with bog restoration. It was agreed that such a plan was a worth the effort to think through.

The Deputy Fire Chief said he would discuss the feasibility of this approach with his colleagues, budget out the costs and return to SAP to discuss the pros and cons of implementation in the fall. A series of points are to be pursued:

1. Determine the locations where it is most likely to have a fire --- probably along the north and south margins and the most heavily treed/forested areas.
2. Improve the 4-wheel access to these regions so equipment can be moved in. Locate and use the original peat rail corridors as much as possible.
3. Create pools so that Bog water is available with the goal of delaying the use of fire retardant and water bombing equipment as long as possible.
4. From the middle of the Bog radiating out --- develop a grid of 35metre fire barrier 'spokes' by removing the forested areas and increasing moisture as much as possible. Conceptually map these grids into patterns coordinating vegetation, sensitive areas and firefighting suppression techniques.

5. Along the interface work with adjacent landowners to prepare their property, especially regarding the availability of water and the removal of trees.

Delta staff confirmed with SAP that water quality measurements were scheduled for June/July and September. **DELTA** will present a report to SAP at their fall meeting.

Greg Paris is to confirm with Mitch Sokalski that GVRD has approved the photo period monitoring and that the photo measurements are being taken.

3. The Future of the Lagg

The healthy lagg checklist was finalized. It was agreed that this was an evolving document and may change in the future. See Appendix One.

The 'Walk Around the Bog' map produced at the May 18 meeting was discussed. It was agreed to set priorities to secure the future of the existing lagg and begin the process for restoring the remainder. These priorities are:

1. Ground truth the map at the locations where transects are proposed. Adjust accordingly and then establish transects to begin instrumenting the lagg.
2. Ground truth the locations where the healthy lagg exists. Determine the protection level and what if/any actions are needed to secure the future.
3. At the locations where the lagg isn't healthy describe the required restoration process (from rehabilitation to reconstruction) and begin the process of determining costs, scheduling, etc.

4. Draft Research and Monitoring Strategy

The draft Strategy was distributed and reviewed. See Appendix Two. It was agreed that components of this draft strategy should be incorporated into the Burns Bog Management Plan.

The fall Terms of Reference for SAP will focus more on implementing this strategy than being involved in the management of the Bog. In the fall this document needs to be reviewed, implemented and expanded into a more formal document as necessary.

5. Ditch Flow Control Devices

Delta distributed two maps updating members on the status of ditch blocking and their future plans, which will take a few years to implement.

6. Next Meetings

It was agreed that the next meetings be sequenced as October, February and June. SAP members will be contacted in September about the arrangements for the October meeting.

Next Agenda Topics

- Confirm Terms of Reference, Appointments, Schedule of meetings, etc
- Update Fire Management Plan and Monitoring of 2005 Fire
- Next Steps Research and Monitoring Strategy
- Field Trip to Ground Truth the 'Walk around the Bog' map. Next steps regarding the lagg's future.
- Establishment of experimental manipulation of plots *vis a vis* the pine vegetation. Discuss how these can be combined with the strategy to compartmentalize the bog as a way of reducing the spread and extent of future fires.

APPENDIX ONE

A Healthy Lagg Checklist

June 15, 2006

The lagg is a transition zone that receives and collects Bog water; this collected water then flows out and leaves the Bog. It is a buffer from outside influences and performs three functions: hydrological, hydrochemical and biological. Each function must be present and working together or you haven't a naturally functioning lagg. These functions are integrated, not independent. These functions must be measurable with unambiguous characteristics that can be easily recognized/measured so that it can be determined 'whether you are in the lagg or not' and 'whether it is healthy'. A healthy functioning lagg is necessary for the Bog's restoration. Refer to the sketch below.

➤ Hydrological

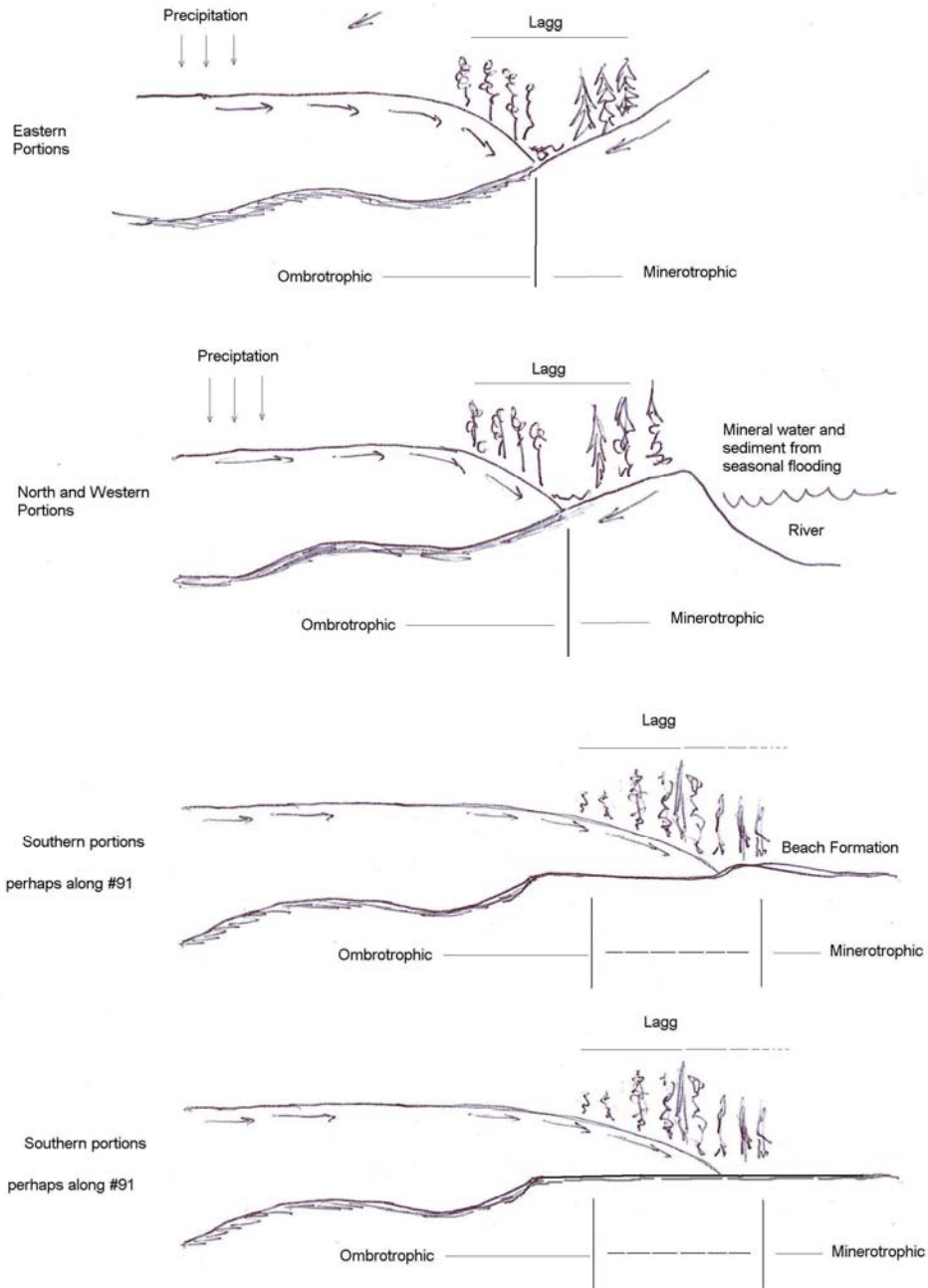
- Unimpeded outward smooth gradient of water moving from the Bog to the inside of the lagg; that is in turn connected to natural surface outputs immediately adjacent to the outside of the lagg.
- Other hydrological characteristics to be determined.

➤ Hydrochemical

- Water Types:
 - **Type I Bog Water:** **pH 3.5-5.5** **Calcium 0-3 mg/l**
 - **Type II Transitional Water:** **pH 4.5-6.0** **Calcium 3-10 mg/l**
 - **Type III Non-bog Water:** **pH 6.0-8.0** **Calcium > 10 mg/l**

➤ Biological

- Soils: **Organic to mineral transition**
- Width: **Varied. Abrupt or diffuse (Confined or unconfined)**
- Plant mosaic: **Low woody or non-woody vegetation. Hardhack Thicket *Spirea* and the Mixed Conifer Forest (Red Cedar-Skunk Cabbage). Maximum 10% variation from this mosaic.**
- Indicator Species: **Riparian communities species. Numbers and range.**
- *Sphagnum*: **Sequencing/gradient of species to the lagg from the bog.**
- Invasive Species: **Minimal**
- Connectivity: **Natural lands adjacent. Connections exist.**
- Boundary: **Natural contours, not right angles**



Interpreted from Burns Bog Lagg workshop by P.H. Whitfield after:
 Damman, A.W.H., 1986. CAN. J. BOT. Vol. 64:384-394.

APPENDIX TWO

Draft Research and Monitoring Strategy**Burns Bog Ecological Conservancy Area**

Draft June 15, 2006

1.0 Introduction

- Brief background on Burns Bog
- Reference to Hebda et al and McDade documents
- Brief history of Scientific Advisory Panel, etc
- Map of Burns Bog

2.0 Preamble

- Critical context of climate change as an overriding consideration
- Covenant essential as it directs management actions
- Why Burns Bog isn't fully protected yet even though key lands were purchased
- Why we need to collect more data and conduct research.
- Time frame --- 100 years
- Rationale why we need to restore Burns Bog, conduct research and monitor our approach.
- How this framework will be shared with decision makers and how it can assist with decision making related to Burns Bog.
- The importance/value of communicating the scientific results and data with the public.

3.0 Strategic Approach and Principles

- Scientific Advisory Panel Terms of Reference
- All research at Burns Bog to be related to this framework.
- Previous research at Burns Bog
- Two fundamental components:
 1. Collect fundamental baseline data and develop a monitoring strategy, as both are a necessary component and background for future research.
 2. Develop a research strategy based on the need for information related to restoration and public use.
- SAP approved Scientific Objective to be incorporated.

Return Burns Bog to an ecological condition shaped by raised bog processes, buffered from disruptive or disturbing processes on the adjacent landscape, over a timeframe of 100 years. Achieve this ecological condition by maintaining characteristic ecological processes, structure and biota interacting over time, while recognizing the directional forces of urbanization, adjacent land uses and climate change. Measure and analyze the ecological condition using the following indicators:

- *Characteristic ecological processes: hydrological systems and water chemistry, peat accumulation, trophic interactions, connection with adjacent ecosystems and landscapes.*
- *Structure and composition: the set of plant species or communities that define the bryophyte dominated shrubby structure and function of the bog habitat.*

- *Biota: the set of key, rare and/or critical acidophilic species (plants, vertebrates and invertebrates) that are collectively capable of natural or progressive evolution into other related bog ecosystem(s) with ecological integrity.*
- Terms of reference for all research. Clear operating principles are required. Certain research and monitoring principles are necessary:
 - Template --- format, expect certain approach
 - Standards --- peer review, do's and don'ts of research as Bog so sensitive
 - Monitoring to be built in.
 - Scope and focus --- applied to bog restoration only and to facilitate management decisions
 - Integration and Collaboration --- link to each other, encourage collaboration, etc
 - Communication --- important to communicate results, not only among researchers and within the scholarly and applied community, but also to the people living in and adjacent to Burns Bog.
 - Use of Volunteers. When appropriate, who and under what circumstances?

4.0 Baseline Data and Monitoring

- Description of why it is essential to collect baseline data and monitor conditions.
- Description of current monitoring status and what the data to date indicates --- what information is being gathered, who is collecting the data, the operations that Delta and Gateway have underway, etc
- Outline the requirement to set standards to measure against and to determine success whether the interventions are working. Point of reference for future research.
- Likely 5 years to gather the data. After data is gathered there will be a requirement for subsequent monitoring and/or re-analysis to determine trends, etc.
- Needed information
 - Standard Data
 - Establishing water levels, based on true elevations. This data is important for determining the 'growth' of the existing dome, annually and seasonally.
 - Analyzing water chemistry and water quality to determine the link between plant communities and Type I and Type II waters.
 - Standard climatological data.
 - Status of key wildlife, plant and *Sphagnum* species as critical indicators of biodiversity.
 - Monitor
 - Determining a water balance/3-D water flow model
 - Determining healthy lagg attributes and mapping the location of the functioning lagg

PRIORITIES

Standard Data

- Determine the actual water balance data for Burns Bog --- in the big picture it is the water balance that we are trying to manipulate. . In its simplest form the water balance appears as **Water in minus water out equals change in water stored.** This balance was discussed in the March 2000 Ecosystem Review – Section 4.2.5.6 Water Balance, and it requires updating. We need to determine the water loss by

- evaporation, evapotranspiration and the interception by trees/shrubs that prevents water even getting to the Bog.
- Map and study the functioning lagg to determine where it is, and where are the gaps. Reference the Healthy Lagg Checklist and the 'Walk around the Bog' map. Obtain a true picture of water flow within and around the Bog. Determine future data needs.

Monitoring

- Annual hydrological monitoring of ditch blocking intervention as initially established by Munson in July 2005.
- Monitor the impact of ditch blocking on the plant community, especially related to the heavily treed portions. Establish a series of transects from the outside to the inside of the Bog.
- Monitoring the 2005 fire to measure its effects, especially related to retardants and salt water on regeneration of vegetation and *Sphagnum*, and the presence of invasives. Water chemistry and photo period analysis.

5.0 Applied Research

- Research is necessary to gather scientific measurements and direction related to both the restoration of the Bog and to assist in determining the implications for public use.

Restoration

- Ecosystems share a basic set of attributes called Essential Ecosystem Characteristics (EEC's) as outlined in the March 2000 Ecosystem Review by Hebda et al.

Ecosystem Characteristic	Description and Indicators
Habitat Quality	▪ Landscapes and community diversity; connectivity and fragmentation; habitat structural diversity
Integrity of the Biotic Community	▪ Biodiversity; trophic structure; key or critical species
Ecological Processes	▪ Production and decomposition; biogeochemical cycling; succession; dispersal and migration
Water Quality	▪ Biological, chemical and physical characteristics
Hydrological System	▪ Water flows, storage and supply; structural characteristics
Disturbance Regime	▪ Fire; floods; storms; drought; disease or pest outbreaks; anthropogenic influences
Sediment/Soil Quality	▪ Biological, chemical and physical characteristics; erosion and accumulation

- The SAP Scientific Objectives lead to the following research themes
 - Hydrology and Hydrochemistry
 - Bog Community Processes and Key Species

- Forest Management
- Lagg
- Fire
- Invasive Species
- Rare and Endangered Species

- The following research approach brings together the EEC framework with the research themes. This table helps define research priorities. Each research themes should be developed in more detail, including a literature review on previous work in the Bog.

EEC's	Research Themes						
	Hydrology Hydrochemistry	Bog Community	Forest Mgmt	Lagg	Fire	Invasive Plants	R/E Species
Habitat Quality							
Biotic Community							
Ecological Processes							
Water Quality							
Hydrology							
Disturbance Regimes							
Sediment/ Soil Quality							

PRIORITIES

- Invasive Species and Water Table Type. Determine which species are present and test the hypothesis that 'bog water' is not 'good for' most invasives and as the Bog restores the most detrimental species won't be able to survive.
- Fire research related to fire management (tree removal, vegetation type, acrotelm compression, etc) and the capacity to regenerate *Sphagnum*.
- Forest Management. Set up a three sample operational field trial along the bog edge where the forest has taken over. To have a more natural transition from the lagg to the Bog and to decrease the pine stock are the desirable goals. The present forest is too dense. Three samples: i) the removal of trees, ii) the removal of trees and scraping up the shrubs and their roots/rhizomes and iii) the above plus removal of the forest floor down to the *Sphagnum* peat.
- Regeneration of Peat-forming Plant Communities. Experiment with plots that are seeded with *Sphagnum* mats and those that are not, in and out of ditches. Selective thinning of Hemlock and Birch from the centre of the Bog outwards. Monitor the result *vis a vis* bog restoration and peat formation.

Public Use Research

- We need to know where, when and if public use is appropriate. Investigation is required on such matters as:

1. Public use and the sensitive nature of the Bog
2. The implications of use to the Bog --- where might a zone of public influence be that won't be harmful.

6.0 Communication

- Important that there is a funded communications strategy. Transparency is important so the public continue to support the Bog's protection and restoration.
- Applied research is meant to be communicated.
- Share knowledge with the effected agencies, neighbours and the public.
- Also important to communicate to university settings and research scientists.

7.0 Anticipated Expenses

- A formal budget needs to be established. What follows below is very rough and at best can be considered a 'guesstimate'.

	Operations/ Labour	Equipment/ Installation	Cost-shared
<u>Data Collection and Monitoring</u>			
○ Baseline Data	20000	20000	
○ Water Balance Model	21000 ¹		21000
○ Hydrological Monitoring	10000		
○ 2005 Monitoring	5000		
○ Restoring the Lagg	21000		21000
<u>Research</u>			
RESTORATION			
○ Forest Management	21000		21000
○ Fire Management	21000	10000 ²	21000
○ Invasive Species	21000		21000
○ <i>Sphagnum</i> Regeneration	21000		21000
PUBLIC USE			
○ Implications of Public Use	21000		21000
<u>SUB-TOTAL</u>			
Data Collection and Monitoring	77000	20000	42000
Research	105000	10000	105000
Total Operations and Capital	\$212000		
Total Overall	\$359000		

Important, the Data Collection and Monitoring expenses amount to ~\$100,000 for the agencies. These expenses are on-going annual expenses and are important to fund as they are related to the future and restoration of the Bog.

The research expenses are more flexible --- although important if there is limited funding the data collection and monitoring is the priority. The outside funding that comes with this research is

¹ A PhD project is typically \$42000: \$21 K to the student and \$21K to support the project, with the costs being split 50:50 between the university and the project sponsor/agency. PhD projects usually last 3 years.

² Large equipment costs --- perhaps a helicopter, small bulldozer.

leverage/cost-sharing money. SAP members can assist with raising this money through their granting and university contacts.

8.0 Next Steps

This research and monitoring strategy needs to be:

1. Adopted by the Planning Team
2. Incorporated into the relevant sections of the Burns Bog Management Plan.
3. A major focus of the Scientific Advisory Panel, beginning fall 2006.

In the meantime the Planning Team needs to determine the new Chair/Facilitator of the Scientific Advisory Panel.

As well a formal research approval process needs to be established by GVRD. This approval process should reflect the following procedure:

- a) Research scientist forwards application of interest to conduct research in Burns Bog to GVRD Parks. GVRD 'screens' the application to ensure it fits the framework of the Research and Monitoring Strategy and the Management Plan.
- b) GVRD Parks refers the application to Delta and the Scientific Advisory Panel.
- c) SAP reviews and provides advice to GVRD and Delta.
- d) Delta and GVRD determine whether research is to proceed.
- e) If the research is to precede GVRD issues the appropriate permit.
- f) SAP monitors the research process and results as appropriate.