
Background

The Cliffs of Point Grey

During the last ice age, glaciers from the north covered the sedimentary deposits in the area that is now the mouth of the Fraser River. The glaciers were typically hundreds of feet thick and compressed the underlying sand and sedimentary deposits. Following a warming trend 10 to 15 thousand years ago the land took on the form now known as Point Grey. In technical terms, the land in this area is what geologists describe as a perched aquifer topology consisting of layers of glaciofluvial sand interspersed with impermeable layers. This topography extends the length of Wreck Beach.

Over the millennia the uplands became forested and the two main streams of the area developed – Cutthroat Creek and Booming Ground Creek. The forests were populated with a variety of wildlife and the streams were a year-round home for fresh water fish and a spawning ground for salmon. The only erosive forces on the cliffs were those due to creek washout and tidal action at the toe of the cliffs.

This area is part of the traditional territory of the Musqueam First Nation. The Musqueam have lived in this area for several thousand years and utilized the whole of the Point Grey area. Musqueam sentries used the cliffs as lookout points for the protection of the Musqueam community from intruders. The forests were their hunting grounds and the beach area was utilized to harvest shellfish and access marine resources.

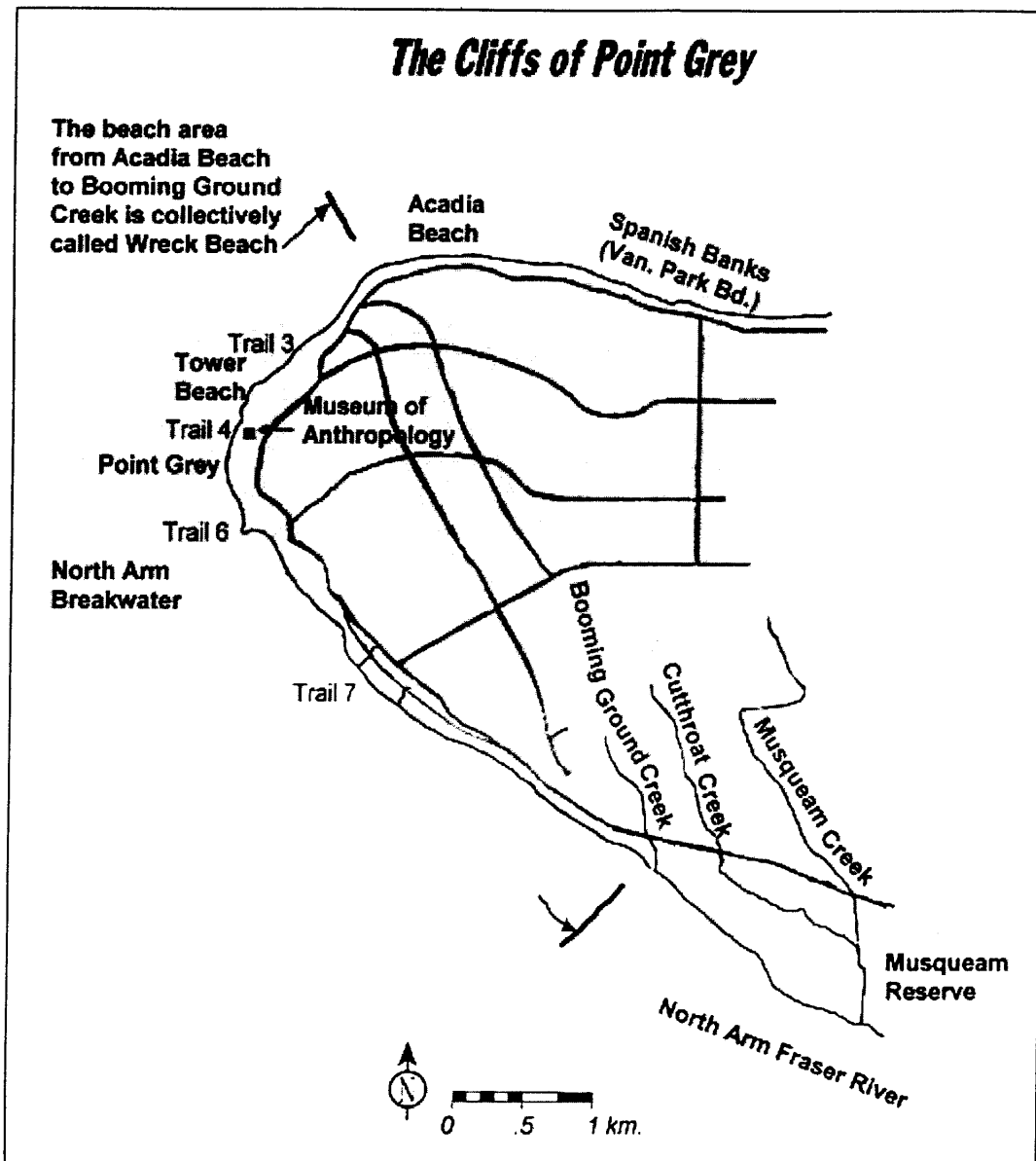
Logging started in these forests towards the end of the last century. Denudation of the land was exacerbated by construction of the new university and by wartime construction of defense works. The cliffs were, from that time on, subjected to erosion from people scaling and sliding down the cliffs. Seepage from the cliff face at the different levels of sand beds has also contributed to erosion by promoting undercutting and shearing off of overhangs – very similar in process to that of the wave action at the base of the cliffs.

Another cause of erosion, sapping, is caused by this same water on the cliff face freezing – the expansion of the freezing water causes pieces of the cliff face to be dislodged. Graham's Gully and more recently the cliffs adjacent to the Coach House at Cecil Green House were significantly effected where large portions of the cliff have eroded due to heavy storms causing water to flow over the cliff top.

At one time or another, human efforts have attempted to manage each of the erosive forces in various locations. Storm run-off was partially addressed by construction of the north (spiral) drain adjacent to the museum. The cliff base was protected by construction of a cobble berm and rock drift sills to deflect wave energy. Paths were constructed to manage beach visitors. The cliffs were extensively planted during the 70's to counter seepage erosion. The most severely exposed cliff faces were terraced and seeded with small trees. Each of these efforts to manage erosion have had some effects, some positive and some less so. These actions were reactive, responding to events, rather than planned to minimize the erosion. A successful plan to minimize erosion cannot be seen as a one-time event; minimizing the causes of cliff erosion will require an ongoing process of action and attention.

Planning Area

The areas of Point Grey included in this planning process are the cliffs and slopes from Booming Ground Creek at the mouth of the Fraser at the south-eastern extreme, wrapping around Point Grey and extending to Acadia Beach at the north-eastern extreme. The high ground to the interior of this strip and the immediate foreshore at the base of these slopes and cliffs will also be included. This area can be seen in the map on the following page.



Management Framework

The plan that is adopted for managing cliff erosion will unfold over a lengthy time frame. It is likely that some issues will need to be addressed before others. In recognition of the varying time frames and parts of the escarpment, it is important that there be a clear management framework to guide any actions that might be taken and decisions into the future. The final management framework for the cliff area will be comprised of an overall objective, principles (governing policies) and values (important aspects for consideration in decision making) to be agreed to by the Musqueam and UBC and approved by the GVRD Board of Directors. The following is presented as an initial framework for consideration during the consultation and management plan development phases.

Objective

The main objective of this process is to find acceptable and affordable ways to manage the causes of cliff erosion.

The cliff erosion management plan is intended to accomplish the following:

- Protect the cultural and archaeological resources of the area from damage due to cliff erosion (i.e. manage erosion threat and development of the cliffs in a manner that protects the cultural and archaeological resources);
- Preserve the wilderness-like setting of the foreshore;
- Mitigate the threat of damage from cliff erosion to UBC assets and property;
- Reduce embankment spills and fallen trees across the beach and access paths to increase safety for people near the cliff tops and those using the beaches; and
- Mitigate erosion threat to Marine Drive.

Principles

1. All other UBC and GVRD planning activities which may have an impact on Point Grey cliff erosion will be integrated with the cliff erosion management plan.
2. Once the cliff erosion management plan is completed, the UBC Official Community Plan (Electoral Area A) will be reviewed and, where necessary, recommendations forwarded to the GVRD Board to adjust the OCP to minimize the causes of cliff erosion.
3. Any actions taken will be in accordance with UBC's policies and regulations and will ensure preservation of UBC assets and lands to the extent possible given the current state of the cliffs.
4. Any actions taken will be in accordance with GVRD Regional Park policy and regulations, GVRD Parks Department philosophy and management style and, where appropriate, fall within the staffing and funding capability of GVRD Parks Department.
5. Any actions taken will be done in accordance with the government's duties of consultation with aboriginal people. This consultation will include and not be limited to matters dealing with identified and unidentified cultural resources of the area.
6. Any actions to manage cliff erosion will be done considering advisory input from stakeholder groups, members of the public and other relevant agencies. An ongoing advisory committee will be established to facilitate gathering this input.
7. Any action taken will not interfere with the recreational values of Wreck Beach regarding clothing –optional sunbathing and swimming.
8. Any actions taken will maintain the current condition of not being able to view buildings from the beach or vice versa.

9. Any actions taken must take into account the preservation of the beach as a whole in nearly a natural state as possible.

Values

1. The cliffs have important cultural and archaeological value to the Musqueam First Nation that must be respected and preserved.
2. While minimizing cliff erosion will likely call for ecological management, the flora and fauna of the escarpment should be preserved to the greatest extent possible.
3. Any actions taken must integrate with the campus community design.

Recent History

- Pre 1858 The area is part of the Musqueam territory.
- 1858 The colony of B.C. was created in response to the rapid influx of miners and settlers during the Fraser River gold rush
- 1865 - 1923 The initial principal uses of this area during early days of settlement were military defense and logging.
- 1928 Land clearing for UBC was started; brick, tile, sand, gravel, stone, cement and other building materials were brought to Wreck Beach by barge and hauled up the cliff embankments.
- 1930 A dairy farm was established on the lands above Acadia Beach. Around this time, initial recreational use was made of this area.
- 1935 A major storm water overflow from the north end of campus eroded a new deep gully adjacent to Graham house (Green College) requiring massive in-filling.
- 1936 The spiral drain at the rear of the Coach House was constructed to handle storm water run-off that could be expected from a storm event with a return period of once every ten years.
- 1939 Searchlight towers were placed on the beach, gun towers were put on the cliff tops and barracks were erected above Point Grey as part of World War II defences; pathways were constructed to connect these installations.
- 1953 The North Fraser Harbour Commission installed a breakwater on the North Arm of the Fraser River across from Wreck Beach to protect river moorage and log booms.
- 1974 A short section of experimental beach berm was constructed to reduce the erosion of Wreck Beach and toe erosion of the cliffs.
- 1977 Bulldozing and dredging deposition on the foreshore permanently altered the shoreline.
- 1979 A UBC Cliff Erosion Task Force identified the following priorities for action.
Priority 1 included: removal of damaged trees; barriers to unwanted access, better signing and improved access (particularly Trail 4); planting and fertilizing to stabilize the slopes; and restructuring the storm drain. An advisory group was struck to help with the implementation of these actions.
Priority 2 included: reclaiming washouts as per Graham's Ravine; beach "defenses"; sand replenishment; a North Arm Breakwater; surface water control; and subsurface (i.e. old drainage systems) control.
An informational program was also suggested to accompany any actions taken.
- 1981 A second phase of beach berm and drift sill work was started in accordance with principles established in the 1979 public process.

- 1987 Extensions to the Public Works Canada's breakwater on the North Arm of the Fraser River were made to further protect log booms and small craft in the Fisherman's Mooring Basin. This has had the unintended consequence of a faster in-fill rate in the Point Grey booming grounds and deposition of river silt on Wreck Beach.
- 1989 The province transferred part of the University Endowment Lands to the GVRD for designation as Pacific Spirit Regional Park. The Musqueam had previously commenced legal action claiming an existing aboriginal title to the area and objected to the transfer. The transfer was made without prejudice to Musqueam aboriginal rights and title.
- 1991 A management plan was adopted for Pacific Spirit Regional Park in which the cliff area was rated as an Environmental Protection Zone with access prohibited except by designated trails. The plan upheld the status of Wreck Beach as a clothing-optional area from Acadia Beach (Mile Marker, wood bridge just west of Acadia parking lot) to Booming Ground Creek. No consultation process with the Musqueam had been developed or implemented.
- 1997 The GVRD Board approved the Official Community Plan (OCP) for Part of Electoral Area "A" (UBC and part of Pacific Spirit Regional Park).
- 1998 UBC has commissioned a small hydrological study re pipe installation on NW Marine Drive. The Musqueam, UBC and GVRD have agreed to embark on a planning process (as described in this Discussion Document) as the basis for the development of a long term approach to minimizing cliff erosion.

Causes of Cliff Erosion

Erosion of the cliffs is both a natural and anthropogenic (humanly affected) phenomena. The slopes have been eroding since the last Ice Age left these formations. However, since the area has grown in population, human activities and development have had a greater impact. At the same time, the desirability of this area for human use and enjoyment has also grown.

The erosion in the following pictures has a variety of causes. Primarily these are shoreline erosion from tides and storms, vegetative uprooting and the forces of gravity, hydrological or groundwater forces, stormwater runoff and human activities.



1968 – Low tide showing logs which hit the cliff 4 feet higher at high tide



1968 – Trees and roots on beach as a result of toe erosion

Hydrogeological

- ⇒ The mixed layers of permeable sand and slowly permeable clays concentrate weeping from the cliff face. This cliff face seepage is a source of erosion.

Winter Freeze and Thaw

- ⇒ Winter conditions that bring heavy freezes lasting for a period of a week or more can accelerate cliff erosion. When the exposed sand surfaces freeze, erosion occurs in two ways. Freezing can expand the surface and force slabs of frozen cliff material to fall. Also, after a heavy freeze is over and thawing occurs, surface materials loosen and fall.

Wind and Rain

- ⇒ Off shore winds and rain cause an ongoing, low level erosion of exposed cliffs. When conditions are dry, winds erode areas of exposed sand and during wet weather, rain beating on exposed areas of the cliff cause further erosion. The extent of these effects are not well understood.

Human Activities

- ⇒ Early logging activities, initial construction of UBC, war time construction of towers and tunnels all have been significant early human causes of erosion. In more recent times, the Point Grey cliffs have been and remain an attraction both to residents of the region and tourists. Construction on the UBC campus has been ongoing. Prior to beach trail construction, access to the beach over the cliffs was a significant cause of cliff erosion. Construction of Trails #7, #6, #4, and #3 has helped to protect the cliffs from this activity. Human activities such as cliff climbing, development of scatter trails, tunneling, sculpting, vegetation removal, camping and ineffective vegetation irrigation practices remain a threat to the cliffs.