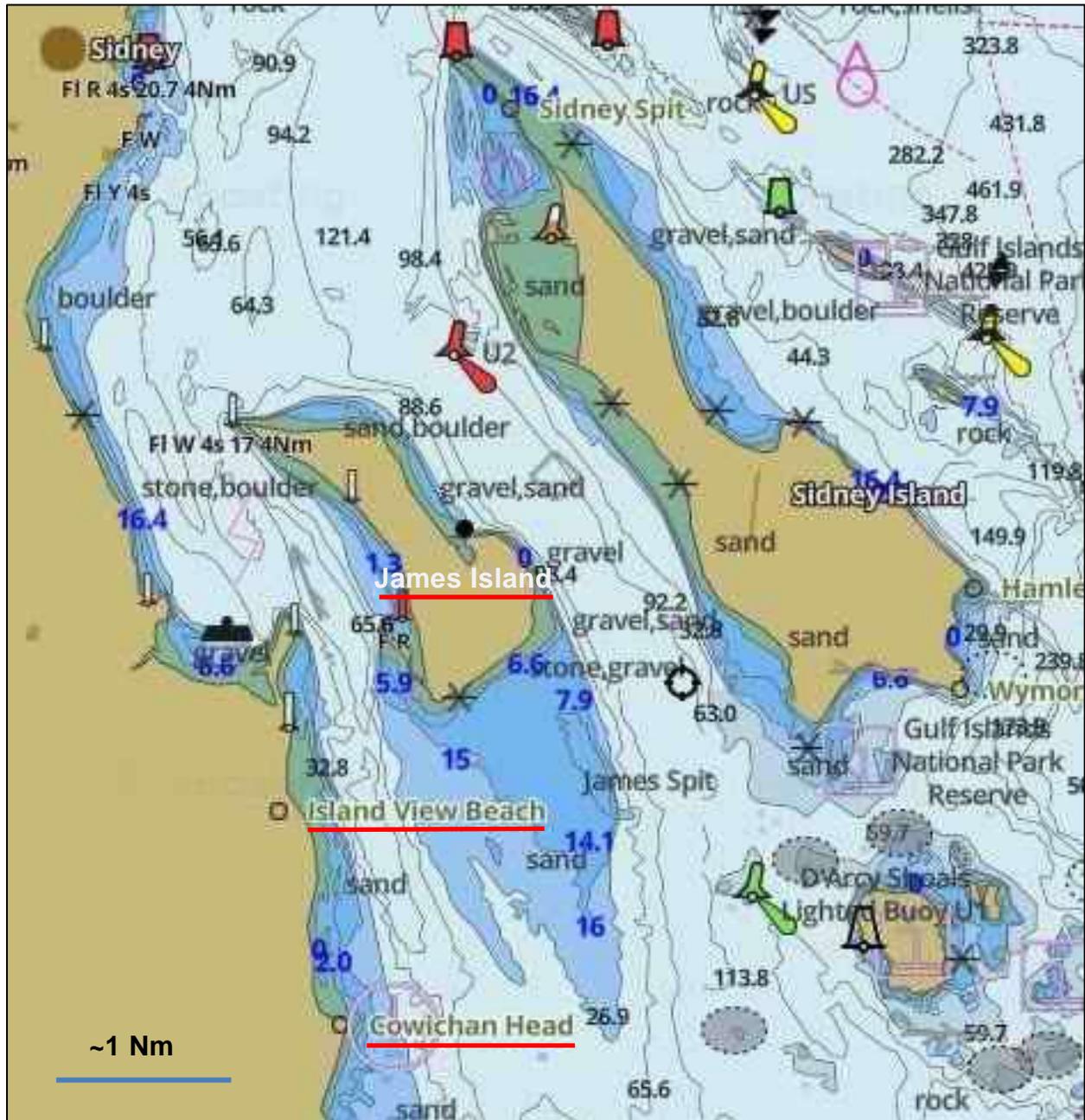


8th ISSMMTC, Victoria, BC



Portion of Canadian Hydrographic Service Chart 3313

Kayak Field Trip, May 10, 2018

Island View Beach, Cowichan Head and James Island

Trip Leader, Doug VanDine (vandine@islandnet.com)

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INTRODUCTION

This field trip is for those who wish to experience sea kayaking, see several classic Quaternary exposures, and see several active geomorphic processes in the Victoria area.

Sea kayaking bears somewhat the same relationship to white water kayaking as cross country skiing does to downhill skiing. Different equipment is used, and sea kayaking is typically less physically demanding. It's a recreation that can be enjoyed at any skill level, but offers the opportunity for continued learning and improving skills. Geologists have found sea kayaking useful to access otherwise inaccessible locations, and to look at coastal exposures from a different viewpoint.

We will be paddling double fibreglass kayaks. They are very stable, have built-in floatation chambers and are steered by foot controlled rudders. All kayaks, paddles, life jackets and accessories will be supplied by Ocean River Sports, <https://oceanriver.com/>, a sea kayak retail and kayak guiding company. Lunch will be provided.

From the Inn at Laurel Point, it is an approximate 20 km, ½ hour, drive to Island View Beach and the Island View Beach Regional Park, on the east side of the Saanich Peninsula. Once there, we will have a short introduction to what we are going to see and a short introduction to sea kayaking: the right way to get in and out of a kayak, basic strokes, steering, basic safety on the water, etc.

Obviously, this activity is very much controlled by weather and/or sea conditions. Based upon typical May weather, we hope to paddle southward along the shore from Island View Beach to view Cowichan Head, then across Cordova Channel to the southern tip of James Island (see the nautical chart on the cover), and then back to Island View Beach. If weather and/or sea conditions don't allow us to kayak, we will walk along the shoreline to visit Cowichan Head, and then walk along the trails of Island View Beach Regional Park and discuss the local geology.

ACKNOWLEDGEMENTS

These field trip notes were compiled, added to, updated and rewritten from three sets of field trip notes prepared for CANQUA *93, the annual conference of the Canadian Quaternary Association that was held in Victoria, BC in April 1993. Those field trip notes were authored by Doug VanDine and Hugh Nasmith (Field Trip 1), Heather Blyth and Hugh Nasmith (Field Trip 3.1), and Peter Bobrowsky and John Clague (Field Trip 3.2). If anyone is interested in the references, please contact Doug VanDine (vandine@islandnet.com).

ISLAND VIEW BEACH

When we turn right onto Island View Beach Road from Highway 17, we first drive across a flat, broad valley and then over a ridge parallel to the coast (Figure 1). This 55 m high ridge (ridge #3) is the third of five, sub-parallel, generally north-south trending drumlinoid ridges in the area. Ridge #1 is west of Highway 17 and a portion of Highway 17 is constructed on ridge #2. We will see ridge #4, on James Island, and ridge #5, on Sidney Island just beyond James Island, when we reach Island View Beach.

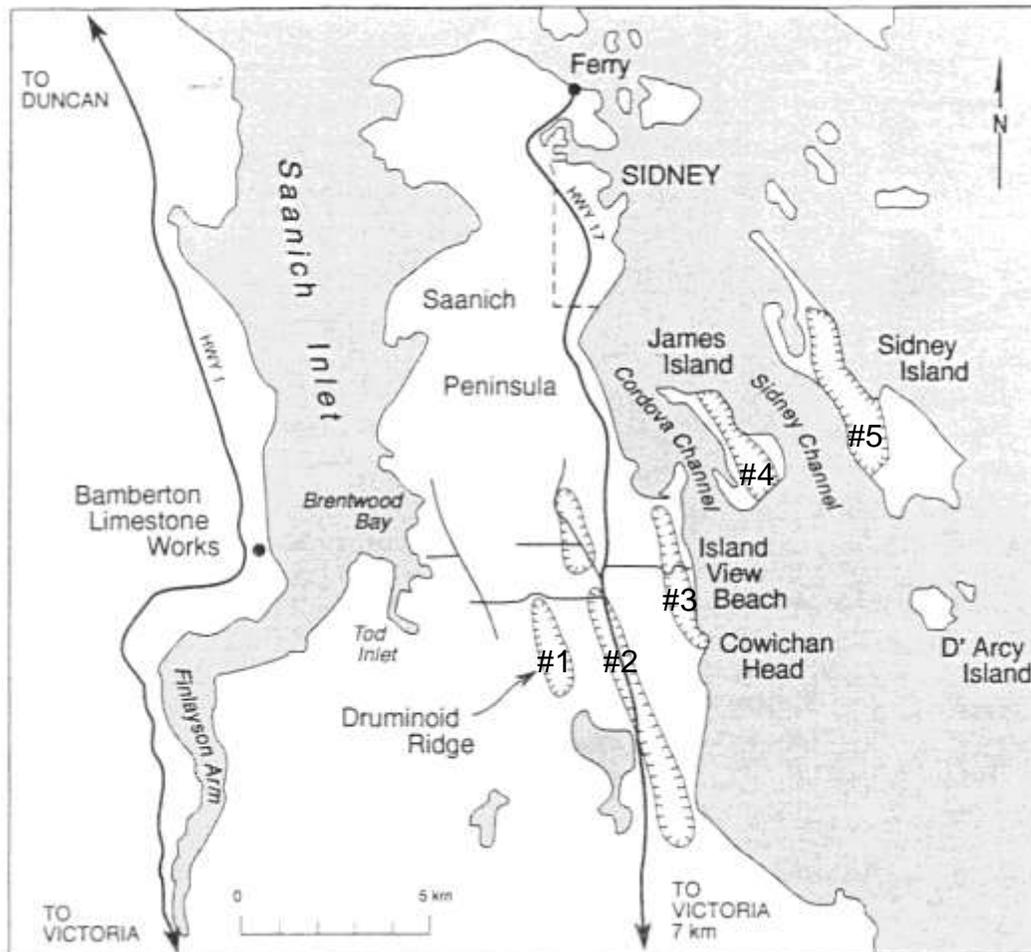


Figure 1: Overview of the field trip area showing the location of the five drumlinoid ridges

Looking eastward from Island View Beach we can see James Island slightly to the north; Sidney Island is partly hidden behind James Island; San Juan Island is across Haro Strait; and in the distance, snow-capped Mount Baker (if the weather cooperates!). The latter two are in the State of Washington, USA.

James Island was named by early European settlers in the late 1800s after James Douglas, the first governor of Vancouver Island; Cordova Channel was named by the British admiralty in the mid-1800s after a neighbouring Cordova Bay (named by the Spanish navy in the late 1700s); Sidney Island was named by a British naval captain in the mid-1800s; Haro Strait was named by a Spanish naval captain after his first mate in the late 1700s; San Juan Island was

named by a British naval captain in the late 1700s; and Mount Baker was named by George Vancouver, a British naval captain, after his third lieutenant in 1792. (Vancouver Island is named after Captain George Vancouver.) Mount Baker is 3,286 m (10,791 ft) high; an active andesitic stratovolcano. It last erupted in 1880; steam was released in 1975-1976, but there was no eruption. Saanich Peninsula and Cowichan Head were named by early European settlers after local indigenous First Nations in the mid-1800s. The indigenous First Nations have been in the area for many thousands of years.

Island View Beach is a portion of a northward trending sand spit formed since the last glaciation (the Fraser Glaciation, approximately 26,000 to 10,000 Years before present...YBP) by the deposition of eroded materials from Cowichan Head to the south. We see many such northward trending spits on the chart on the cover and on Figure 1. These spits are the result of erosion, longshore drift and deposition resulting from the dominant southeast winter storm winds and waves.

Westward (landward) of the Island View Beach spit is a relatively large lagoon. The lagoon was drilled and shovel-pitted in the early 1990s by a joint BC Geological Survey (provincial) and Geological Survey of Canada (federal) study program. The purpose was to look for evidence of Holocene seismicity, neotectonism and sea level history.

From the drilling, continuous core was recovered to a depth of 14 m. Most of the sediment consists of clean, medium to coarse sand, interspersed with two thin interbeds of silt and clay and a few much thinner gravel beds. The sand indicates a lengthy period of intertidal, or perhaps subtidal, sedimentation when the sea level was lower than present. The silt and clay interbeds indicate periods of quiescence, while the gravel beds indicate episodic storm events.

The relatively shallow (< 2 m) shovel-pits found a bed of sand that contains some gravel, overlain by peat, overlain by littoral 'mud; and capped with a thin surface layer of peat. The lower peat bed has been dated between ~2440 and ~2630 YBP. A tree stump found in this peat bed has been dated at ~2040 YBP. The contact between the lower peat and the overlying mud is in some places sharp and in other places gradational. Therefore, is not clear whether the transgressional change from the lower peat to mud is the result of subsidence related to seismicity, or a more gradual process.

There is no evidence at Island View Beach of significant subsidence of the land surface after about 2000 YBP. This is in contrast to the situation along the coasts of Washington, Oregon and western Vancouver Island. At these locations, there are several prominent coastal marsh deposits that are thought to be the result of coseismic subsidence associated with major Cascadian subduction zone earthquakes. The last such earthquake, magnitude 8.7-9.2, occurred in the January 1700.

Island View Beach was the site where a tusk of an Imperial mammoth was uncovered approximately 75 years ago. Several other specimens, found buried on James Island, and in several gravel pits on the Saanich Peninsula, have been dated 17,000-20,000 YBP. It is thought that these mammoths, whose shoulder height could be up to 4 m, became extinct shortly after the last period of glaciation, approximately 10,000 years ago.

COWICHAN HEAD

Cowichan Head provides a section of the Quaternary Fraser Glaciation (Late Wisconsin 26,000-10,000 YBP) / Olympic Nonglacial Interval (Middle Wisconsin ~65,000-26,000 YBP) / Semiahmoo Glaciation (Early to pre-Wisconsin from ??~65,000 YBP). The exposure is the eroded east side of ridge #3 that we drove over to reach Island View Beach.

As we kayak (or walk) along the shoreline of Cowichan Head, we can see an almost continuous Quaternary stratigraphy dating back to the pre-Wisconsin. In addition, we can see evidence of ongoing erosion, recent landsliding (as recently as in early 2018!) and various methods that the land owners have used to try to stabilize the ongoing erosion and landsliding (with varying degrees of success!).

The Quaternary units (from youngest, Unit 8, to oldest, Unit 1) are described in Table 1. Figure 2 is a sketch of the section and Figure 3 is a compilation of the Quaternary stratigraphic sequences of the region.

Unit 8: 'Victoria Clay'; **thin, discontinuous brown clay** with numerous pebble inclusions; marine environment; dated older than ~12,750 YBP; deposited in the Holocene, shortly after the Fraser Glaciation.

Unit 7: 'Vachon Till'; **brown indurated silty diamicton (till)** with abundant clasts of Vancouver Island volcanics and few Coast Mountain gneisses, schists and granites; the base of the unit has been dated older than ~17,000 YBP; deposited during the Late Wisconsin, Fraser Glaciation.

Unit 6: 'Quadra Sand'; predominantly **well sorted, fine to coarse grained, stratified white sand**; probably outwash deposited in front of the advancing Fraser glacial ice; dated younger than ~22,600 YBP; deposited during the Late Wisconsin, pre- to near Fraser Glaciation.

Unit 5: 'upper Cowichan Head Formation'; **predominantly organic rich silt with interbeds of sand**; blue-grey clayey silt near the base of the unit; interpreted as a near shore environment; dated ~35 600 YBP; deposited during the Middle Wisconsin, Olympia Nonglacial Interval.

Unit 4: 'lower Cowichan Head Formation'; **interbedded, oxidized sand and gravel**; coarse and pebbly sand beds are interstratified with beds of fine to medium sand; interpreted as a near shore environment; no date, but inferred deposited during the Middle Wisconsin, Olympia Nonglacial Interval.

Unit 3: thought to represent the 'Dashwood Till'; **shell bearing diamicton (till)**; three dates between ~35,000 to older than ~51,000 YBP; probably deposited during the Early to Middle Wisconsin, Semiahmoo Glaciation to Olympia Nonglacial Interval.

Unit 2: probably part of the Muir Point Formation; **interbedded, oxidized sand and gravel**; may be fluvial to deltaic; no date, probably deposited during the pre-Wisconsin, Highbury Nonglacial Interval.

Unit 1: probably part of the Muir Point Formation; **light grey well sorted sand**; may be aeolian; no date, probably deposited during the pre-Wisconsin, Highbury Nonglacial Interval.

Table 1: The Cowichan Head Quaternary units (from youngest, Unit 8 to oldest, Unit 1)

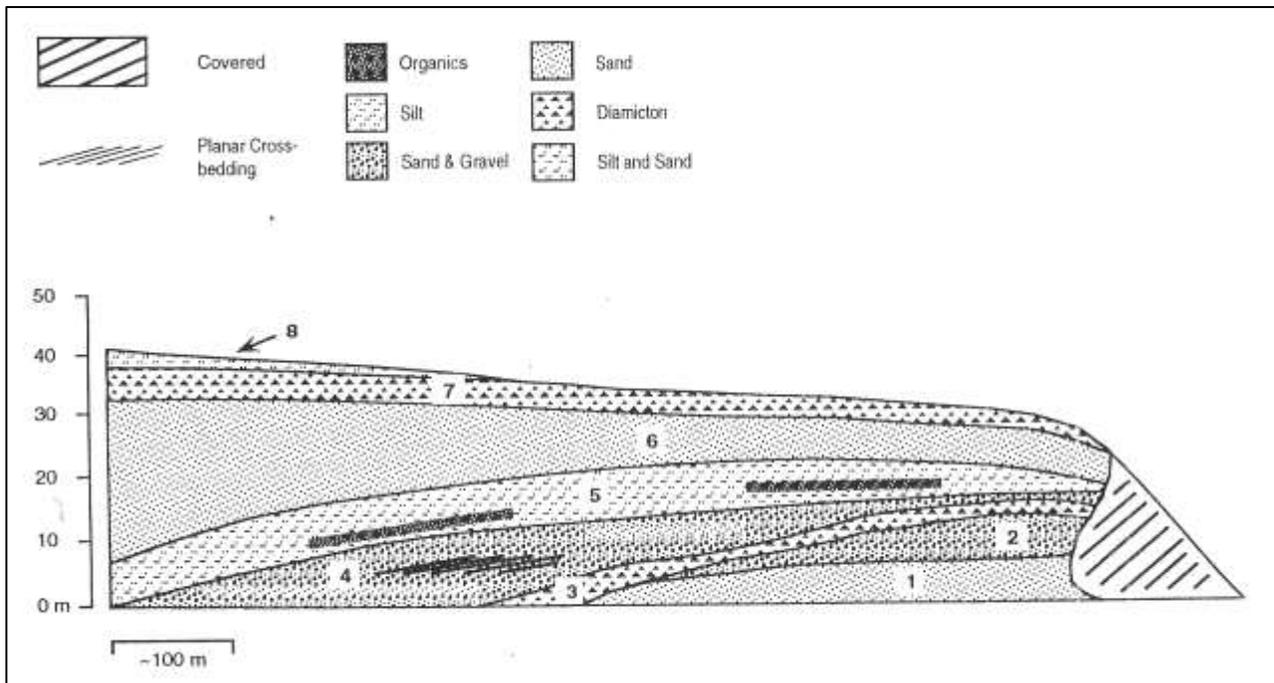


Figure 2: Sketch of the Cowichan Head Section

Years B.P. (x10 ³)	Time Stratigraphic Units	Geologic-Climatic Units	Fraser Lowland	Southern Vancouver Island	Puget Lowland	
-5	Holocene	Postglacial	Salish Sediments and Fraser River Sediments	Salish Sediments	Holocene	
-10			Salish Sediments	8	Sumas	
-11			Sumas Drift	Capilano Sediments	Everson Interstade	
-12	Late Wisconsin	Fraser Glaciation	Fort Langley Formation	Fraser Drift	Vashon Stade	
-13			Capilano Sediments			7
-15			Vashon Drift	Vashon Till and Drift		
-17			Quadra Sand	Cowichan Drift		6
-18						
-20				6	Olympia Interglacial Quadra Sediments	
-26	Middle Wisconsin	Olympia Nonglacial Interval	Cowichan Head Formation	Cowichan Head Formation	Upper Salmon Spruce Stade	
-30				4	3	
-35			Cowichan Head Formation?			Lower Salmon Springs Stade/ Possession Drift
-41	Early Wisconsin	Semiahmoo Glaciation	Semiahmoo Drift	2		
-50						
-60	Pre-Wisconsinian (Sangamonian and Illinoian Stages) ???	Highbury Nonglacial	Highbury Sediments	1	Whidbey Formation	
-65			Westlynn Drift			Double Bluff Drift
>65			Older Sediments			Older Glacial and Non-glacial Sediments

Figure 3: Compilation of Quaternary stratigraphic sequences of the region. Shaded column best refers to the Cowichan Head Section; numbers indicate the units

The more recent local geological history is interpreted as follows. At the onset of the Fraser Glaciation, ice accumulated on the mountains of central Vancouver Island (to the north) and formed a valley glacier which advanced southward and spread out across southeastern Vancouver Island. Meltwater from this valley glacier created a series of coalescing sand and gravel fans at the glacial front (Unit 6, Quadra Sands) that buried the older glacial and non-glacial sediments (Units 1 to 5). As the Vancouver Island glacial ice merged with glaciers advancing southward down the Strait of Georgia, the ice overrode the sand and gravel fans and older sediments, deposited glacial till (Unit 7, Vachon Till) and sculptured the five drumlinoid ridges. After the Fraser Glaciation, while the land surface was still depressed, marine sediments were deposited (Unit 8, Victoria Clay).

JAMES ISLAND

James Island is dominated by drumlinoid ridge #4. It is the only island in the area that has no rock exposed anywhere along its shoreline. The south end of the island provides a natural cross section of this drumlinoid ridge, because the southern half of the island has been eroded away. This appears obvious from the chart on the cover of these notes.

For approximately 10,000 years, the island has been exposed to strong southeast wind and wave activity during the winter months. The blunt end of the island attests to the erosive power of the wind and waves and to the erodibility of the Quadra Sand that forms the core of this drumlinoid ridge. Northward trending sand spits have formed on each side of James Island; in part the deposition zones for the eroded sand.

Large lag boulders, that could not be transported by waves, sit just below the high tide line where the eroded southern portion of James Island used to be. Some of these large boulders are exposed at low tide, and some aren't. They pose a navigational hazard.

The island has a colourful history. In 1913, James Island was purchased by Canadian Explosives Limited (now CIL) and was used up until 1962 as a location to manufacture explosives (primarily TNT). It was particularly busy during the two world wars when 1,200 men and women worked and lived on the island. In the mid-1980s, a clean-up program was undertaken jointly by CIL and the BC provincial government and much of the evidence of industrial use was removed. Since then, the island has had several private owners who have tried various, only semi-successful, developments. Currently on the island there is a Jack Nicklaus-designed golf course, a 5,000 square foot principal residence, six guest cottages, private docks, an airstrip, a pool house and a manager's residence. In 2012 it was put on the market for \$75,000,000 (CAN) but did not sell.

One thing that might be holding back development of the island is the fact that there is no source of fresh water on the island. Another might be that the Tsawout First Nation (one of the Saanich First Nations, whose main village site is immediately north of the Island View Beach Regional Park, is seeking title to the island because the First Nation claims the island was once the site of a traditional village.

Because the land is privately owned, although the public can land on the island, they cannot venture above the high tide line without trespassing. The owners have been known to be unfriendly to some kayakers who have landed on the island.