

## Appendix B. Puget Sound Shoreline Field Trip: Kitsap County and Bainbridge Island

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Shoreline Armoring on Puget Sound: State of the Science Workshop

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### Field Trip Itinerary

11:45	Depart Alderbrook on Hood Canal by bus
1:00-2:00	Field Stop #1: Suquamish Tribal Center and Agate Pass
2:20-3:00	Field Stop #2: Fay Bainbridge State Park
3:30-4:30	Field Stop #3: Pritchard Park
5:00-7:00	Dinner on Bainbridge Island
7:00	Depart Bainbridge by bus
8:00	Return to Alderbrook

*NOTE: This field trip guide reflects the final field trip itinerary. The original planned field trip included a different site on Bainbridge Island, a boat tour, and a visit to the Bremerton waterfront. Last minute mechanical problems, combined with stormy weather, required a shift to a different field site and cancellation of the boat trip.*

### Overview

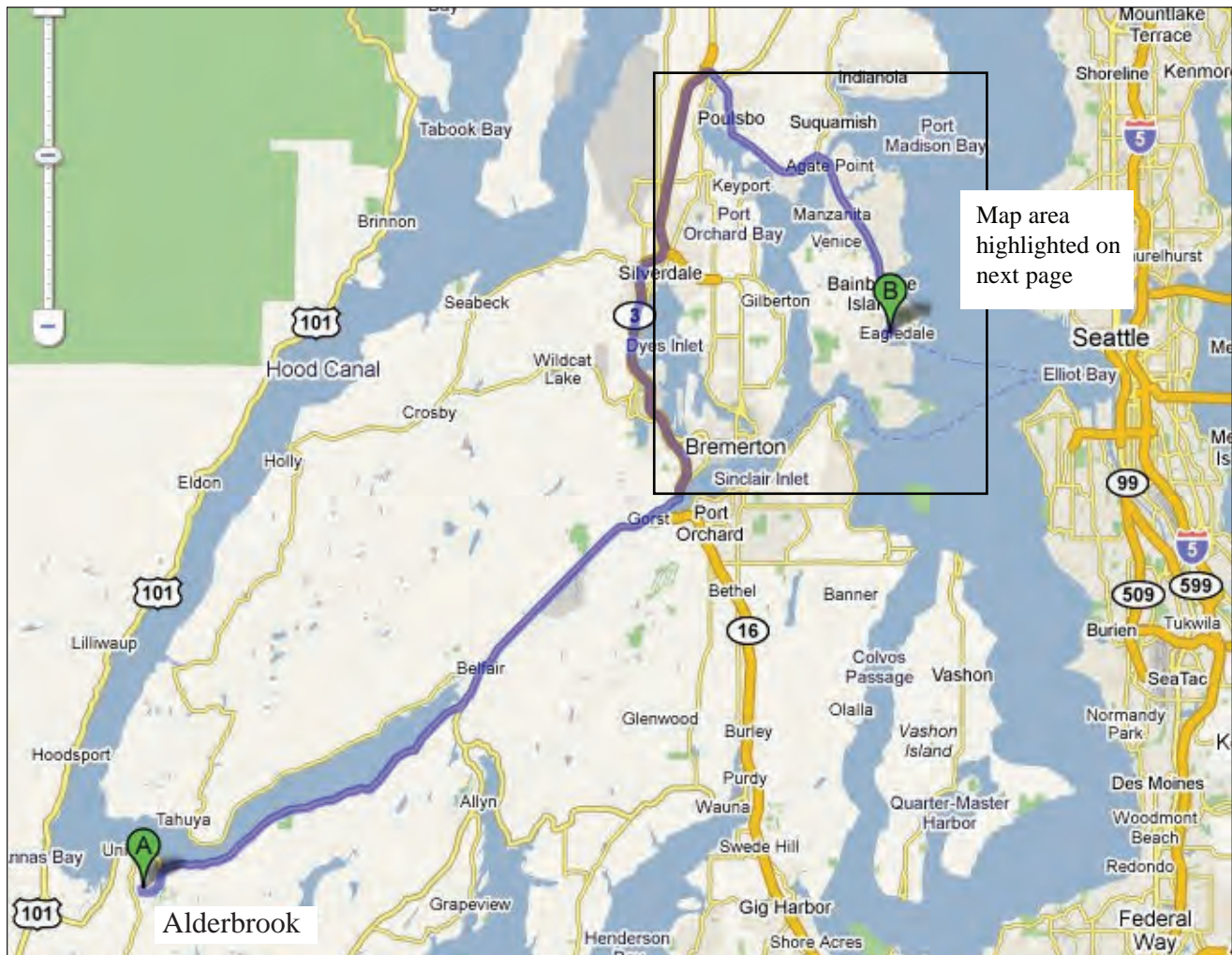
From Alderbrook, we will travel by bus along south shore of Hood Canal and east towards Bremerton. From there, we will drive northwards through Silverdale and Poulsbo, to our first stop near Suquamish on Agate Pass.

We will make three stops on our bus trip. Each site illustrates a relatively different shoreline and highlights unique issues. Our first stop features eroding bluffs, a small stream mouth, and a recent soft shoreline project. Our second stop will be along a more exposed depositional beach on the main basin of Puget Sound, where we will see a typical Puget Sound mixed sand and gravel beach, along with a nearby example of a heavily developed spit. Our final bus stop will be a Superfund project on the southern shore of Eagle Harbor, where cleanup and redevelopment efforts have resulted in a restored beach.

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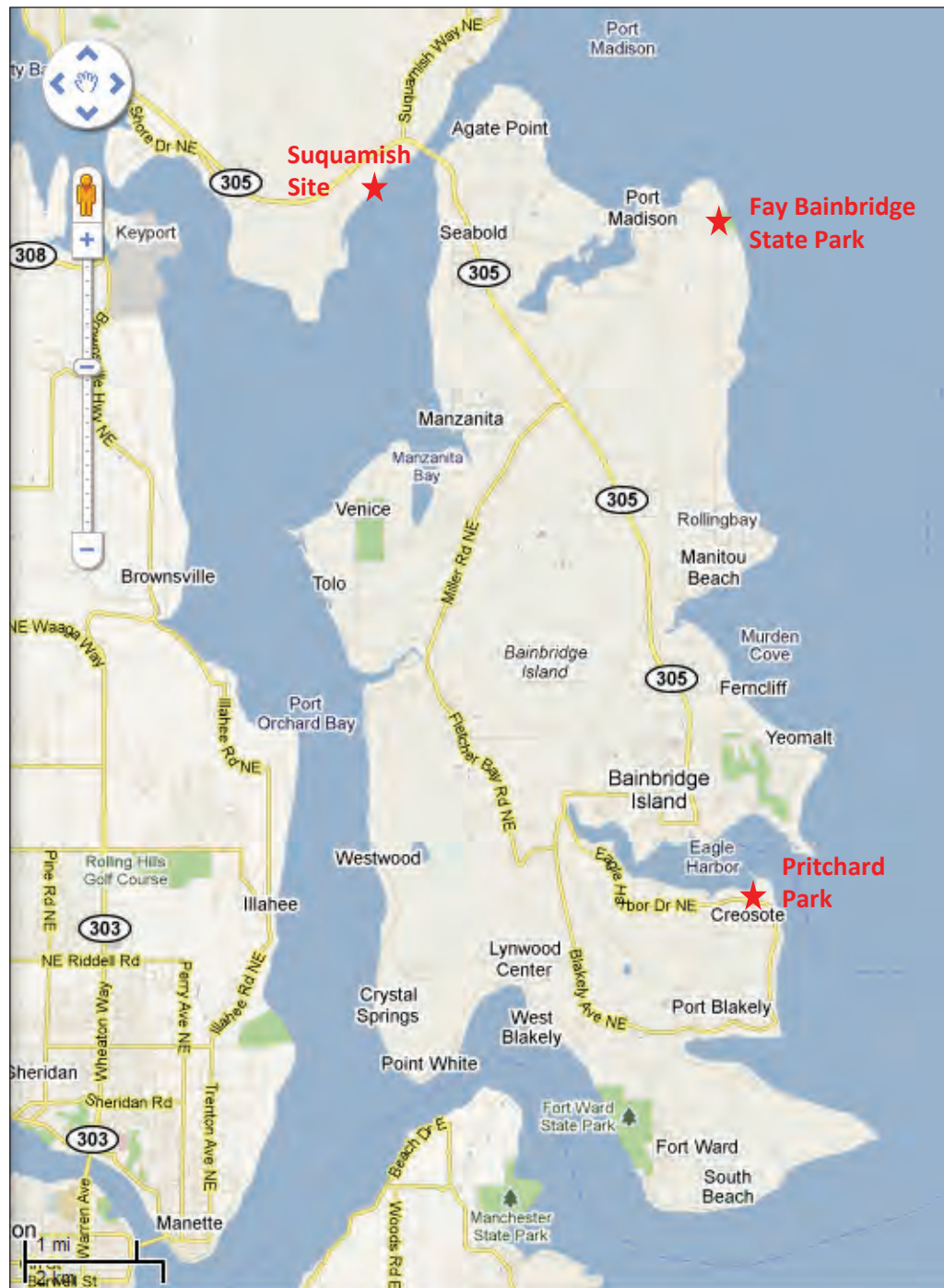
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## Field Trip Map



Source: Google, 2009

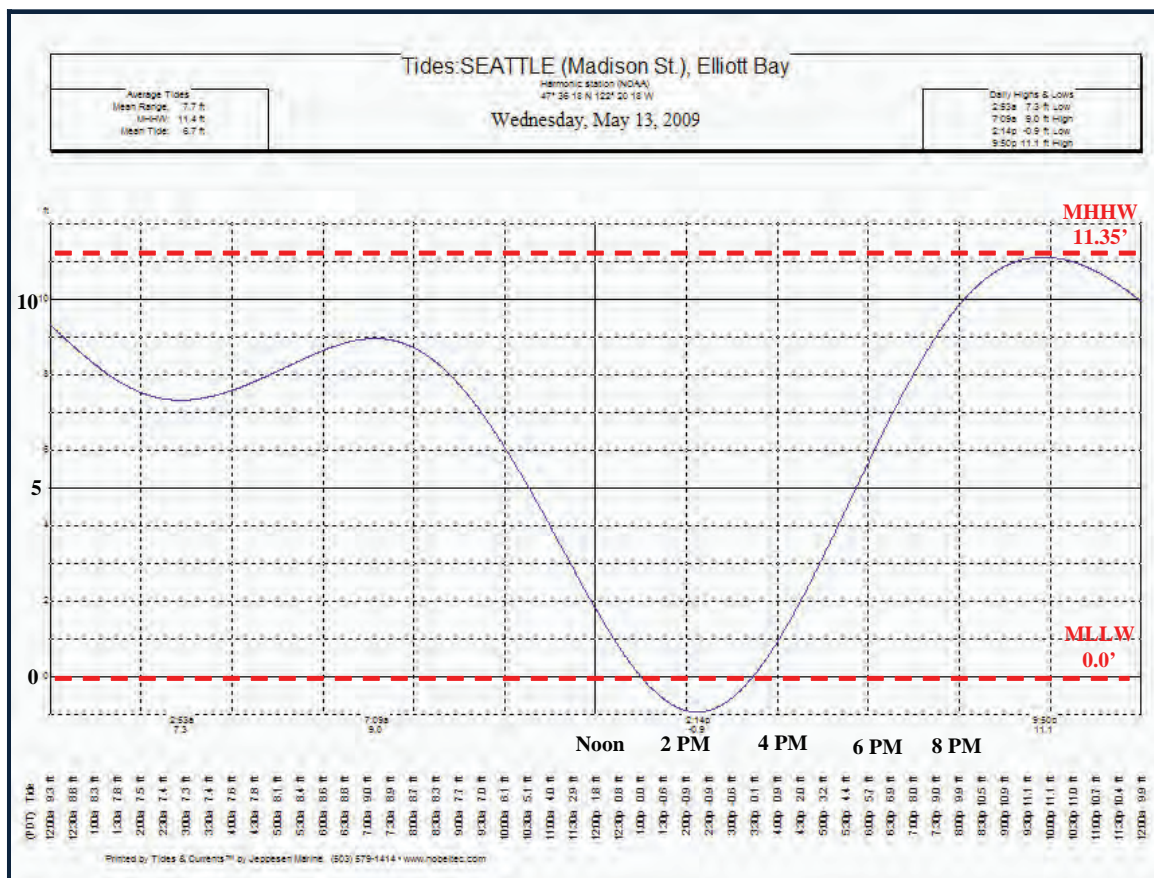
## Map of Bainbridge Island and Vicinity



Source: Google, 2009



## Tides During May 13 Field Trip



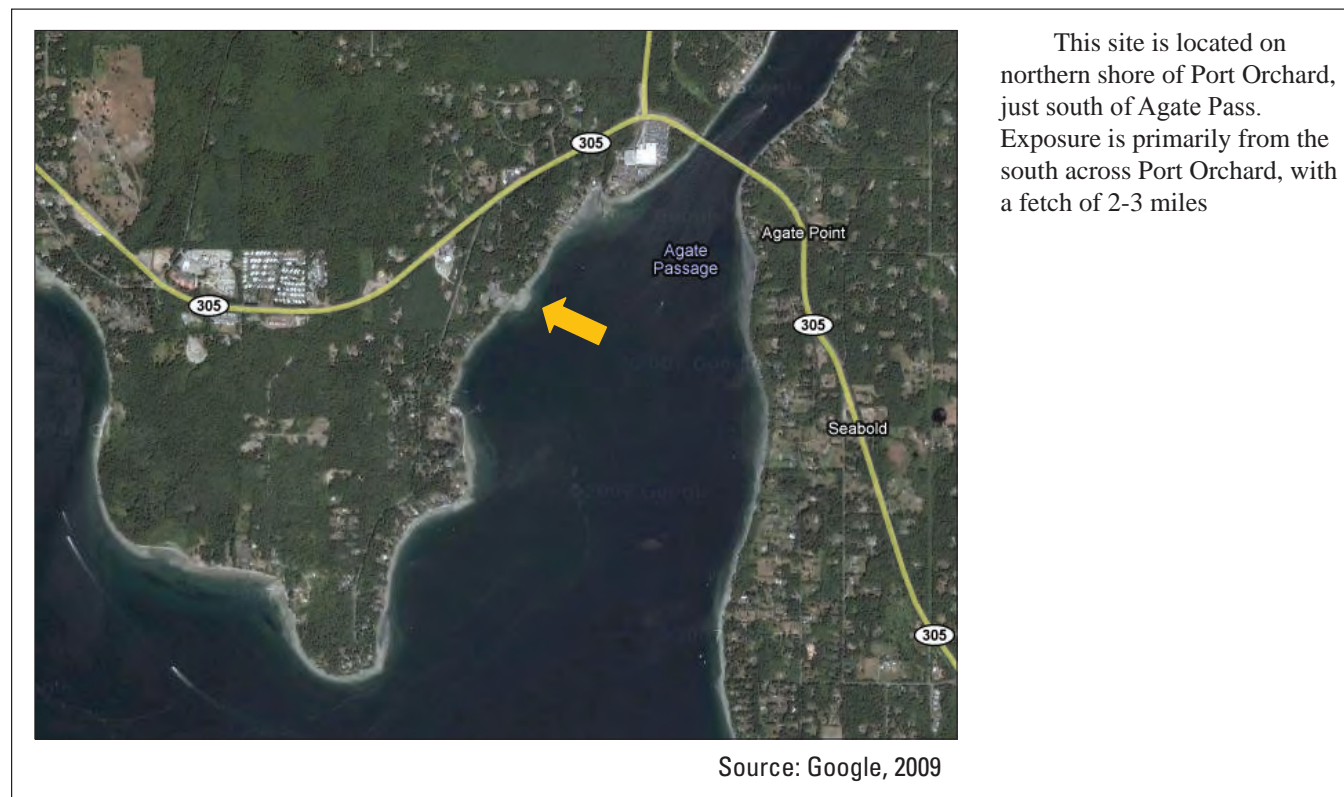
Tides, shown here for Seattle, are fairly similar in timing and height throughout the area of our field trip. The tides during the field trip will be lowest around 2PM (1 ft below MLLW) and will be rising throughout the boat trip.

Puget Sound experiences mixed semidiurnal tides. Mean Higher High Water in Seattle and vicinity is 11.35 ft above MLLW (0 ft). The lowest tides tend to occur during the daytime in late May and June (and at nighttime during December and January). Extreme low tide is approximately -4 ft; extreme high tide is between 14 and 15 ft.

During severe weather, tides may be routinely elevated 2 ft above predicted levels, but the Sound does not experience the extreme storm surges of the sort familiar to those on the east coast. During El Nino events (for example 1983, 1998, 2006) sea level on the west coast, including in Puget Sound, can be elevated an additional 6-8 in., which greatly increases the likelihood of extreme high water events.

## Field Trip Stops

### 1. Suquamish Tribal Center — South of Agate Pass



The low, relatively steep bluffs in each direction are composed of glacial till, which often forms steep slopes with limited vegetation. We will see evidence of erosion, although the long-term rate of bluff retreat would be low. A small stream enters the Sound at this site. The developed portion of the site is built partially on artificial fill in the low areas surrounding the historic stream mouth.

The beach at this site is dominated by the intertidal delta of the small creek (see oblique aerial photo). Stream mouth deltas such as this are common on Puget Sound. Little is known about their relative importance, compared to the eroding bluffs, in delivering sediment to the littoral system, although it likely varies significantly between sites.

Longshore transport on this shoreline is from south to north, driven by the predominance of southerly storms and the greater southerly fetch. The volumes of transport may be relatively low on this shoreline due to the modest wave exposure and the limited availability of sediment.

Concerns about the eroding bank in front of the large building led to the recent stabilization project. This project is typical of others on Puget Sound where there is tension between the need to protect upland structures using standard accepted engineering techniques and the desire to protect shoreline processes and ecologic functions. As is often the case, the result is some interesting compromises. The project employs a deep pile wall, a reconfigured soil bank with plantings, and the structural incorporation of large wood on the beach.



Photo: Department of Ecology

Oblique aerial photograph of Suquamish site. Note bluffs in each direction, variability in bank vegetation, and the distinct intertidal delta fan at the stream mouth.



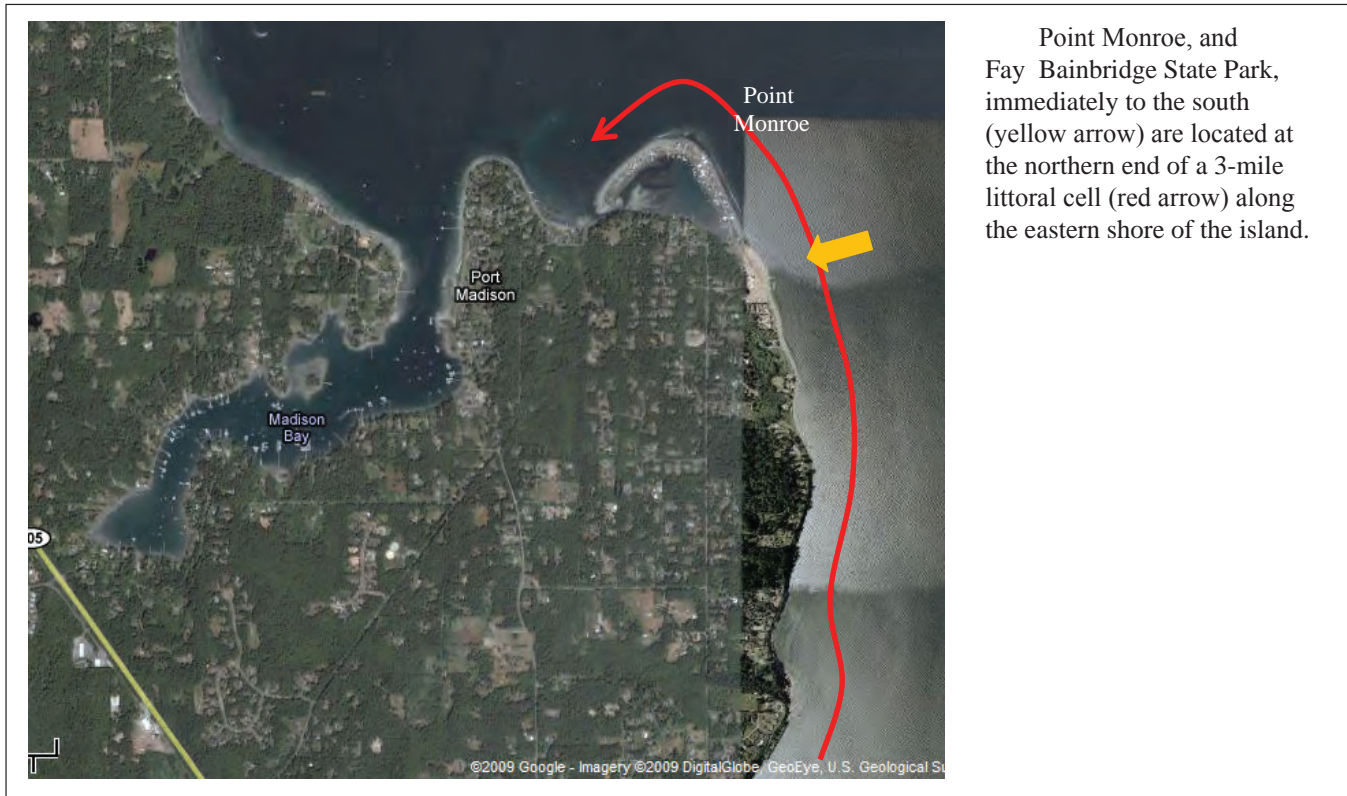
View northeast, looking across the stream delta at a mid-tide. The bluff is developed in glacial drift which often forms steep, bare cliffs.





Bank stabilization project in front of building, showing vertical pile wall, recently planted and regraded slope (covered with mesh), and large anchored logs.

## 2. Fay Bainbridge State Park, Bainbridge Island



Fay Bainbridge State Park is located immediately south of Point Monroe, along a spit that begins farther south, follows the coastline north, and then forms a hook at Point Monroe itself, enclosing a small tidal lagoon.

Longshore transport is to the north as a result of southerly storms and an extensive fetch (10–15 mi). Sediment is supplied by bluff erosion within a littoral cell that begins 2–3 mi to the south.





View north from the State Park showing homes along the Point Monroe spit. Note that many seawalls extend well below the waterline at the time of this picture (approx. Mean Higher High Water).



View north of the beach from south of Fay Bainbridge Park. Illustrates typical berm with drift wood, gravelly foreshore, and broad sandy low tide terrace.

Point Monroe itself is developed with waterfront homes, many of which are heavily armored to protect against erosion and storm damage. The spit experienced serious damage in December, 1990, following a pair of unusual northerly windstorms (most major storms and wave action on the Sound come from the south). Many seawalls were destroyed and in some cases homes themselves were damaged when walls collapsed or when backfill was eroded out from under the walls during the height of the storm.



Point Monroe is a recurved spit that actually begins 1-2 kms south (left) of these images. The broad backshore at the park and where the homes are to the south historically contained an extensive wetland system that drained north towards the lagoon. This photo illustrates the extent of residential development on the spit itself, with homes located on both exposed beach and on the lagoon. Note the extensive use of seawalls to protect homes.

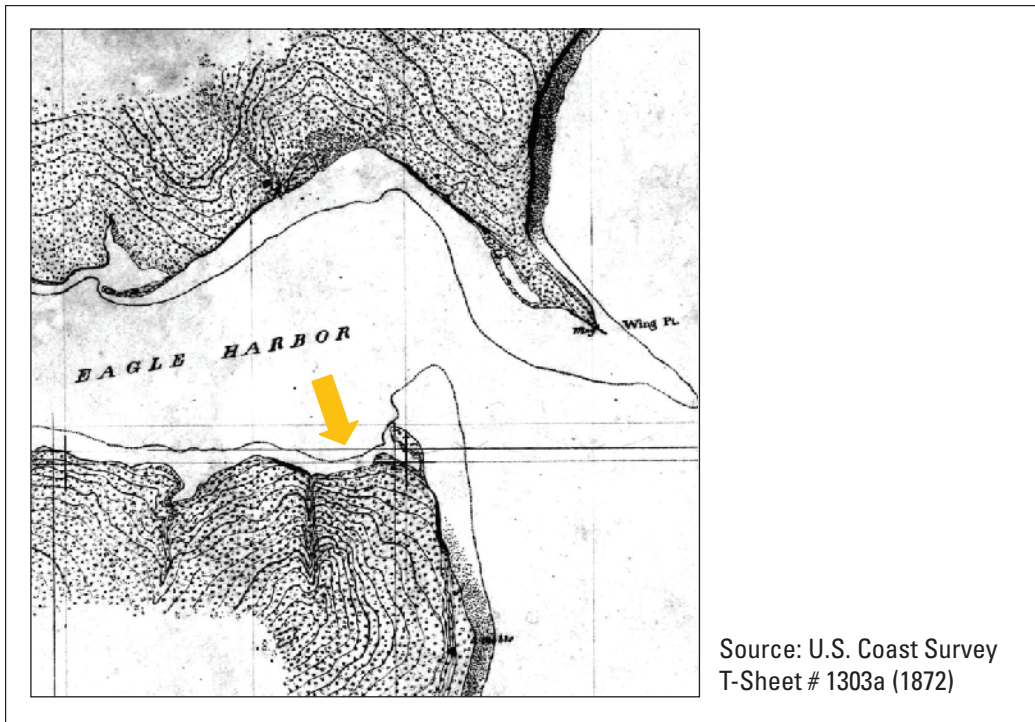
### 3. Pritchard Park, Bainbridge Island



Pritchard Park is located on the southeastern shore of Eagle Harbor, on the east side of Bainbridge Island. The island's commercial center of Winslow lies on the north side of the harbor.

The western portion of Pritchard Park lies inside the harbor and is sheltered from typical southerly storm waves, although boat wakes may be an issue in this heavily used harbor.





Historically, a small spit called Bill Point marked the southeastern entrance to Eagle Harbor. Sediment was supplied by eroding bluffs south of the point and transported northward by southerly wave action. The shoreline west of the spit would likely have been a combination of salt marsh and a narrow, low-energy beach along the base of the bluffs.



Aerial photo of site when creosote treatment facility was still in operation.  
(Source: Eric Nelson, U.S. Army Corps of Engineers)

Throughout much of the 20th century, a creosote plant operated at this location. The facility closed in the 1980s and was taken over by EPA as a Superfund site. Remediation began in the late 1990s, with construction of a steel sheet pile containment wall and treatment of contaminated soils.

Under the guidance of the Corps of Engineers, historic fill, overwater structures, and debris were removed from the western portion of the site, a large sediment cap was placed to isolate contaminants, and a broad sandy gravel beach was created. This beach has become a popular recreational site for local residents.

On the eastern edge of the site, facing Puget Sound, there are plans to remove a failing timber bulkhead and to relocate a roadway with the objective of allowing natural erosion of the steep bluff to occur, restoring an historic source of beach sediment to the point.



Aerial view of Pritchard Park site taken in July, 2009. Sheet pile wall and soil remediation facilities are located on the point in the foreground. The created beach can be seen behind point.

*NOTE: Pritchard Park was substituted for Bainbridge Waterfront Park as a result of last-minute changes to the workshop field trip. An earlier version of this field trip description includes the Waterfront Park site.*



Initial excavation of historic fill and debris on western portion of the site (Source: Eric Nelson, U.S. Army Corps of Engineers.)



Photo of the same area as above, taken in 2005, following capping and beach creation.