PC

Eastin, Darryl

From: gammon@u.washington.edu
Sent: Tuesday, March 25, 2014 4:42 PM
To: Eastin, Darryl
Cc: Richard H Gammon
Subject: EIS Scoping Comment (Pt Wells), second message
Attachments: Sea level.docx

Begin forwarded message:

From: Richard Gammon <gammon@u.washington.edu>
Date: February 28, 2014 7:00:17 PM PST
To: Darryl.Eastin.co.snohomish.wa.us@washington.edu
Cc: csg <csg@uw.edu>, Richard Gammon <gammon@u.washington.edu>, Jerry Patterson <jerrypat08@gmail.com>
Subject: Pt Wells EIS Scoping comment (2)

Dear Mr Eastin,

Below are my comments on a second aspect of the Pt Well EIS, namely, sea level rise. i have written separately concerning the seismic hazard. I have also submitted comments to the City Shoreline regarding the Transportation Corridor Study.

Thank for your attention to these important issues.

Sincerely,

Richard H Gammon
20240 Richmond Beach Dr NW
Shoreline, Wa 98177
206-533-1141

Professor Emeritus
Chemistry and Oceanography
University of Washington
Seattle, Washington

I-53 Gammon, Richard -- March 25, 2014
PFN: 11-101457-LU, et. al

To: Darryl Eastin, Principal Planner 2.28.14
Snohomish County Planning , Development Services

From: Professor Richard Gammon, University of Washington

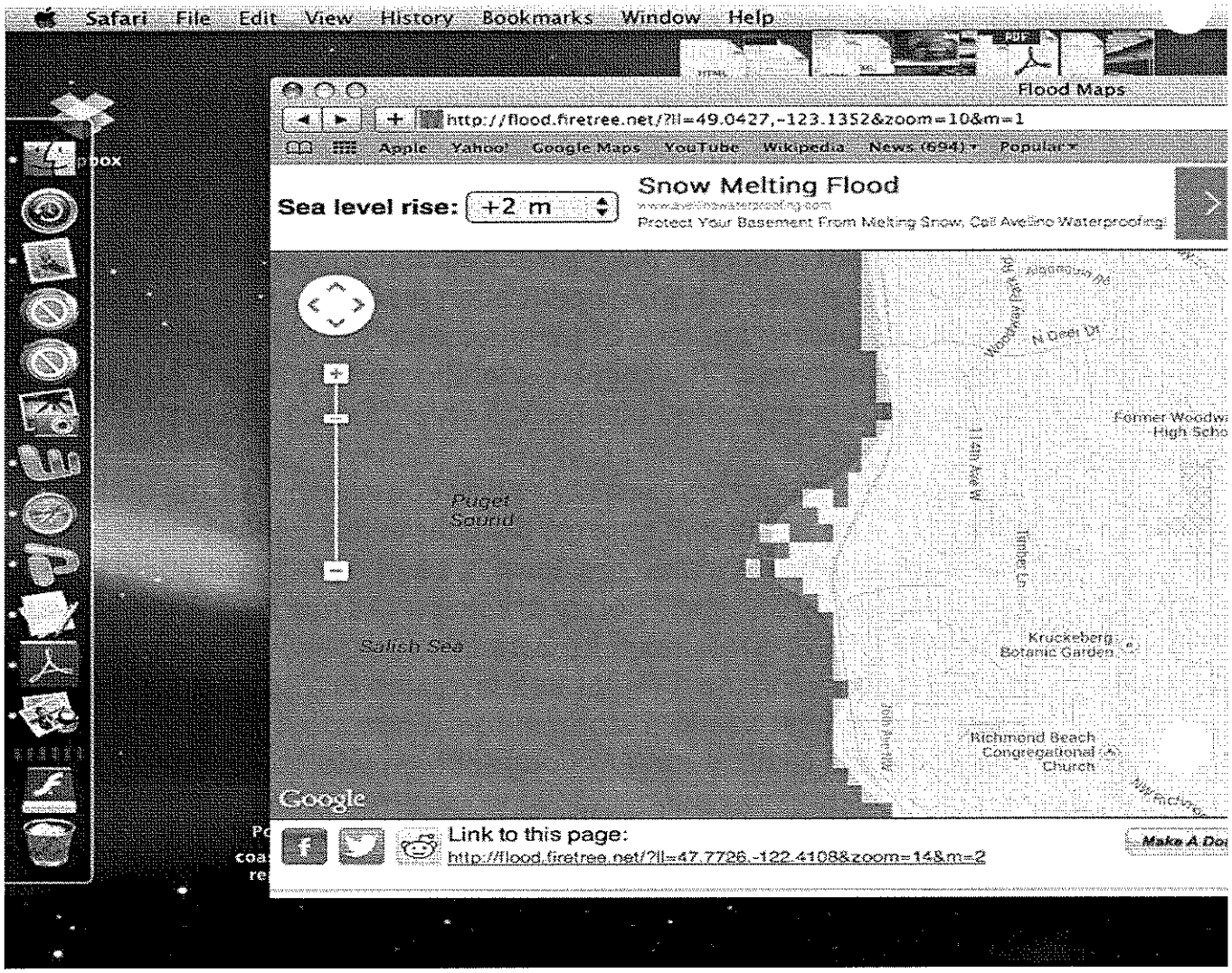
Subject: Comment on the draft EIS for the Point Wells development

This comment concerns the known and certain hazard incurred in building a high-rise urban concentration (center or village) on a sand-spit at sea-level in the face of certain major sea-level increase (1meter, 2 meters,...?) within a generation or two (by 2100) , which is far beyond the estimated completion date (2040?) of this project.

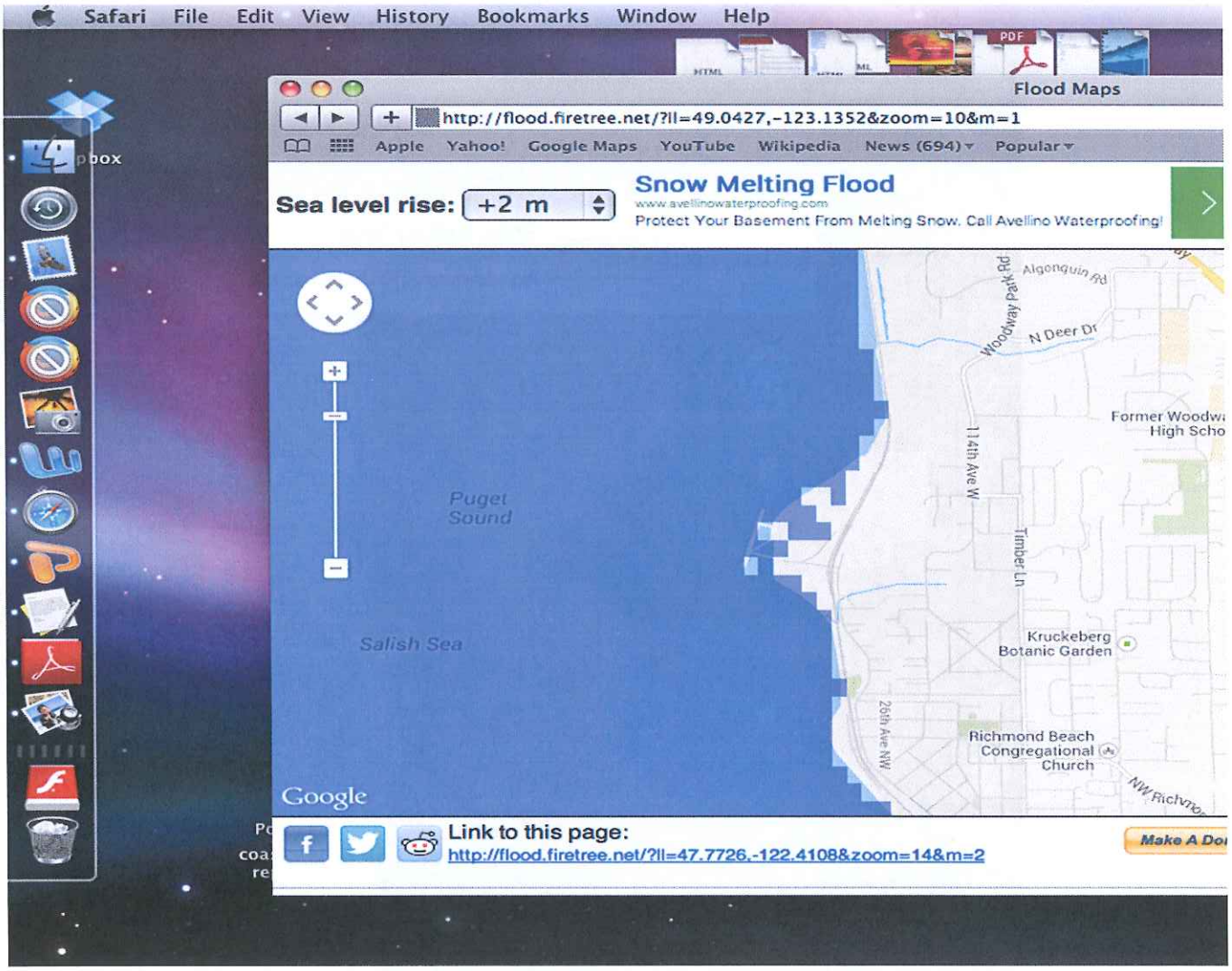
The earthquake hazard (see my earlier comment), is a roll of the dice, with only ~2% chance of seismic disaster in this century; in contrast, the predicted rise in global sea level is dead certain, with only the rate of future rise by 2100 still poorly predicted (as much as 1 meter (3.3 feet) (IPCC '13), or as much as 2 meters (6.6 feet) (NOAA)....see figures below. Even a 1 meter sea level rise is a serious hazard, especially at high tide in a storm surge, since most of the present Pt Wells site sits within a meter of current high tide.

Concerning BSRE's description of the Pt Wells site in their application that most (30 acres) of the area is 'upland' and not coastal 'tideland' (15 acres), I submit the following images of the inundation of the Pt Wells site by a successive sea level increases: of 1 meter, of 2 meters, of 3 meters. (see the images below). These maps are easily generated by a program to estimate sea level rise for any location on earth: http://flood.firetree.net/

Within a relatively short time after scheduled completion of the Point Wells urban center (village?), the ocean will reclaim it, the investment will be lost, and the site will have been abandoned. This is a certainty.



Pt Wells with a 2 meter sea level rise (more than half inundated). This could happen before the end of this century, within 50 years of the completion of the proposed build-out.



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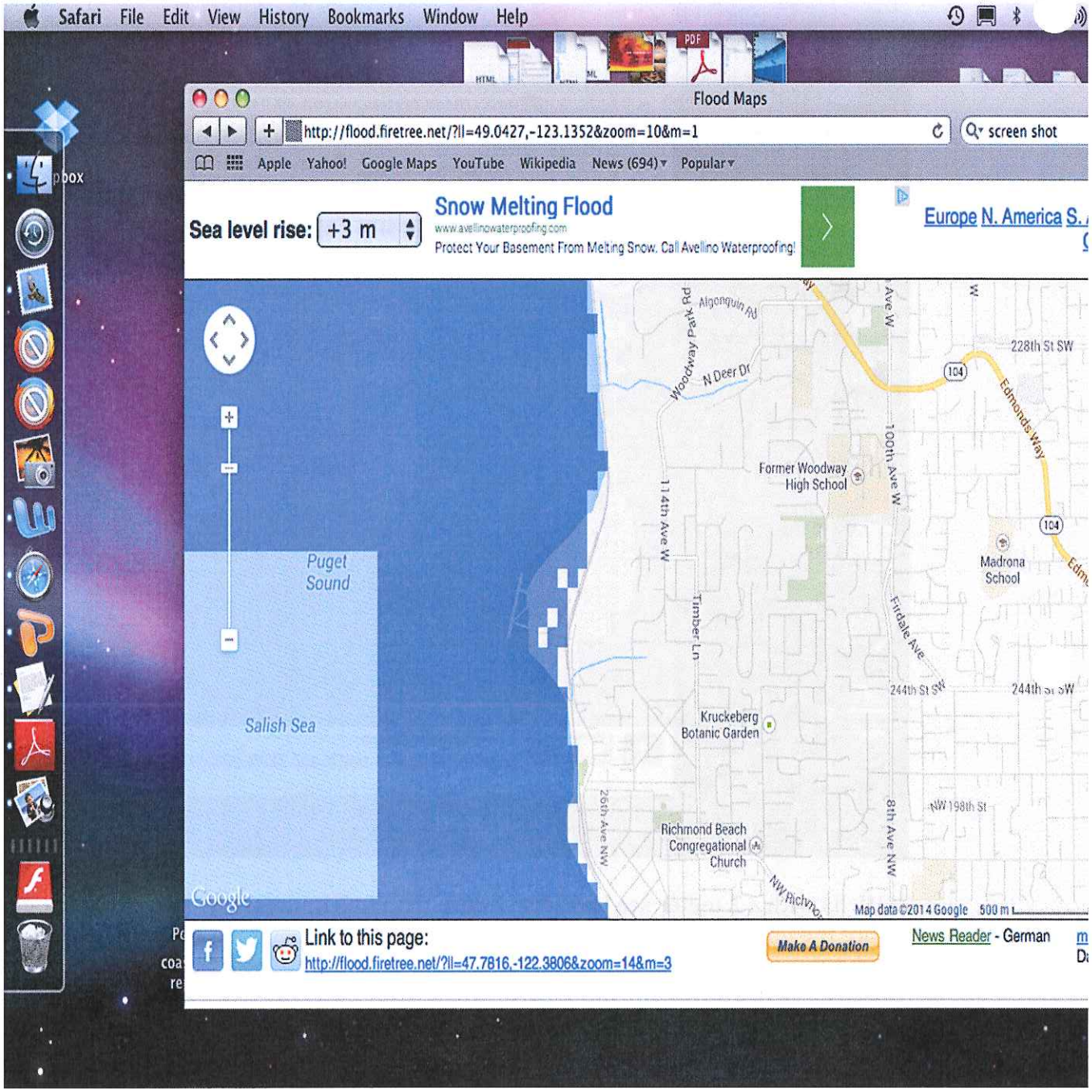
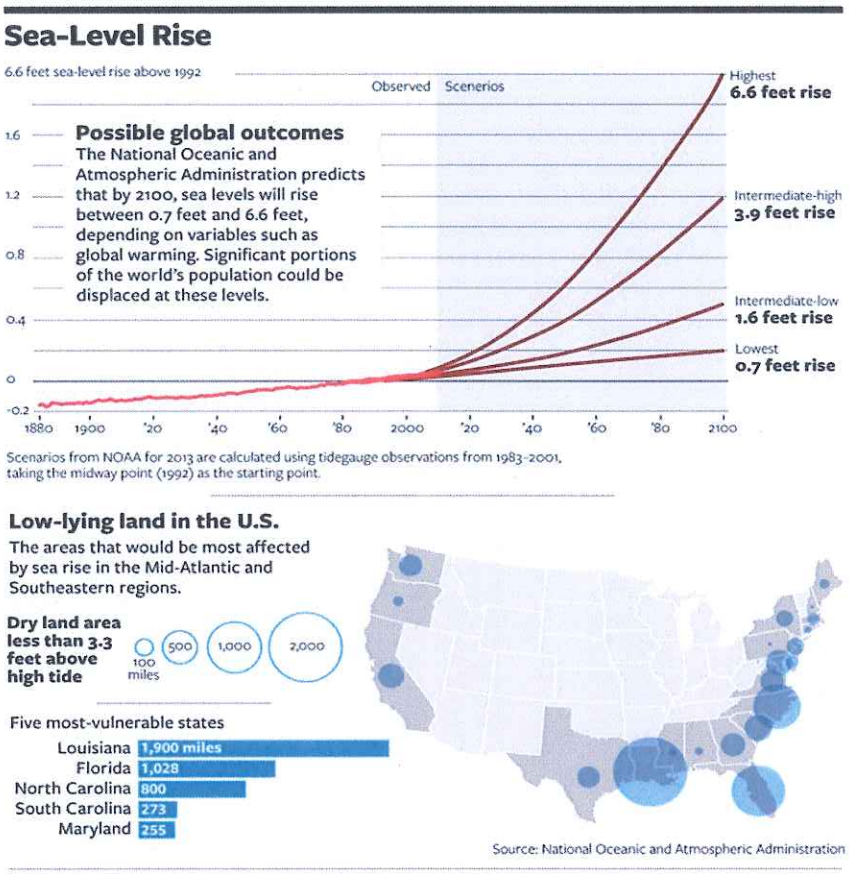


Pt Wells with a 3 meter (10 feet) of sea level increase, coming within the next ~150 years (Pt Wells is completely submerged and the center/village abandoned)



NOAA prediction of global sea level rise of as much as 2 meters (6.6 feet) by 2100

PC

Eastin, Darryl

From: gammon@u.washington.edu
Sent: Tuesday, March 25, 2014 4:36 PM
To: Eastin, Darryl
Cc: Richard H Gammon
Subject: EIS Scoping Comment (Pt Wells)
Attachments: Earthquake.docx

Dear Mr Eastin,

Below are my comments on one aspect of the Pt Well EIS, namely, the seismic hazard. i wlll write separately concerning sea level rise. I have also submitted comments to the City Shoreline regarding the Transportation Corridor Study.

Thank for your attention to these important issues.

Sincerely,

Richard H Gammon
20240 Richmond Beach Dr NW
Shoreline, Wa 98177
206-533-1141

Professor Emeritus
Chemistry and Oceanography
University of Washington
Seattle, Washington

To: Darryl Eastin, Principal Planner
Snohomish County Planning and Development Services

From: Professor Richard Gammon, University of Washington

Subject: Comment on the draft EIS for the Point Wells development

This comment concerns the multiple hazards of building a high-rise urban concentration (center or village) on a sand-spit at sea-level very near the seismically active South Whidbey Island Fault (SWIF), and just north of the Seattle Fault.

The information interpretated here has been furnished by Dr William Steele (Earth and Space Sciences, University of Washington), and by Professor Timothy Melbourne (Central Washington University)
I have attached a document (see below) on the estimated damage from a 7.4 quake on the South Whidbey Island Fault (supplied by Professor Melbourne's Cascadia Hazards Institute)

The most relevant seismic study of the Point Wells site was recently done for the Brightwater sewage outfall at the southern end of the Pt Wells property. The chance of a major quake (magnitude 6-7) is small, but not negligible (of order 3% per hundred years), given the frequency of major seismic events on this fault (every 3 to 4 thousand years on average).

Probable liquifaction of these uncompacted sandy soils at Pt Wells in the event of a SWIF quake, as well as the danger of a meter or more sea-level tsunami surge from a major Cascadia subduction quake off our coast only add to the cumulative seismic hazard for any urban concentration at Pt Wells.

Concentrating 10,000 people on the Pt Wells sand bar with no emergency exit should be forbidden. It is simply too dangerous

Professor Melbourne has said it best in his very recent Op/Ed in the Seattle Times (Wednesday, Feb 26th, 2014) on the unappreciated local earthquake hazard… .

" ...Owners of unsafe infrastructure, (such as) low lying beach homes..should be required to abandon or upgrade their buildings, and to clearly state to all occupants that they live or work in unsafe conditions and would be a major quake's first victims...Those living in places with no feasible safe exit deserve to be told they are rolling the dice for themselves and their children"

Dr. Timothy Melbourne,
Professor of Seismology and Tectonics
Central Washington University
Director, Cascadia Hazards Institute

Note: Professor Melbourne's warning applies directly to the ~10,000 people who would daily be put at great risk by the proposed Point Wells development. Who rolls the dice, and who is at risk?

UNDERSTANDING EARTHQUAKE HAZARDS IN WASHINGTON STATE

Modeling a Magnitude 7.4 Earthquake on the Southern Whidbey Island Fault Zone

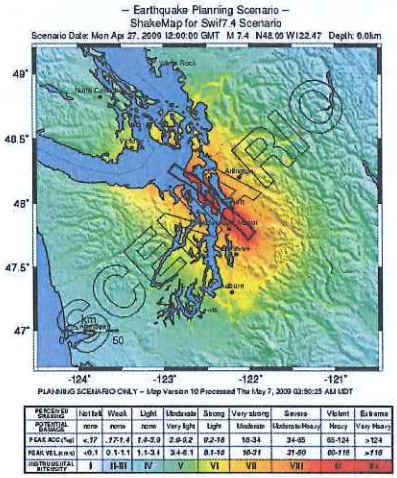
Geologic Description

The southern Whidbey Island fault (SWIF) stretches from the vicinity of Victoria, B.C., across Puget Sound as far as the Cascade Range. This scenario was modeled on the part of the SWIF from Woodinville to just west of Whidbey Island. The SWIF has been assessed by the USGS as capable of generating the largest crustal earthquake in Puget Sound.

The SWIF was originally envisioned as a single, steeply dipping, north-side-down fault reaching from Port Townsend to Woodinville. Over the past 15 years, geological and geophysical studies have extended the SWIF beyond this and reinterpreted the SWIF as a broad, north-side-up fault zone (6–11 kilometers; 4–7 miles wide) dipping steeply to the northeast. It has now been traced to the eastern Strait of Juan de Fuca. Seismic tomography has tracked the fault along the northwestern margin of the Port Townsend basin, where it is thought to merge with the Darrington–Devils Mountain fault zone near Victoria, B.C.

Geologic mapping has extended the SWIF from the eastern edge of Puget Sound southeastward to the vicinity of North Bend. Lidar and aeromagnetic data confirm that the SWIF projects onto the mainland near Everett and continues southeast towards Woodinville. A series of faults and folds in the Snoqualmie area have recently been mapped that likely correlate with the SWIF. These faults merge with mapped faults on Rattlesnake Mountain near North Bend and continue southeast into the Cascade Mountains.

Current researchers used aeromagnetic data to correlate faults in the Yakima fold and thrust belt with faults west of the Cascades. In their model, geophysical lineaments and mapped structures associated with Umtanum Ridge pass through the Cascades and merge with geophysical lineaments and mapped structures on and near Rattlesnake Mountain in western Washington. If this model is correct, the SWIF now extends about 385 kilometers (240 miles), from Victoria, B.C., to Hanford, Washington.



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

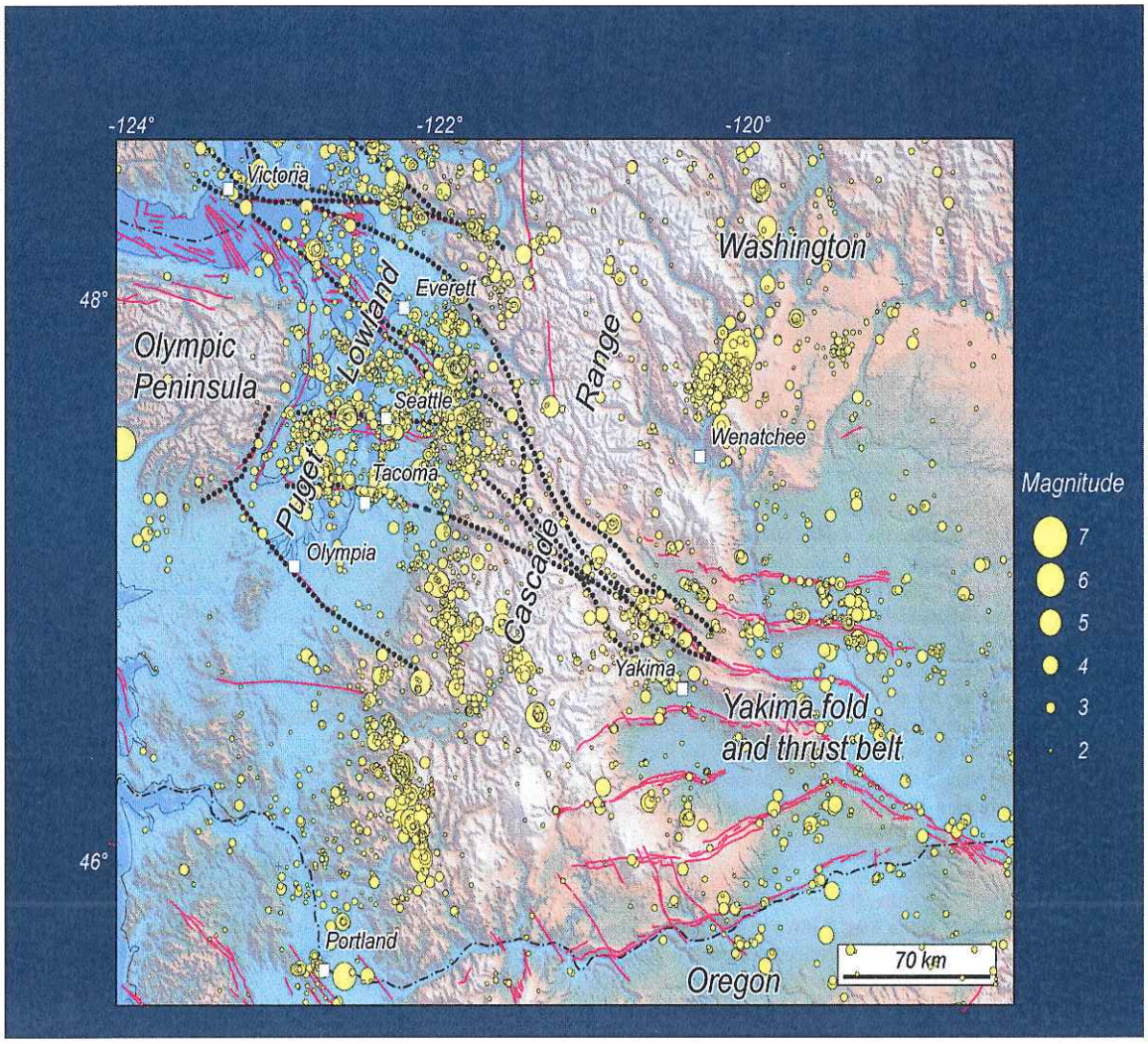
Figure 1. ShakeMap for a M7.4 earthquake on the southern Whidbey Island fault. The black polygon is the modeled fault rupture for this scenario.

Paleoseismology: Radiocarbon and stratigraphic data collected from sites on either side of the SWIF on Whidbey Island showed that the sea-level histories of the two sites were not comparable. Instead, the relative sea-level curves diverged 3,200 to 2,800 years ago, suggesting 1 to 2 meters of uplift along the north side of the fault. This suggests the fault has been active in the past. Based on these calculations, researchers concluded that the SWIF is capable of producing a magnitude 6.5 to 7.0 earthquake.

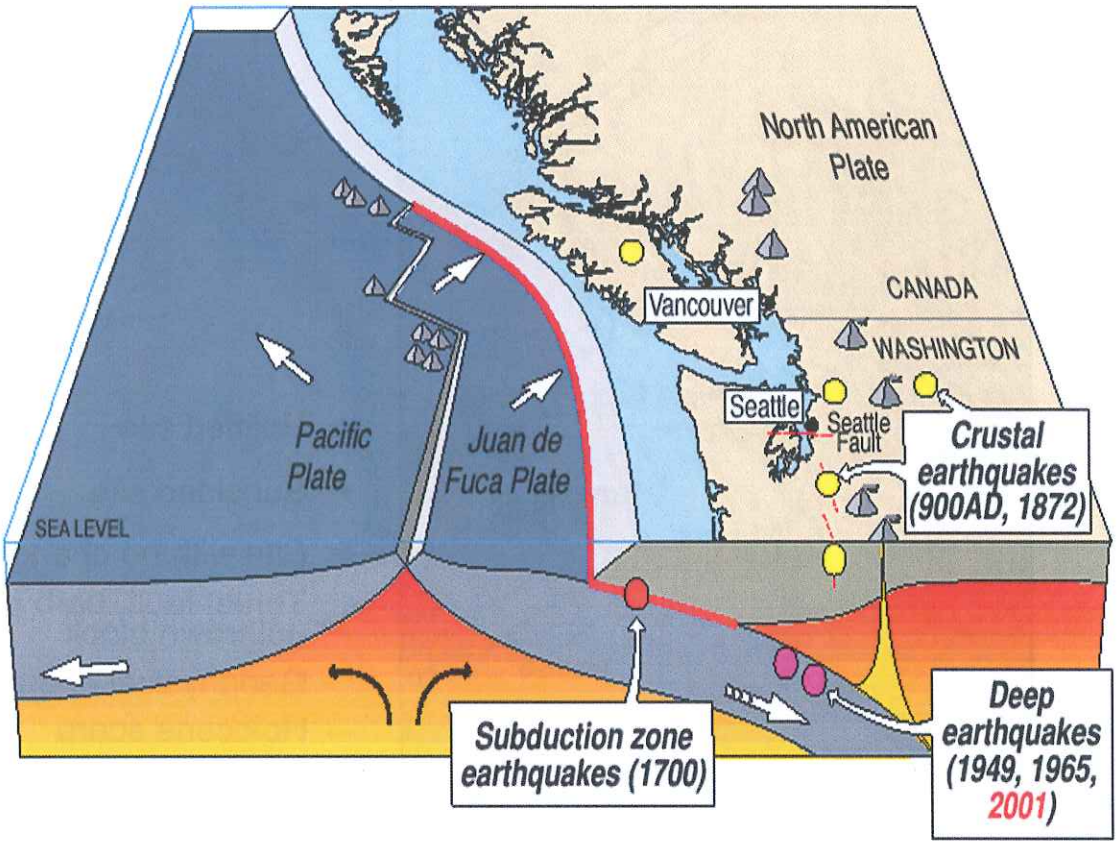
WASHINGTON STATE DEPARTMENT OF Natural Resources

USGS science for a changing world

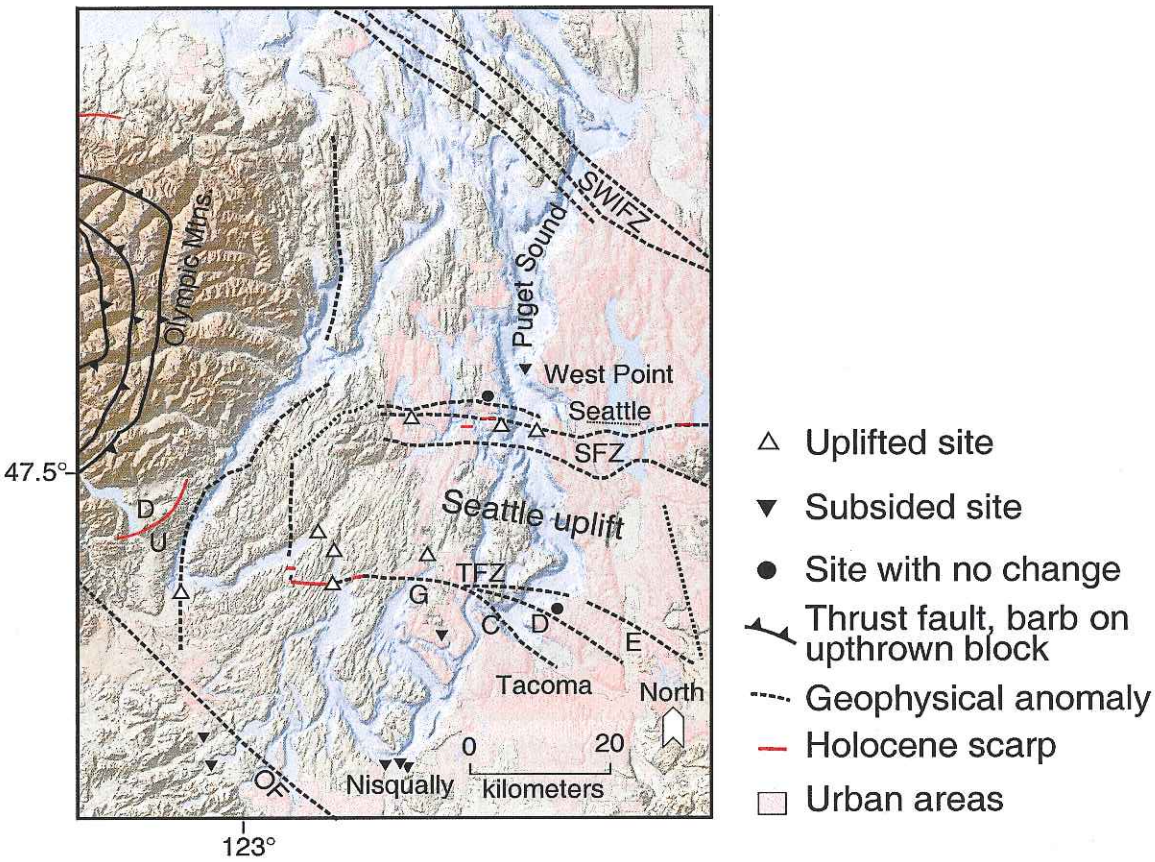
FEMA



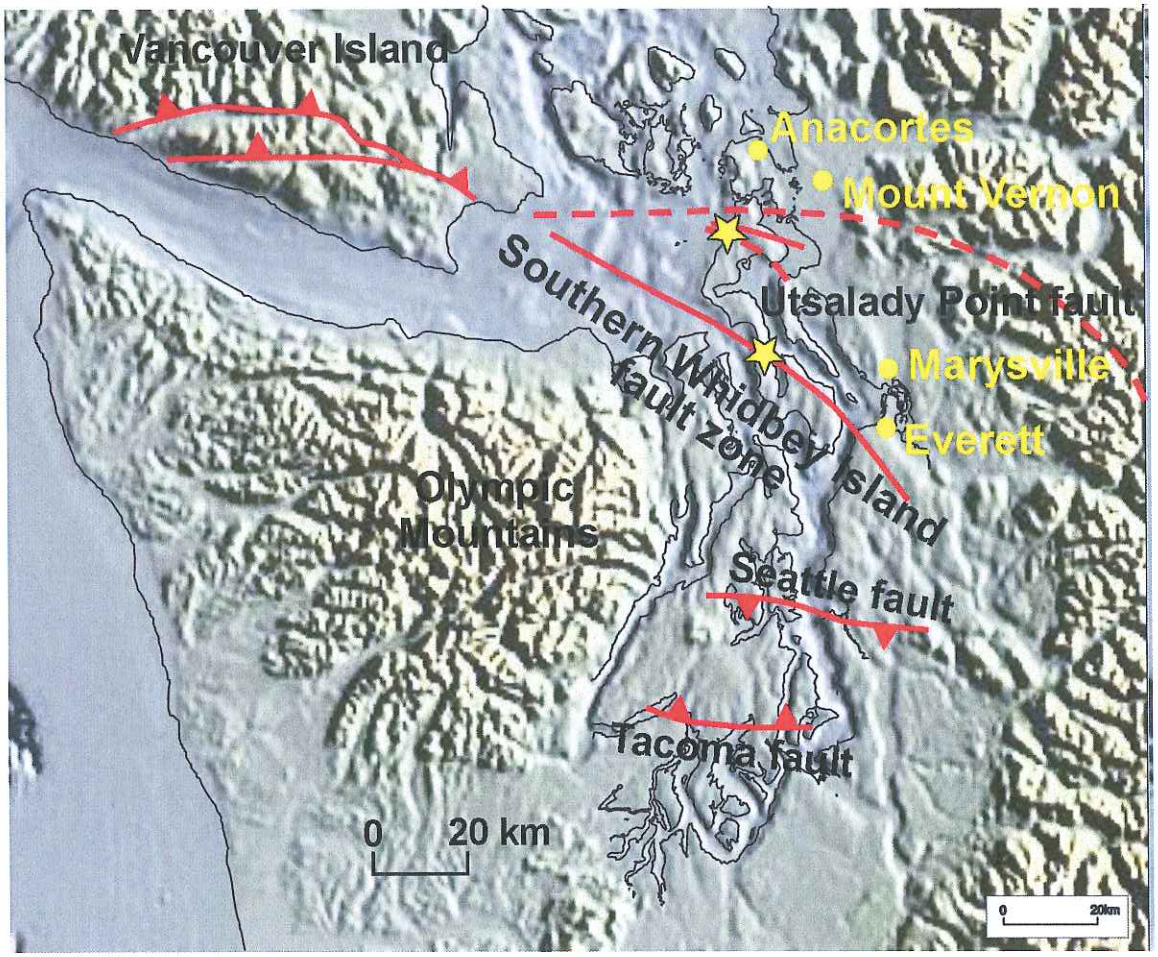
Recent earthquakes in the Puget Sound region by magnitude. Note that the region between Seattle and Everett, where Pt Wells is located, just south of Edmonds is very seismically active.



A larger picture of the seismic hazard in the Pacific NW, with timing of most recent earthquakes



A map of faults including the South Whidbey Island Fault



Another view of the SWIF