

Tsunamigenic Landslide Potential in Puget Sound, Washington

Tsunami Workshop Planning Meeting

Center for Tsunami Inundation Mapping Efforts

24 April 2002

The Center for Tsunami Inundation Mapping Efforts has created a number of graphics to depict areas of steep topographic and bathymetric slopes and potential tsunamigenic landslides. A graphic of Puget Sound river deltas was also created. These graphics were developed by GIS analysis using ESRI ArcView 3.2.

Computations were made based on the following parameters:

Projection: Universal Transverse Mercator, Zone 10

Horizontal Datum: North American Datum 1927

Vertical Datum: National Geodetic Vertical Datum 1929

Resolution: 30 meters

Units: meters

Extent: SW 466755, 5200095; NE 571365, 5362875

Distance units: meters

The University of Washington PRISM 30-meter bathymetry and topography grid was used to conduct the analysis. The grid was clipped to remove inaccurate data surrounding Bellingham and the Nooksak River delta. Three contours at -30, 0, and 50 meters were created from the grid set using Spatial Analyst. 150- and 200-meter buffers were created using the 0 contour line as the source file.

Intersection between the -30-meter contour line with the 200-meter buffer was calculated using the XTools extension to determine areas of deep water. Intersection between the 50-meter contour line and the 150-meter buffer was calculated to determine areas of steep elevation. "Deep and Steep" areas were added by visually examining the intersection results to find areas of generally coincident steep elevation and deep water.

Table 1. Data Files.

Item	Filename	Description
Bathymetry-Topography Grid	prism30	Merged 30-meter resolution bathymetry and topography grid from University of Washington PRISM project.
Shoreline	shore	Shoreline depicted as zero contour of prism30.
Topographic Limit	tline	50-meter contour of prism30 to represent the height limit of the analysis.
Bathymetric Limit	bline	-30-meter contour of prism30 to represent the depth limit of the analysis.
Buffer (150m)	buff150	150-meter buffer limit for topographic slope analysis.
Buffer (200m)	buff200	200-meter buffer limit for bathymetric slope analysis.
Coastal Bluffs	steep	Areas that represent steep topographic slopes depicted by an elevation within 150 meters of the shore that exceeds 50 meters.
Deep Water	deep	Areas that represent steep bathymetric slopes depicted by a depth within 200 meters of the shore that exceeds 30 meters.
Deep and Steep Areas	slide	Potential tsunamigenic landslide areas based on both steep elevation and deep waters as described above.

Table 2. Statistics.

Length of coast with steep topography	280 km
Length of coast with deep water	355 km
Length of coast with possible tsunamigenic landslide risk (note: estimation due to generalization of prone areas.)	~200 km

Area and length were calculated and are provided in tables.

Statistics: length of segment, percentage of coast.

Compare to stability plots from ecology website or bluebooks in library.

Import prism30

shore = contour(prism30, list, 0)

bline = contour(prism30, list -300)

tline = contour(prism30, list,500)

projectdefine cover shore

build shore arc

build shore node

buffer shore buff150 # # 150 # line flat

buffer shore buff200 # # 200 # line flat

intersect bline with buff200

intersect tline with buff100