

Landslides on Puget Sound

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**Shoreline and Coastal
Planners Group**

Lacey Community Center
5 October 2017





Overvie

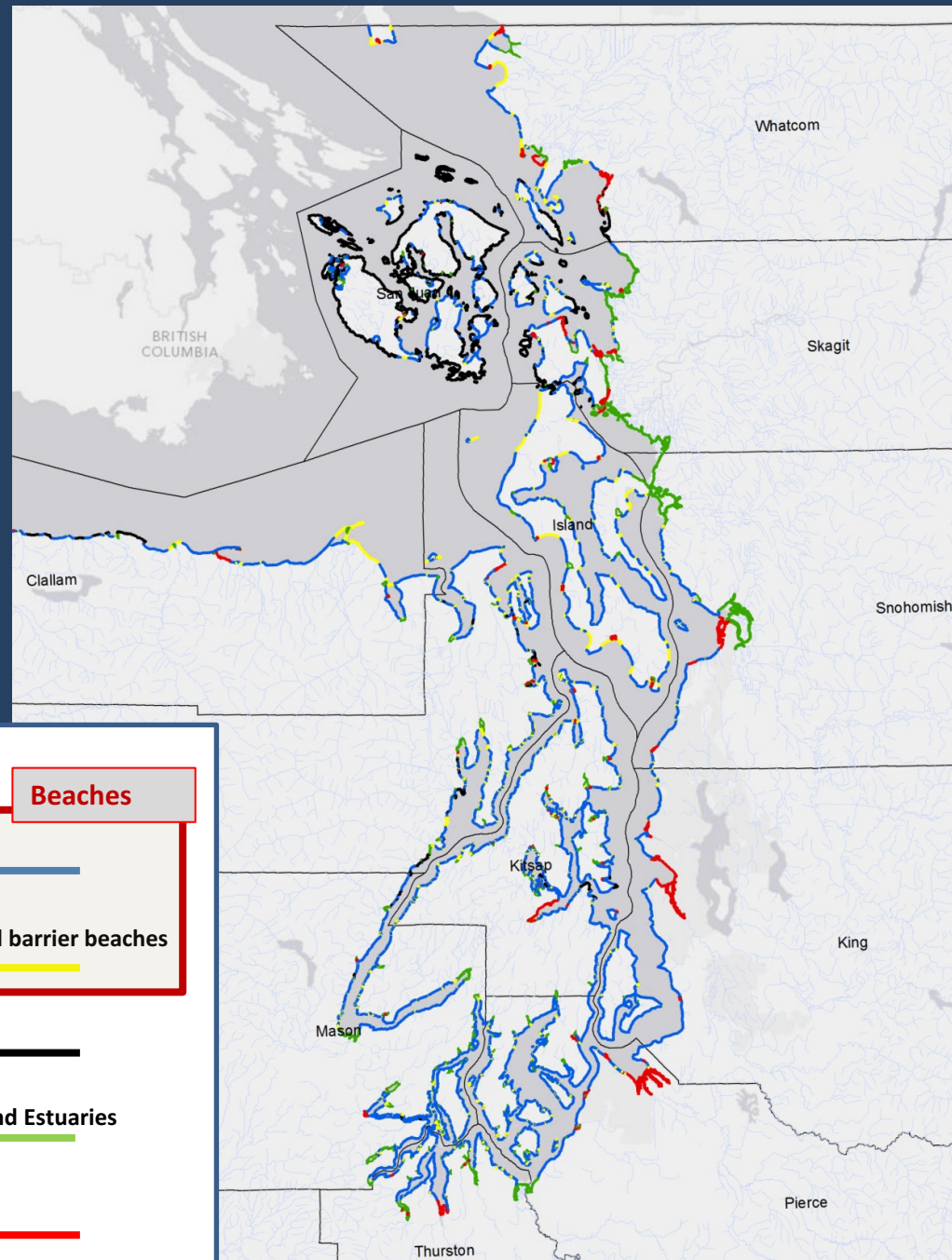
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1. Puget Sound Bluffs
2. Landslide Gallery/Tour
3. Planning/Development Issues

Perkins Lane, Seattle
(photo: Len Palmer)

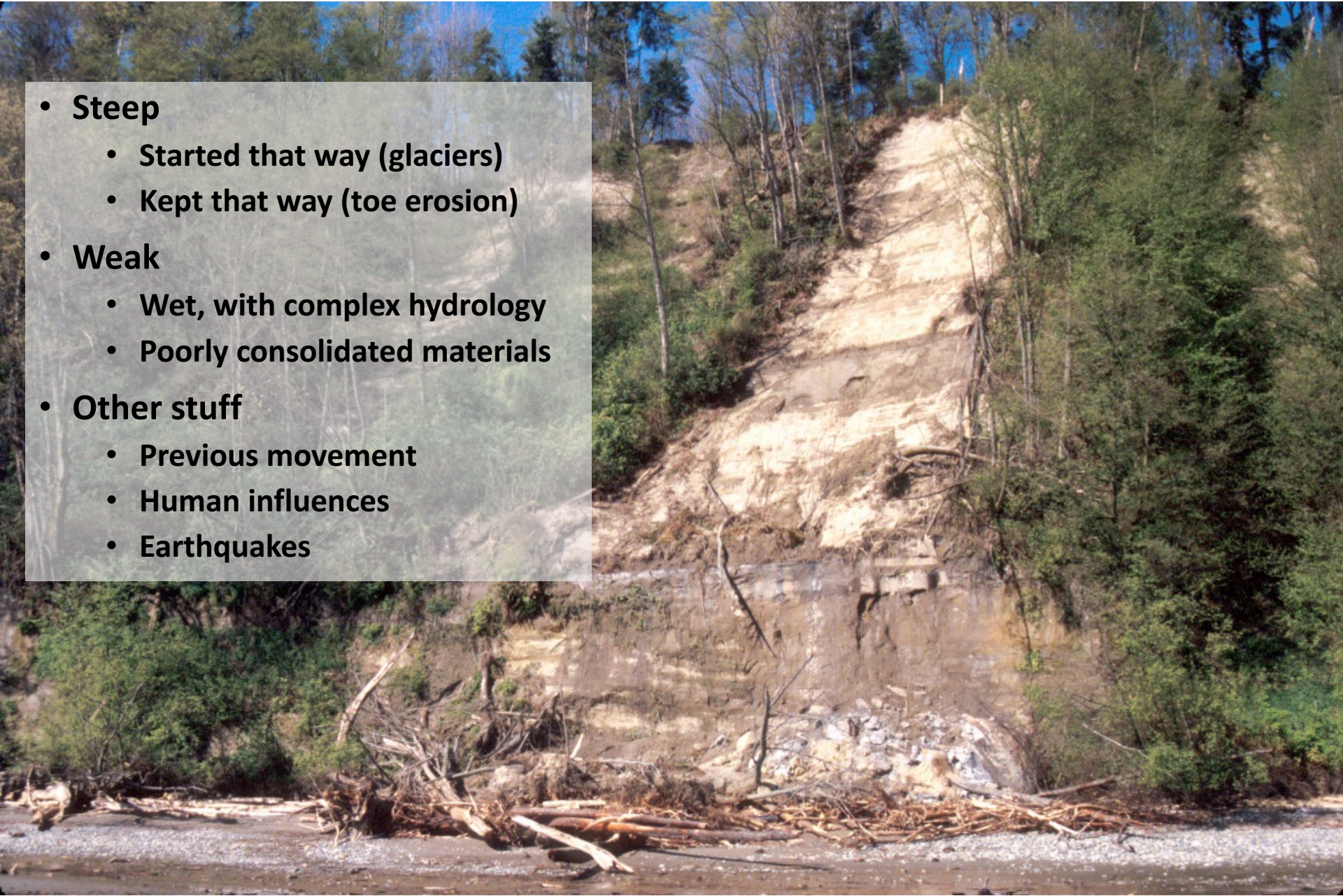
Puget Sound Bluffs

- Steep slopes along the shore
- Any height
- Wide variety of slides
- Regional variation
- **Not all are landslide hazards**



Why are coastal bluffs unstable?

- **Steep**
 - Started that way (glaciers)
 - Kept that way (toe erosion)
- **Weak**
 - Wet, with complex hydrology
 - Poorly consolidated materials
- **Other stuff**
 - Previous movement
 - Human influences
 - Earthquakes



Why are coastal bluffs popular?



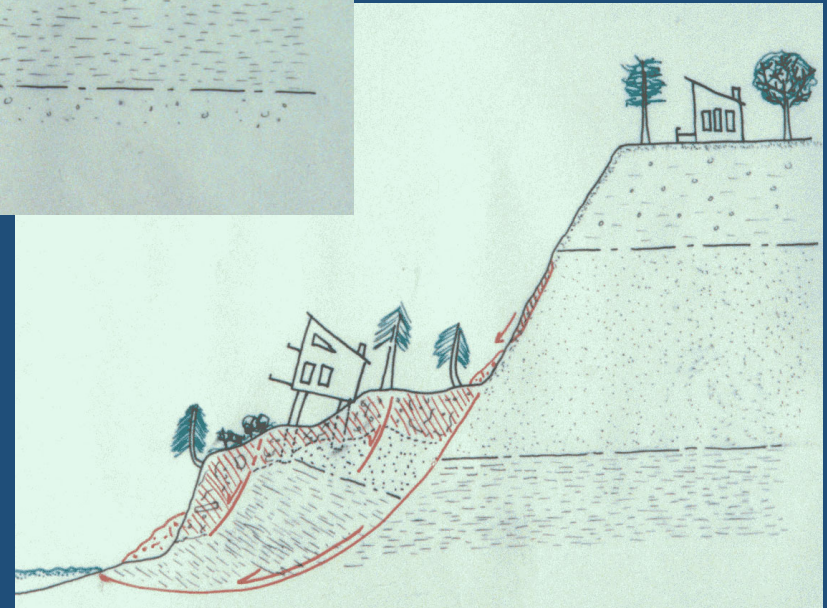
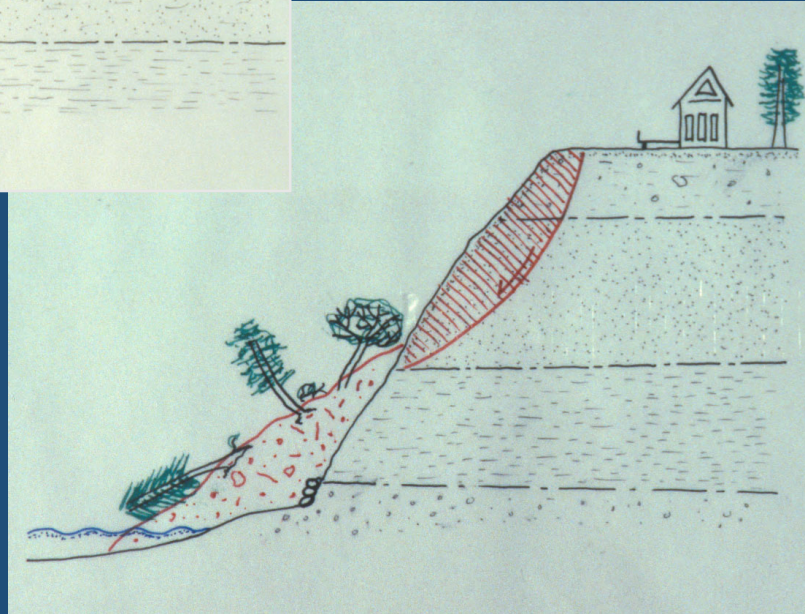
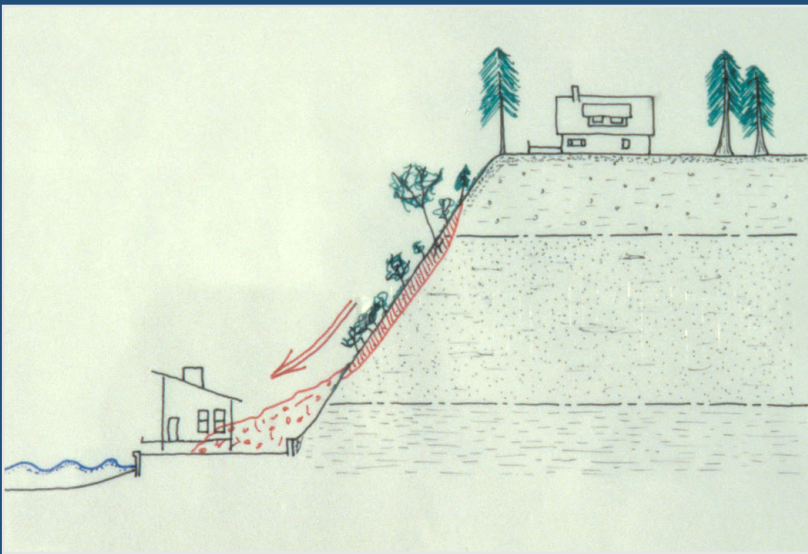
- Views
- Proximity/access to the water
- High demand/high prestige residential property
- Lack of awareness or underestimation of risks
- Confidence that instability can be dealt with

RESIDENTIAL EMPHASIS

But also:

- Parks and recreation
- Transportation corridors
- Commercial activity

Landslide Gallery: Types and Examples





**Cape George
Jefferson County**



**Hartstene Island
Mason County**

Hugh Shipman, WA Ecology



Rolling Bay Walk (1997)
Bainbridge Island
(photo: Len Palmer)



Possession/Glendale (1980)
Whidbey Island
(photo: Dave Frank)



Carlyon Beach (1999)
Thurston County

5 8 '99



Hammersley Inlet (1996)
Mason County

3/29/96

010411 131310



Ledgewood Beach (2001)
Whidbey Island



**Ledgewood Beach (2006)
Whidbey Island**

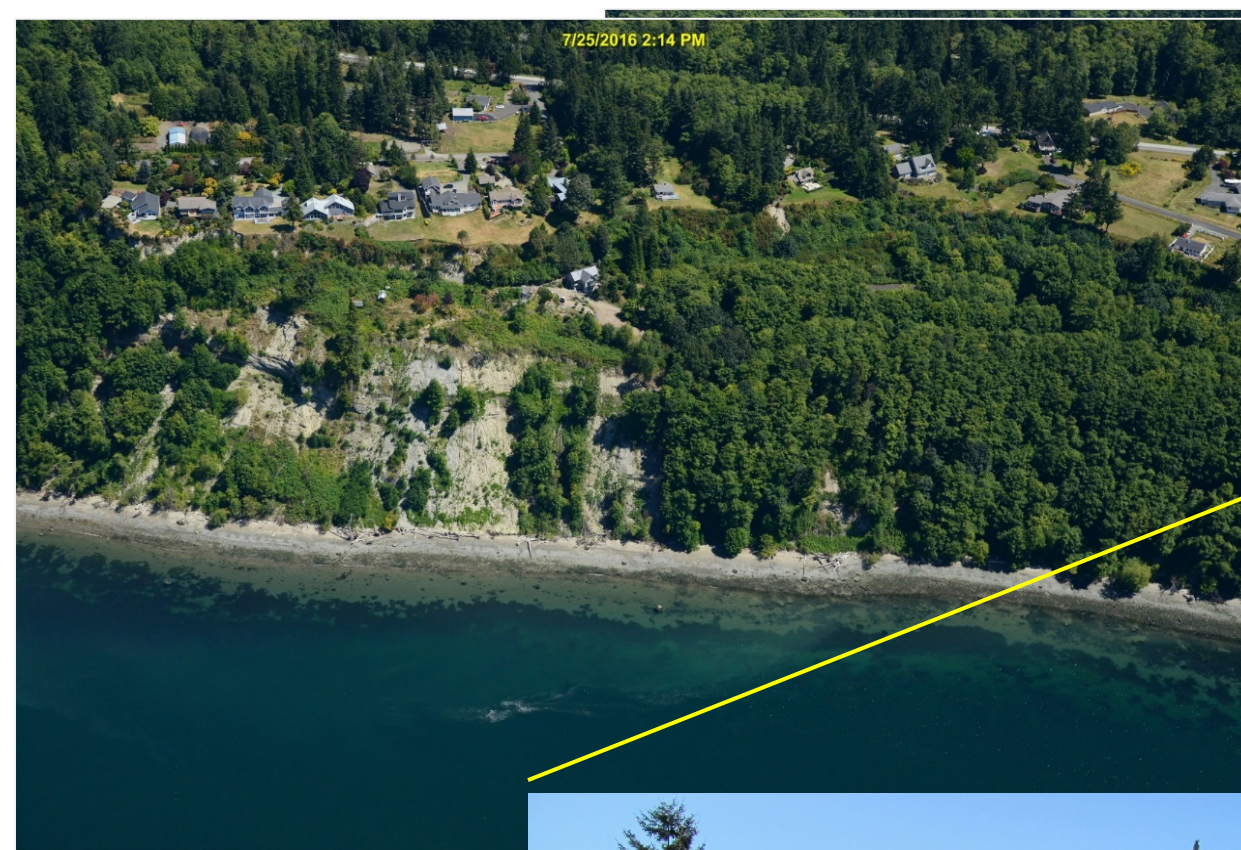


Ledgewood Beach (2013)
Whidbey Island

KING5 News
March 27, 2013

7/25/2016 2:14 PM

7/25/2016 2:14 PM



**N. of Bush Point
Whidbey Island**



Just seeing small
part of a big picture!

Planning and Development Issues

- New development in steep slope/slide prone areas
- Setbacks from steep slopes
- Associated activities:
Stairs and Trams
- Armor and stabilization
- Landslides as an
environmental issue



**Foulweather Bluff
Kitsap County**

**Building on or
near landslides**



- *Avoiding* landslide-prone areas
- *Reducing* the likelihood or severity of slides
- *Engineering* sites and buildings to withstand landslide risks



**Perkins Lane
Seattle**

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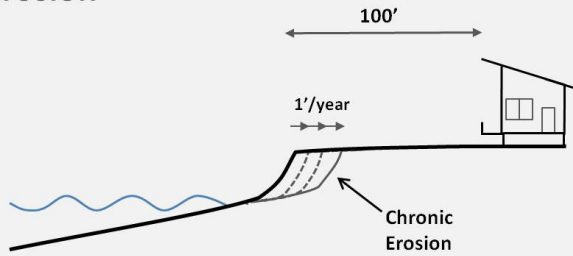
Undeveloped lots within developed landslides



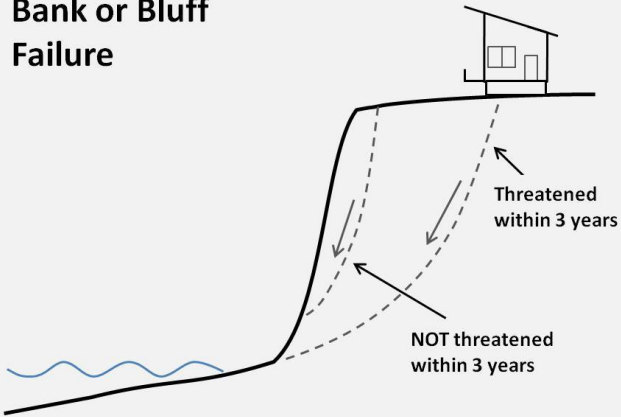
**Broomgerrie
Bainbridge Island**

Setbacks

Gradual Bank Retreat or Bluff Erosion



Bank or Bluff Failure





Point Jefferson (2016)
Kitsap County

010512-150002

**Hammersley Inlet
Mason County**



**Double Bluff
Whidbey Island**



Stairs and Trams

- *Not the houses themselves, but the stuff that goes with them...*



**Marrowstone Island
Jefferson County**

**Magnolia Bluff
Seattle**

Landslides and Bulkheads: *Engineering*

- *Will* slow toe erosion
- *May* buttress slope

- Do not prevent slides from higher on slope
- Usually not sufficient to prevent deep movement



**Ledgewood
Whidbey Island**

Upslope stabilization

Engineering wisdom
Environmental impact



**Rolling Bay
Bainbridge Island**



**Suquamish
Kitsap County**

Landslides and Bulkheads: *Environment*

Riparian Vegetation



Feeder Bluffs

- *As with dikes in floodplains, growing recognition that **preventing** a hazard has long-term environmental consequences.*
- *Shifts emphasis to **avoiding** risks and **maintaining** natural processes*

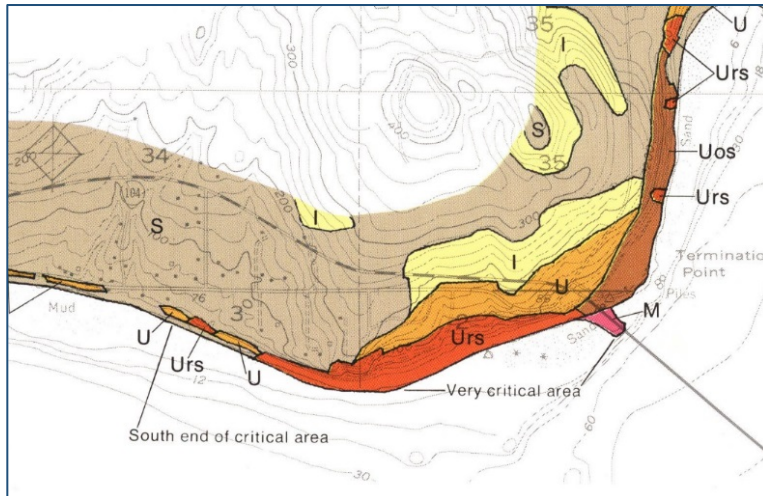


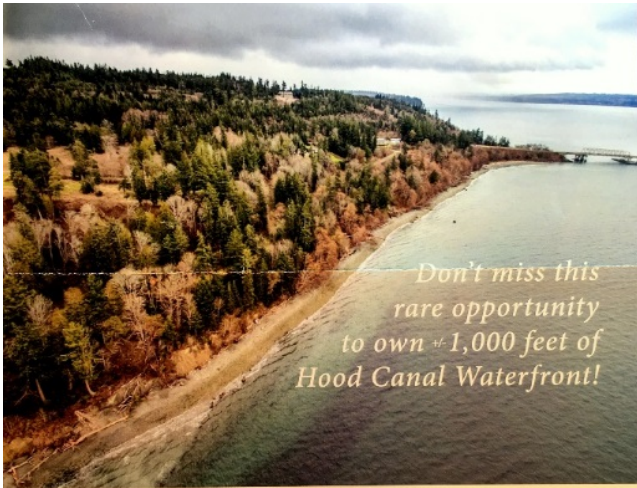
**Landslides are an
ecosystem process!**

**Waterman
Whidbey Island**



Termination Point (Hood Canal)





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The End

FOR SALE
BY OWNER
BEST BUY, BEST VIEW
ON PERKINS LANE

NO SLIDES
CIVIL ENGINEER SAYS -----
"GOOD CONDITION *to* BUILD ON"

ME. 3843 -- MA. 8847

150 Ft. FRONTAGE -- WILL DIVIDE

15396
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