Introduction to the State of Alaska’s Seismic Hazards Safety Commission And Ocean Fury Tsunami Discussion

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The Alaska Seismic Hazards Safety Commission (ASHSC)

Laura Kelly, PE
- Vice Chair, Federal Agency Rep., ASHSC (Active member 2005 – present)
- Civil Engineer, US Coast Guard (Fed. Employee) , Kodiak, AK (2000 – present)

Discussion Topics

- Purpose/ Vision of the ASHSC
- Tsunamis & Earthquakes in Kodiak
- Active Seismic Regions of Alaska & Associated Tectonics
- How to Plan/Respond
Commission Mission
Why does this Governor’s Commission exist?

Advise the public and private sectors on approaches for mitigating earthquake and tsunami risk. Make recommendations to the governor and legislature for reducing the State’s vulnerability to these seismic hazards.
- California Seismic Safety Commission
- Cascadia Region Earthquake Workgroup (CREW)
- Oregon Seismic Safety Policy Advisory Commission
- Utah Seismic Safety Commission

See: Western States Seismic Policy Council (www.wsspc.org)
11 Members of the ASHC

- John Aho-Public/Restricted (Chair)
- Laura Kelly-Federal Agency (Vice Chair)
- Rich Koehler-DNR Representative
- *Roger Hansen-UAF Representative
- Mark Roberts-DMVA Representative
- *Gary Carver-Public/Restricted
- Robert (Buzz) Scher-Public/Restricted
- Gay Dunham-Local Government Representative
- Dan Mahalak-Local Government Representative
- Dave Miller-Local Government Representative
- Gayle White-Insurance Representative
- Plus: April Woolery- DNR Assistant

*(Appearance in Ocean Fury, 2004 – 40th Anniversary of 1964 Earthquake and Tsunami)*
Commission Committees

- Insurance - White
- Schools - Kelly
- Earthquake Scenario - Koehler
- Education & Outreach - Aho
- Hazards Identification - Carver
- Response & Recovery - Roberts
- Post Earthquake Planning - Roberts
- Partnership – Aho
- Tsunamis
Please visit our website: http://www.seismic.alaska.gov
USCG – Kodiak, AK: Tsunami Hazard

CITY OF KODIAK
50% LOSS OF FISHING INDUSTRY
75% LOSS OF CITY BUSINESS, BUILDINGS.
NO WATER, NO POWER
75% FOOD SUPPLIES DESTROYED.
ALASKA EARTHQUAKE STATISTICS

- Alaska is home of the second largest earthquake ever (Chile, 1960, M9.5; Alaska PWS, 1964, M9.2; Sumatra, 2004, M9.1; Japan, 2011, M 9.0; Kamchatka, 1954, M9.0; Chile, 2010, M8.8; Alaska Rat Islands, 1965, M8.7)
- Alaska has 11 percent of the world’s recorded earthquakes
- Three of the eight largest earthquakes in the world were in Alaska
- Seven of the ten largest earthquakes in the United States were in Alaska
Top Priorities

**Completed:**
- Kodiak
- Homer/Seldovia
- Seward

**In Progress:**
- Whittier (close)
- Cordova
- Valdez
- Tatitlek
- Chenega Bay

**Next:**
- Sitka
- Sand Point
- Unalaska
- Juneau/Douglas
- Akutan
- Yakutat

Link to tsunami hazard maps from Alaska Earthquake Information Center
http://www.aeic.alaska.edu/tsunami/kodiak.html
Geological setting

- Fjord head delta
- Lowell Cr. Fan delta
- Blocky debris
- Forth of July Cr. Fan delta
- Spruce Cr. Fan delta
Major slide complexes and their volumes ($x\ 10^6 m^3$)

1. Seward downtown  &  27.5  
2. Lowell Point  &  18.1  
3. Resurrection river delta  &  2.9  
4. 4th of July Point  &  35.0  
5. Middle bay  &  40.7  
6. Tonsina Point  &  16.8  
7. West shore  &  15.3  
8. East shore  &  4.5  
9. Thumb Cove  &  16.5  
10. South slope  &  33.3  

Total: 210.6
• ~7m net subsidence superimposed on seven earthquake cycles in the past 4000 years.

• EDC model for the Girdwood area with coseismic subsidence (1), followed by rapid post-seismic uplift in the decades after the earthquake (2). This merges into centuries of slower inter-seismic uplift (3) before a period of pre-seismic subsidence (4).

• Great earthquakes: no fixed recurrence interval between great. The shortest interval is between ~180 and 720 years. The longest interval is 790 – 920 years, which is between the penultimate earthquake and the Mw9.2 Alaska earthquake of March 1964.
HISTORIC SEISMICITY - KODIAK REGION - 1900-2001

Year

Magnitude (M)

1900 1920 1940 1960 1980 2000

Data Base:
M ≥ 7.0: 1900 - 2001: R = 150 km
M ≥ 6.0: 1950 - 2001: R = 100 km
M ≥ 5.0: 1970 - 2000: R = 50 km
Center of R - Kodiak City

Recurrence:
M ≥ 7.0 - 10.0 yrs
M ≥ 8.0 - 33.3 yrs
How to Plan and Respond?

How National Tsunami Hazard Mitigation Program works in Alaska

Hazard Assessment

Warning Guidance

Mitigation
USCG – Kodiak, AK: Earthquake Induced Landslides

SLIDE AREA & ROAD THAT FAILED IN 1964 EARTHQUAKE. SLIDE AREA WILL PROBABLY ONCE AGAIN PREVENT TRAVEL BETWEEN TOWN AND USCG BASE

KODIAK’S PRIMARY FACILITY USED TO LOAD/OFF-LOAD CONTAINER VESSELS
USCG – Kodiak, AK: Liquefaction

Historical Panoramic Photograph of Womens Bay, June 1940.
Final Results Mapped & Prioritized Action Taken

Peterson Elementary School
(Originally constructed by Navy ca 1952, ~300
occupants, primarily children of USCG personnel)
Retrofitted by Borough in 2008. Success due to increased understanding at local level, 2003 USCG RVS and pro bono review by Structural Engineer, extremely proactive local government, & support money via Federal Grants and State/Local Funding.
"High dwellings are the peace and harmony of our descendants," the stone slab reads. "Remember the calamity of the great tsunamis. Do not build any homes below this point." - 600+ year old marker, ANEYOSHI, JAPAN

Through history, this community elected to not allow construction below this marker. Consequently, their homes were spared by the March 11 tsunami.

In a neighboring community, a school had been constructed 500 feet from the ocean’s edge… the children attending that school have not been found.

NOTE: In some communities these markers were submerged.
“Beach Seiners”
by Eustace Ziegler, Alaskan Frontier Artist (My great grandfather’s brother)

Note: Numerous pieces of his artwork were lost in the 1964 Valdez tsunami. Some of his surviving works can be seen at the Anchorage Museum.

Questions? E-mail: Laura.W.Kelly@uscg.mil