Preparing for Natural Disaster Events in Washington

Kris Grinnell

Washington Department of Ecology
• 25 mountains >8,000 feet

• 30 – 200 inches rain per year

• 3,000 miles of shoreline

• Puget Sound: 2nd largest estuary in U.S.
Sea level rise: Increase of 8.6 inches
Coastal flooding: From ~1 to ~3 flood days/year and nuisance tidal floods
Heavy rain events (24-hour rainfall): Wetter springs
Wildfires: Number and extent - since 1970s
Spring snowpack: Decline in Western states

Source: CIG 2015, EPA 2016, NOAA 2017; CIG 2019
Increased Flooding
Pacific Northwest
Convergence of Events

Wet spring
+
Heavy rain events
+
Saturated soils & snowmelt influenced rivers at capacity
+
Early spring snowmelt
=
Unprecedented Flooding

Sources: Bruce Haffner, Spokesman Review; Washington Post
Wild and Forest Fires
Average annual air temperatures

- Increase up to 9.1°F
- Warming for all seasons
- Greatest increase in summer
- More frequent extreme heat events
- Less frequent extreme cold events

Source CIG 2015, IPCC 2014
Wildfire
Pacific Northwest - 2015

Source: NASA.gov
Erosion and Storm Severity

1990 – Washaway Beach

2016 – Washaway Beach

Source: Bobbak Talebi, Ecology
Landslides

Before

After

Oso, WA

Sources: Seattle Times & CBS News
“...Warming of the climate is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and sea level has risen.”

Translation: Climate change is happening now

“...It is extremely likely that more than half of the observed increase in global average surface temperature from 1951 to 2010 is caused by the anthropogenic increase in greenhouse gas concentrations and other anthropogenic forcings together.”

Translation: People are major contributors to climate change

Source IPCC, 2017
Washington State Governor’s Office and Legislation

• Governor’s Office
  ◦ WA Climate Change Challenge, 2007
  ◦ Pacific Coast Collaborative, 2008
  ◦ Washington’s Leadership on Climate Change, 2009
  ◦ Carbon Emissions Reduction Task Force, 2014
  ◦ Clean Air Rule enacted in 2017

• Legislature
  ◦ ~50 laws passed in past ten years ranging from greenhouse gas emissions reductions to green economy jobs
Probabilistic Sea Level Rise Projections

- 171 locations along coastline
- Absolute and relative sea level rise projections
- Includes vertical land movement
- Access the report:
  

Adaptation Strategy Guidance

- Climate science
- Vulnerabilities assessment
- Adaptation Strategy
- Appendices

Adaptation Strategies for Resilient Cleanup Remedies

A Guide for Cleanup Project Managers to Increase the Resilience of Toxic Cleanup Sites to the Impacts from Climate Change

November 2017
Publication no. 17-09-052
Climate Change & Cleanup
Why an Adaptation Strategy?

• By law, cleanup remedies must be:
  o Protective of human health
  o Protective of environmental health
  o Effective over the long term

• Adaptation strategy guidance
  o Consistent with enforcing cleanup laws and rules
  o Supports long-term adaptive management of contained remedies
Adaptation Strategy Guidance

• Vulnerabilities identified based on:
  o Flooding
  o Sea level rise
  o Wildfire
  o Landslide
  o Drought

• Resilience recommendations based on:
  o Location of site
  o Type of site
  o Type of remedy
  o Cleanup phase
And Finally

Final Guidance

*Adaptation Strategies for Resilient Cleanup Remedies*

*Guidance for cleanup project managers to increase the resilience of toxic cleanup sites to the impacts from climate change*

Publication No. 17-09-052

[https://fortress.wa.gov/ecy/publications/SummaryPages/1709052.html](https://fortress.wa.gov/ecy/publications/SummaryPages/1709052.html)

**Summer 2019** – Finalize the public facing GIS web application
Potential Effects:
Underground Storage Tanks
Focus on: Storage Tanks and Climate Change

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Special accommodations
To request ADA accommodation including materials in a format for the visually impaired, call Ecology.

How can you protect your business?
One of the easiest things you can do to protect your business is learn more about climate impacts that might threaten it. You may not need to take any immediate steps to protect your investment, but you may find ways to safeguard your tanks and business over the next few decades.
The following links can teach you about potential threats and guide you to resources that might help.

Where you can learn more
1. Learn about climate threats to tanks.

Service station flooded during extreme weather event.
Provide Information

- Threats to Tanks
- Financial resources to help upgrade tanks
- Map links
- Insurance views on more severe weather
- Success stories using FEMA Communities Rating System to protect communities from flood risk
Make UST Owners aware
Conclusions

• Highest risk impacts: sea level rise and flooding
• Greatest vulnerability: inundation
• Most effective responses:
  o Maintain UST systems
  o Emergency plan

• Increase awareness and inform upgrade decisions
Special Thanks

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