Climate Resiliency Planning: Turning Science into Action

PNW Climate Conference | October 11, 2017

Agenda…

1. Getting to Ground: Lessons Learning
2. It's complicated: Intergovernmental floodplain management
3. Let's talk about uncertainty
4. The leap from technical analyses to community meetings
5. Questions and Discussion

Presenting today…

The Nature Conservancy Washington — Julie Morse | Regional Ecologist

Van Ness Feldman LLP — Molly Lawrence | Attorney

MAUL FOSTER ALONGI — Gretchen Greene | Economist

MAUL FOSTER ALONGI — Michael Stringer | Planner

Floodplains by Design

Floodplains by Design

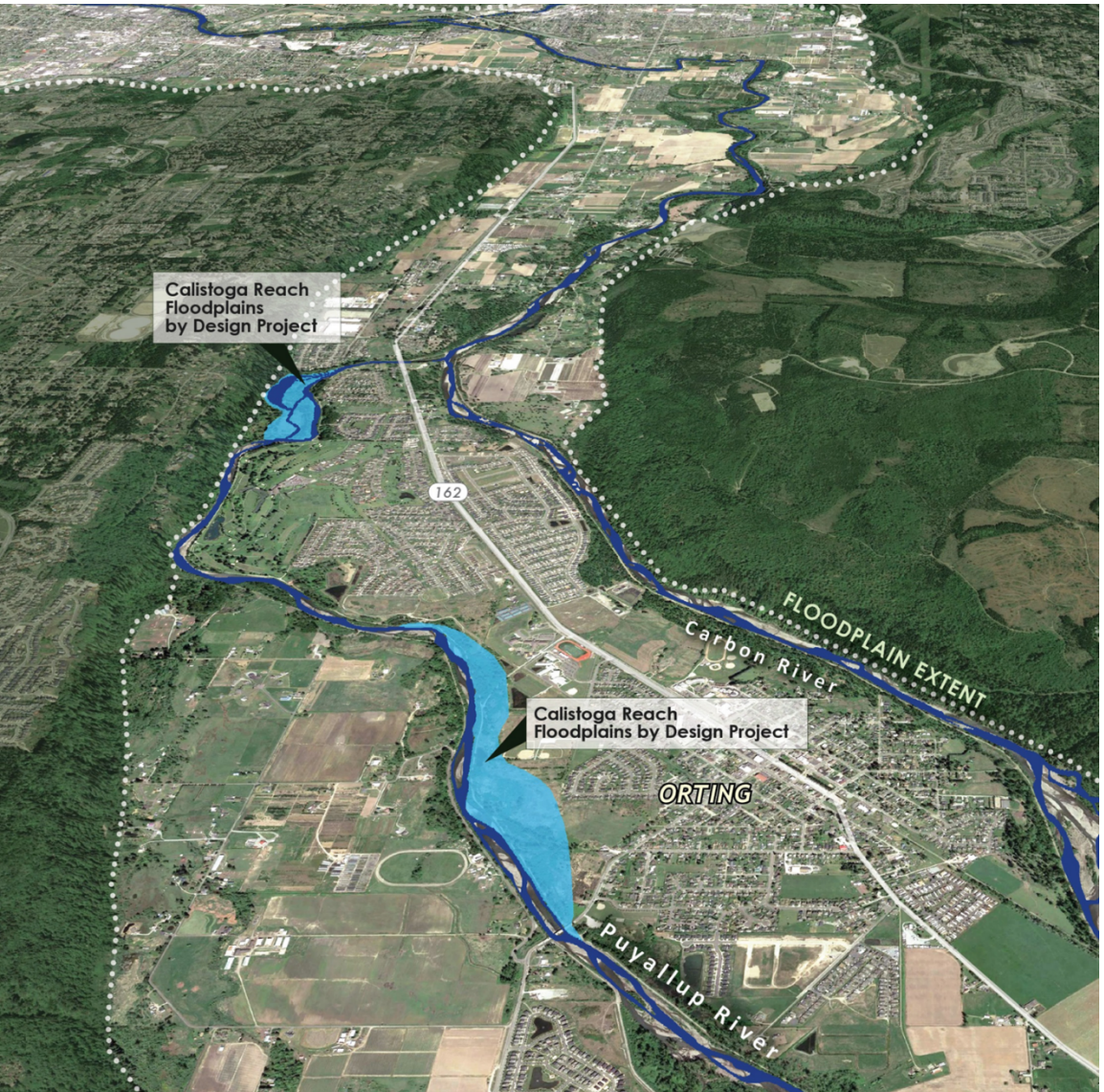
• REDUCING RISK, RESTORING RIVERS •

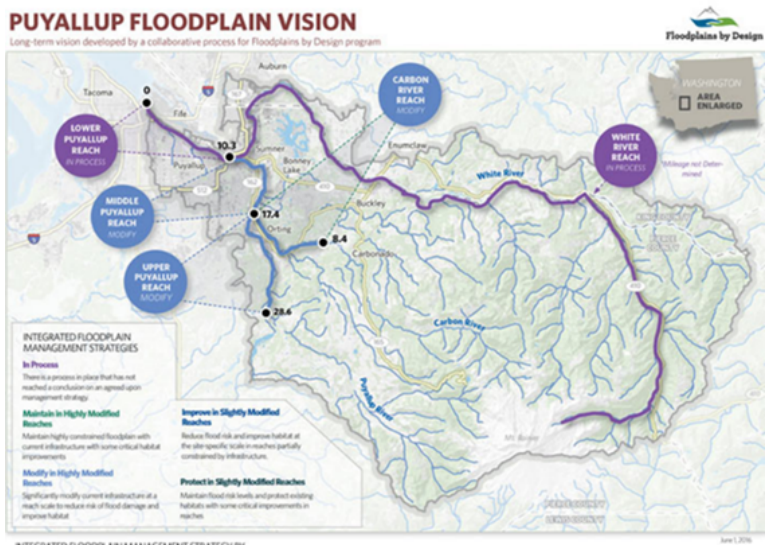
"It took 100 years to build the historic downtown, and it'll take 100 years to move it."

City Administrator, Stanwood WA

Re-thinking “infrastructure”

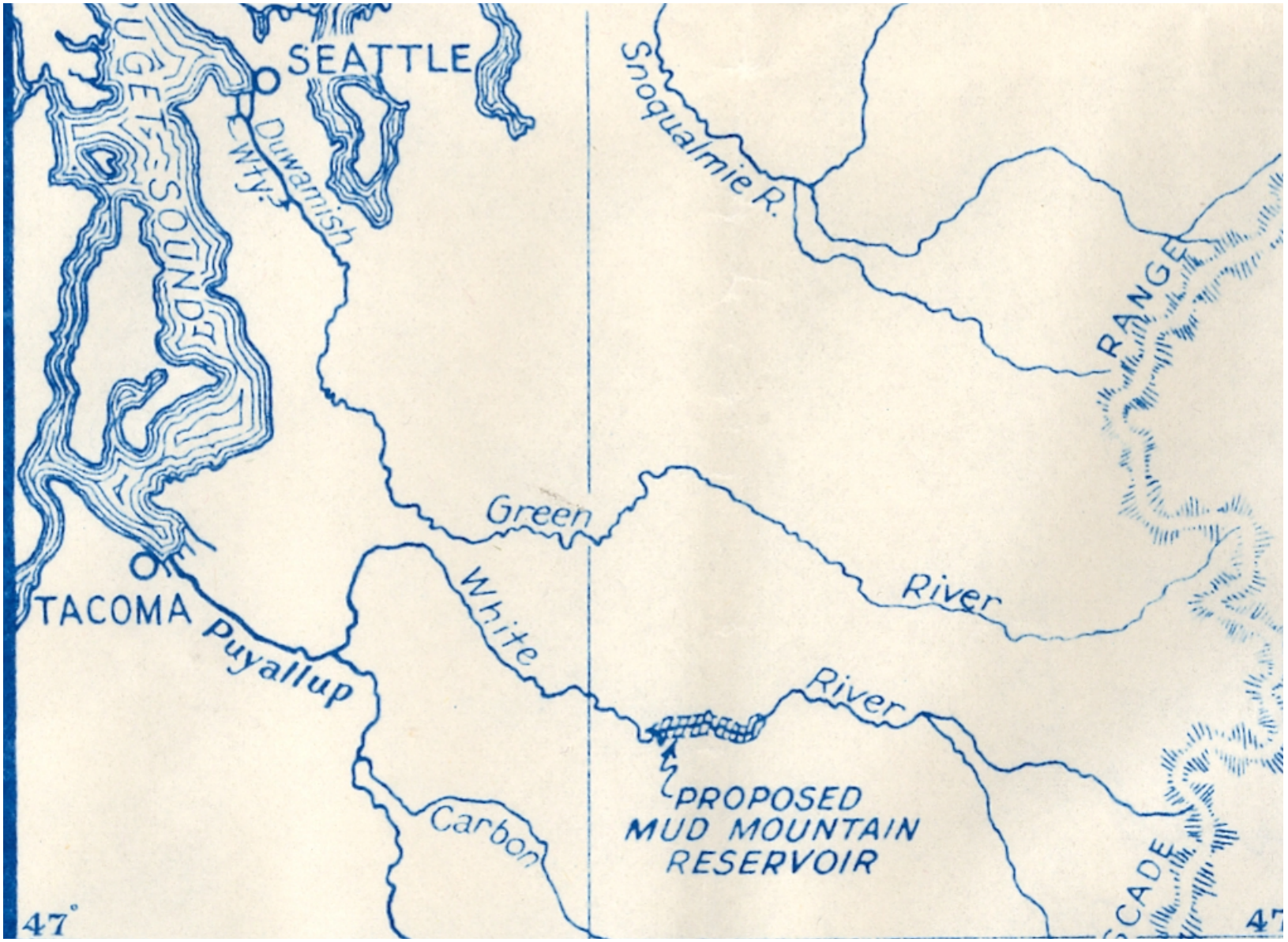
Integrated Floodplain Management





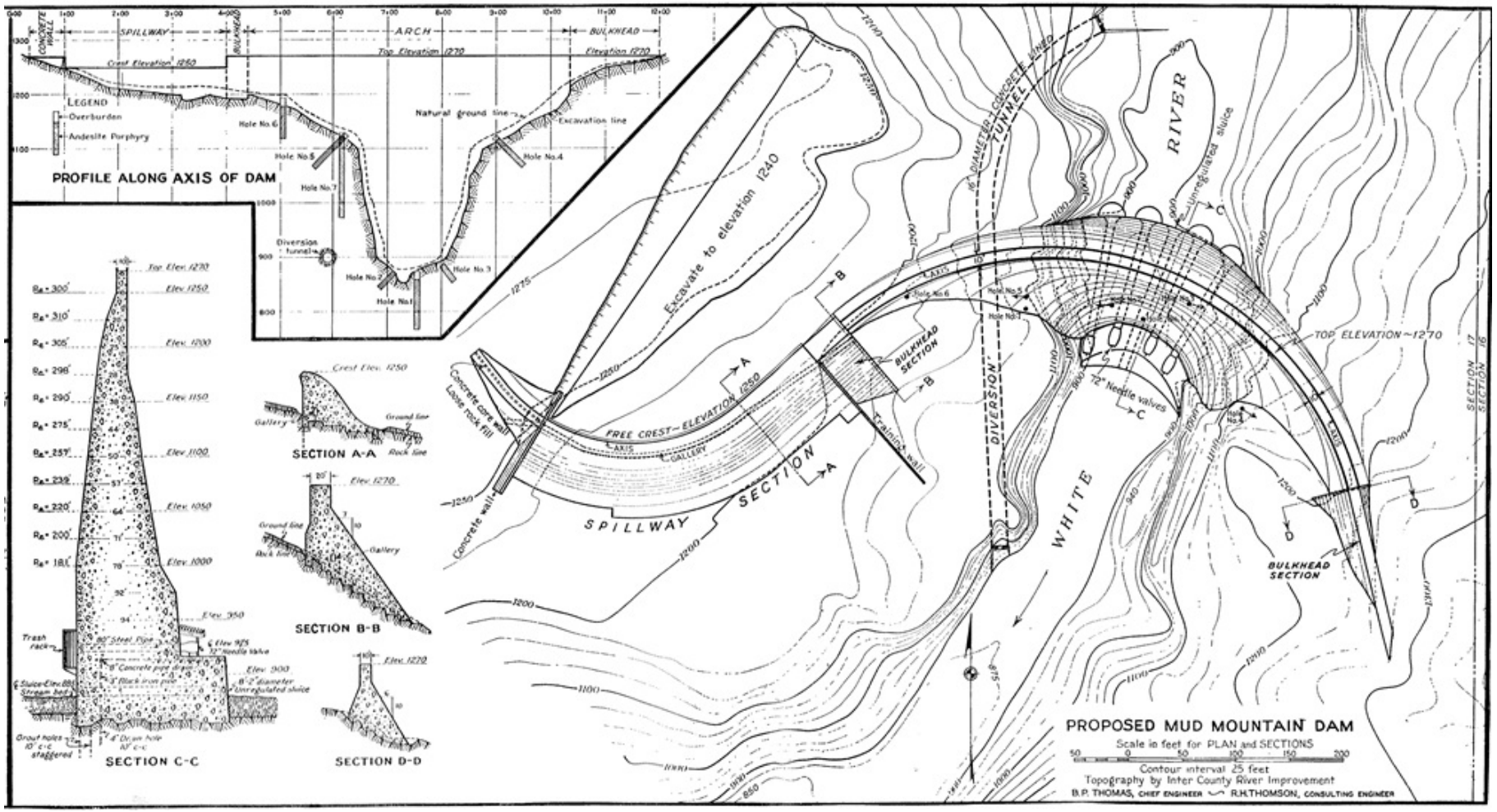
Complexity in the White River: Fish, Floods, Sediment, and the Future

White River – proximity to the Green River

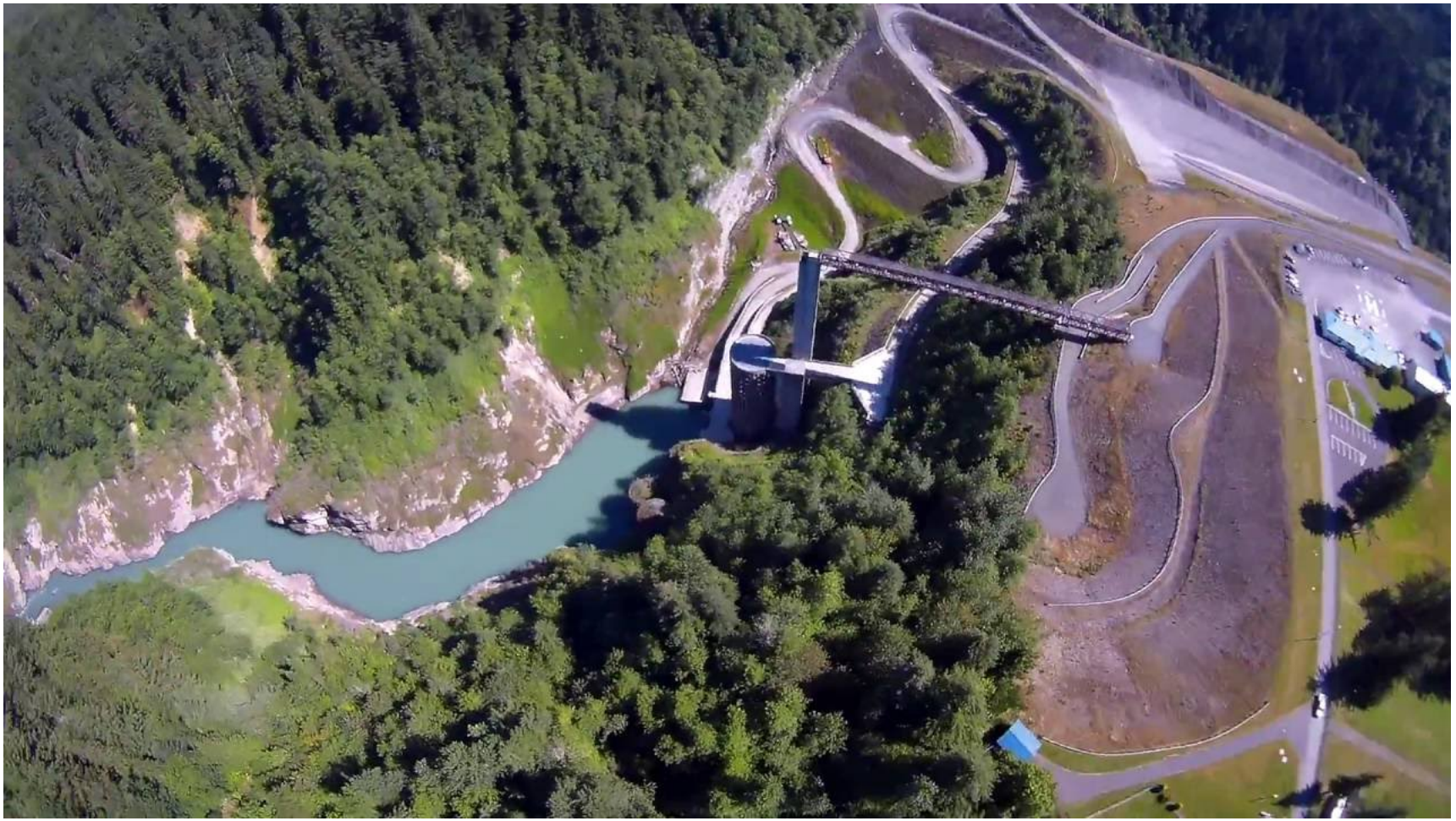


Auburn Diversion Dam - 1921

Mud Mountain Dam – design circa 1933



Mud Mountain Dam



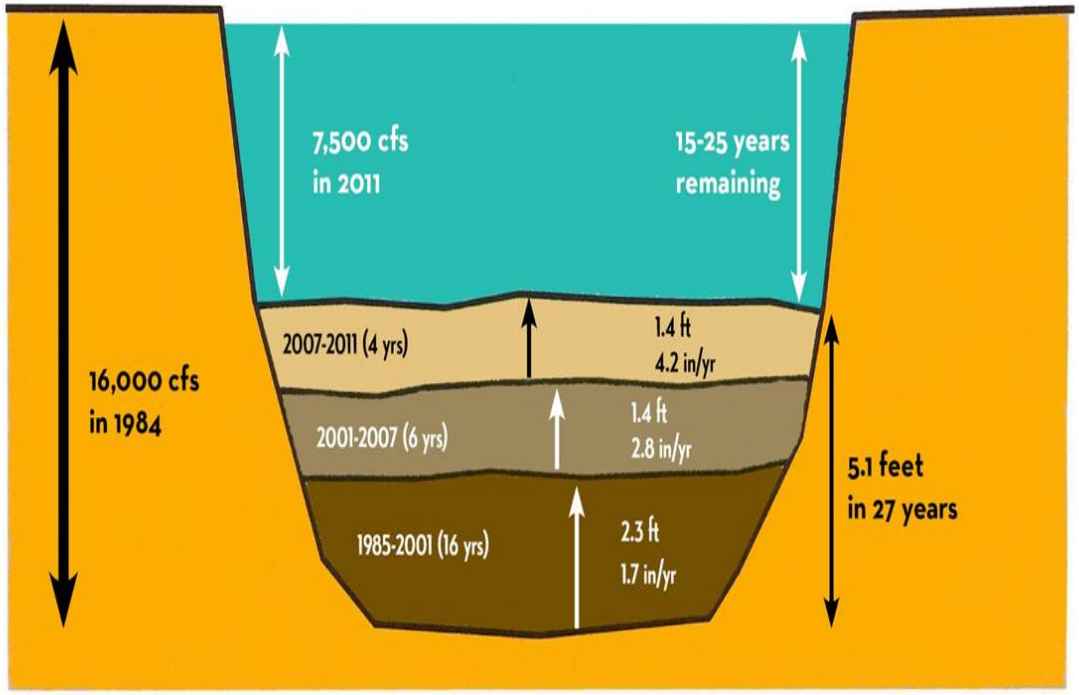
1949 Engineers Report – Sediment Problem

The gradient over which these mountain streams flow is extremely pronounced, consequently, this steep gradient results in severe scour on the channel floor, especially thruout the upper reaches from the glaciers down to near the King-Pierce County line, where a pronounced reduction in gradient occurs. The heavier river borne rocks and gravel are deposited thruout this area while the finer gravel, sand and silt are carried on down stream to be deposited at various locations in proportion to stream velocity and the weight of sand and silt particles carried. This movable river borne material is an ever present factor which cannot be neglected, for its occurrence in the channel,if not periodocally removed, will result in the over topping of the levees during peak flood periods.

County Line Section
RM 6.4 to RM 4.9

History of Channel Capacity in Sumner

Sediment deposition and loss of channel conveyance between A St. and 8th St.



Conveyance capacity

Rate of channel filling

History of Channel Capacity

1948: 20,000 CFS

2004: > 12,000 CFS

2008: > 12,000 CFS

Jan. 2009: 9,000 CFS

Dec. 2015: 7,000 CFS

Jan. 2017: 5,500 CFS

Current Challenges

- Channel with less capacity
- “Routine” winter releases at dam
- More water flooding in Sumner industrial areas

Multiple Jurisdictions Looking for Solutions

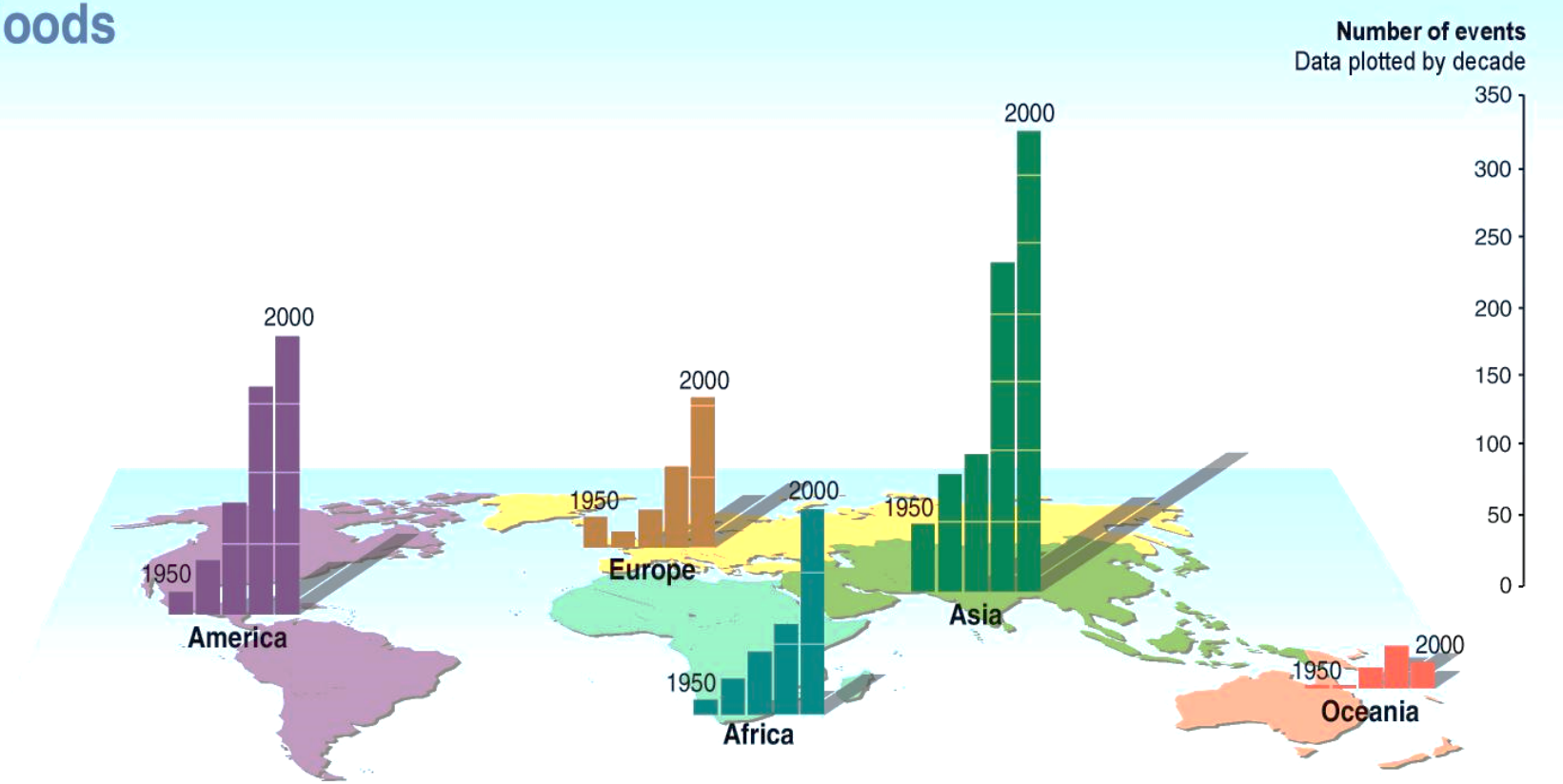
- King County:
  - Countyline Levee Setback
  - Pacific Park Setback Levee
- Dialogue Group: Sumner, Pierce County, Pacific, Puyallup and Muckleshoot Tribes:
  - Multiple flood reduction/habitat improvement projects under development
- Pierce County Flood Control Zone District (2011):
  - Worked with Pacific on Butte Ave flood protection improvements
- USACE:
  - General Investigation
  - MMD operations
  - Providing emergency HESCOs with cities and counties

Challenges

- MANY UNKNOWNS – modelling is only so reliable; long lead time for more studies
- Multiple overlapping regulatory schemes:
  - Federal: USACE, 404/10, 408; FHWA
  - State: WDFW, HPA; Ecology, WQ certification
  - Local: Shoreline, critical areas, floodplain
- Multiple funding sources, but always challenging
- Disagreement between jurisdictions regarding appropriate solutions; (everyone and no one is responsible)
- Disagreement amongst land owners regarding solutions – engaging affected property owners

Making Decisions in an Uncertain Climate: Ventura County California

Floods



Source: Millennium Ecosystem Assessment

Risk, Uncertainty, and Fear

Framework for Risk

Probability of an event or chance that it will occur in the future

Likelihood of Events

x

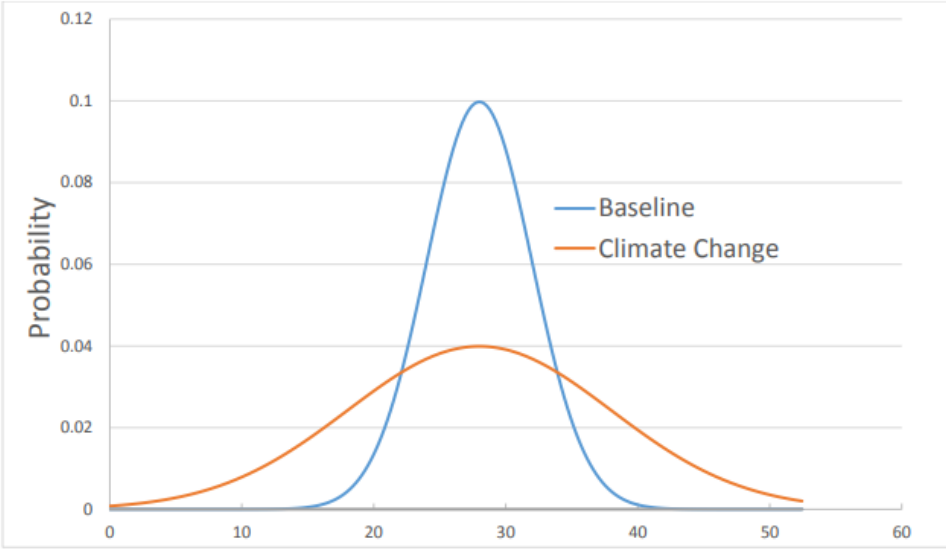
Impacts of events in terms of structural damage, environmental harm, business interruptions

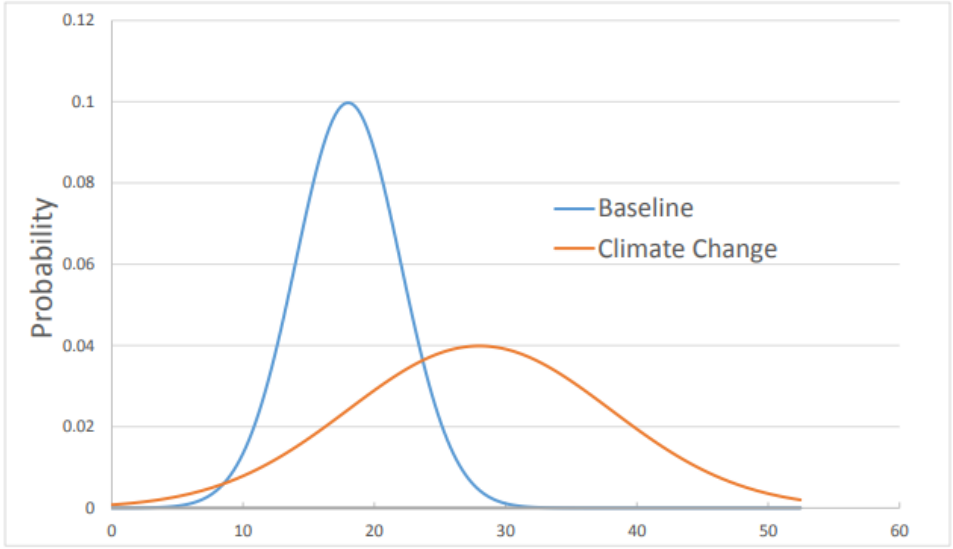
Consequences of Events

UNCERTAINTY

Uncertainty is fundamental to climate change

- Uncertainty in the probability distribution (fat tails?)
- Uncertainty about whether the probability distribution is changing
- Uncertainty about all the factors that collectively increase damages, impacts
- Economics offers a cost and benefit approach
- Focus on decision-making and tipping points with an interdisciplinary team





Higher probability of extreme events…

Decision making is local

The ability and willingness of a community to invest in protective measures depends on local geographic conditions, incomes, discount rates, social norms, perceptions of local climate risk, and the costs of risk mitigation measures. Complete insulation from climate risk is infeasible, even for the wealthiest communities, and affordable adaptive measures may leave poor communities exposed to recurrent losses in hazard-prone areas.

Wheeler, David, "Quantifying Vulnerability to Climate Change: Implications for Adaptation Assistance"

VENTURA COUNTY EXAMPLE

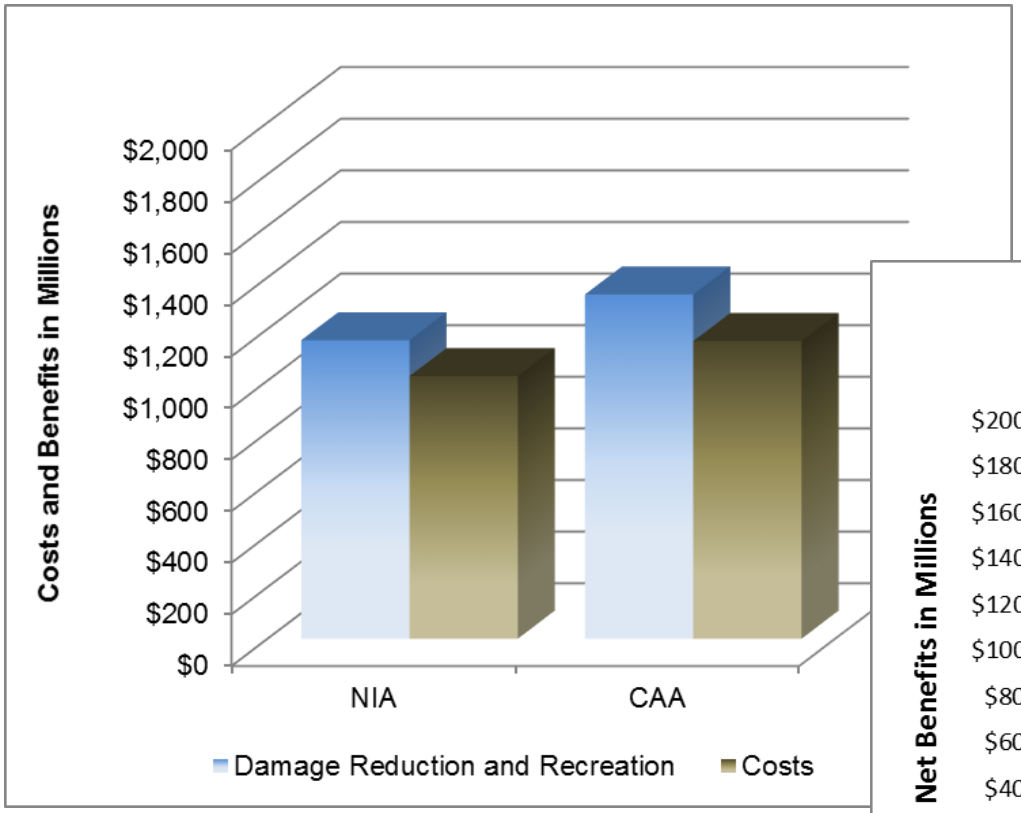
Baseline: Damages to buildings and infrastructure, loss of beach, land conversion

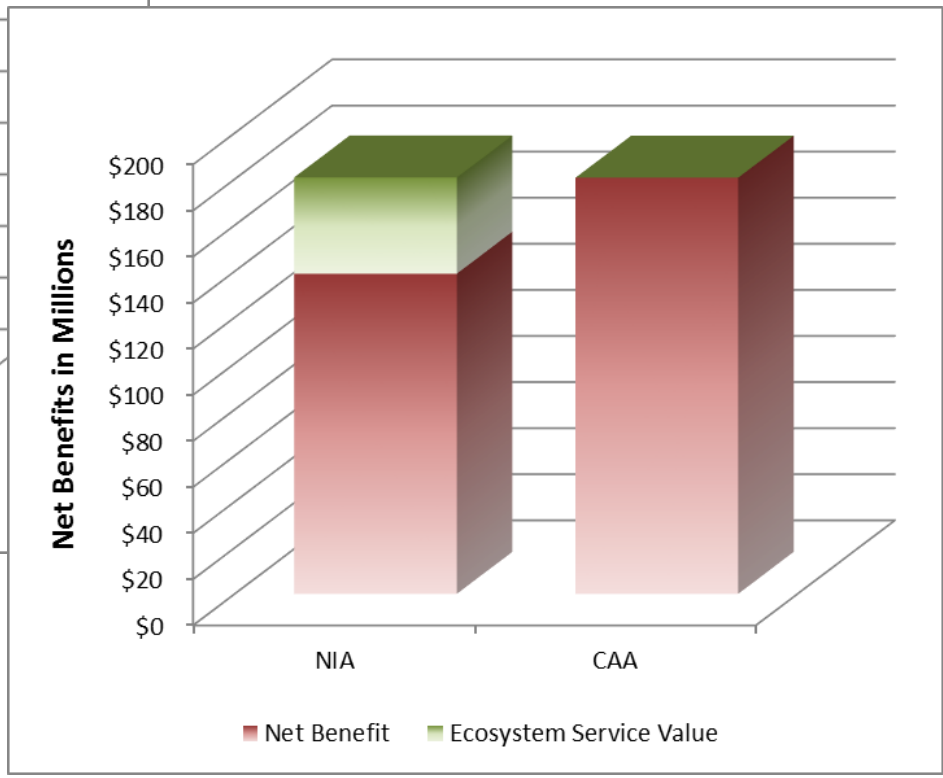
- Response 1: Engineering solutions/Coastal Armoring
- Response 2: Natural Infrastructure

Analyze costs and benefits through time, relative to the baseline, including:

- Financial costs and benefits
- Ecosystem service costs and benefits

VENTURA COUNTY EXAMPLE

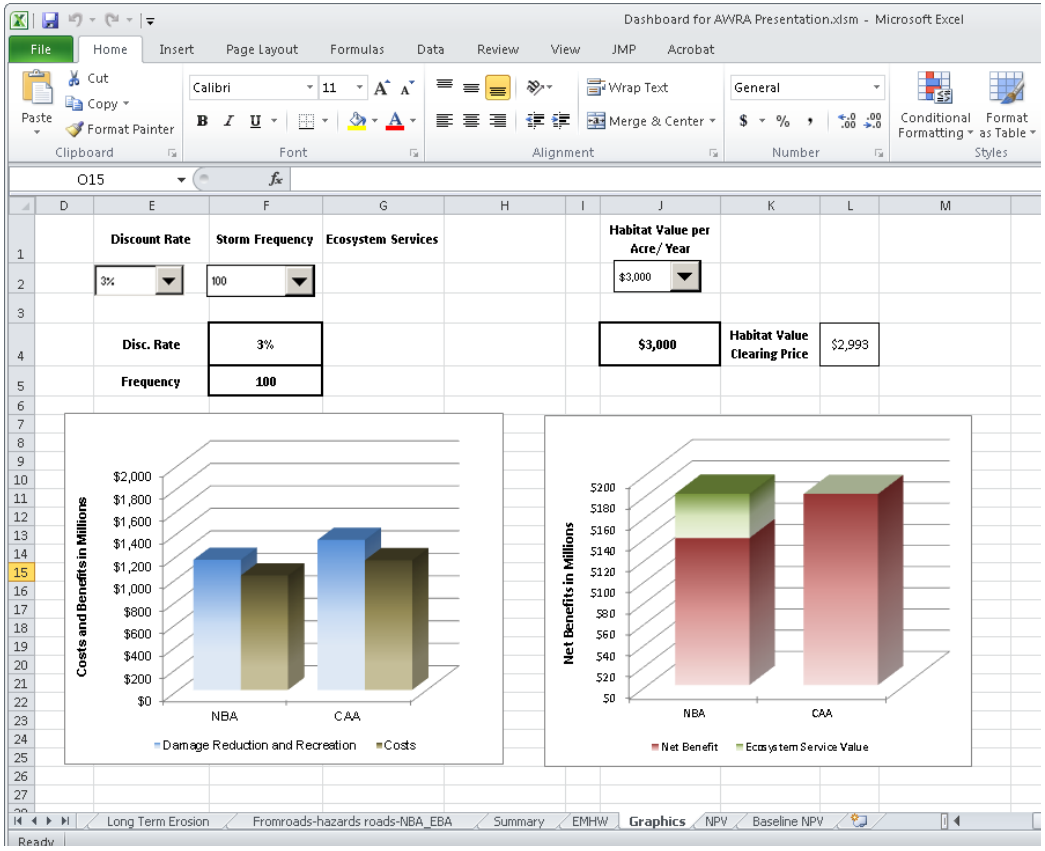




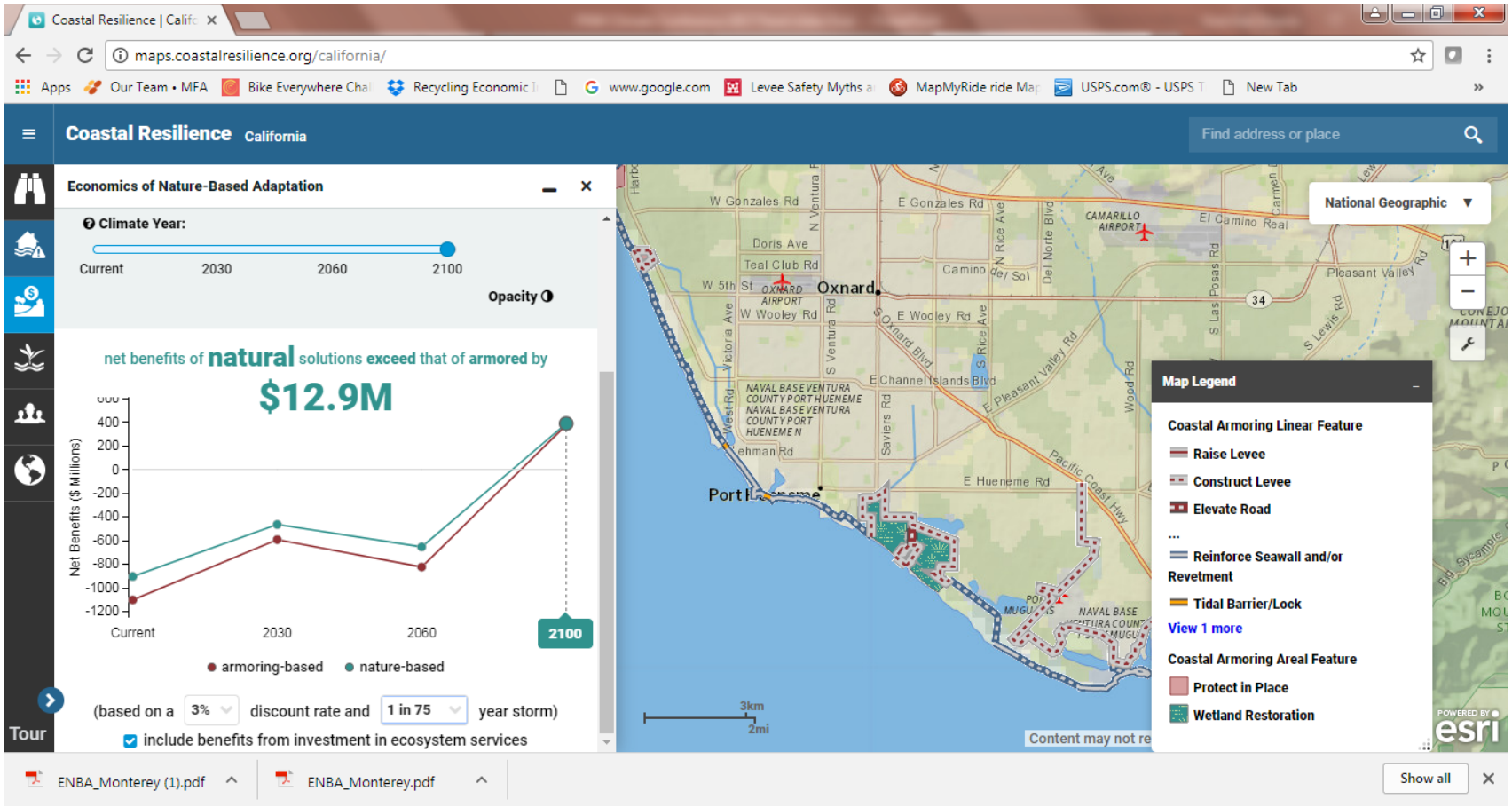
VENTURA COUNTY EXAMPLE

Resulted in Dashboard Tool to Explore Sensitivity:

- Allows decision makers to explore how decision outcomes change over a variety of assumptions
  - Storm frequency
  - Ecosystem services value
  - Discount rate
  - Sea level rise



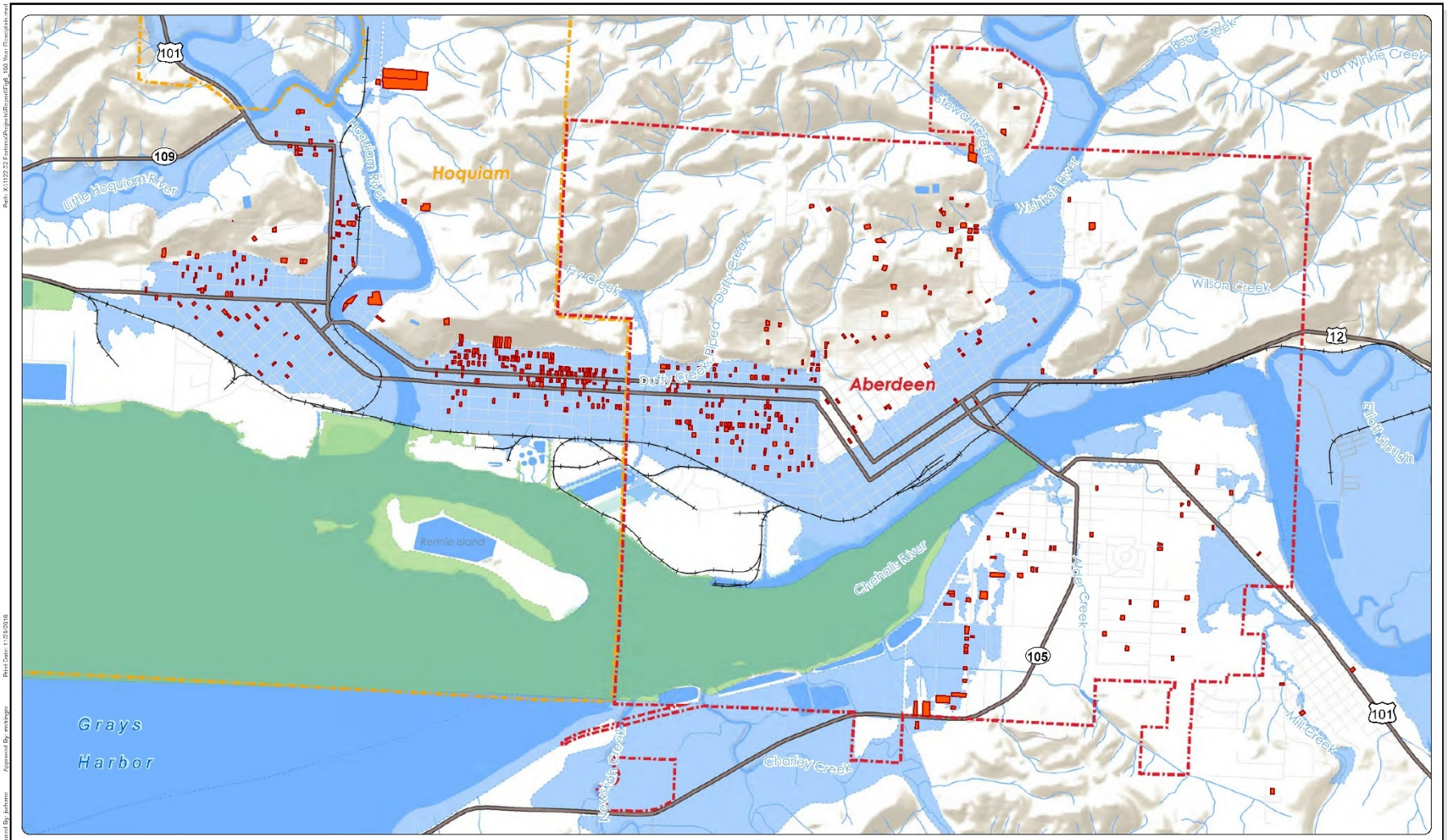
VENTURA COUNTY EXAMPLE



http://maps.coastalresilience.org/california/

Planning for Resiliency in Aberdeen & Hoquiam

FLOOD RISK IN ABERDEEN & HOQUIAM



MAUL FOSTER ALONGI
p. 971 544 2139 | www.maulfoster.com

Source: Aerial photograph obtained from Esri ArcGIS Online. Flood data obtained from FEMA. Flood damaged properties were impacted by an exceptionally heavy rain event in January 2015.

0 1,250 2,500
Feet

Legend

- Parcels Reporting Flood Damage During January 2015 Event
- FEMA 100-year Floodplain
- FEMA High-Risk Coastal Area

DRAFT

Figure 6
100-Year Floodplain
Timberworks
Aberdeen/Hoquiam, Washington

TIMBERWORKS PLAN

- **Purpose**: Reduce floods, improve fish habitat, improve community spaces, stimulate economy

- **Approach:**
  - Seek multiple benefit solutions
  - Integrated technical analysis and community input

- **Outcomes**:
  - Comprehensive, broadly supported approach
  - Prioritized set of projects
  - Funding and implementation strategy

WALKING TOURS

TOUR FLOOD PRONE AREAS

- Opportunity to provide information and learn about local concerns
- Sparked creative ideas for solutions

DRIVERS OF FLOODING

kpff

LOCATING PROJECTS

Community Open House

- Collaboration to Identify Types of Projects That Meet Needs in Specific Locations
- Strong Interest In Open Space and Economic Benefits of Flood Reduction Projects

Combine Local and Technical Knowledge

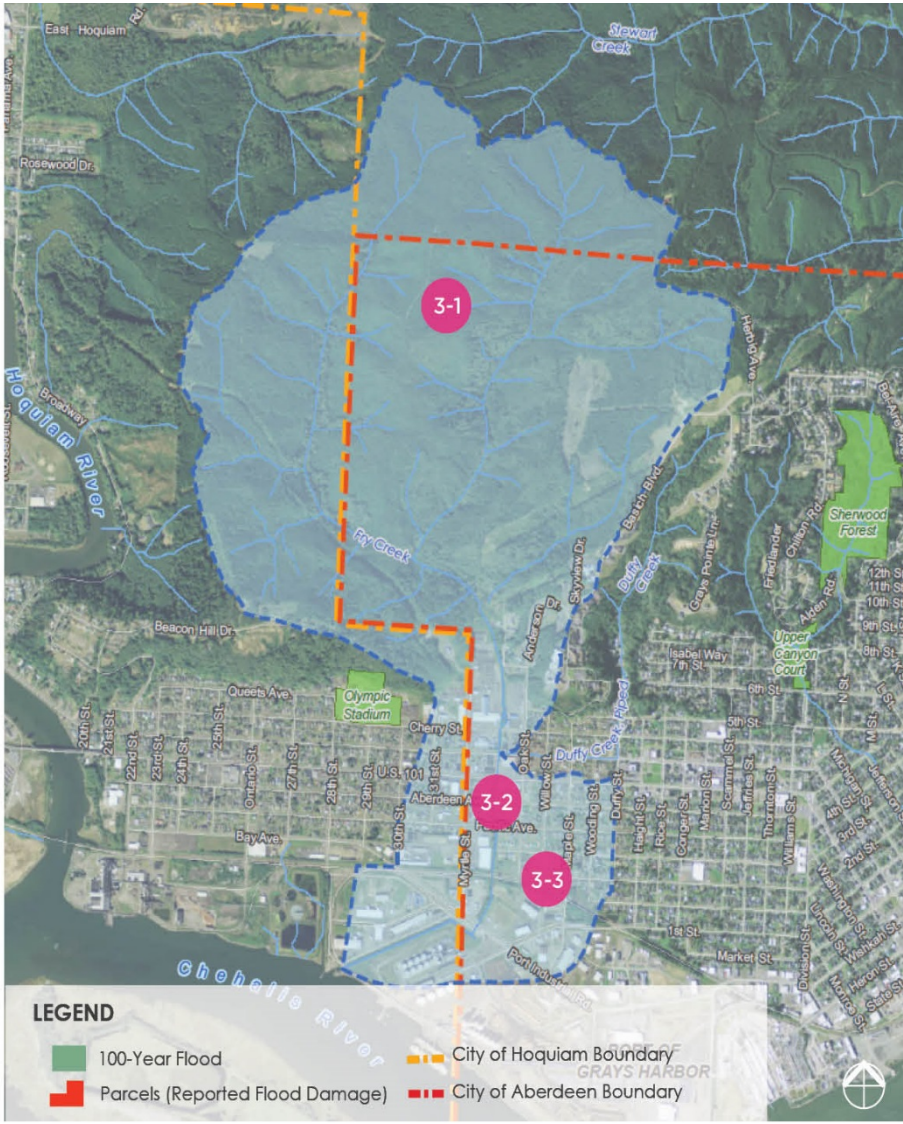
PRIORITIZATION IN SMALL GROUPS

MANAGE THE BUDGET

- As a Group – Select Projects to Fund with a **Budget of $5,000**
  - Card for Each Project Type
  - Project Type: Cost & Benefit (flood, fish, public)
- Report Out on Your Decision

POTENTIAL PROJECTS

Project	Cost
3-1 **Land Conservation in Upper Watershed** Keep land in forest to reduce runoff	**MED**
3-2 **Fry Creek Enhancement** • Replacing culverts to remove flow restrictions and fish passage barriers • Increasing capacity of creek to contain and convey high flows • Creating public recreation features	**MED**
3-3 **West End Play Field** Excavate to create a flood control feature on the south end of the park	**MED**



FRY CREEK ENHANCEMENT

FRY CREEK ENHANCEMENT

Themes

1. Continued Learning
2. Overlapping Jurisdictions
3. Uncertainty
4. Communicating Technical Information
5. Interdisciplinary Coordination

Questions?

1. How do communities become motivated to act?
2. How do different perspectives on climate change affect communication strategies?
3. Any experience with Public/Private Partnerships?
4. How much scientific detail do decision makers need or typically want?