

Adaptation needs and lessons

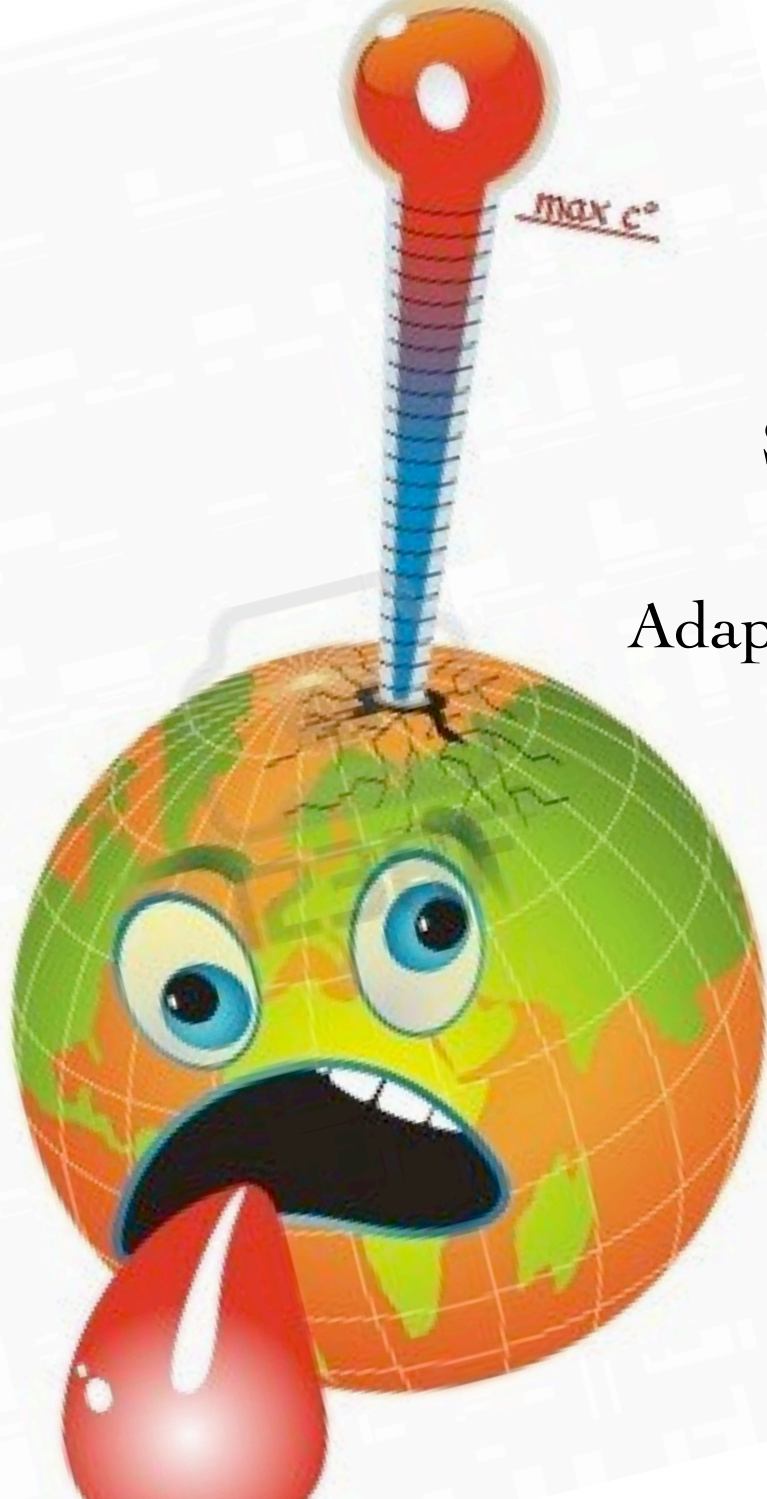
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OCCRI



Mitigation

Suffering

Adaptation



Examples of adaptation

- King County



north cascadia adaptation partnership

Preparing for climate change through science-management collaboration

- Oregon agencies
- Piloting Utility Modeling Applications (PUMA)
- Snake River plain: envisioning future water mgmt
- Tribal first foods at risk from climate change

King County



With all the discussion we've had on global warming, I am stunned that people haven't realized that it's actually going to occur. The ice caps are melting now. We're going to live in that world. So plan for it.

-- Ron Sims, King County Executive



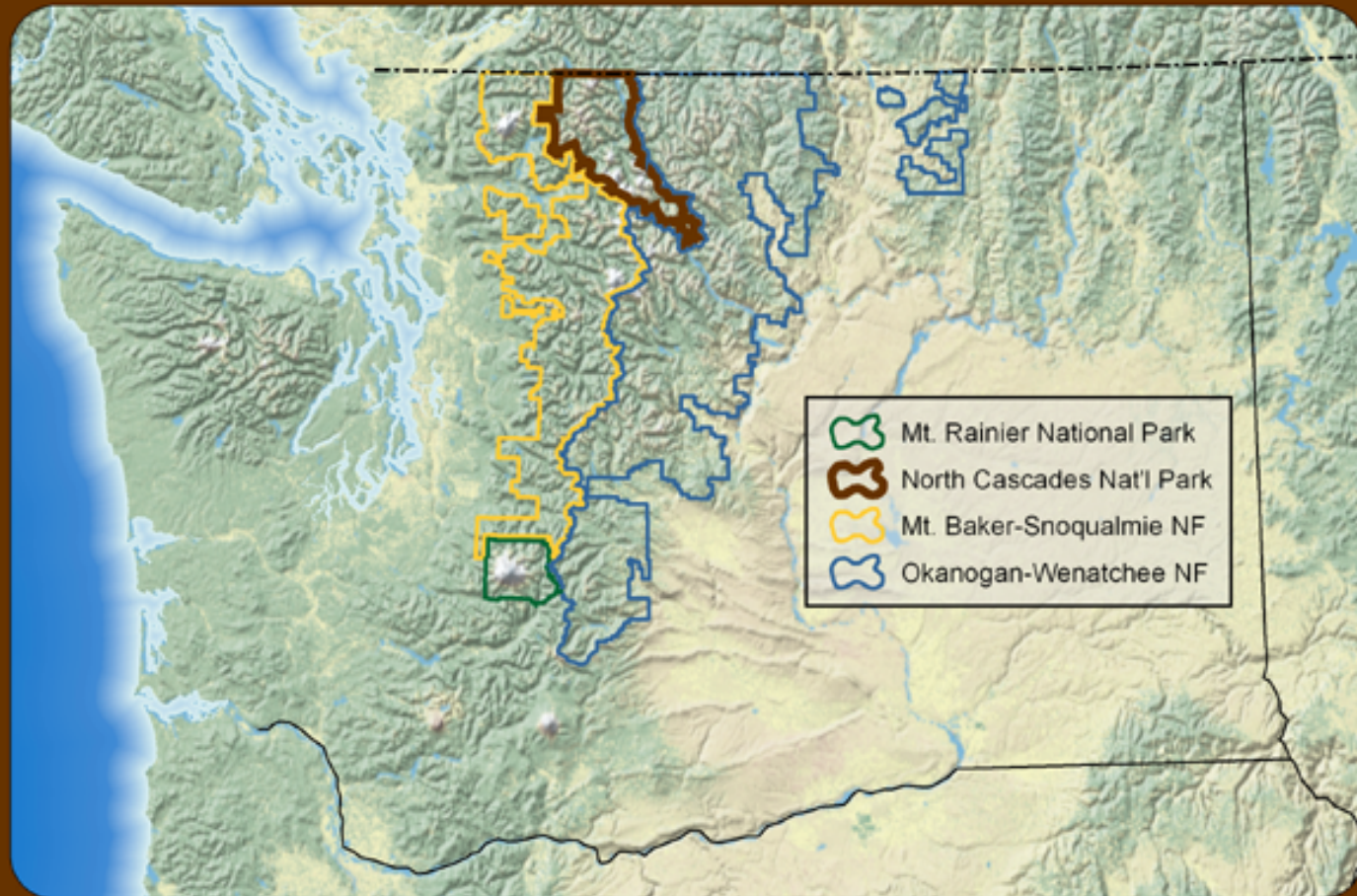
King County



- Early leader among local governments
- Held conference in 2006 on impacts and adaptation with ~700 participants
- Formed interdepartmental climate change adaptation team in 2006
- Multi-million dollar investments to adapt: reclaimed water system, river levees, wastewater outflow retrofitting

north cascadia adaptation partnership

Preparing for climate change through science-management collaboration



North Cascades Nat'l Park

- USFS, NPS, and Climate Impacts Group (UW)
- Four objectives:
 - Synthesize published information and data on climate change science to develop an educational program for resource managers and stakeholders.
 - Assess the vulnerability of natural and cultural resources (e.g. water, vegetation, wildlife, fisheries, recreation, roads, high-elevation ecosystems) to a warmer climate.
 - Develop science-based adaptation strategies and tactics that will increase ecosystem resilience to climate change while maintaining other management objectives.
 - Ensure that science-based adaptation options are effectively incorporated into relevant planning documents.

Oregon agencies

- WA: legislative mandate; CA: governor executive order; OR: agency initiative
- Natural resource agencies spent a year collaborating with OCCRI in evaluating impacts, consequences, and risks
- Final result: list of 11 risks, in “Oregon Climate Adaptation Framework”



Piloting Utility Modeling Applications (PUMA)

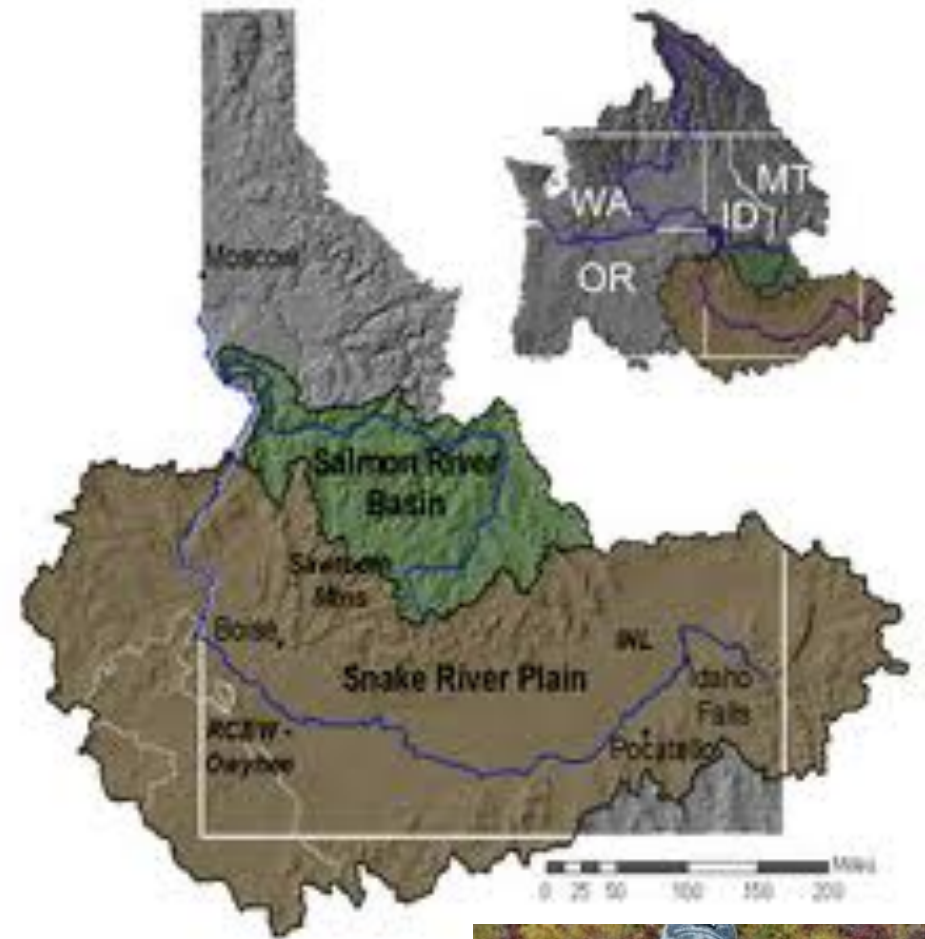
Piloting Utility Modeling Applications (PUMA) is a collaborative venture bringing together Water Utility Climate Alliance (WUCA) members, Regional Integrated Sciences and Assessments (RISA) leaders, and selected representatives of the climate science and applications community.



- Seattle and Portland: water utilities have been looking at climate change for >10 yrs
- Current efforts:
 - Portland: building internal capacity for hydro modeling
 - Seattle: long list of climate queries (e.g., will timing of fall rains change? atmos rivers?)
 - Both: new downscaling

Knowledge to Action Network in Idaho

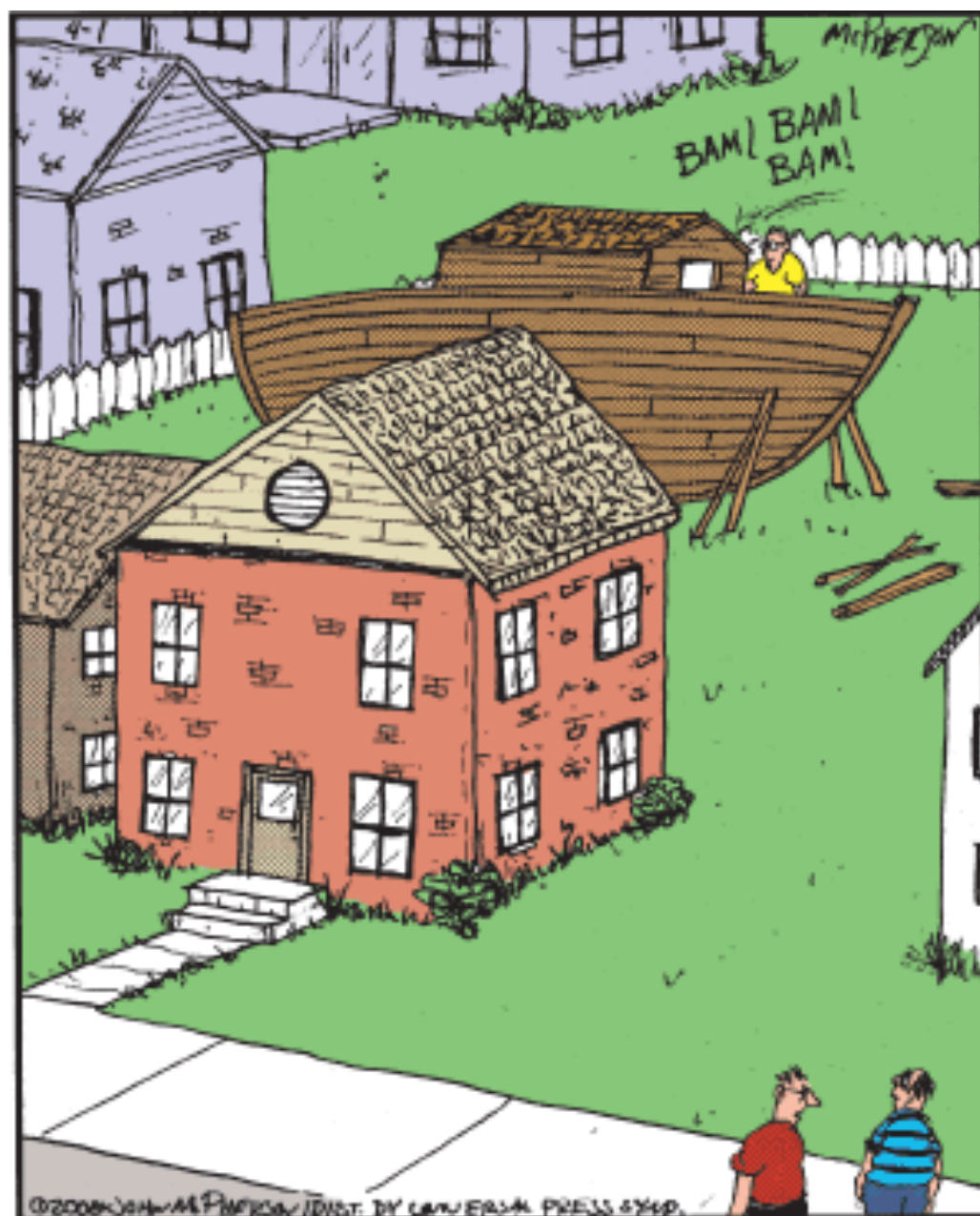
- Irrigators, canal operators, extension folks work with CIRC scientists and facilitators to model likely impacts and adaptation strategies in Snake River Basin
- Small demo project in the Big Wood Basin



Tribal first foods

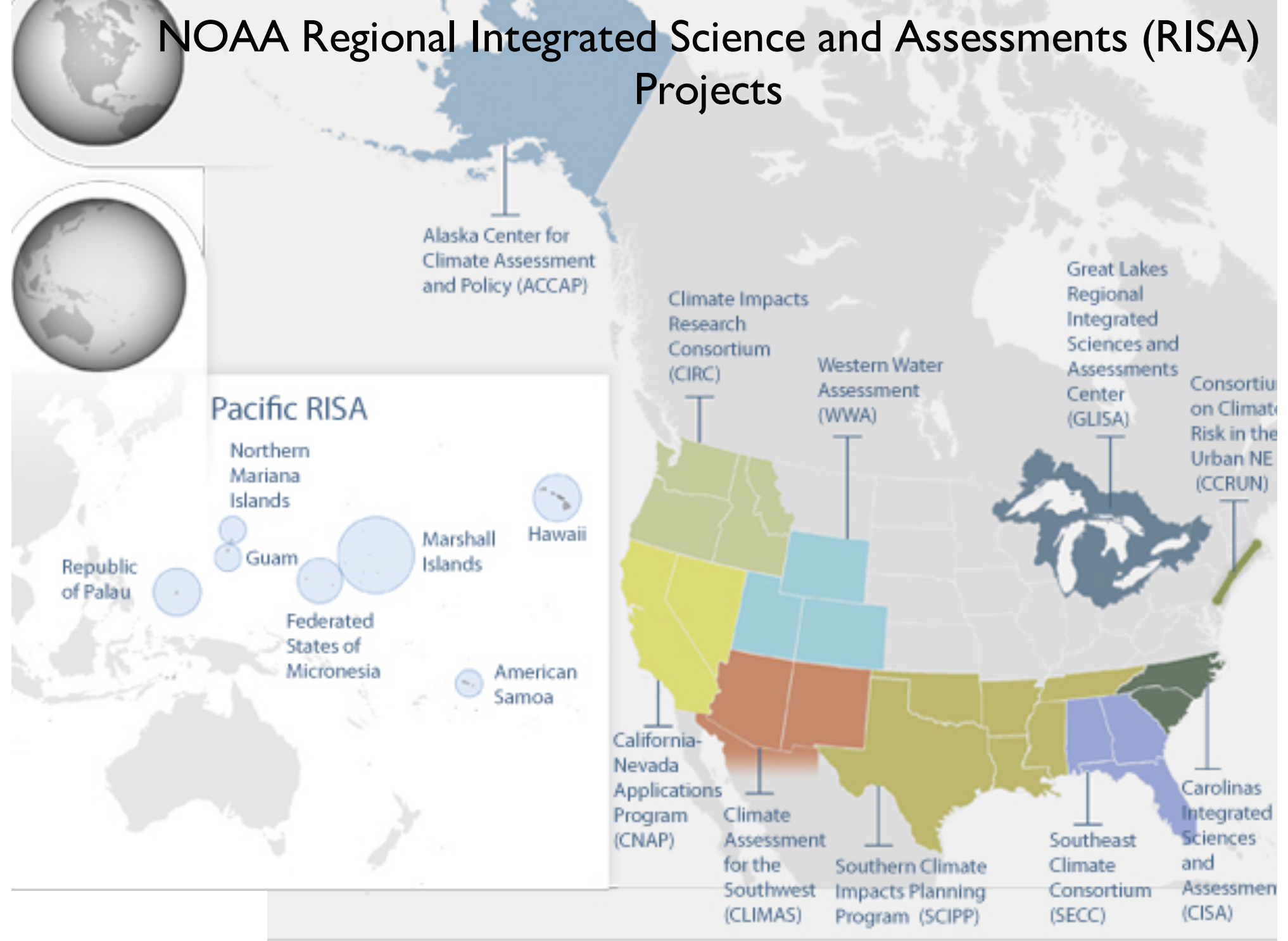
- Culturally important resources (e.g., timing of salmon runs and longhouse ceremony)
- Land management strategies now built around First Foods
- High awareness of risks of change, little synthesis and application of science
- First steps: Columbia River Intertribal Fish Commission undertaking survey of tribes as to what their First Foods are





"I'd chalk it up to just another crazy backyard hobby, except that he's the world's leading authority on global warming."

NOAA Regional Integrated Science and Assessments (RISA) Projects



Vision for the CIRC

Building knowledge-to-action
networks to improve resilience to
climate variability and change

PRODUCTS

Scenarios

climate, socio-economic, policy, technology, institutional, governance, etc.

Data Warehouse/Database

data, metadata, etc.

Risk Assessments

climate, socio-economic, policy, technology, institutional, governance, etc.

Communications Risk & Needs

policy, etc.

GOVERNANCE

Coordination

public/private, government, etc.

Data Coordination

data, metadata, etc.

Communication

public, private, etc.

IMPLEMENTATION & ACTION

Mitigation

climate, socio-economic, policy, technology, institutional, governance, etc.

Evaluating Adaptation Options

climate, socio-economic, policy, technology, institutional, governance, etc.

Informing Mgt & Resource Allocation

climate, socio-economic, policy, technology, institutional, governance, etc.

Communication

public, private, etc.

ADAPTIVE MNGT

Monitoring & Evaluation

climate, socio-economic, policy, technology, institutional, governance, etc.

Indicators

climate, socio-economic, policy, technology, institutional, governance, etc.

Communication

climate, socio-economic, policy, technology, institutional, governance, etc.

Fisheries Science

Regional forester, USFS

Regional director,
BLM

director, ODFW

Regional executive, USGS

dean

Regional director, USFWS

staff, BLM

OR gov's office



Knowledge to Action Networks

- **Co-production of knowledge**: scientists, managers, policy makers, land owners, and other interested parties
 - Framing problems
 - Identifying acceptable methods/sources of evidence
 - Interpreting data within local contexts
- **Disseminating** information, data, and best practices to create usable knowledge

Sustainable Knowledge to Action Networks

- Collaboration combined with focus, flexibility, and stability.
- Committed group of individuals willing to engage in the work.
- Funding to support network.
- Willingness to use knowledge in traditional and innovative ways.



- *Climate impacts on soil erosion:* obtain downscaled meteorological data from CIRC, which SPU will use as input to the WEPP soil erosion model and potentially WARSEM. [presuming this only requires the standard variables from MACA].
- *Climate impacts on burn severity and fire spread probability:* obtain downscaled meteorological data from CIRC, which SPU can use to generate burn severity (Energy Release Component) maps for its municipally-owned watersheds and to generate climate scenarios as input to the FSPro module of the RAVAR-Water tool to evaluate the impacts of climate and wildfire ignitions on watershed resources. [Abatzoglou suggests using the energy release content or ERC, but this is open for discussion] Rolf will provide the fuel model (has to be one of the ones already included in the national fire danger rating). John will use the downscaled gridded data.
- *Climate impacts on fall rains:* the timing of fall rains can have dramatic implications for SPU's management of its water supply system. We are interested in exploring whether there is any signal on how climate change may affect this annual cycle. [per conversation between Fleming and Mote 6/15/12, SPU will define 'return of fall rains' using a metric derivable from daily precipitation. CIRC will then use the MACA downscaling to describe how that metric was simulated by models for the 20th century and how it changes in future simulations. CIRC will not attempt to back up this description with a rigorous analysis of the physical mechanisms or the reasons for models' shortcomings.] [We are proposing using a weekly rate of 2.5" as a working definition of the return of fall rains.] at the met station at Masonry Dam. Alan interested in synoptic situation

THERE'S A
DEAD END AND
A REALLY DEEP
RAVINE UP
AHEAD.

IT'S A
HOAX!
DEAD ENDS
DON'T EXIST!

CLIMATE
CHANGE
AHEAD

DANGER

OIL
BASED
ECONOMY

HORSEY
©2011
WALT
DISNEY
PUBLICATIONS

Needs and lessons

- Sustained investments by NOAA RISA have been instrumental
- Ingredients of success: engaged leadership, knowledgeable staff, patient scientists, sustained engagement, adding adaptation thinking to existing planning processes
- Can do this a bit without using the 'c' word
- Very high level of sophistication

Changes in # Freezing Days

Δ Days Minimum Temperature $< 0^{\circ}\text{C}$
2041-2060 vs. 1950-2005, CSIRO-MK3.6 RCP4.5

