Uncertainty and the Politics of Science Policy Concerning Global Climate Change: Who's Listening?
A Cross-Scale and Behavioral Approach

By

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SCALE I:GLOBAL
What Do We Know About the Policy Dynamics of Long Time Scale Environmental Problems?

- Distinguish between malign & benign problems.
- **Malign problems** characterized by **incongruity**, where the cost-benefit calculus of individuals systematically biased in favor of either costs or benefits of particular courses of action.
- **Incongruities** caused by either **externalities** or **competition**. Latter far more difficult to deal with politically.
- **Long time scale =** decades to millennia.

Uncertainty & International Regime Building

- Uncertainty about seriousness & causes of a problem & malign configuration of actor interests are separately major hurdles in international regime building. In combination, results often lethal.
- Global climate change the ultimate collective action problem.

Conditions Under which International System Responds Effectively to Global Environmental Problems

- Available evidence suggests two conditions: a). Disaster; b). Consensus that disaster on significant scale highly probable in short run.
- So system propensity to respond is hyperdependent on rate of envir. change & immediacy of perceived effects.

SCALE II: National
Compare Science-based Policy Making
UK/US

- UK Science Advisor has independent political authority; cannot be removed by PM before term. Advises UK Gov't. on all science-based policy issues and controls entire science budget across all agencies.
- US Science Advisor not independent of President who appoints; does not control science budget; no authority beyond advisory role; and often has difficulty getting access to President.
- **Moral= Political Culture Matters**

Sizing the Uncertainties and Responding

- UK

  Role of Margaret Thatcher, 1989: Cabinet Seminar; Mobilizing EU @ Maastricht, Nov.; UNGA speech. Continuity of UK policy. (Note: Thatcher is an industrial chemist[FRS] & common language of GCC problem is chemistry).

- US

  Bush I,1989: State Dept.(Baker) pushing for creation of IPCC as means of slowing down drive for action. Sununu & GCM's. USGCRP I⇨ Research used both to develop new knowledge & to slow down drive for immediate action.

MORAL: Leadership matters

Comparing the UK and the US, cont’d.

- Clinton/Gore, 1992-2000: Attempting a carbon tax and failed. Falling back to voluntarism with expected results. 1997ff National Assessment. Aim to expand awareness of problem and make people see what they had at stake.
- BUSH II, 2000-present. Hostile to National Assessment & Kyoto Protocol. Hostile to mitigative action by regulation. Relying on voluntarism with expected results. Final draft of USGCRP II stopped. Replaced by CCSP. Scientific community not happy. US Gov’t. scientists under heavy pressure. Uncertainties re climate sensitivities used as basis for inaction. Industry worried about costs of regulation. Even though energy intensity declining, total emissions increasing significantly.

Policy based on sound science

- Look to scientific evidence and risks - ensure it underpins policy
- Accept conclusions of IPCC
- Support research to reduce uncertainties
- Uncertainties no reason to defer actions
- Aim for international consensus view of problem

(David Warilow, 2004).

Responses – mitigation and adaptation

- Unrestrained climate change presents unacceptable risks
- Global control of greenhouse gas emissions essential to stabilise concentrations at a safe level
- Kyoto the first step
- But some climate change is unavoidable so essential to develop adaptation strategies (local)

(David Warilow, 2004).

Mitigation in the UK

- UK on track to meet Kyoto commitments and a domestic 20% target for CO_2
- Comprehensive programme of policies and measures, including emissions trading
- Energy White Paper – long term view

(David Warilow, 2004).

Summary and prospects to 2010

- **Annual UK emissions down 13.2% and CO_2 down 7.5% by 2000 from 1990 levels**
- **All greenhouse gas emissions expected to be down by 23% and CO_2 by 20%, by 2010.**
- **The economy grew by 49% between 1990 and 1999.**
- **GHG emission intensity fell by about 30%.**

(David Warilow, 2004)

Planning for Climate Change

1995:

Few managers

– Saw a role for climate information in planning & decision making

– Recognized predictability of climate (variability or change)

–Possessed a contextual framework for applying climate change information

1997:

- First regional-scale examination of climate change impacts on PNW
- Most stakeholders unfamiliar with potential impacts of climate change & unprepared to use this type of information
- Spatial scale of interest << scale of analysis

1997-2001:

- Increasingly focused climate change research
- Intensive region-wide outreach
- **Shift in attitudes:** widespread official recognition of regional water resources systems' lack of capacity to meet present & anticipated future demands even without climate change!
- Out in front: Portland & Seattle

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Policy Hurdles

- System is top-down. Technical level cannot determine own planning scenarios.
- System currently includes only population growth & ESA applications in long term planning.
- Policy level says they unlikely to face up to climate change challenge without leadership from White House & U.S. Congress (i.e., system is top-down for them too).
- Bottom-up breakthroughs both possible via media and constituents pressure but scope limited without top-down leadership.

The Problem: The System is Already Taxed

Increasing Scarcity and Conflict
2000-2020

- **Little or no room for growth in supply for the Columbia River and much of the PNW**. Patterns of year-to-year and decade-to-decade climate variability may exacerbate or ameliorate potential impacts.

- **Level of water scarcity is relatively new.** Demands on water systems are growing, but supplies remain essentially fixed. *Less margin of safety available to cope with the unexpected.*

- ***Region in severe difficulty even if climate doesn't change***

- **Management system inadequate to task, 2000-2020:**
  - Highly fragmented;
  - No one management entity in charge re droughts;
  - Little or no inter-use coordination;
  - Inconsistent standards, re: water quantity and quality across basins;
  - Conflicting management practices: international, federal, states, counties, private, tribal lands;
  - Large number of largely uncoordinated planning efforts;
  - No official incorporation of climate change scenarios in planning.

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What Is At Stake?

- PNW a snowmelt system with limited storage capacity.
- 70% of storage in winter snowpack.
- But, given the adiabatic lapse rates, snowpack highly vulnerable to increases in average regional temperature, especially in low to mid-elevation ranges.

On Use/Non-Use of Risk Assessment as Decision-Making Tool

- Fact is that sophisticated risk assessment techniques largely missing from public sector management decision processes.
- Decision processes designed to be conservative and therefore fairly robust to (unexamined) uncertainty in the typical deterministic forecasts that are used.
- Objective seems to be to avoid short term risks.

What Is To Be Done?

- So far, only small group of “early adopters” willing & able to use probabilistic climate forecasts.
- Before combined ENSO/PDO forecasts can be widely used, appropriate tools for risk assessment must be put in place.
- Such an effort a very large job since 1970’s technology & info. systems still being used as primary decision support.

What May Not Be Knowable (before it happens!)?

- Not possible to eliminate uncertainties from projections of climate change linked to impacts on natural resources.
- Not possible to predict accurately how economies, technology, society, and public policies will evolve in next few decades to centuries.
- GCM's currently incapable of predicting ENSO/PDO variability in a significantly warmer world.
- Given constraints on ecosystem predictability, resource managers and policy makers better off focusing on ways in which ecosystems dealing with environmental variability in the past. This one avenue for managing climate sensitive resources in future.

(Mantua & Mote, 2002).

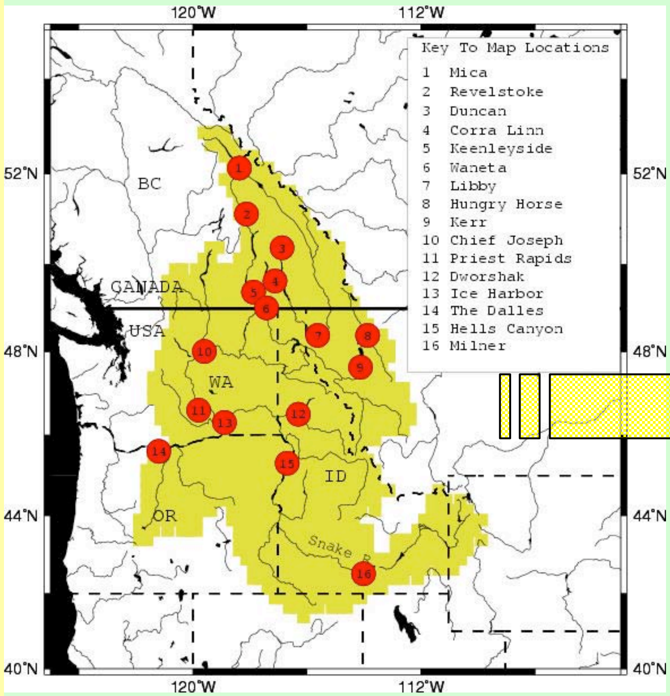
Planning for climate change: water resources in the Columbia basin

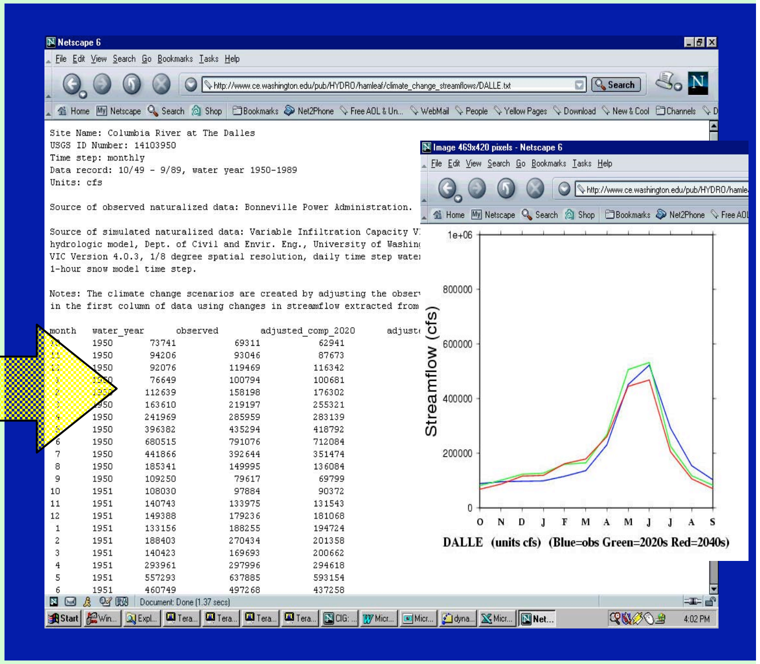
Water policy workshops have highlighted the need to inject climate change information into *existing* river basin planning activities and to provide free access to streamflow scenarios.

Partners:

Northwest Power Planning Council

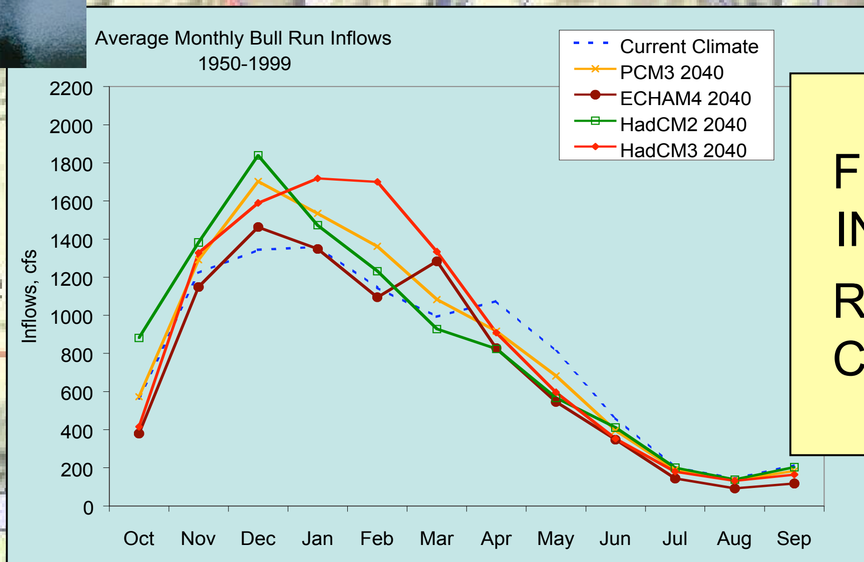
Idaho Dept of Water Resources





www.ce.washington.edu/~hamleaf/climate_change_streamflows/CR_cc.htm

Planning for climate change: municipal water supply



FUTURE WATER DEMAND IN PORTLAND (OR):

Regional growth: +40 mgd

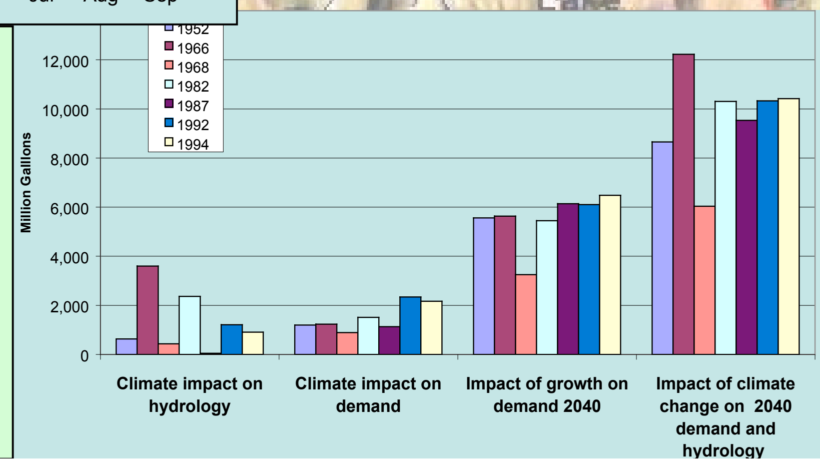
Climate change: +20 mgd

CLIMATE CHANGE IMPACTS on WEST-SIDE MUNICIPAL SYSTEMS:

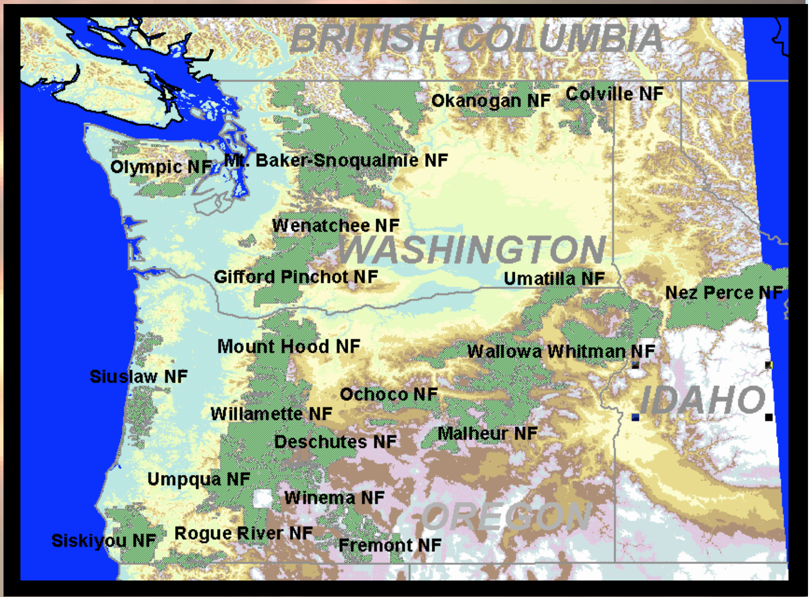
Decreased spring streamflow

Increased demands

→Regional planning & infrastructure investments



Climate and Wildfire



1. **Climate Matters**

Region wide increases in area burned are characterized by antecedent drought accompanied by persistent blocking events

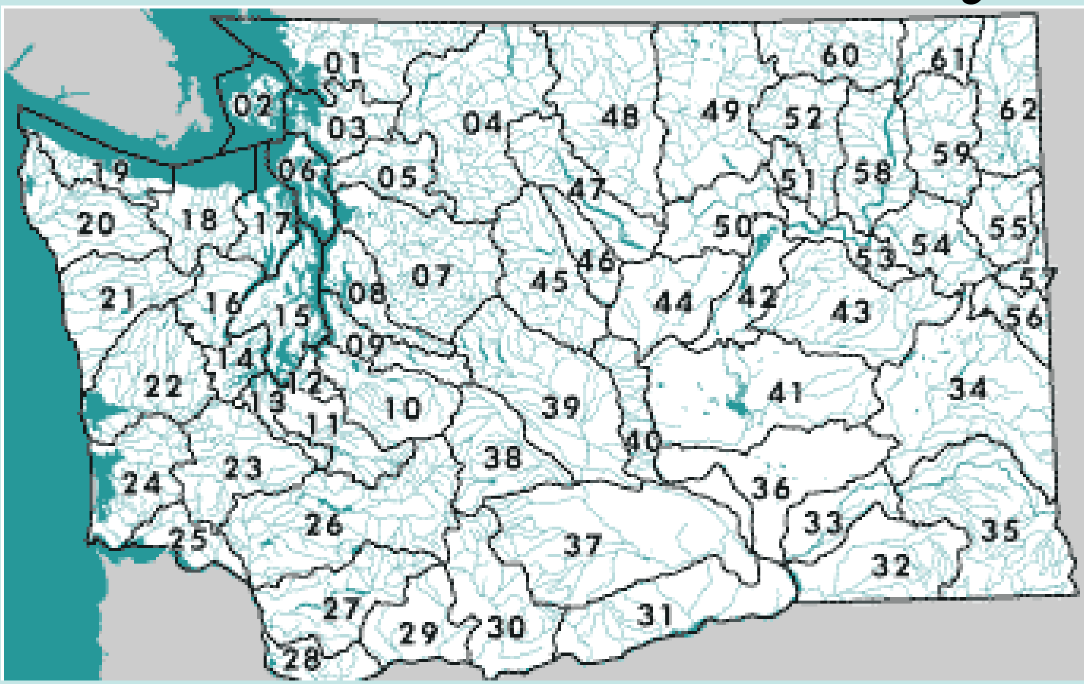
2. **Ecology Matters**

Underlying ecology appears to modulate the response to drought and circulation

3. **Relationships are non-linear**

Small changes in mean climate may lead to dramatic changes in wildfire activity

Watershed planning for climate variability and change



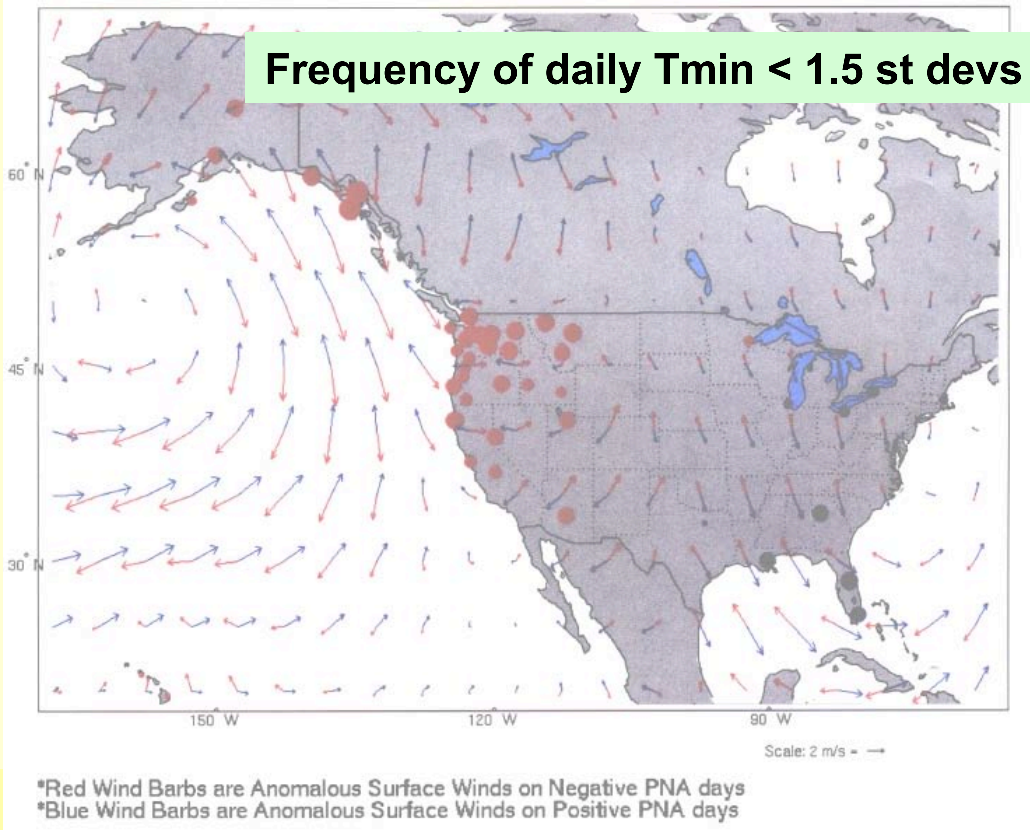
Information about climate variability and change need to be translated for and delivered to the watershed level.

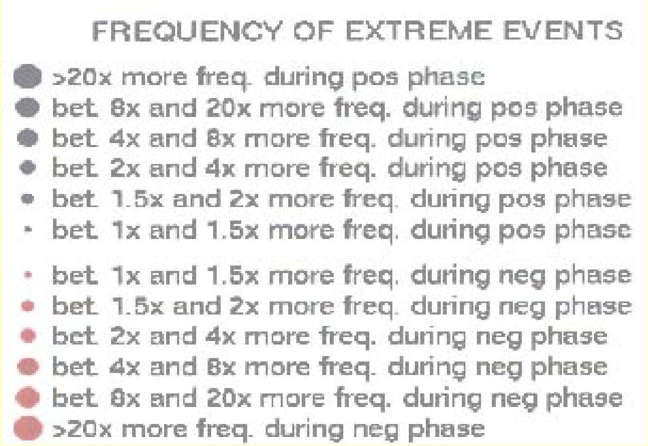
- Assessed use of climate information in planning
- Building a foundation & forging relationships
- Develop & provide tools for planning

The PNA and the statistics of extreme weather events

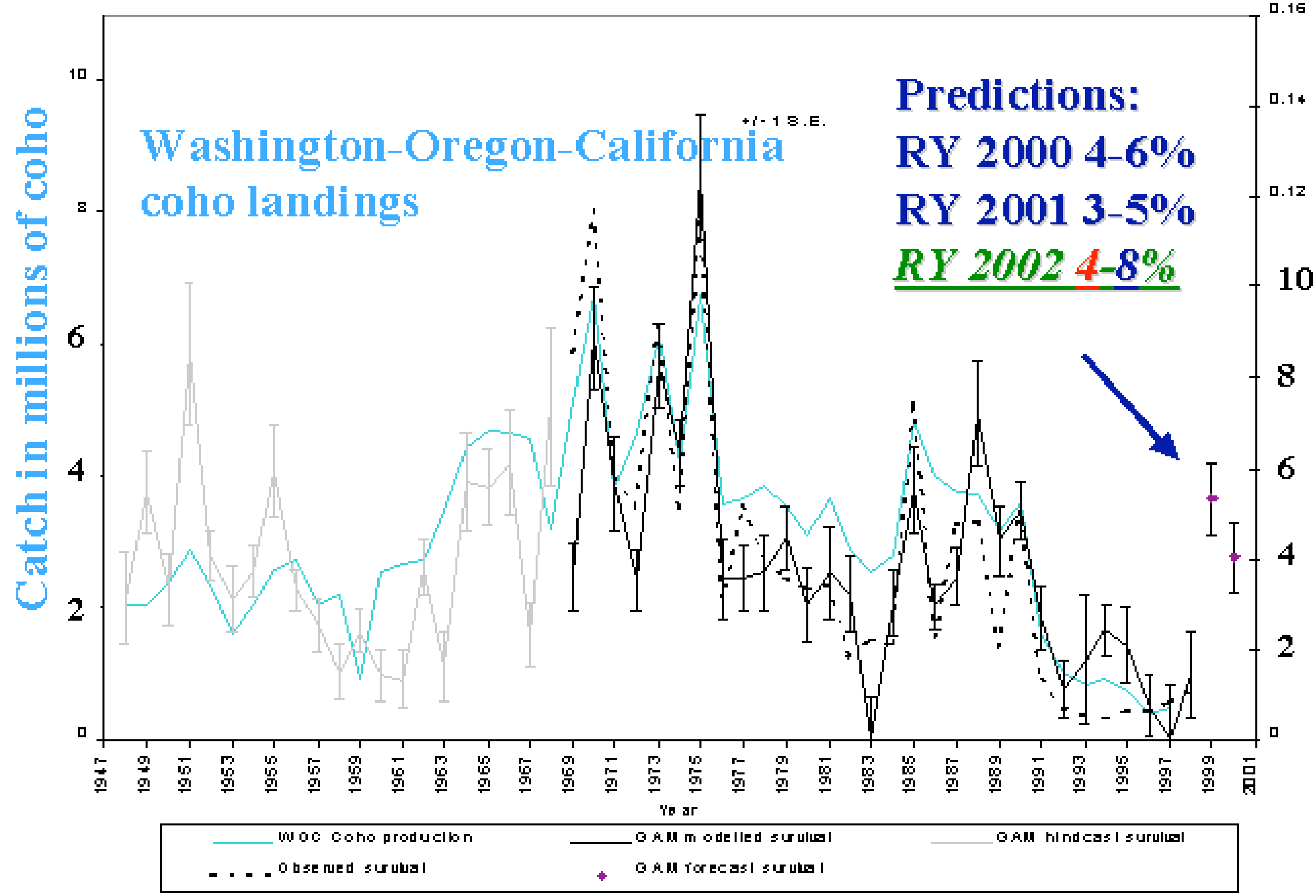
Daily variations in PNA circulation pattern are closely related to the relative frequency of extreme daily weather events

- PNA is most predictable atmospheric pattern at 5-10 day lead times (Renwick and Wallace 1995)
- Tmin at right; but also true for Tmax, precip., freeze days, snow days, and surface wind gusts

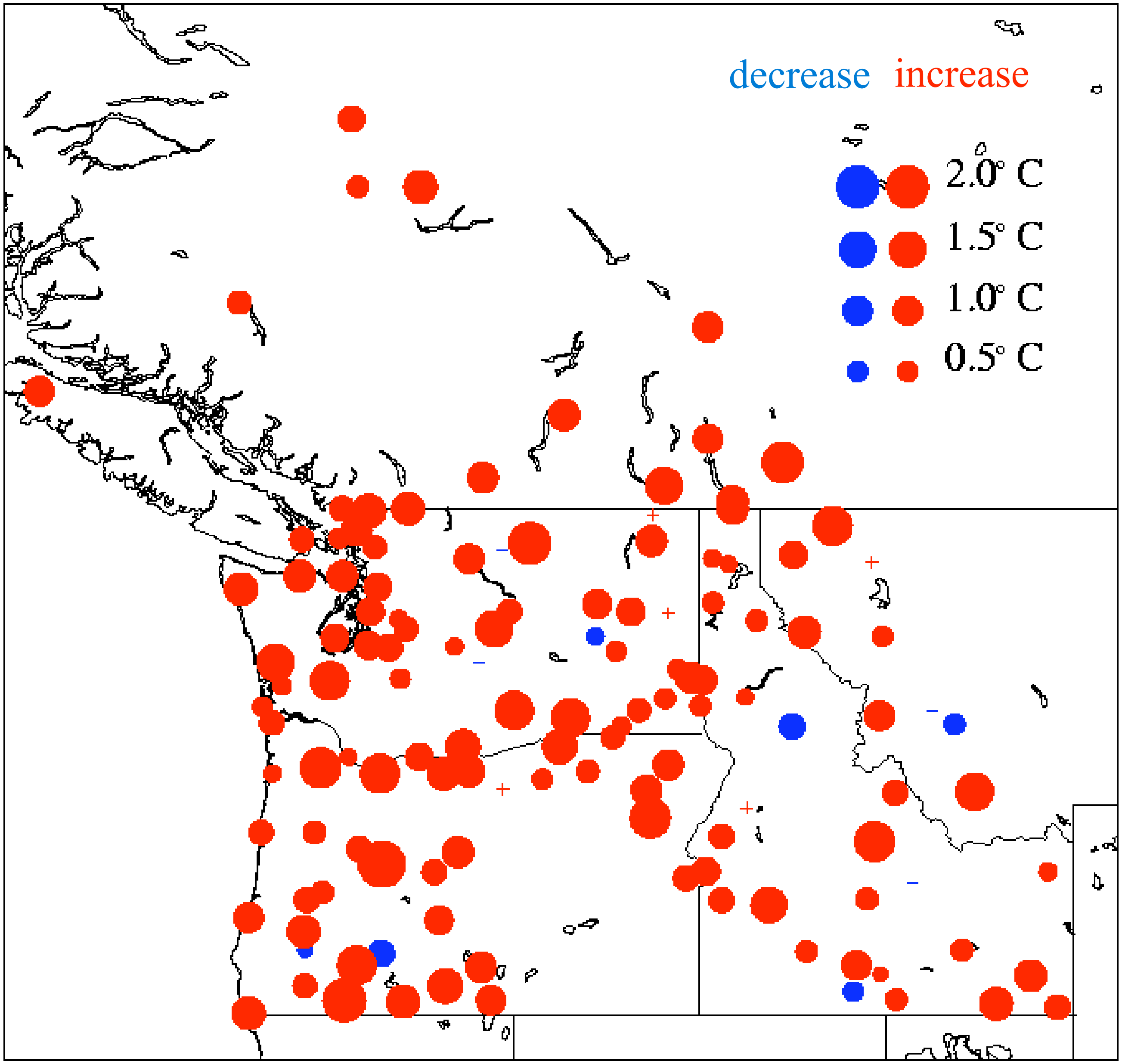




Forecasting coho ocean survival

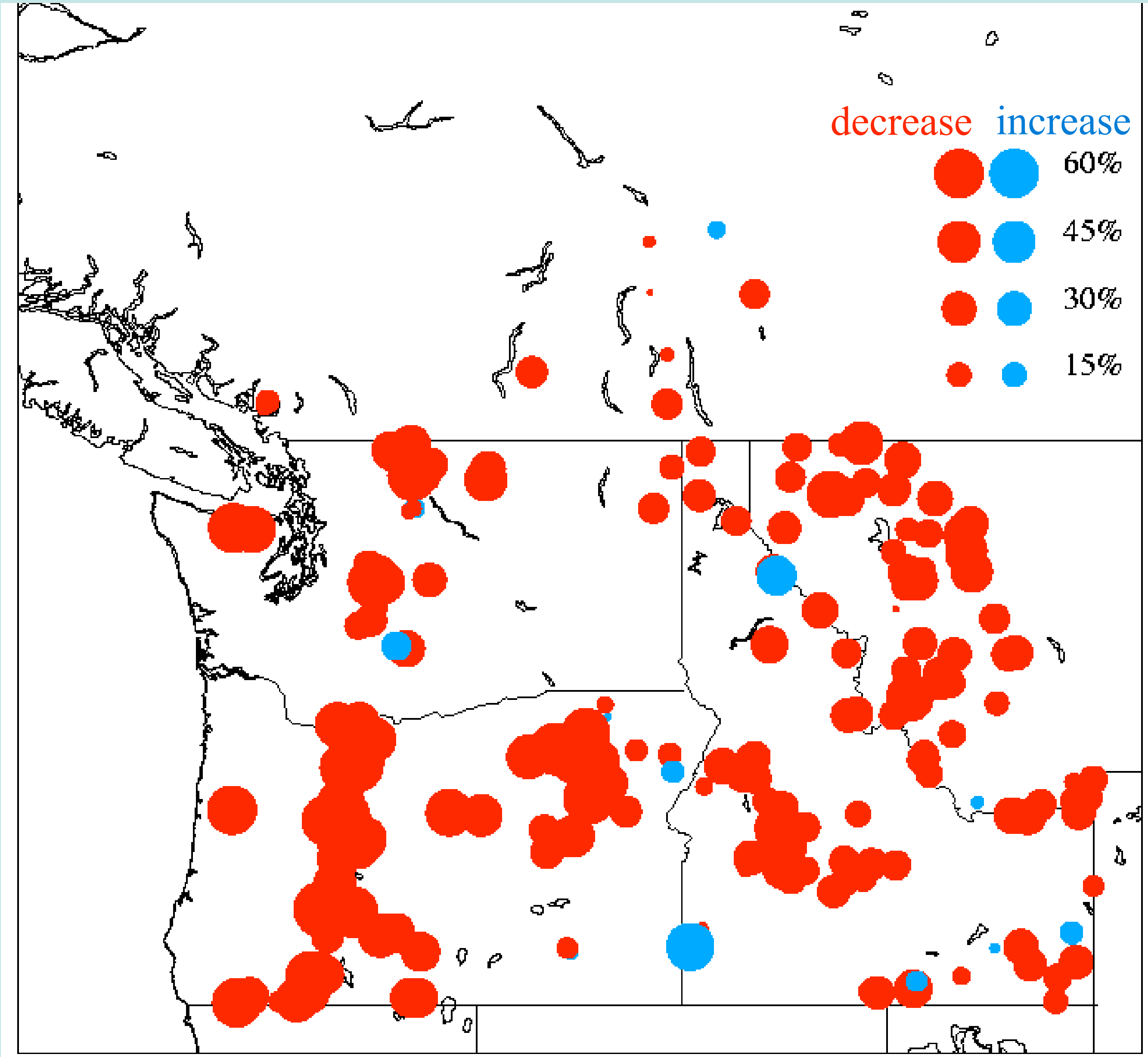


Temperature trends (°C per century), since 1920



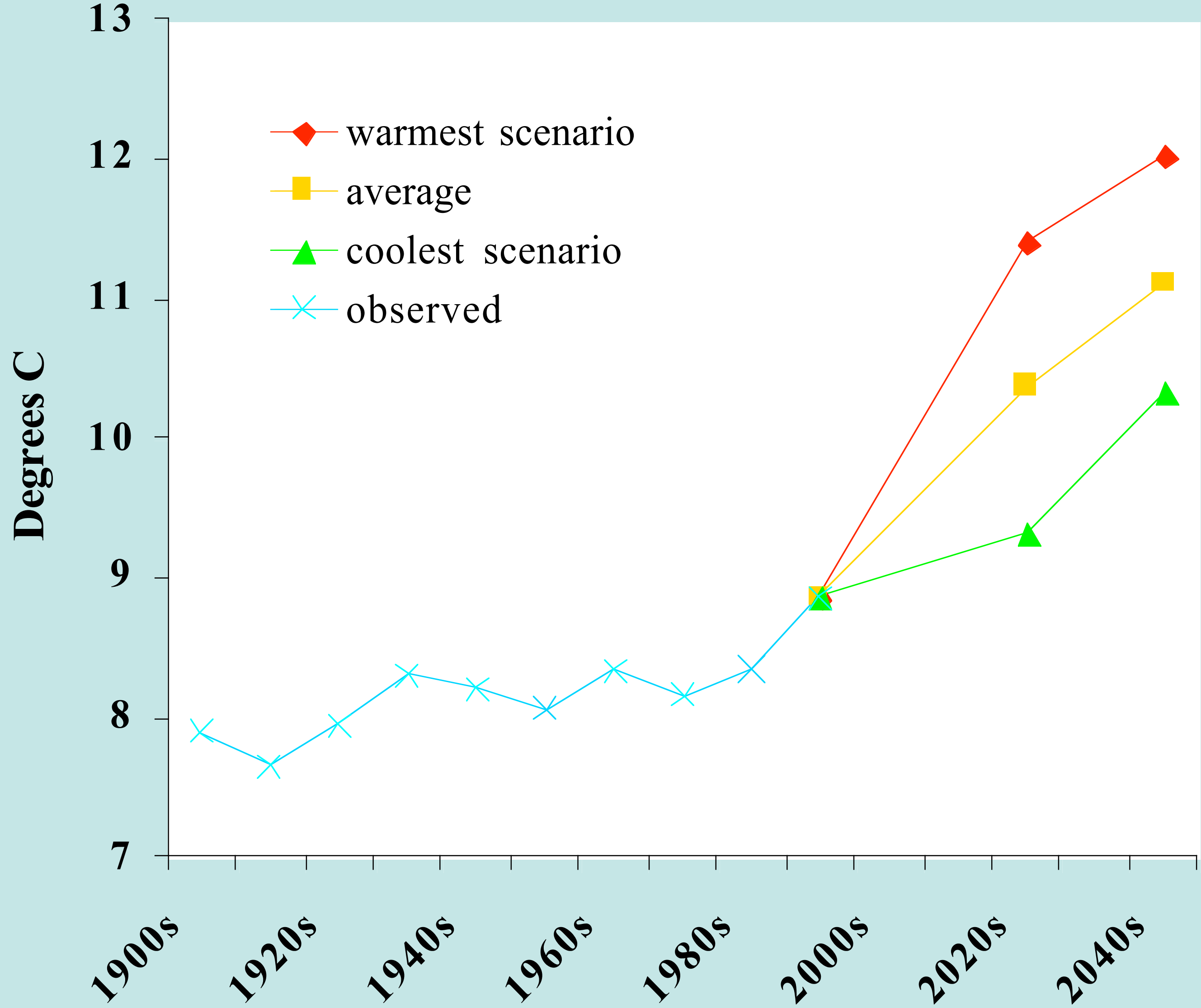
Source: Mote, P. W. 2003. Trends in temperature and precipitation in the Pacific Northwest during the twentieth century. *Northwest Science* 77(4): 271-282.

Trends in April 1 snow water equivalent, 1950-2000

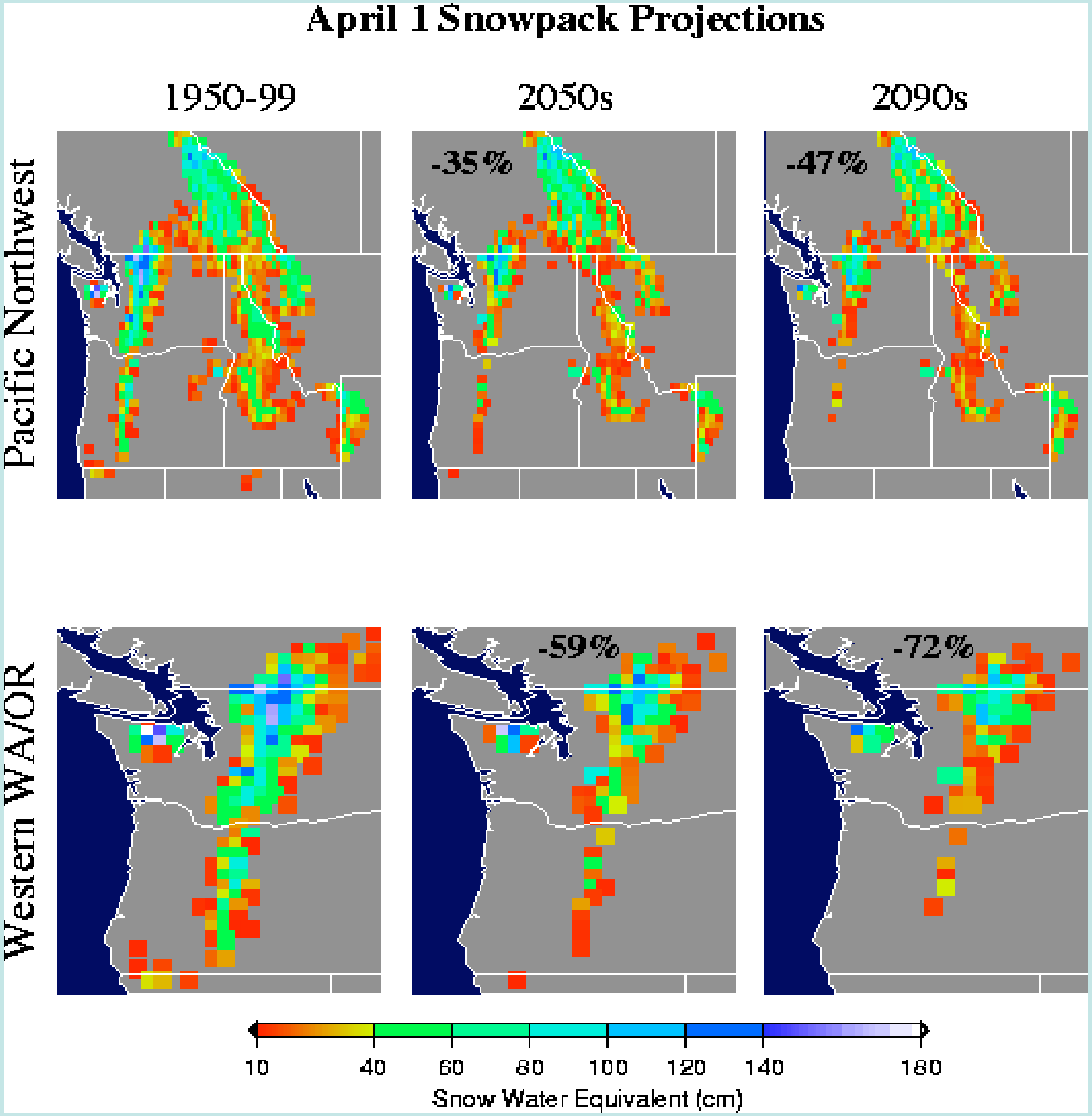


Source: Mote, P. W. 2003. Trends in snow water equivalent in the Pacific Northwest and their climatic causes. *Geophysical Research Letters* 30(12) 1601, doi:10.1029/2003GL017258, 2003.

Northwest warming



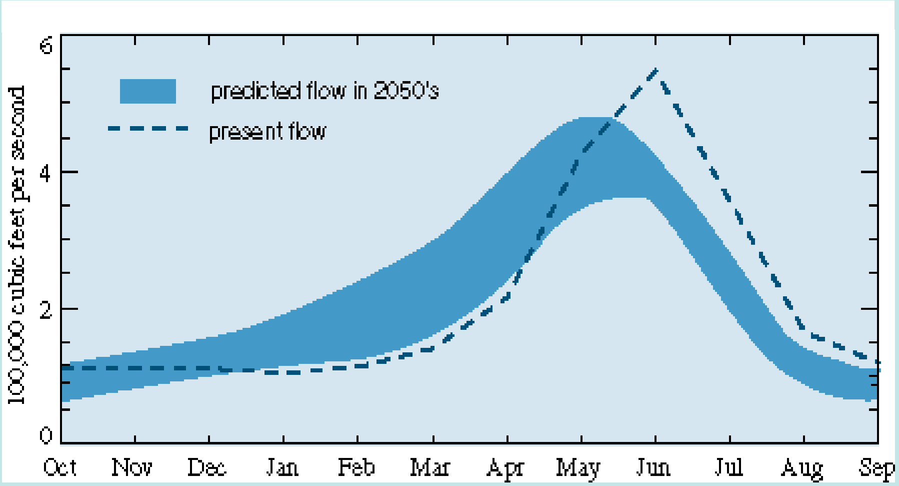
~1.5 to 3°C
or
~ 3 to 6 °F
warmer in
the 2040's



Provided by Dennis Lettenmaier and Andy Wood, UW Civil Engineering
Accelerated Climate Prediction Initiative, a UW-SIO-PNNL collaboration

Impacts of Hydrologic Changes

- **Less snow, earlier melt means less water in summer**
  - irrigation
  - urban uses
  - fisheries protection
  - energy production



Natural Columbia River flow at the Dalles, OR.

- **More water in winter**
  - more hydropower production
  - flooding

Courtesy of Hamlet and Lettenmaier, UW Civil Engineering

Storage of Columbia River Water