Straight Talk About the Future of Salmon

Robert T. Lackey
Oregon State University

Mat-Su Symposium - Wasilla
November 7, 2012

Topics

1. Brief history of the decline worldwide

2. Most likely status of PNW wild salmon in 2100

3. Alternative policies that would restore wild salmon

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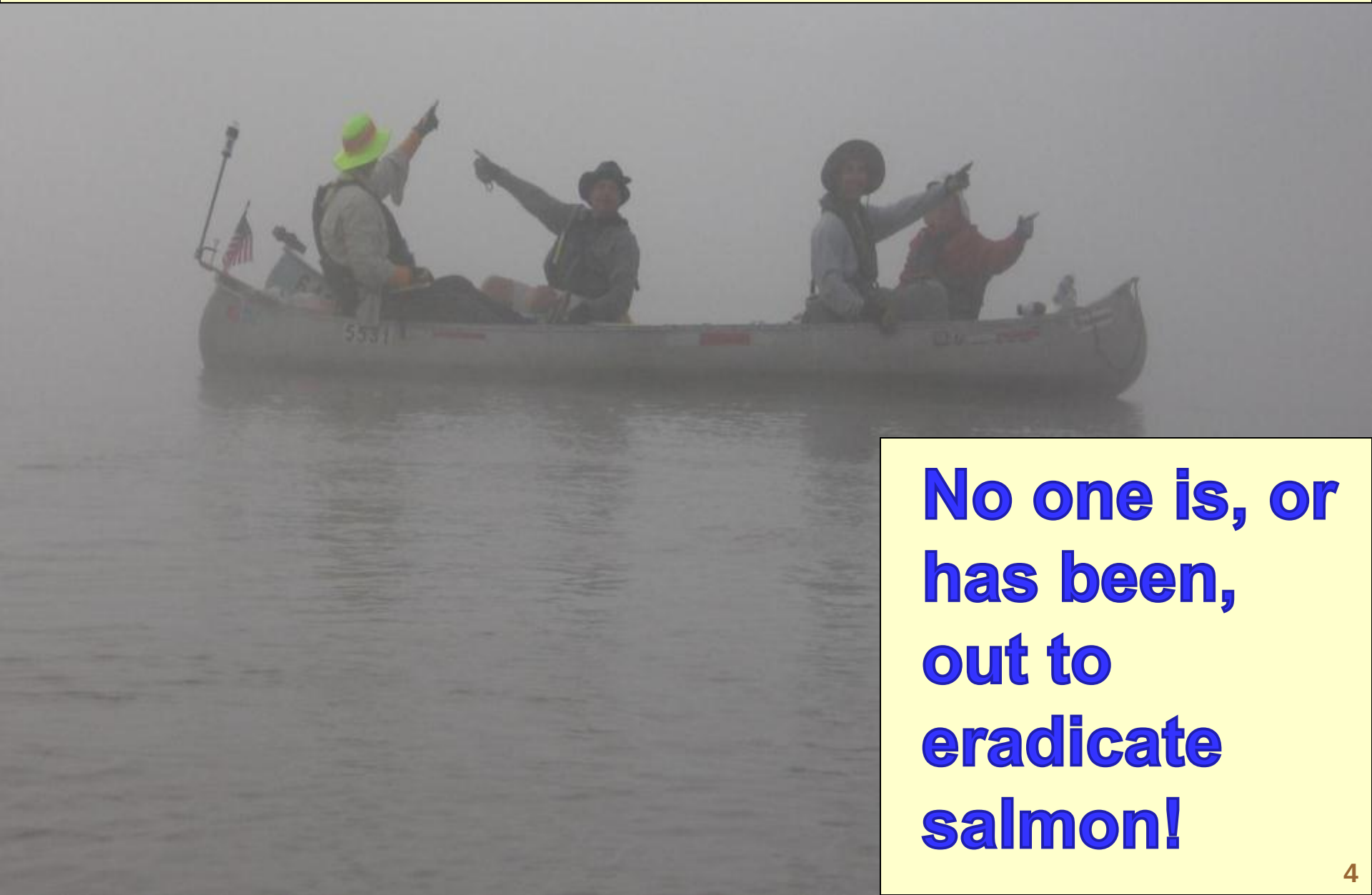
1. Brief history of the decline worldwide

2. Most likely status of PNW wild salmon in 2100

3. Alternative policies that would restore wild salmon

A few points of reference

Points of reference



No one is, or has been, out to eradicate salmon!

Points of reference

Easy to get lost in the technical weeds about salmon!

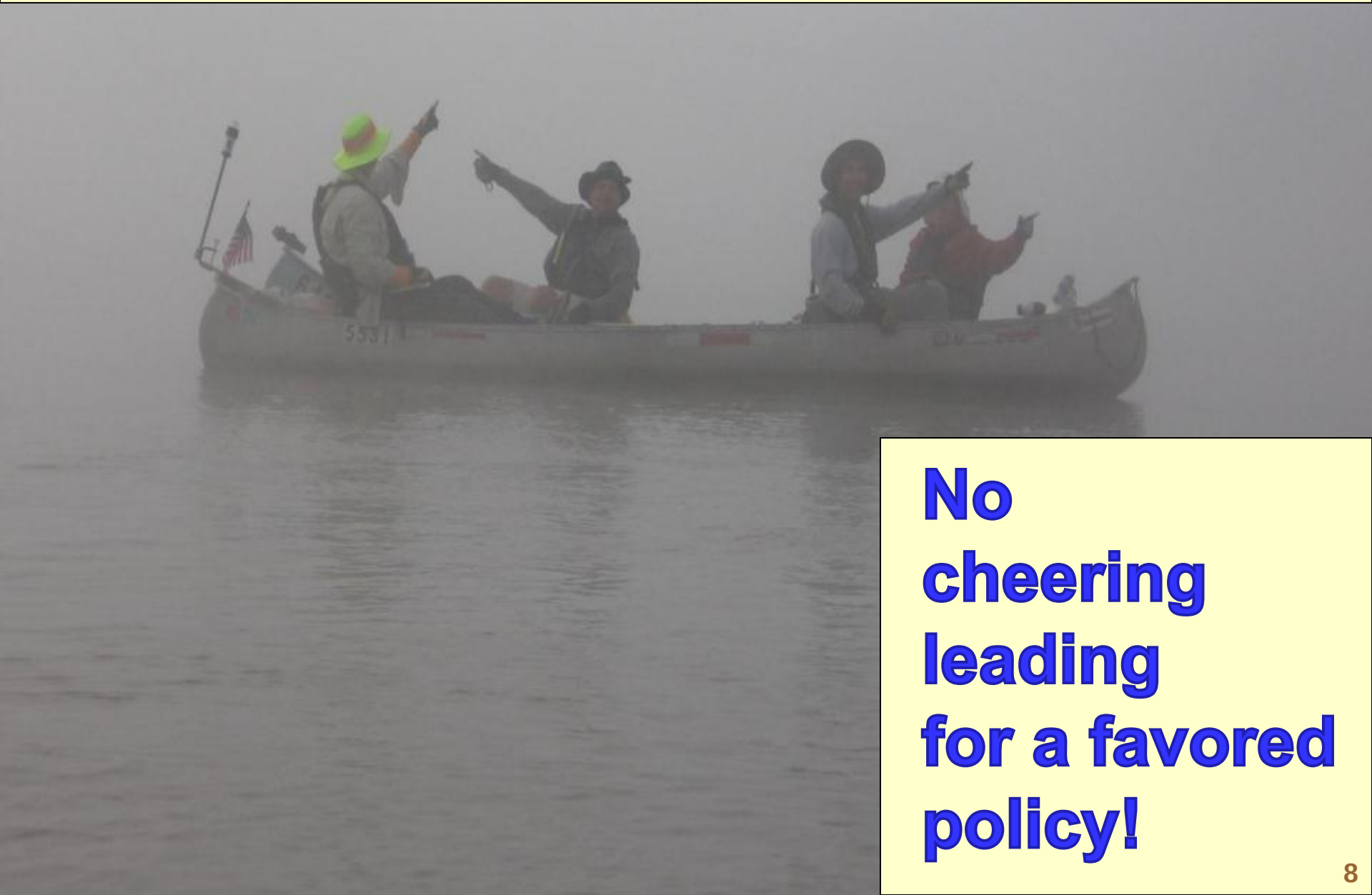
Points of reference

No delusional reality about the future of wild salmon!

Points of reference

No doom and gloom about the future of wild salmon!

Points of reference



No cheering leading for a favored policy!

Topics

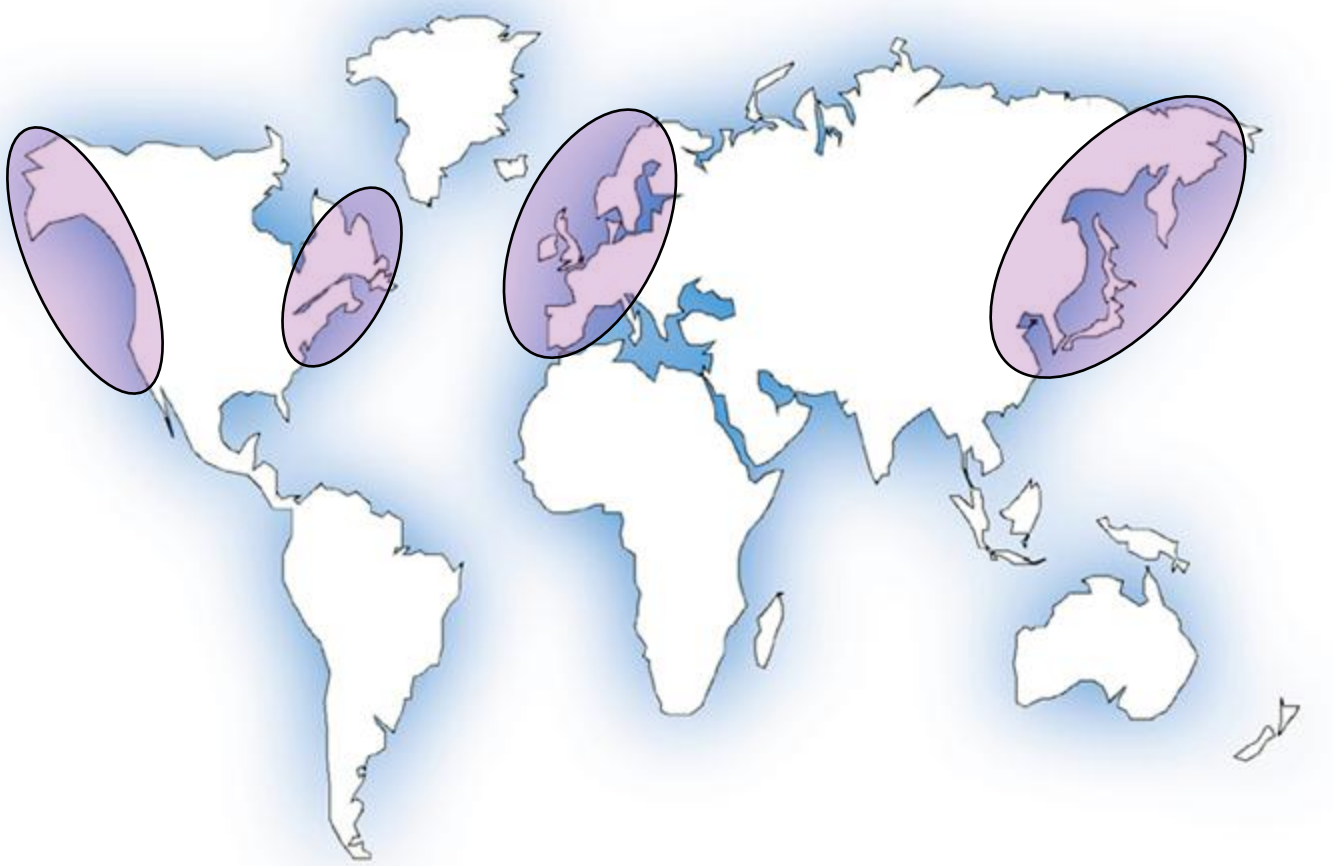
1. **Brief history of the decline worldwide**

2. Most likely status of PNW wild salmon in 2100

3. Alternative policies that would restore wild salmon

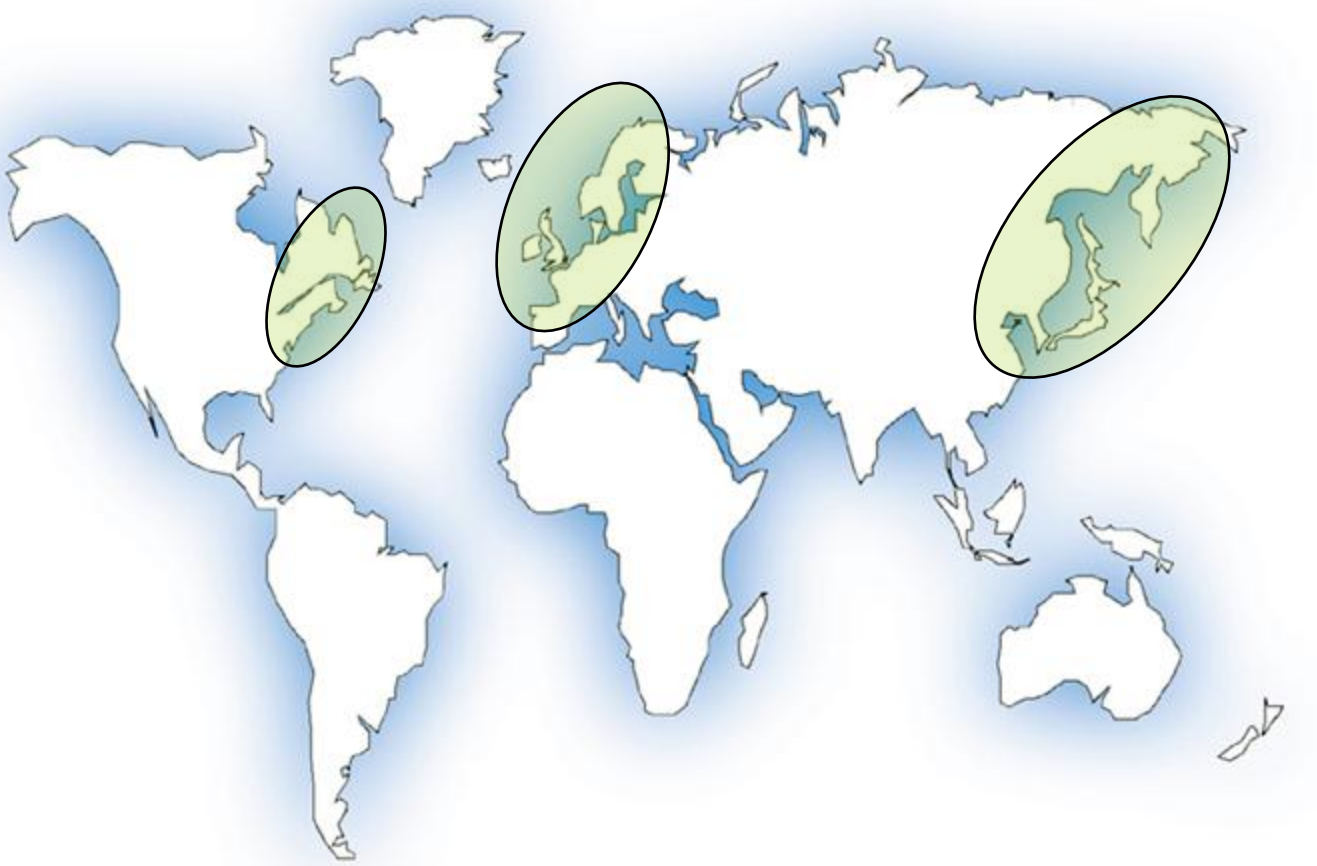
Historical Context

Status ~4,000 yrs ago



Distribution roughly as it is today

Status in 2012



Pattern of decline has been similar

Status in 2012

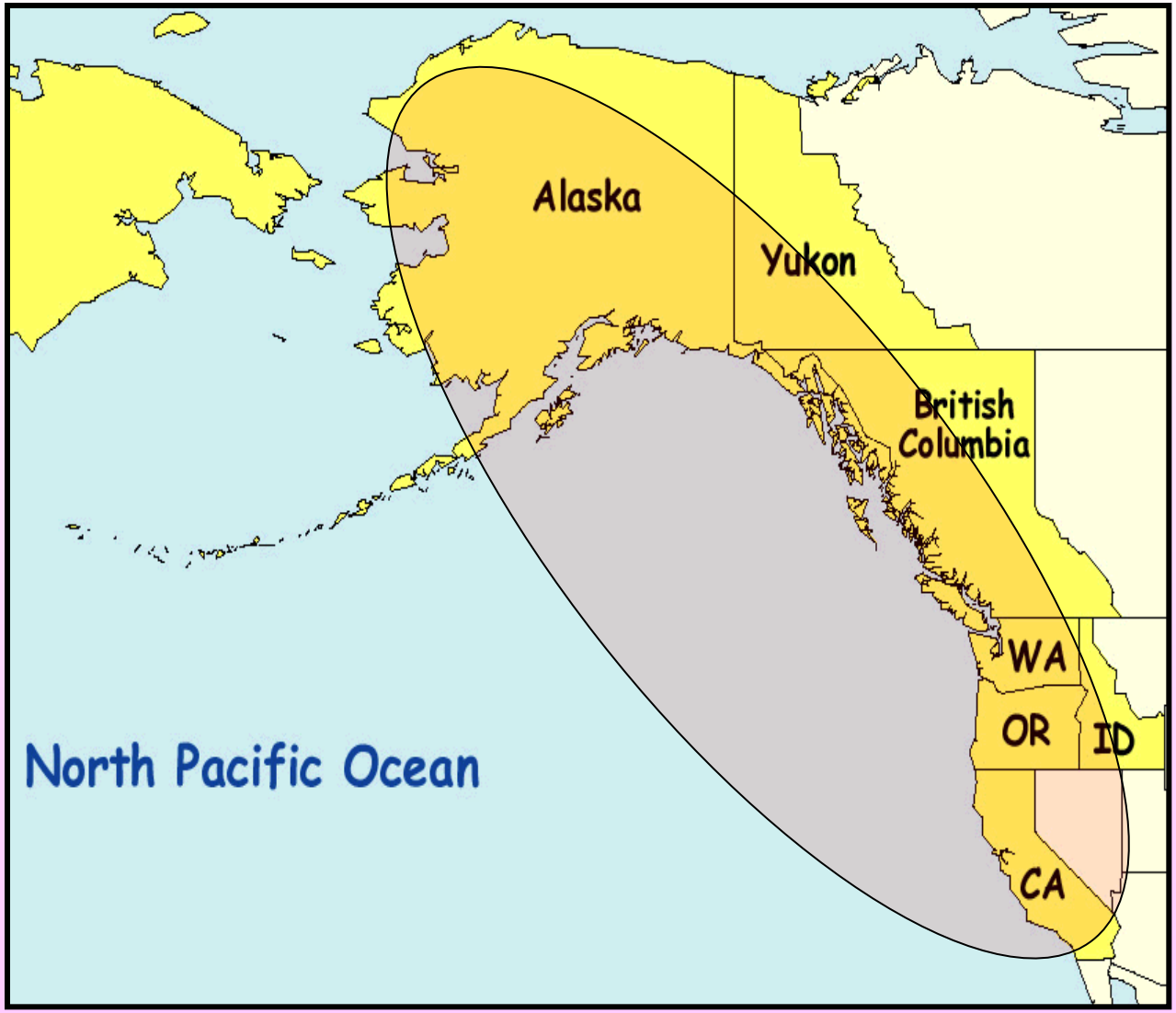
What about western North America?

The “Modern” Era

1848

Changing status of runs —

past 164 years



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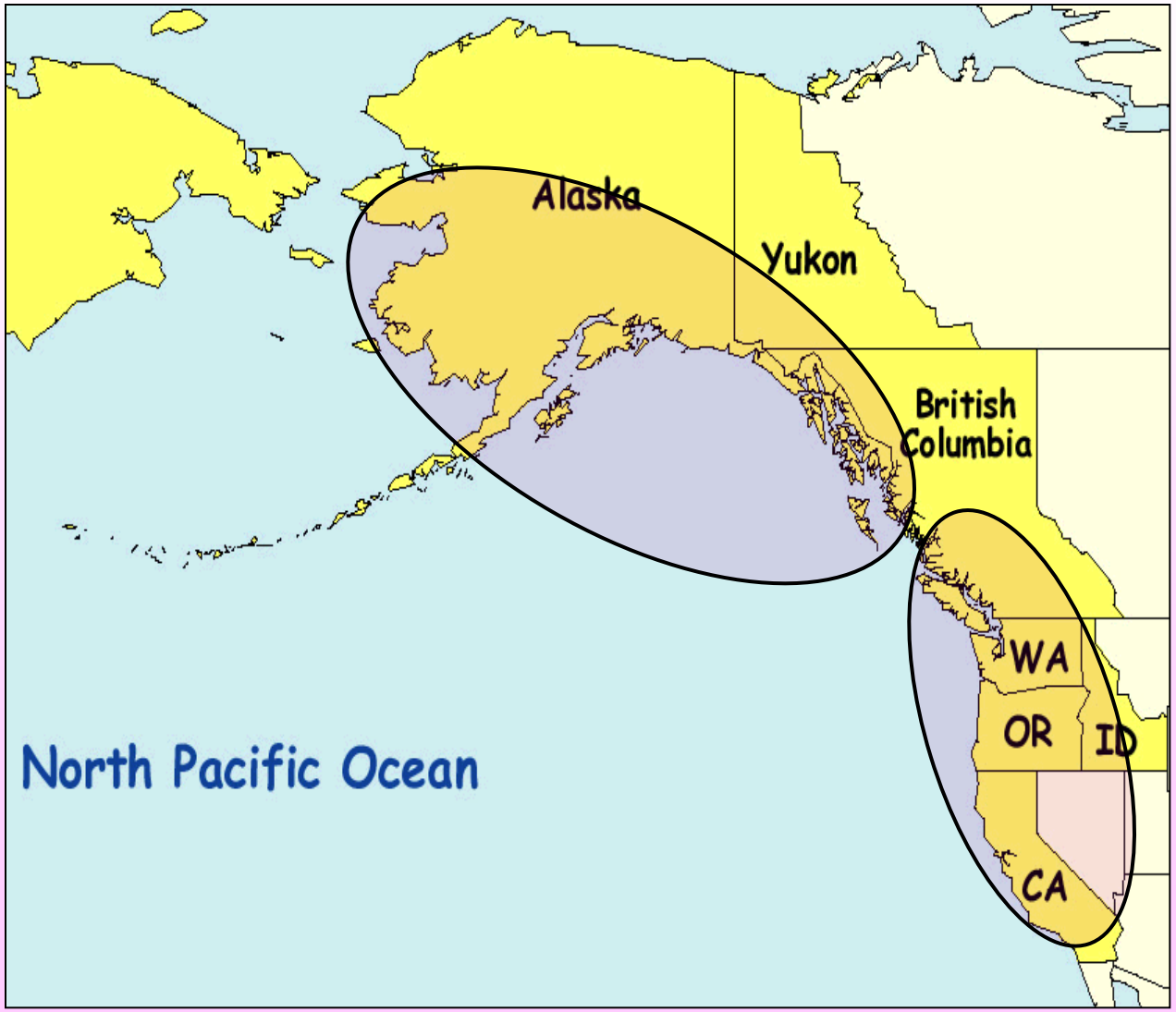
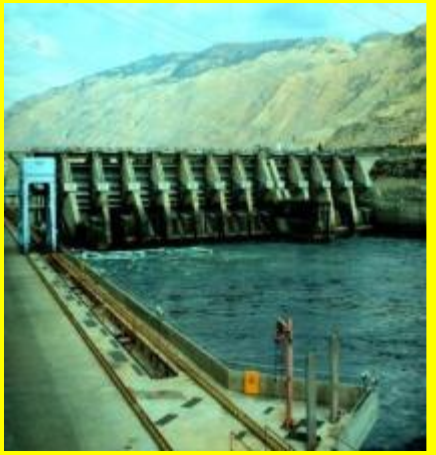


2012

Causes of the decline:

CA, OR, WA, ID, & southern BC



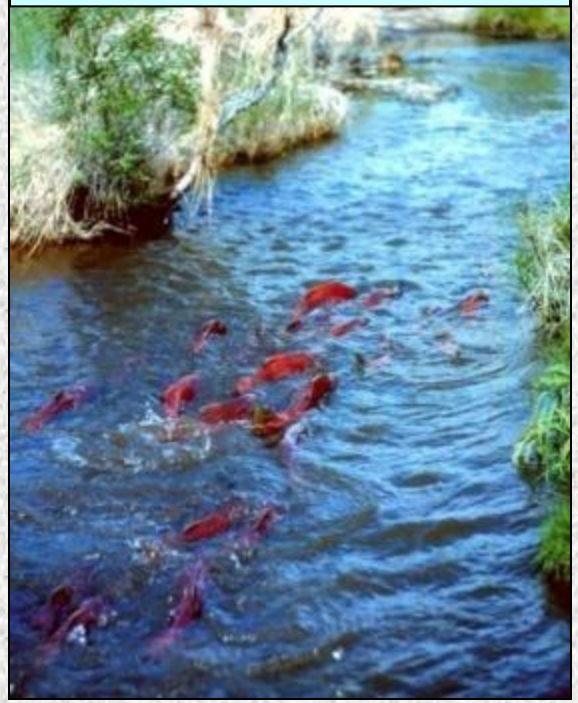


Three “types” of salmon

Hatchery

Farmed

Wild



Endangered Species Act

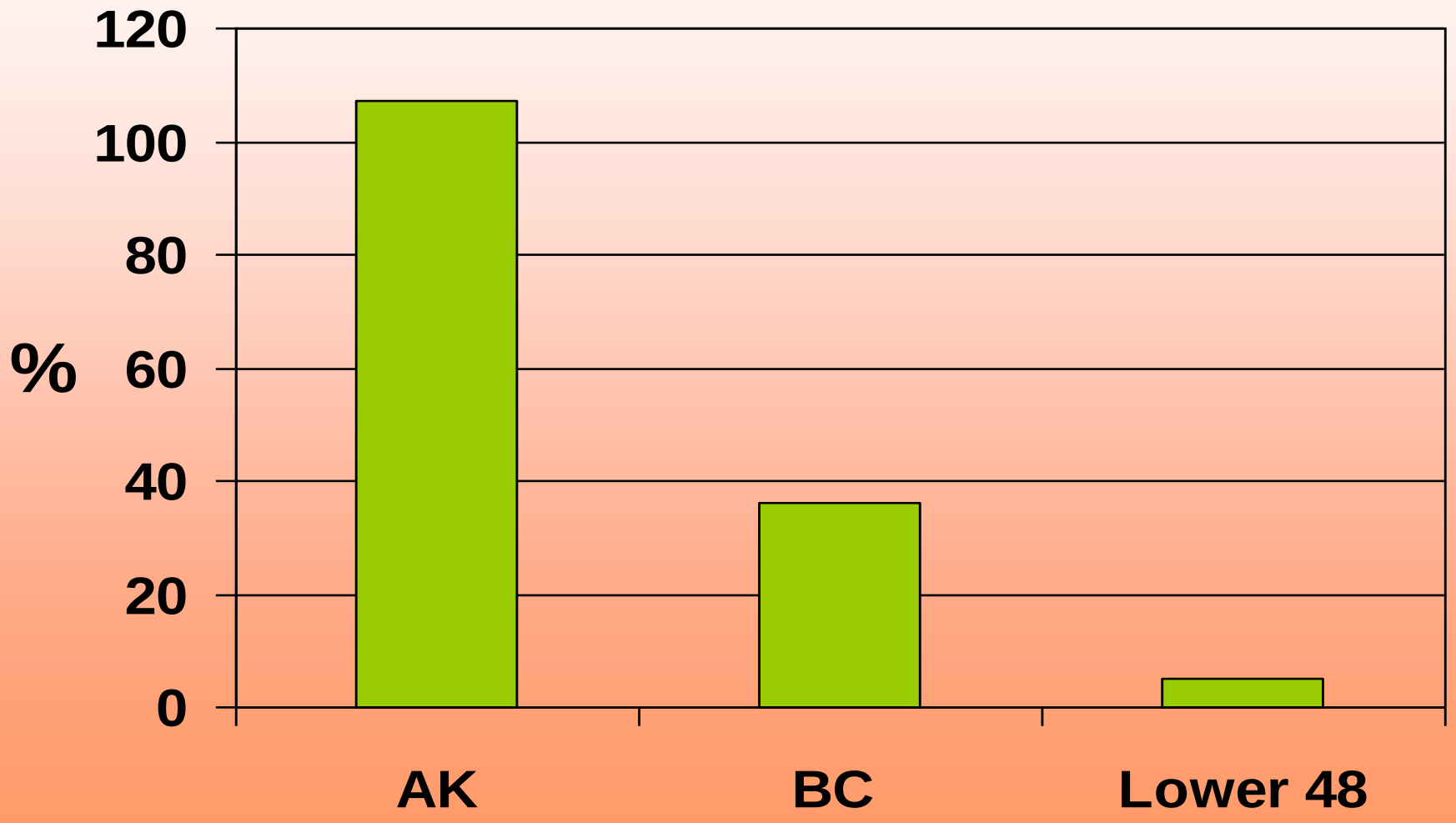
"Wild" Salmon:

"those produced from parents who spawned naturally in natural habitat"

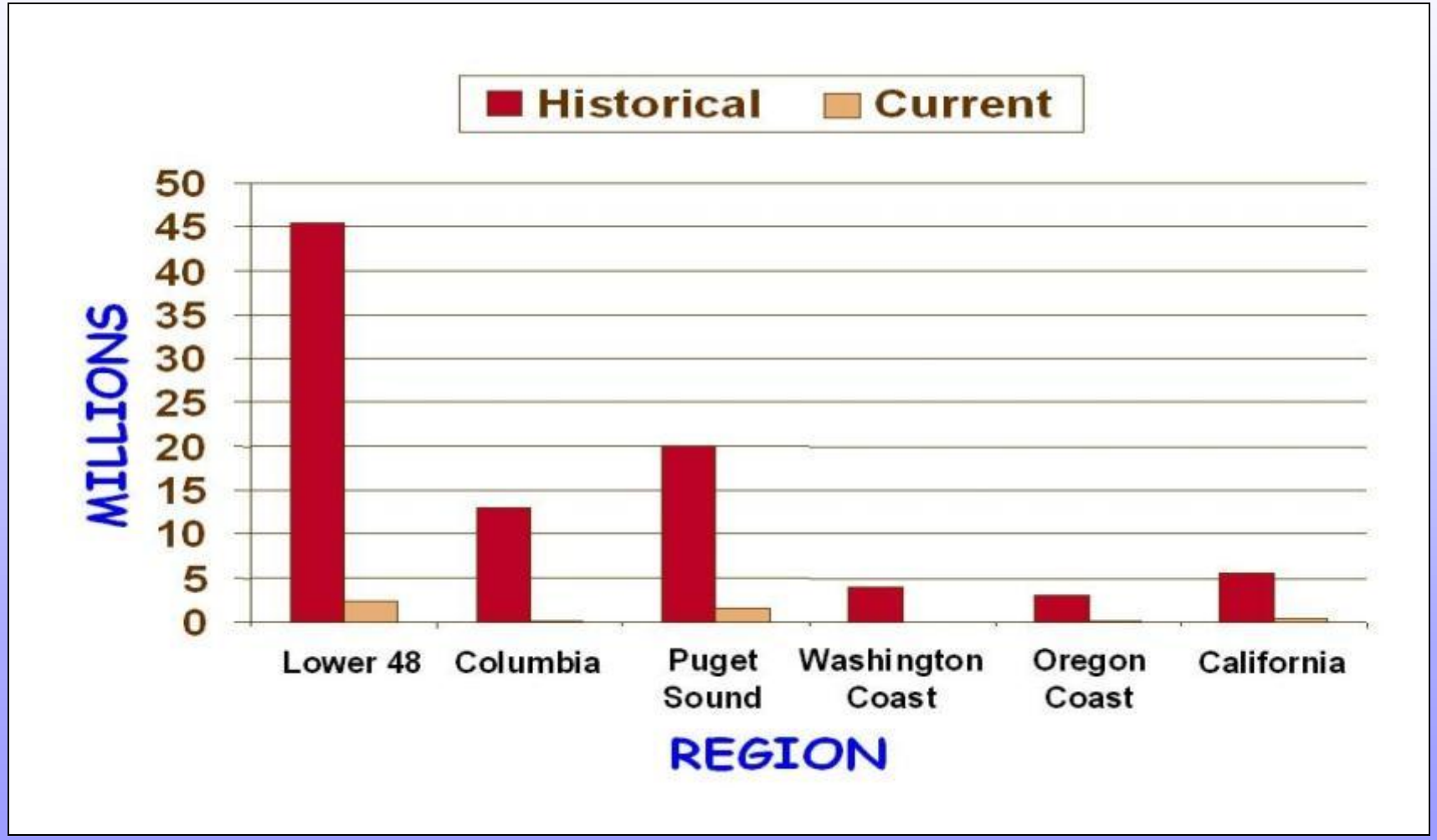
Changes in wild salmon numbers?

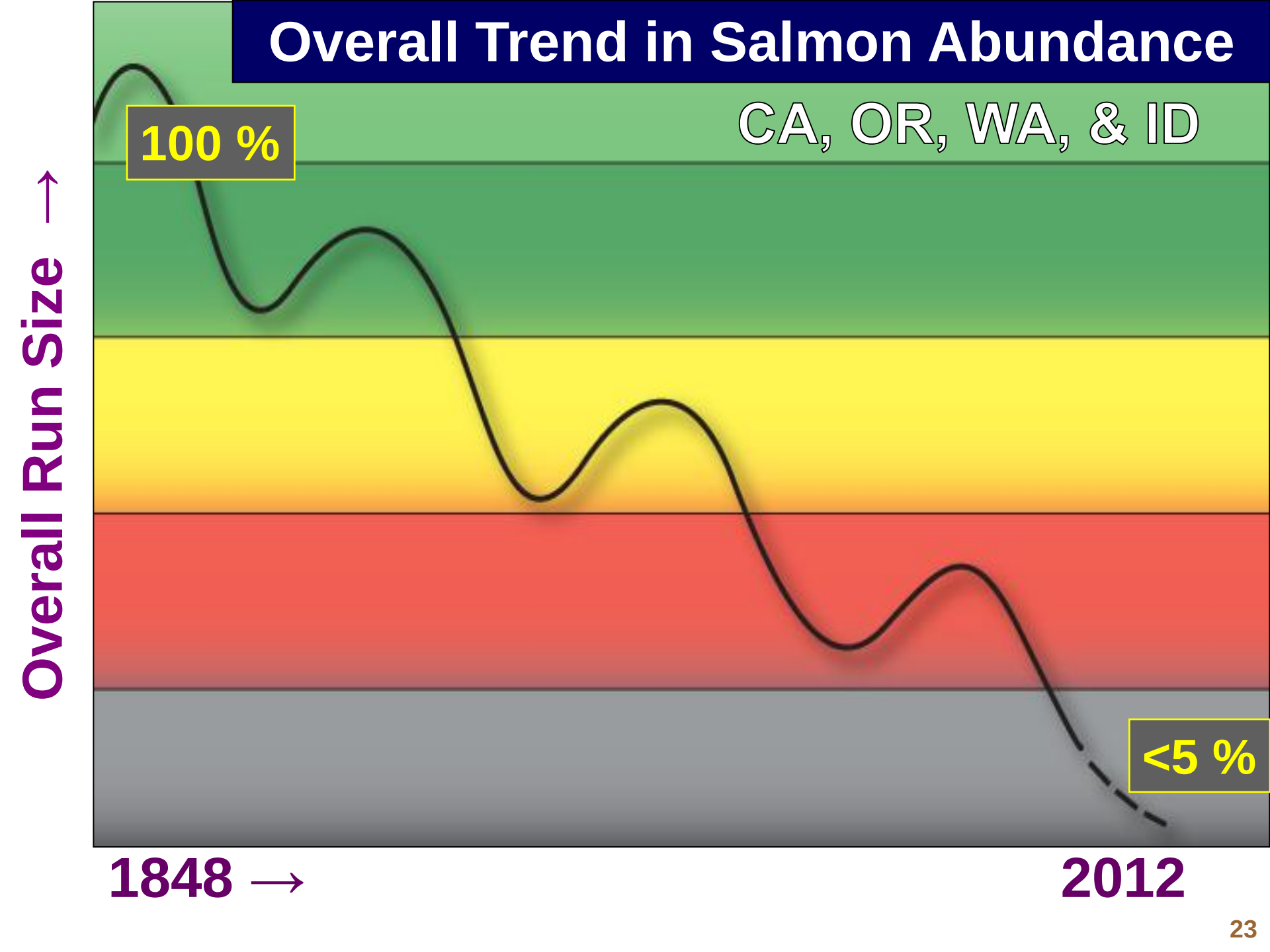
Changes in wild salmon numbers

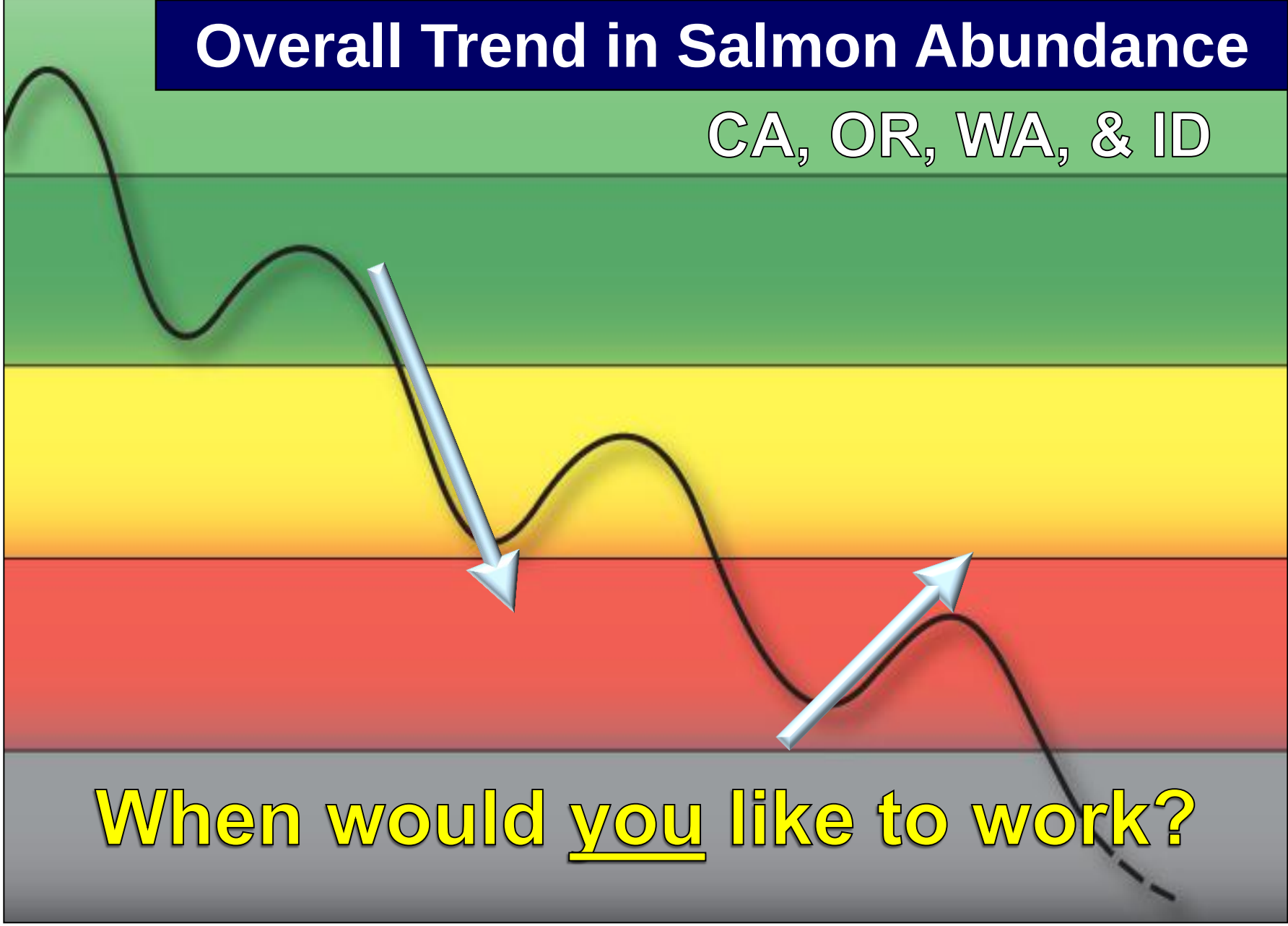
(historical vs. current) – 30 year averages



Wild salmon decline:




Overall Trend in Salmon Abundance
CA, OR, WA, & ID
100 %
<5 %
Overall Run Size →
1848 →
2012


Overall Trend in Salmon Abundance
CA, OR, WA, & ID
Overall Run Size →
When would you like to work?
1848 →
2012

Recovery efforts (1848 – 2012) have been extensive and expensive

CA, OR, WA, & ID

Long-term trend is still downward

Topics

1. Brief history of the decline worldwide

2. **Most likely status of PNW wild salmon in 2100**

3. Alternative policies that would restore wild salmon

What will determine the future of wild salmon in western North America?

Salmon Forecasting:

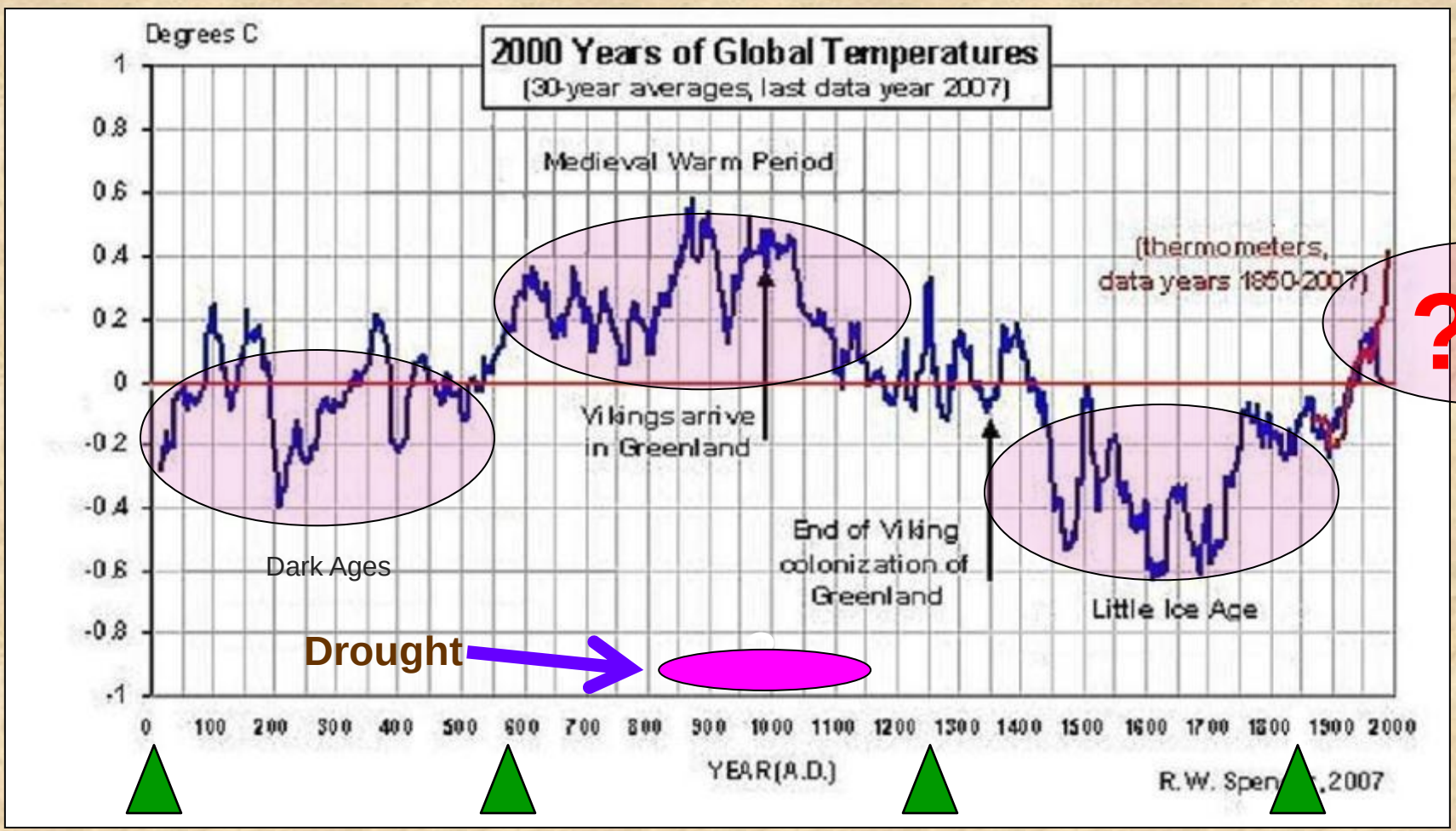
There are really big uncertainties:

known unknowns

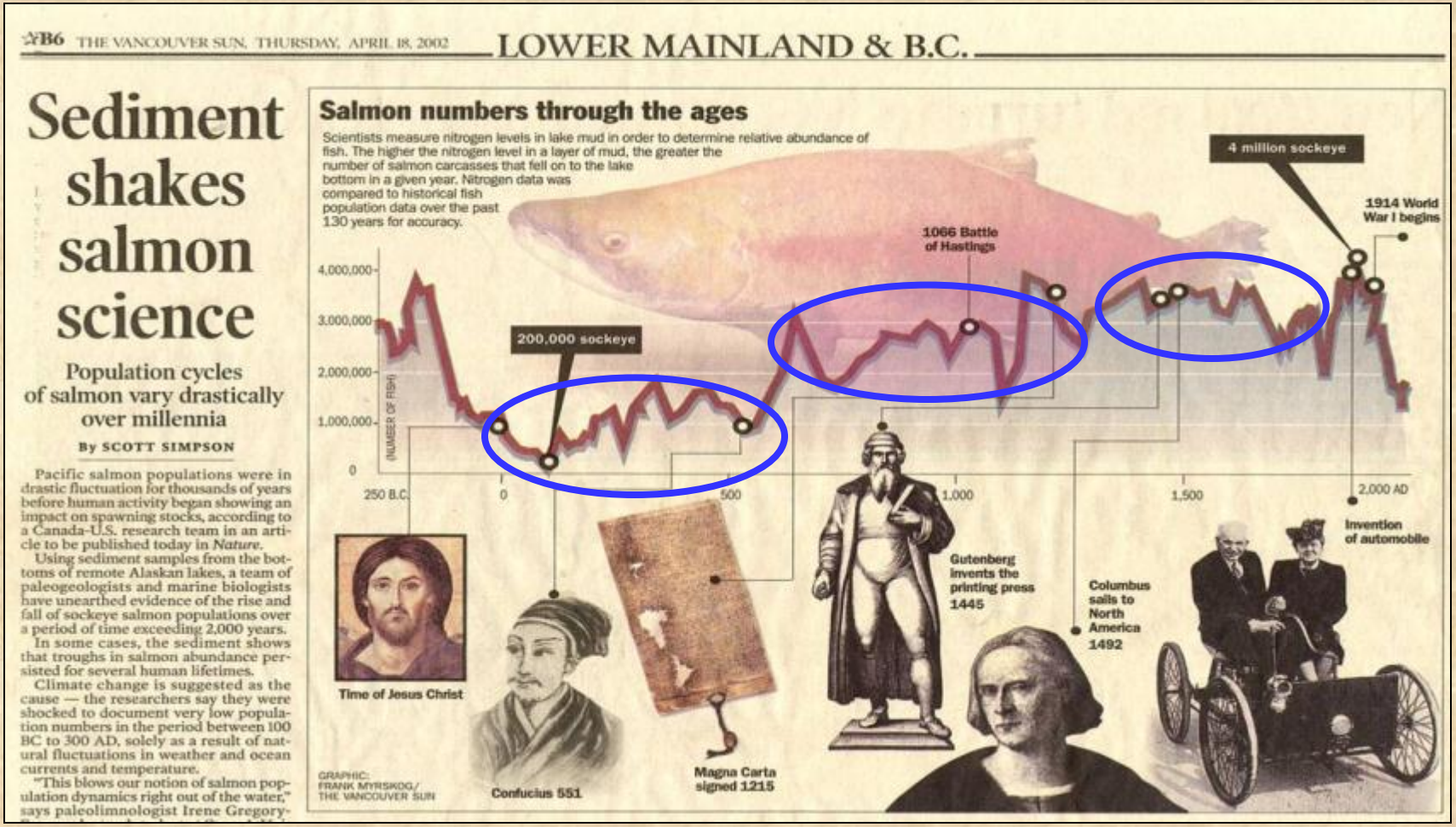
&

unknown unknowns

Effect of climate on salmon habitat



Effect of climate on salmon runs



B6 THE VANCOUVER SUN, THURSDAY, APRIL 18, 2002 LOWER MAINLAND & B.C.

Sediment shakes salmon science

Population cycles of salmon vary drastically over millennia

By SCOTT SIMPSON

Pacific salmon populations were in drastic fluctuation for thousands of years before human activity began showing an impact on spawning stocks, according to a Canada-U.S. research team in an article to be published today in *Nature*.

Using sediment samples from the bottoms of remote Alaskan lakes, a team of paleogeologists and marine biologists have unearthed evidence of the rise and fall of sockeye salmon populations over a period of time exceeding 2,000 years.

In some cases, the sediment shows that troughs in salmon abundance persisted for several human lifetimes.

Climate change is suggested as the cause — the researchers say they were shocked to document very low population numbers in the period between 100 BC to 300 AD, solely as a result of natural fluctuations in weather and ocean currents and temperature.

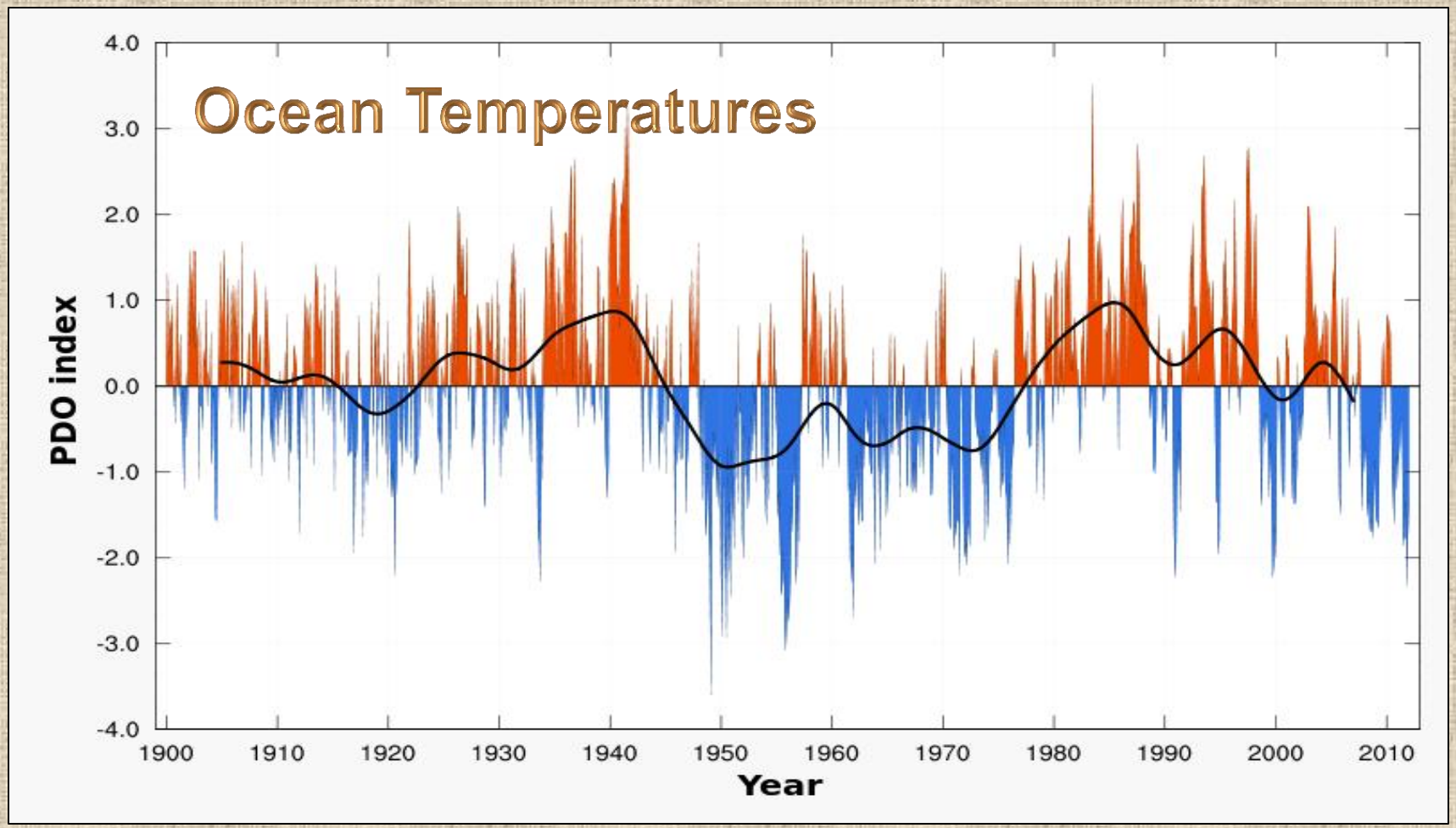
"This blows our notion of salmon population dynamics right out of the water," says paleolimnologist Irene Gregory-

Salmon numbers through the ages

Scientists measure nitrogen levels in lake mud in order to determine relative abundance of fish. The higher the nitrogen level in a layer of mud, the greater the number of salmon carcasses that fell on to the lake bottom in a given year. Nitrogen data was compared to historical fish population data over the past 130 years for accuracy.

"Long-term" fluctuations in salmon abundance

Effect of climate on salmon habitat



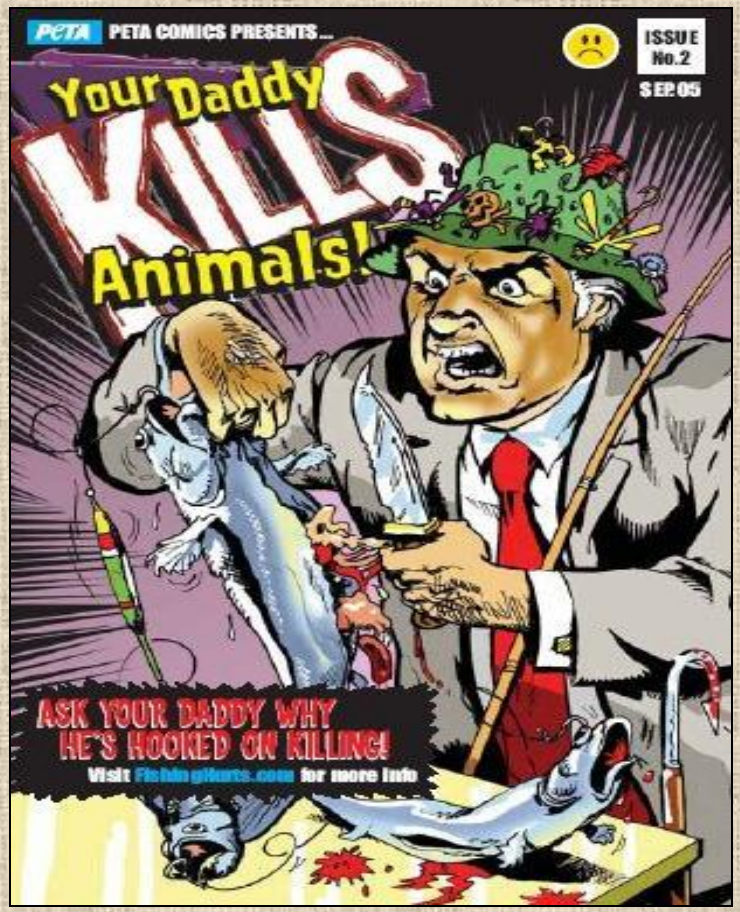
"Short-term" fluctuations in salmon abundance

Effect of highly uncertain and changing economic factors

BRIC and PIIGS Factors?

Social Change

dramatic value shifts



Watch out for black swans in long-term assessments!

Many important factors are known and could be changed if society is serious

Focus on the core policy drivers!

Core policy drivers:

Core policy driver #1: *Rules of Commerce*

"The current rules of commerce tend to work against increasing the abundance of wild salmon — especially problematic are trends in international commerce and market globalization"

Rules of commerce: *general characteristics*

Individual choice — ***determines collective priorities***

Rules of commerce: *general characteristics*

Individual choice — ***determines collective priorities***

Personal freedom — ***trumps collective good***

Rules of commerce: *general characteristics*

Individual choice — ***determines collective priorities***

Personal freedom — ***trumps collective good***

Externalities — ***handled outside market place***

Rules of commerce: *general characteristics*

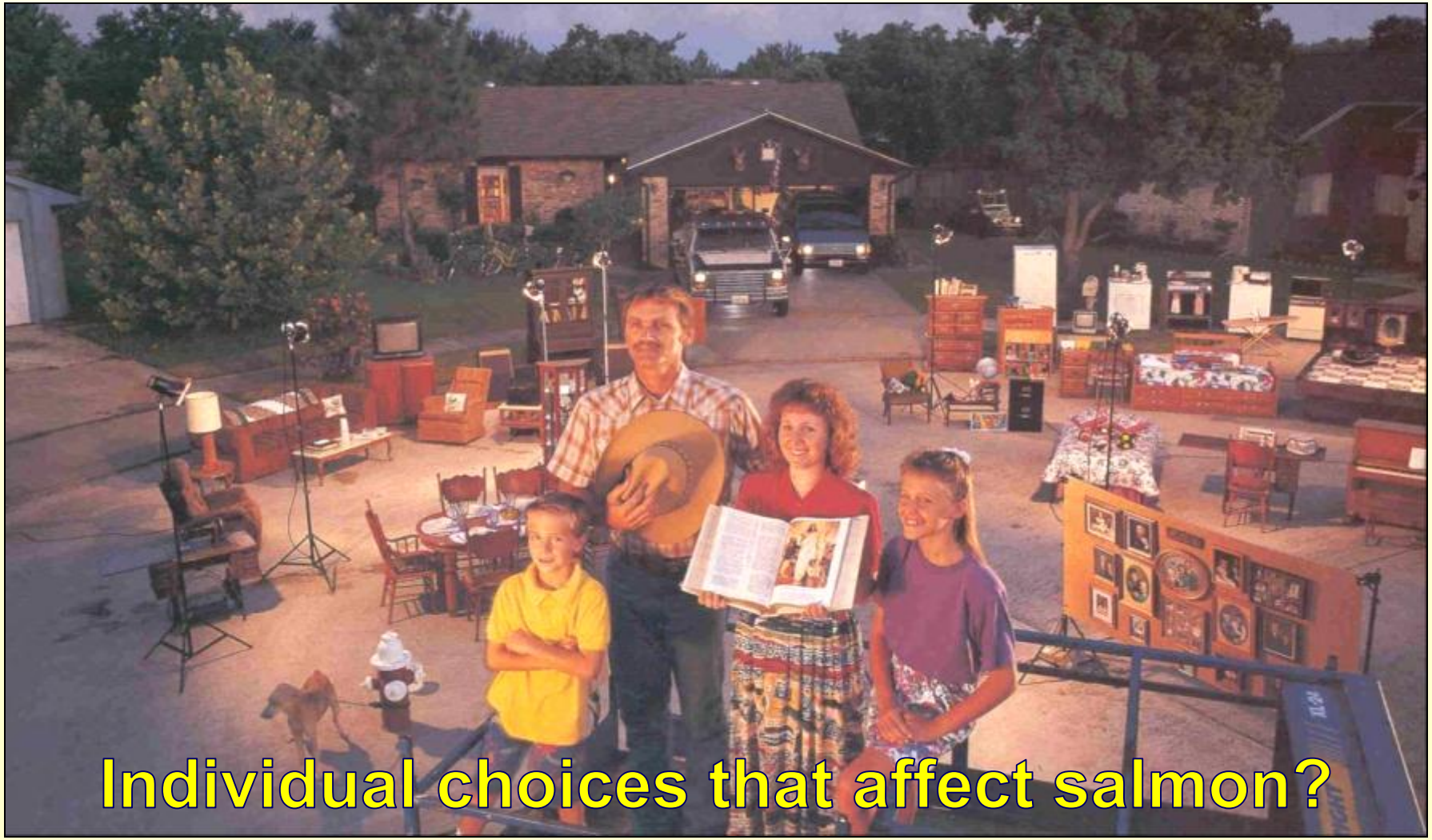
Individual choice — ***determines collective priorities***

Personal freedom — ***trumps collective good***

Externalities — ***handled outside market place***

Consumer is king — ***dollars spent are votes cast***

Success of market-driven economies!



Market-driven competition

Market-driven competition

California

Washington

Oregon

Idaho

Are there “better” alternatives to the current rules of commerce?

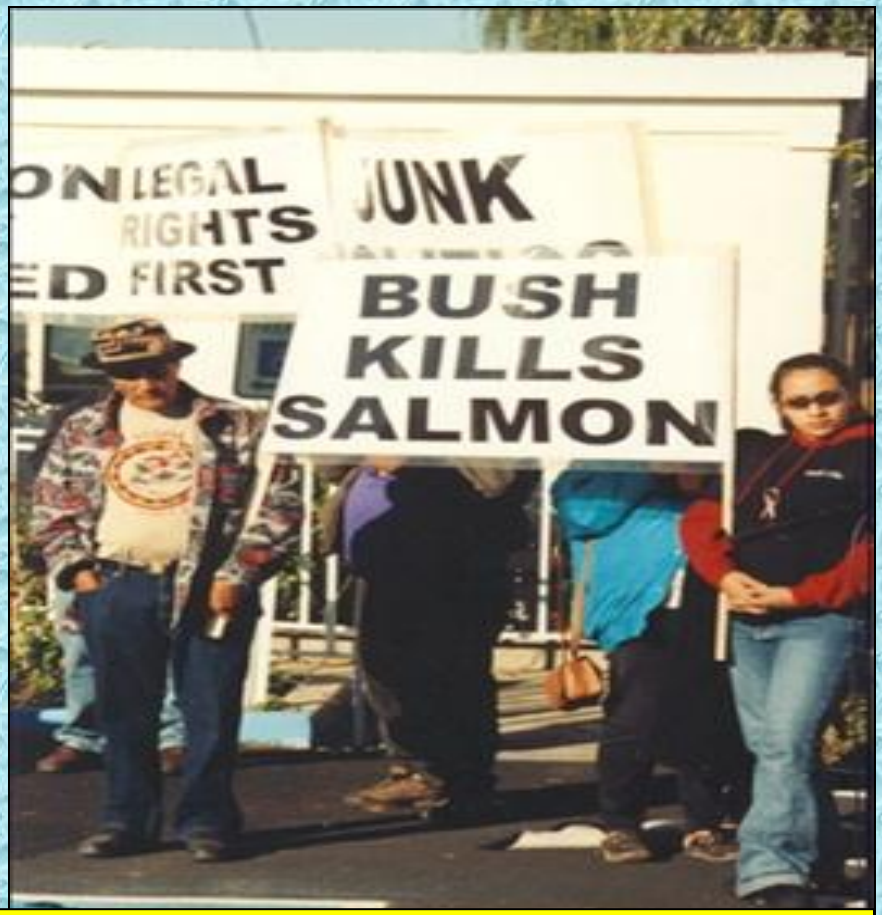
Core policy driver #2:
Scarce Natural Resources

"The demand for critical natural resources — especially for high quality water — will increase through this century"

Escalating competition for a largely finite water supply

Increasing demand

Conflicts over water:
will increase with demand



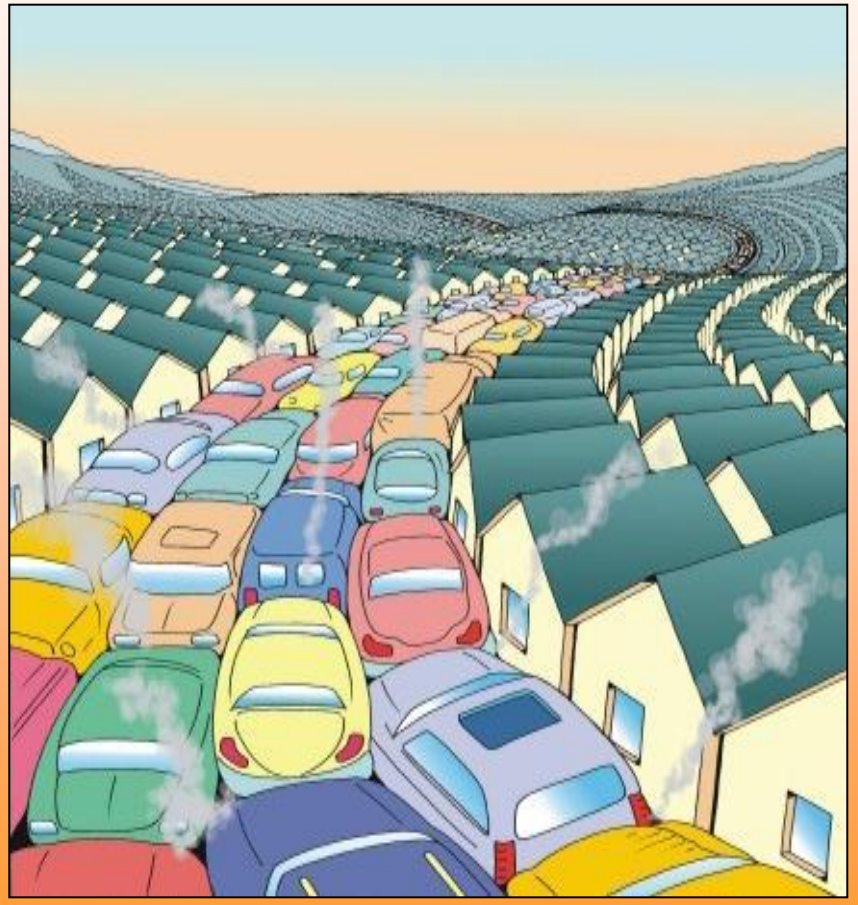
How are such conflicts resolved?

Salmon *vs.* other important uses for scarce water

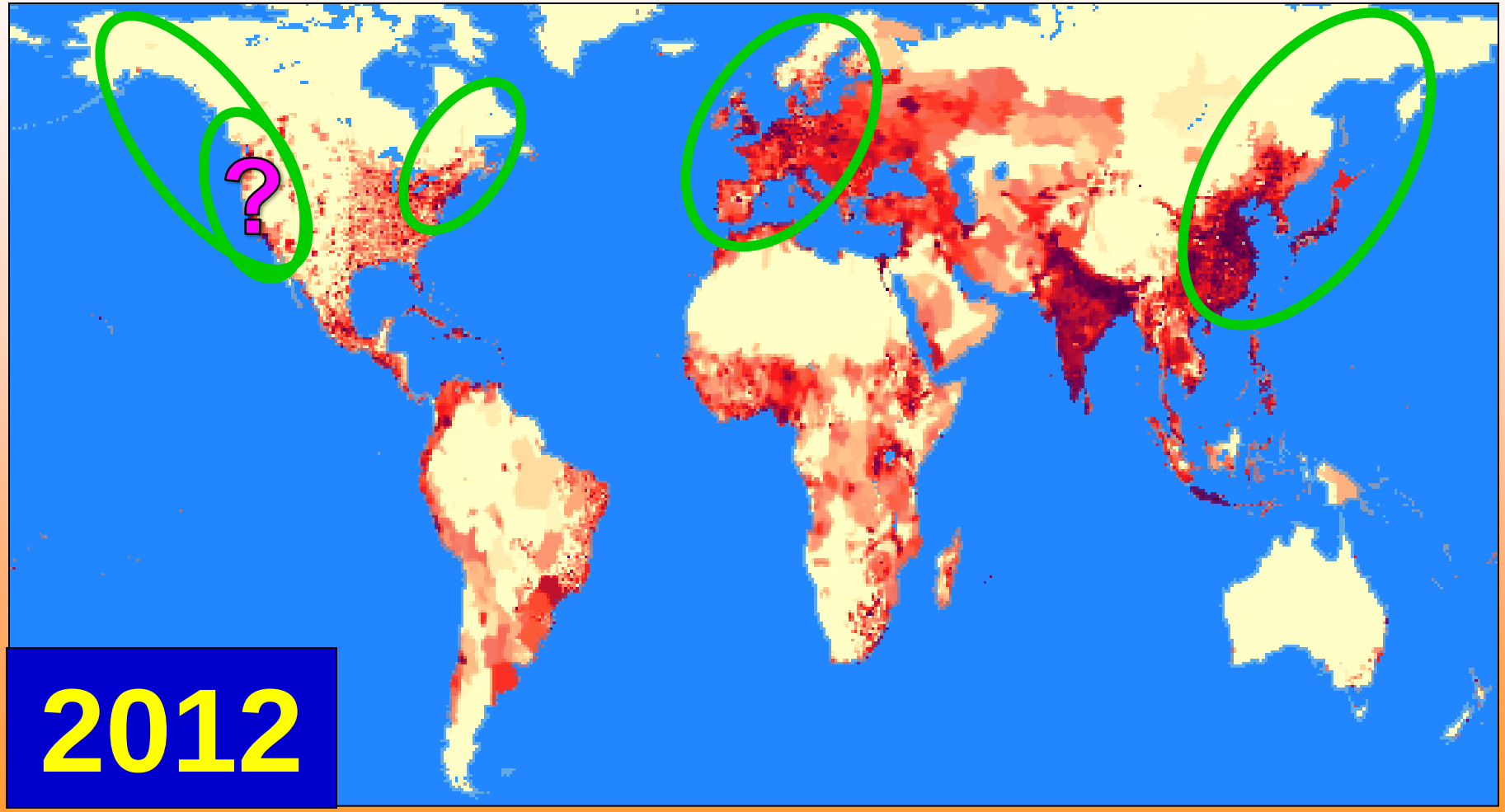
No substitution options!

Core policy driver #3:
Human Population in the Region

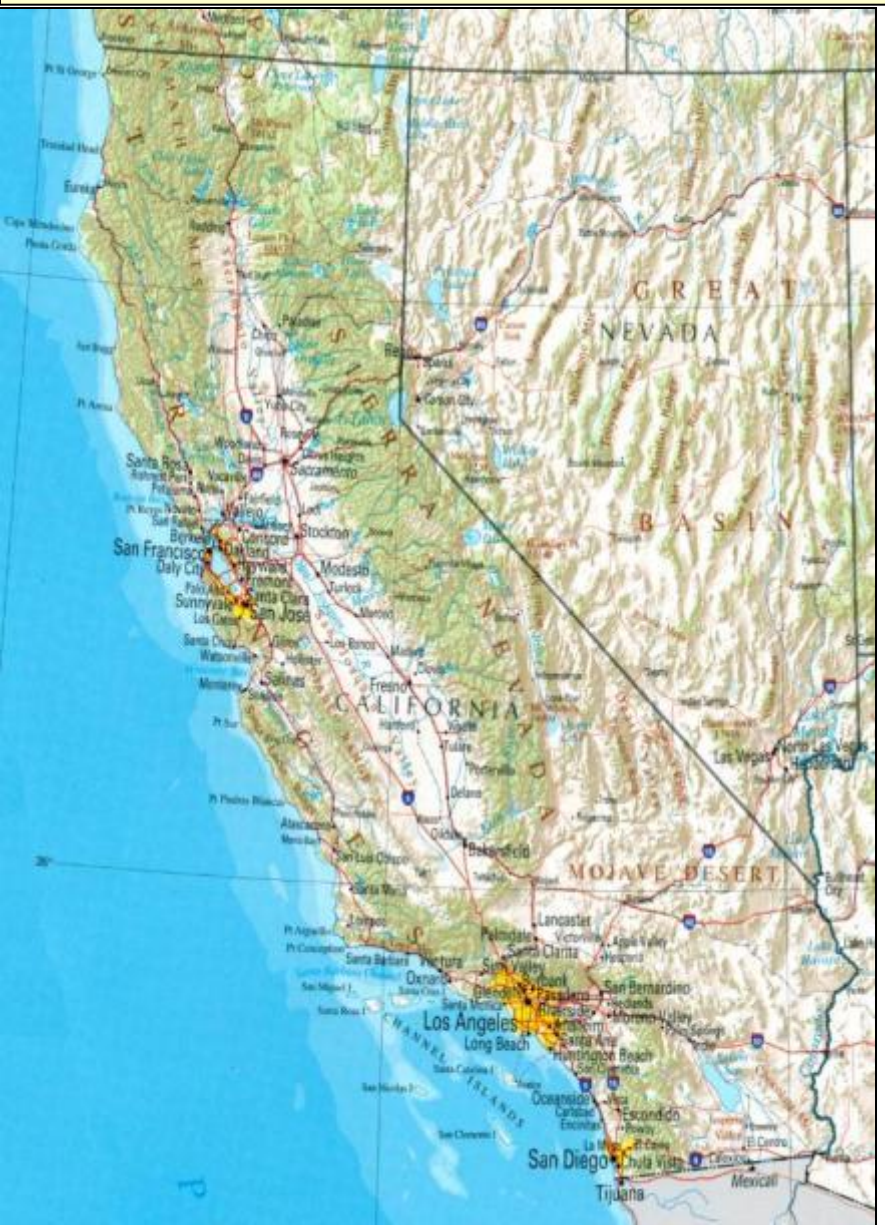
"The number of humans in the region will increase — and their aggregate demands to support chosen life styles will constrain the abundance of wild salmon"



Relationship between human and salmon abundance ????

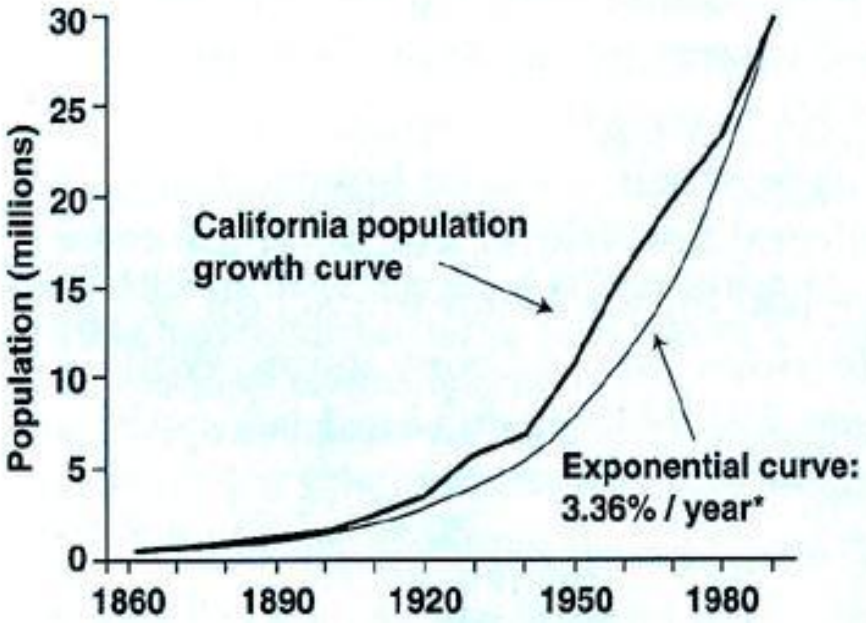


California: *humans and salmon?*



Forecasting the future in California?

California: *growth projections*



2100 = ?

California: *growth projections*

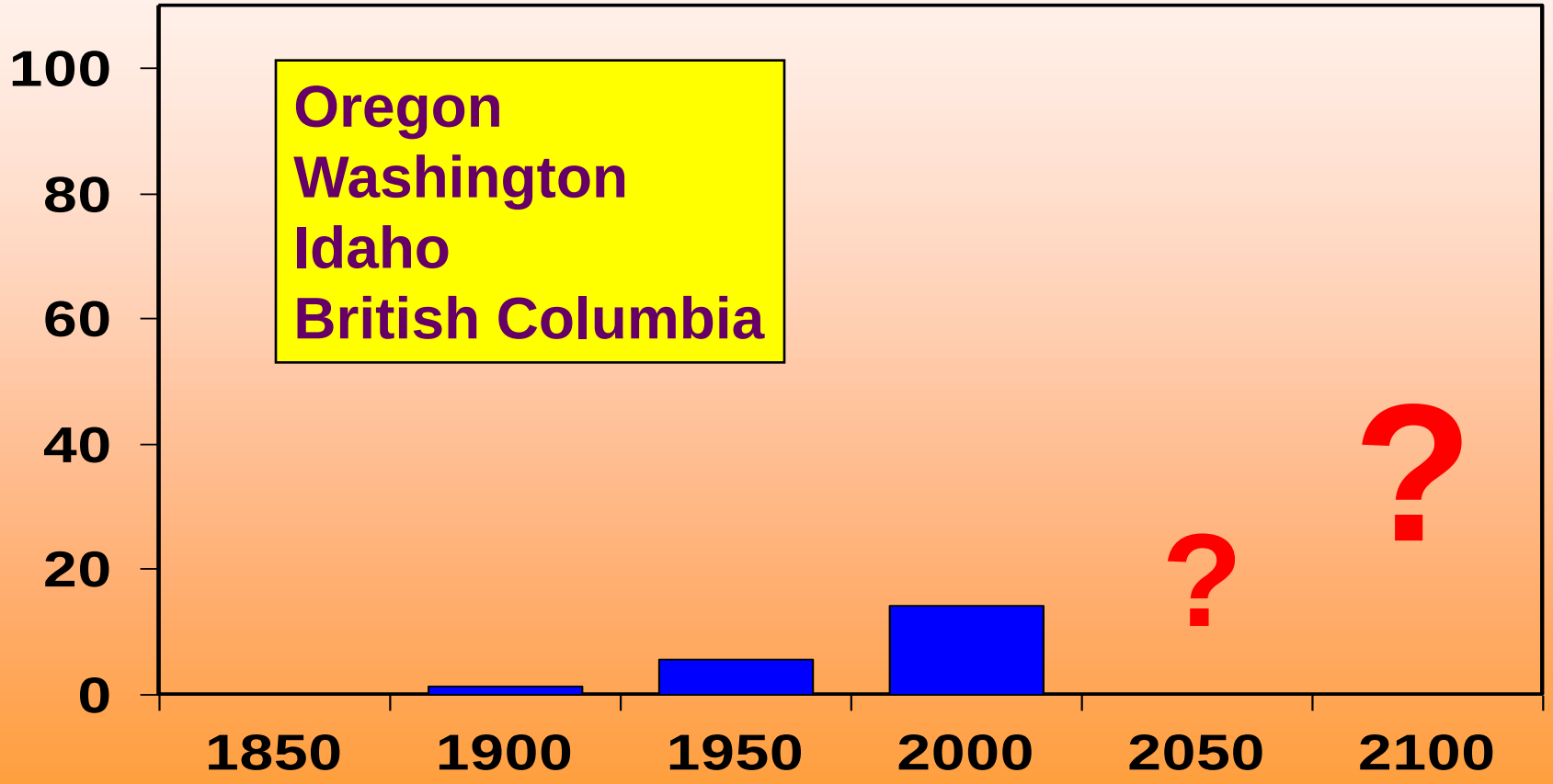
~160 million

2100

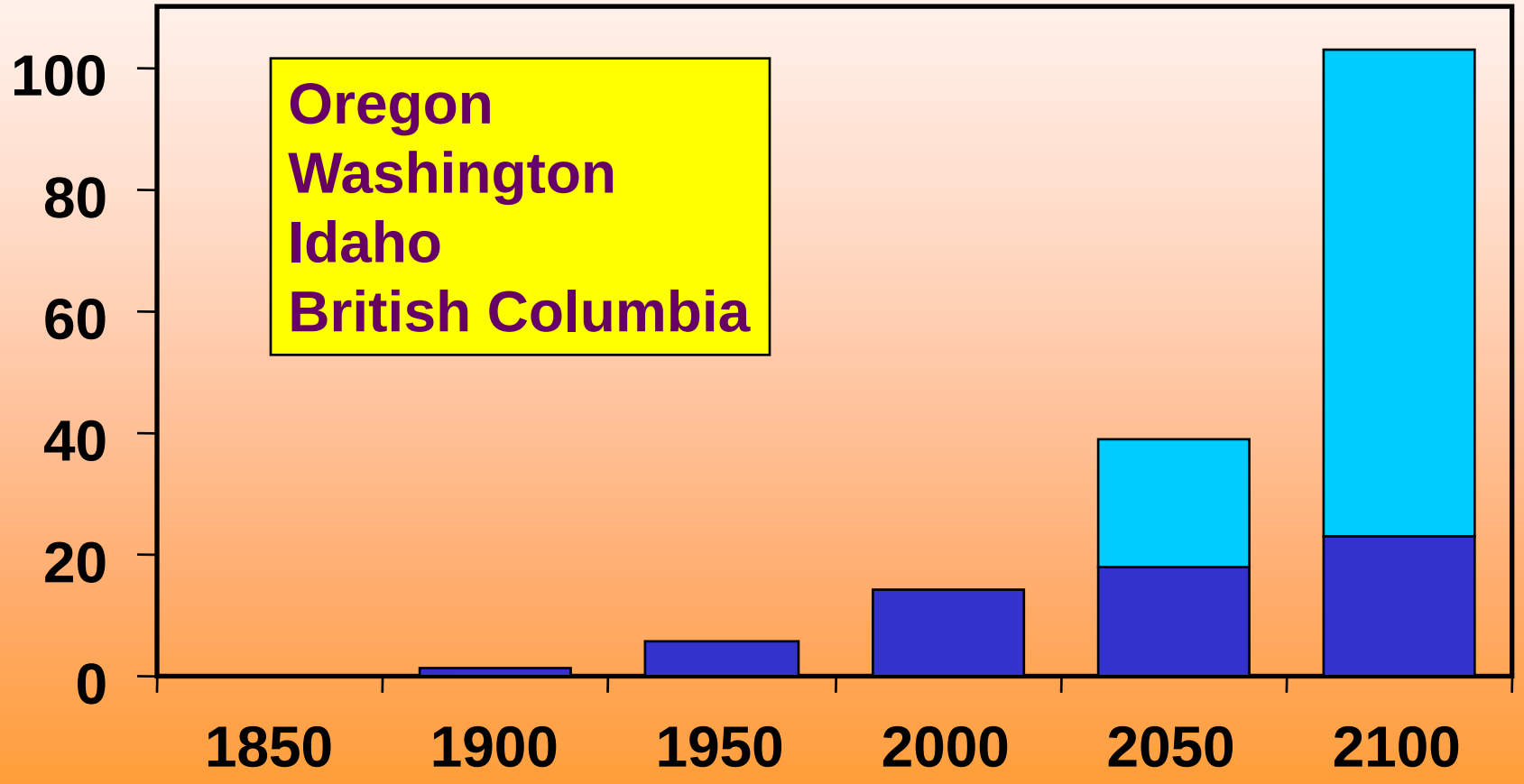
What about the Pacific Northwest?

2100 = ?

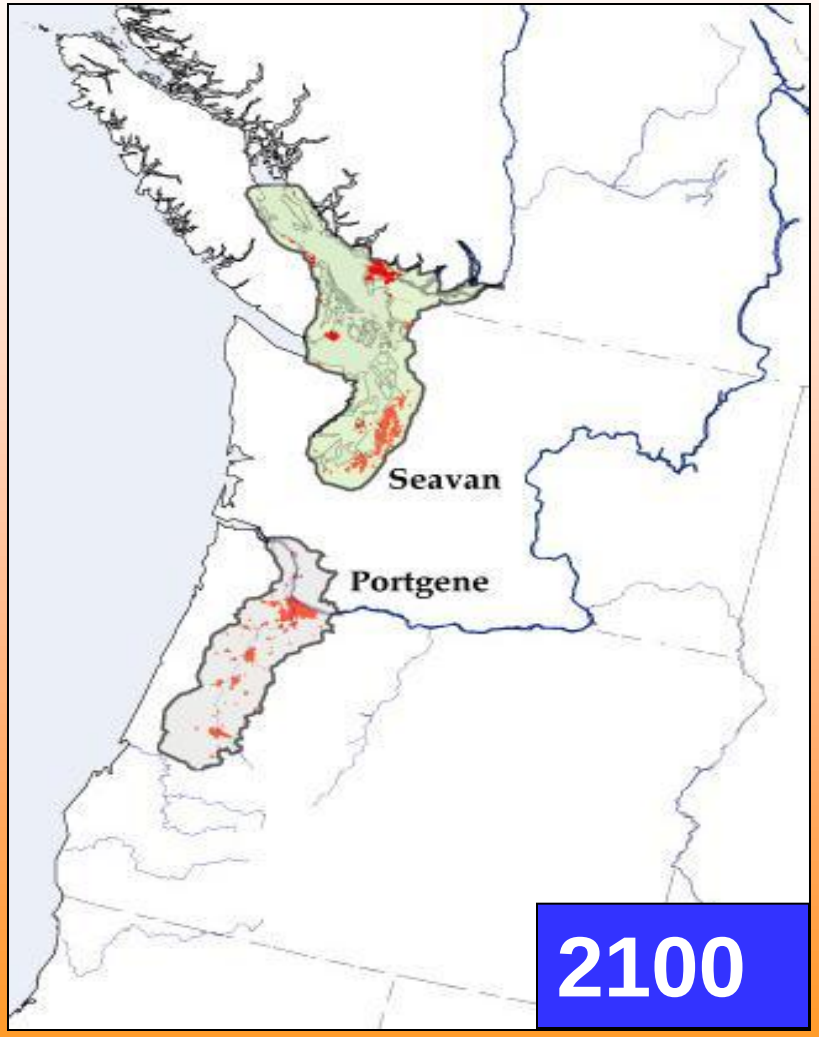
PNW: growth projections



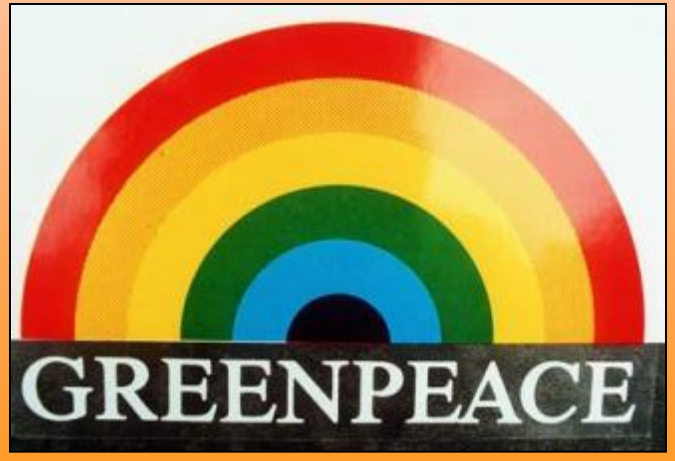
PNW: growth projections



Pacific Northwest urban areas — *anticipating the landscape in 2100*



How likely are population or immigration policies to change?



How likely are population or immigration policies to change?

How likely are population or immigration policies to change?

"The Sierra Club supports the decision of the Board of Directors to take no position on U.S. immigration levels and policies."

Core policy driver #4: *Individual priorities*

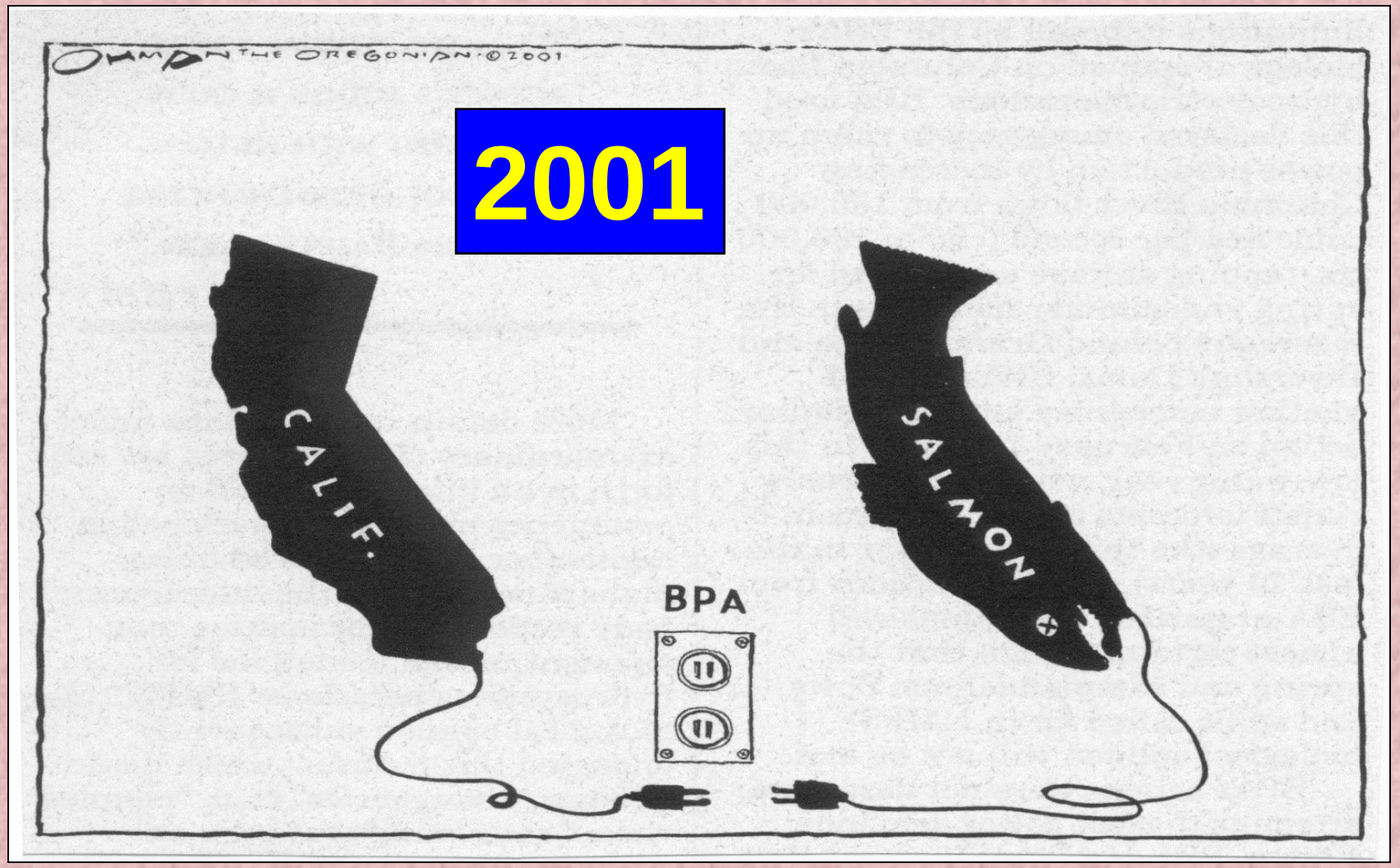
"Individual and collective preferences directly determine the future of wild salmon — and substantial and pervasive changes must take place in these preferences"

Core policy driver #4: *Individual priorities*

Given clear-cut facts and choices, what kind of choices will people <u>really</u> make?

Personal and societal priorities:

are they changing or will they change?



Neither good *nor* bad

Air Conditioners

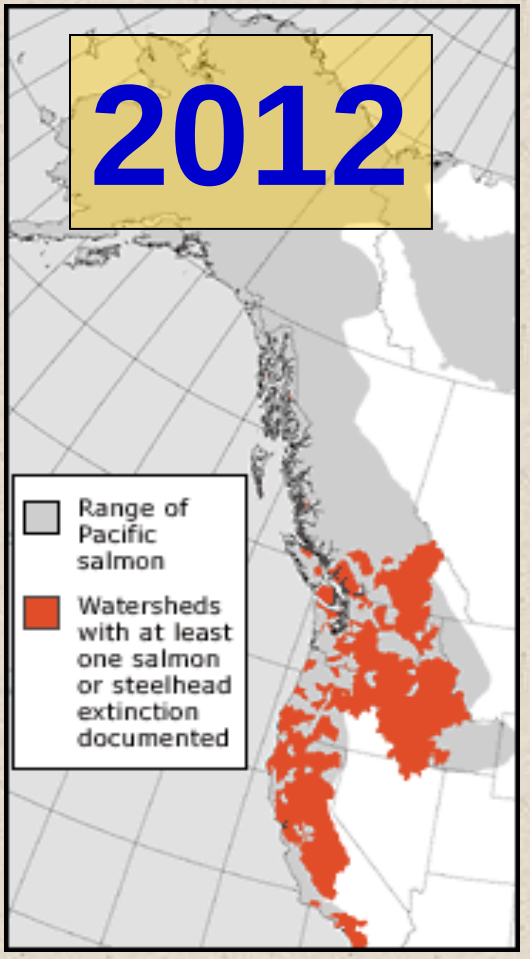
vs.

Salmon

2100 salmon forecast

GIVEN little change in the core policy drivers:

- ✓ **Rules of commerce**
- ✓ **Scarce natural resources**
- ✓ **Human population growth**
- ✓ **Individual/collective priorities**



2100 salmon forecast

GIVEN little change in the core policy drivers:

- ✓ Rules of commerce
- ✓ Scarce natural resources
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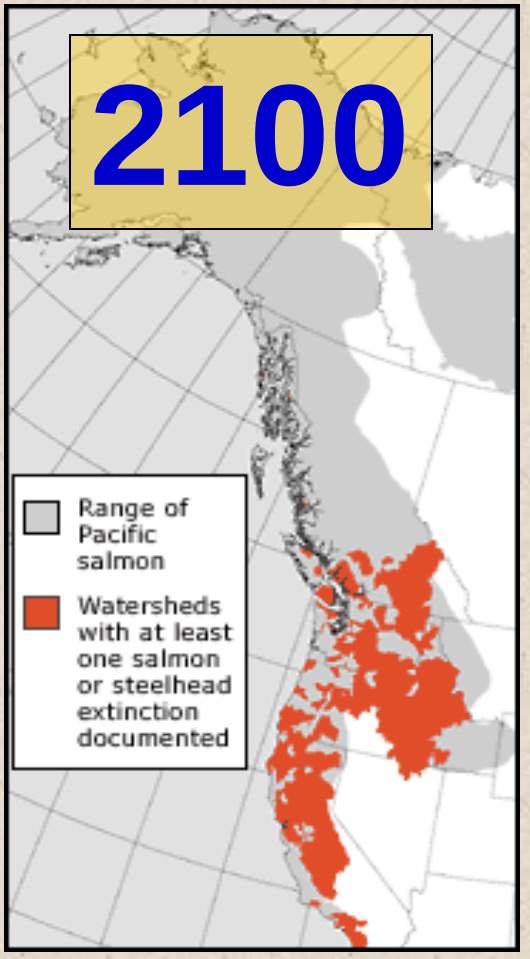


THEN the most likely forecast:

Wild salmon will be reduced to remnant runs in CA, OR, WA, ID, and southern BC by 2100

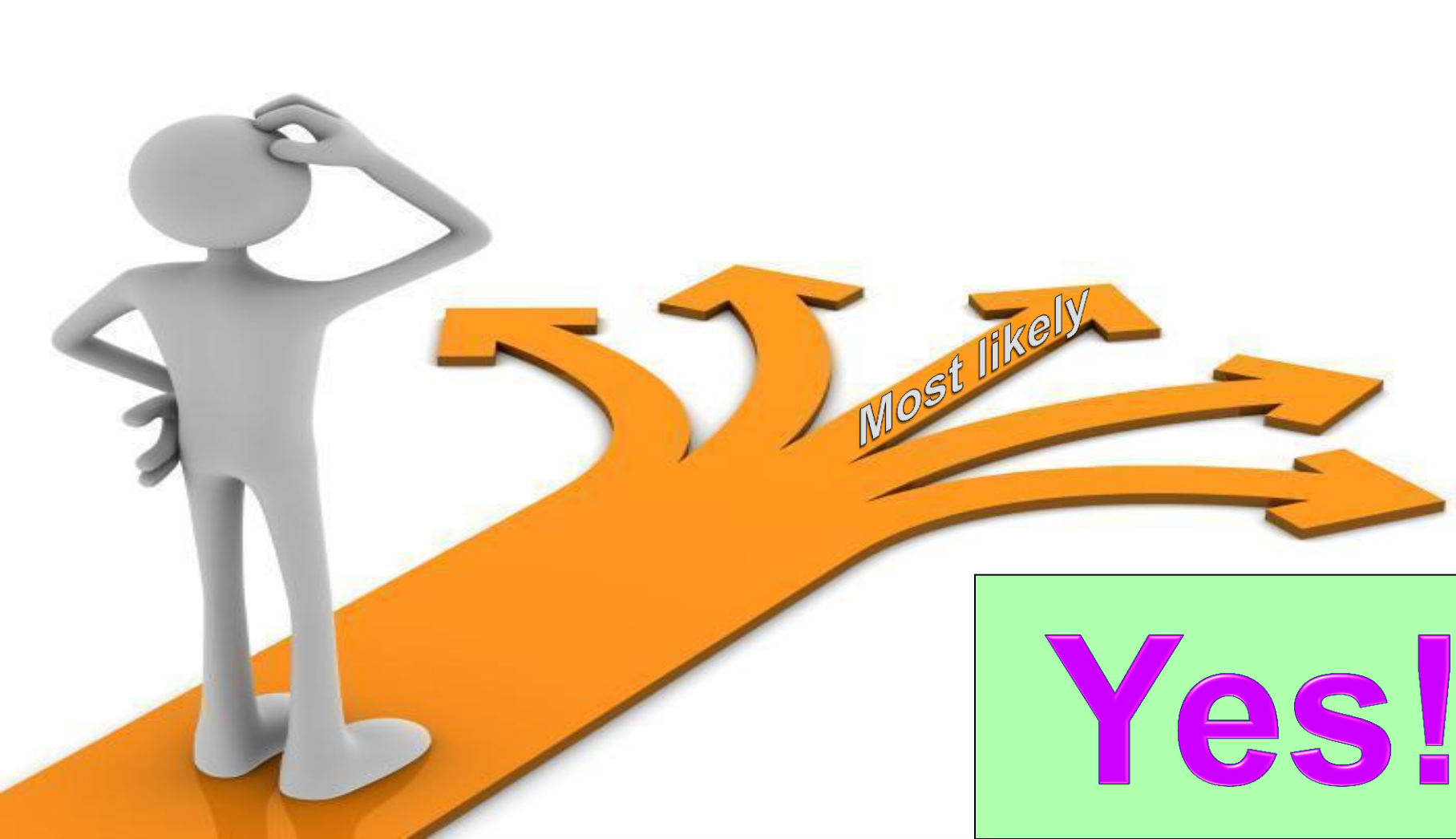
Topics

1. Brief history of the decline worldwide

2. Most likely status of PNW wild salmon in 2100

3. **Alternative policies that would restore wild salmon**

Given the current reality, are there policy options (prescriptions) that would alter this "most likely" scenario in the lower 48?



Yes!

Project participants

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The Question:

What specific policies must be implemented in order to have a high probability of restoring significant runs of wild salmon through 2100 in CA, OR, WA, ID, and southern BC?

Independently Developed and Peer Reviewed Policy Prescriptions (23)

4 general approaches emerged

First Cluster of Policy Prescriptions:

Use Technology:

Get a grip on reality and use what tools are available

What is a “wild” salmon?

Technology Prescriptions

Second Cluster of Policy Prescriptions:

Apply Triage:

Focus recovery efforts in those areas that have the best chance for success

Need to work "strategically"

Triage Prescriptions

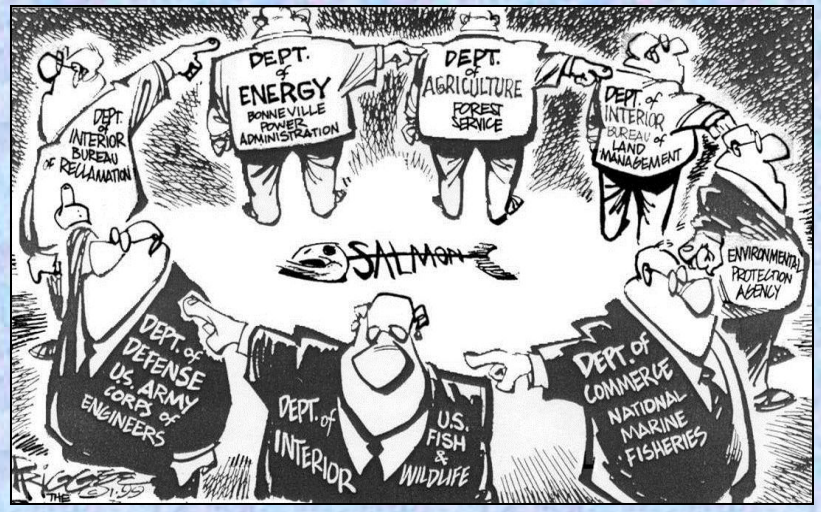
Third Cluster of Policy Prescriptions:

Overhaul bureaucracy:

There are few bureaucratic incentives to protect, restore, or enhance wild salmon runs

Avoid "symbolic politics"

Bureaucracy Prescriptions



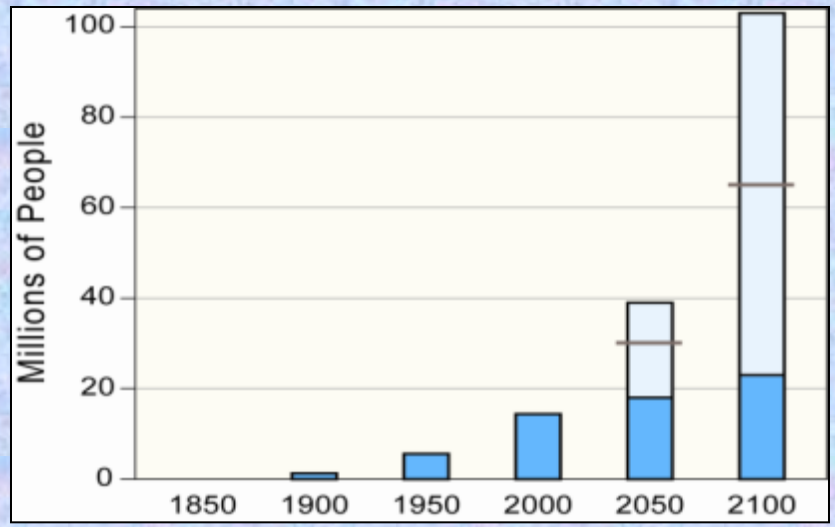
Fourth Cluster of Policy Prescriptions:

Change Behavior:

Force behavioral change through incentives or punishments

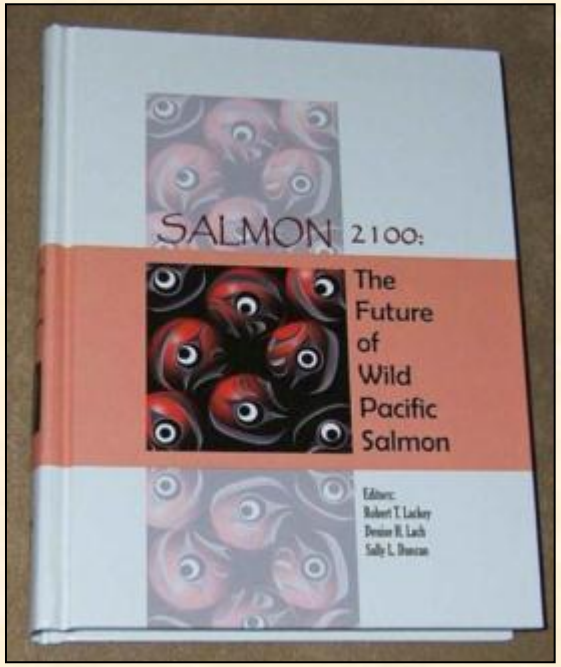
Focus on human choices

Behavioral Prescriptions



Alternative futures for wild salmon in the lower 48 . . .

AFS



$55.00

http://afsbooks.org/

Charting a preferred future for wild salmon in Alaska . . .

Wicked, messy policy problem

Take-home messages

- Well documented history of declines
- Well studied group of fishes
- Short-term forces out long-term
- Watch for symbolic politics!

Good luck!

Robert T. Lackey

Dr. Bob Lackey is professor of fisheries science and adjunct professor of political science at Oregon State University. In 2008 he retired from the Environmental Protection Agency's research laboratory in Corvallis where, over a 27 year career, he served in various senior science and leadership jobs. Since his very first fisheries job ago mucking out raceways in a trout hatchery, he has worked on an array of natural resource issues from various positions in government and academia. His professional assignments involved diverse aspects of natural resource management, but mostly you would find him at the interface between science and policy. He has published over 100 articles in scientific journals and authored or edited 5 books. Dr. Lackey has long been an educator, having taught at 5 North American universities. He continues to teach an on-campus and an on-line graduate course in ecological policy at Oregon State University. A U.S./Canada dual citizen, he was a Fulbright Scholar at the University of Northern British Columbia during the 1999-2000 academic year. Dr. Lackey holds a Doctor of Philosophy degree in Fisheries and Wildlife Science from Colorado State University and was selected as the 2001 Honored Alumnus by their College of Natural Resources. He is a Certified Fisheries Scientist and a Fellow in the American Institute of Fishery Research Biologists. In 2008 he was awarded the U.S. Environmental Protection Agency's highest honor — the Gold Medal — for exceptional contributions in strengthening the role of science in ecological policy.

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