

Wild Salmon in 2100:

An Alternative Futures Perspective on Recovery Options



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Points of Reference



Points of Reference



No
Policy
Advocacy

Points of Reference



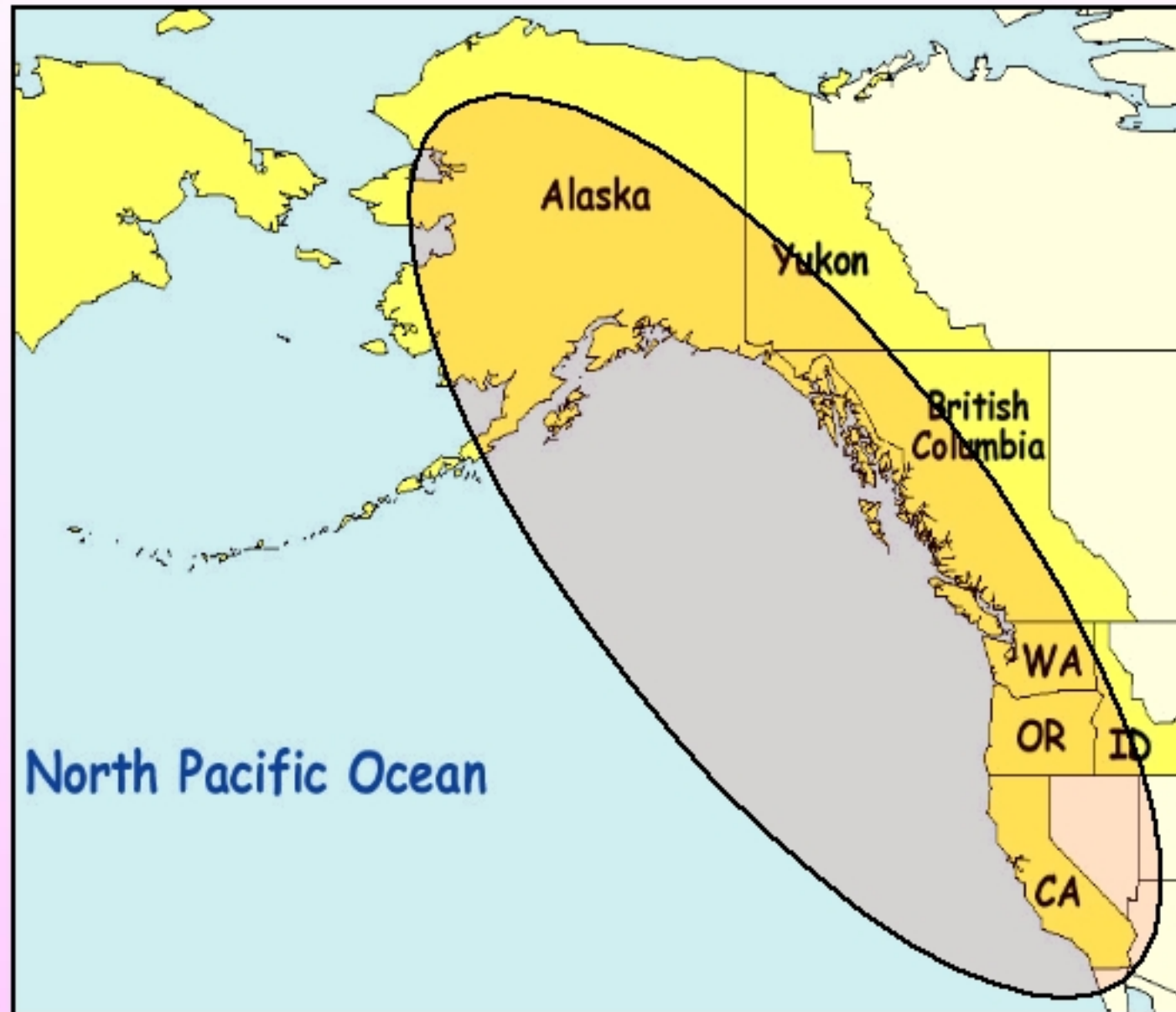
Disclaimer



A FEW YEARS AGO . . .

Changing status of runs —

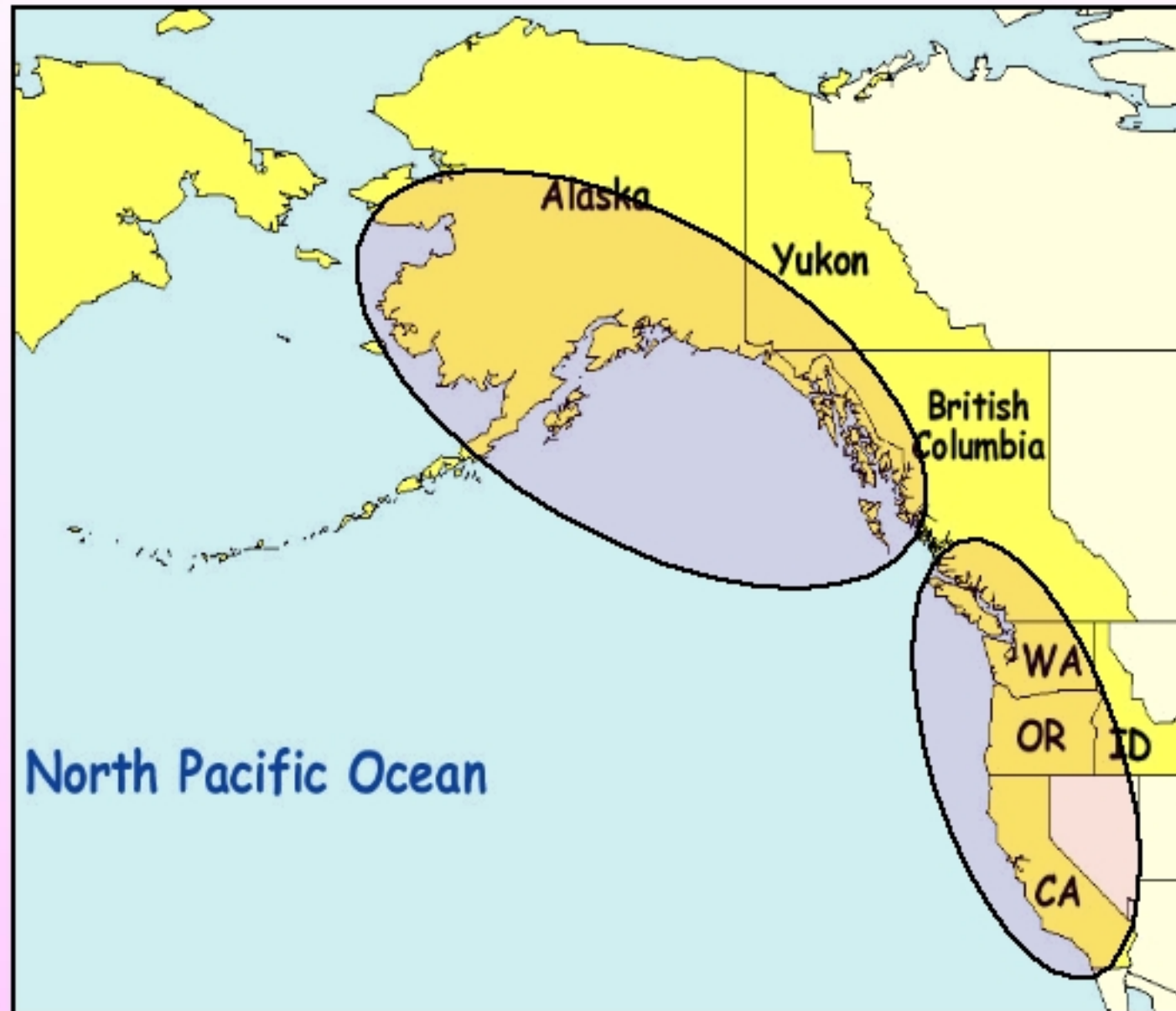
most recent 158 years



1848

Changing status of runs —

most recent 158 years



2006

“Causes” of the decline — *CA, OR, WA, ID, & southern BC*



What is a wild salmon?

Hatchery



Farmed



Wild



Wild Salmon

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

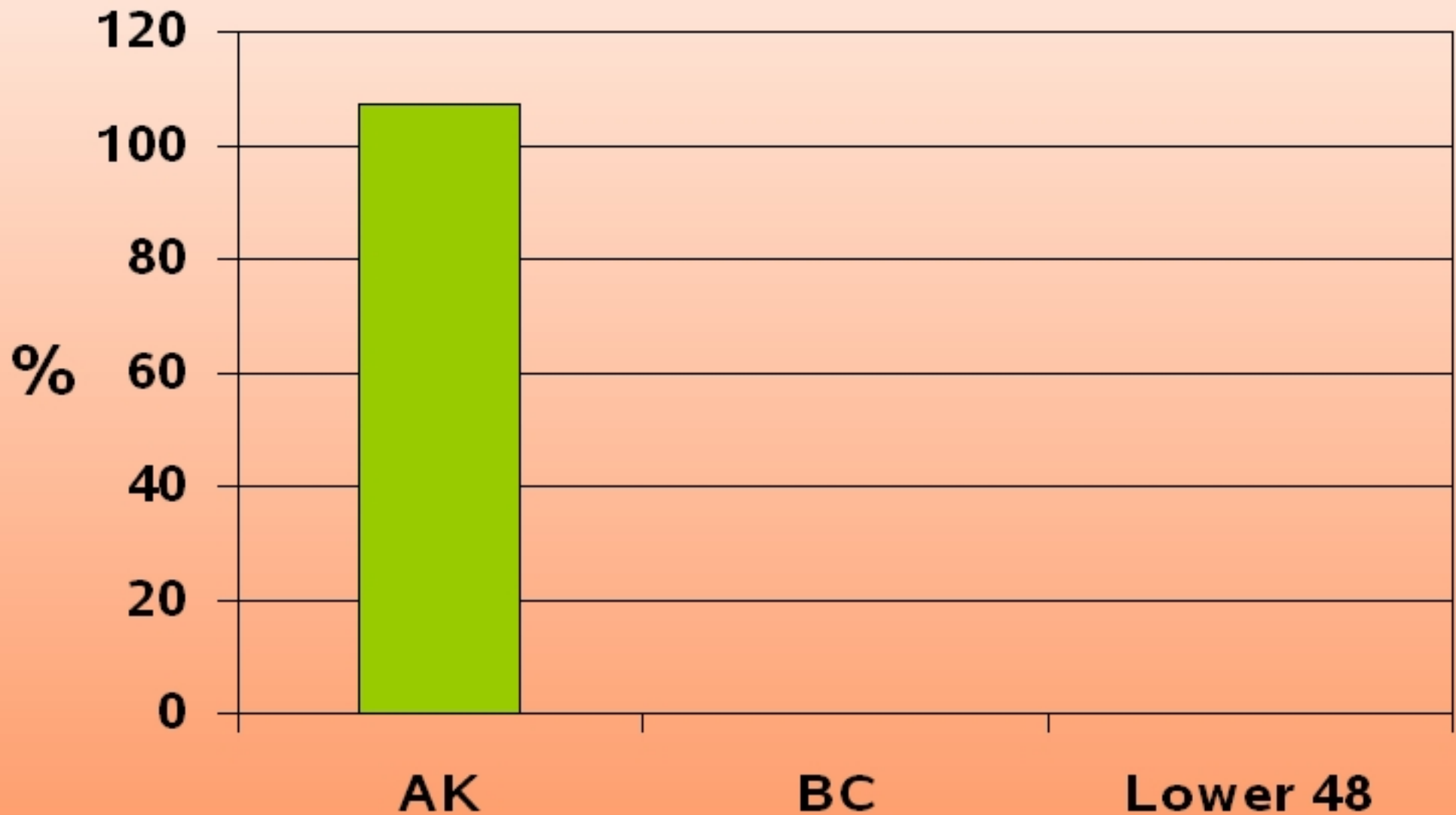
Changes in wild salmon numbers —

(historical vs. current) - 30 year averages



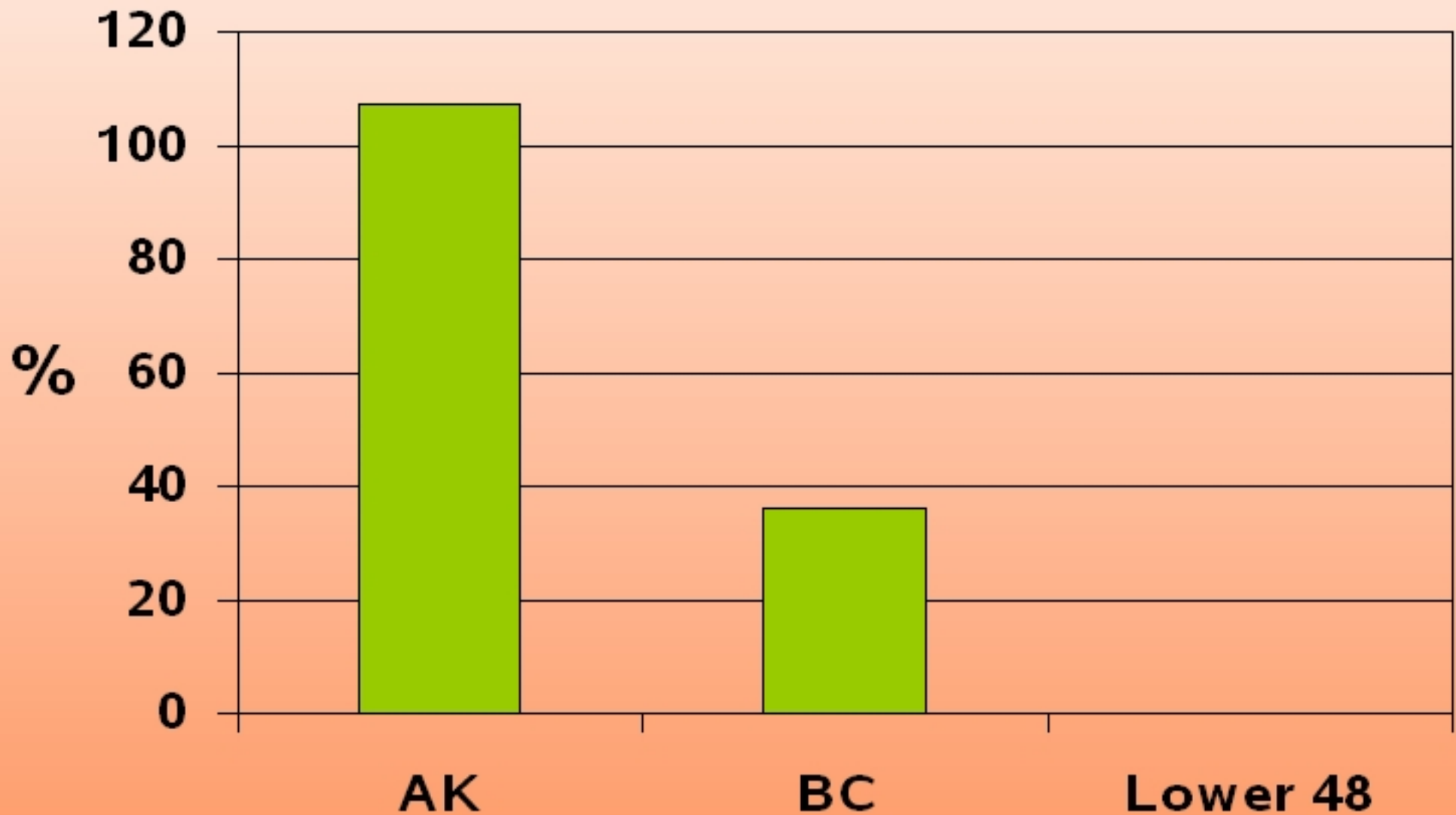
Changes in wild salmon numbers —

(historical vs. current) - 30 year averages



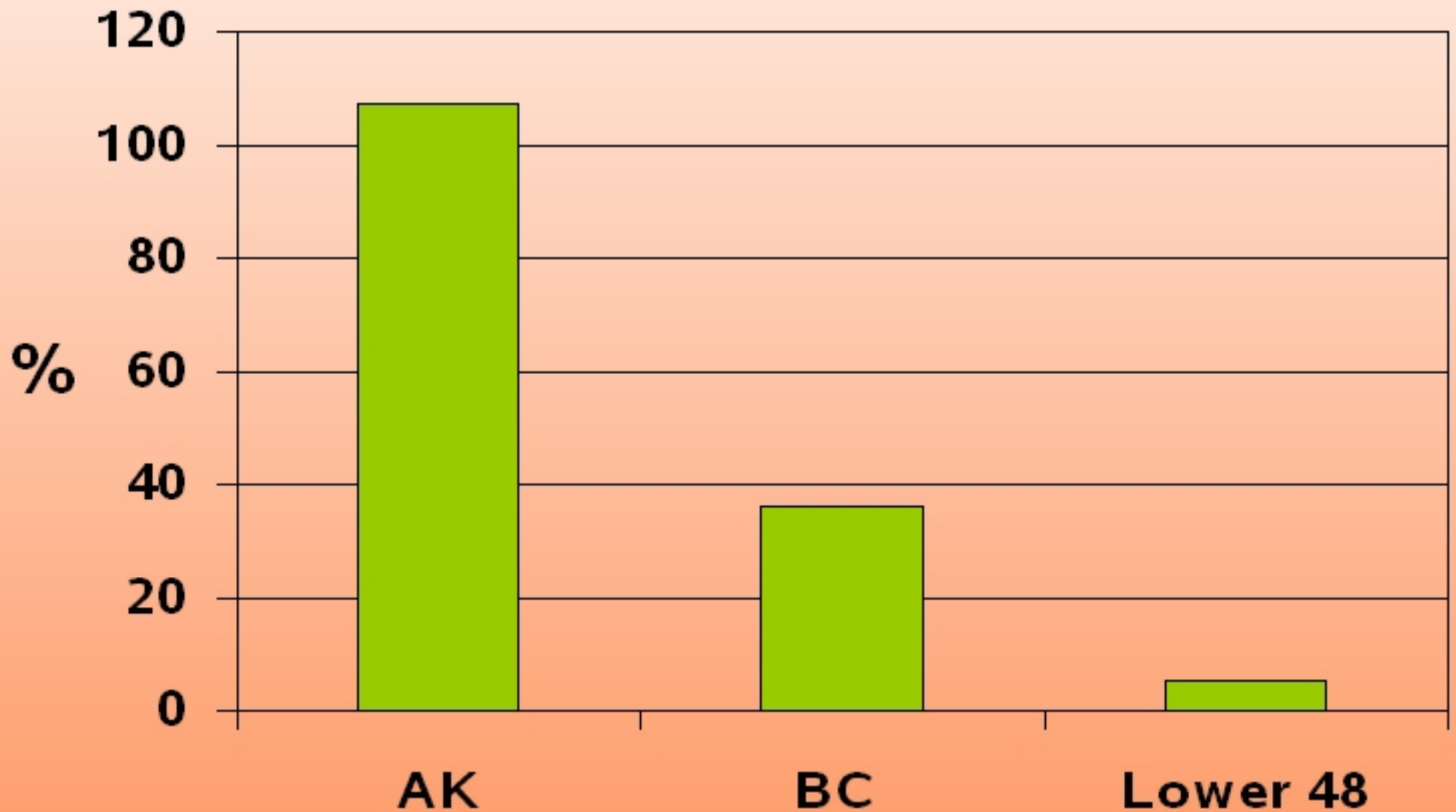
Changes in wild salmon numbers —

(historical vs. current) - 30 year averages

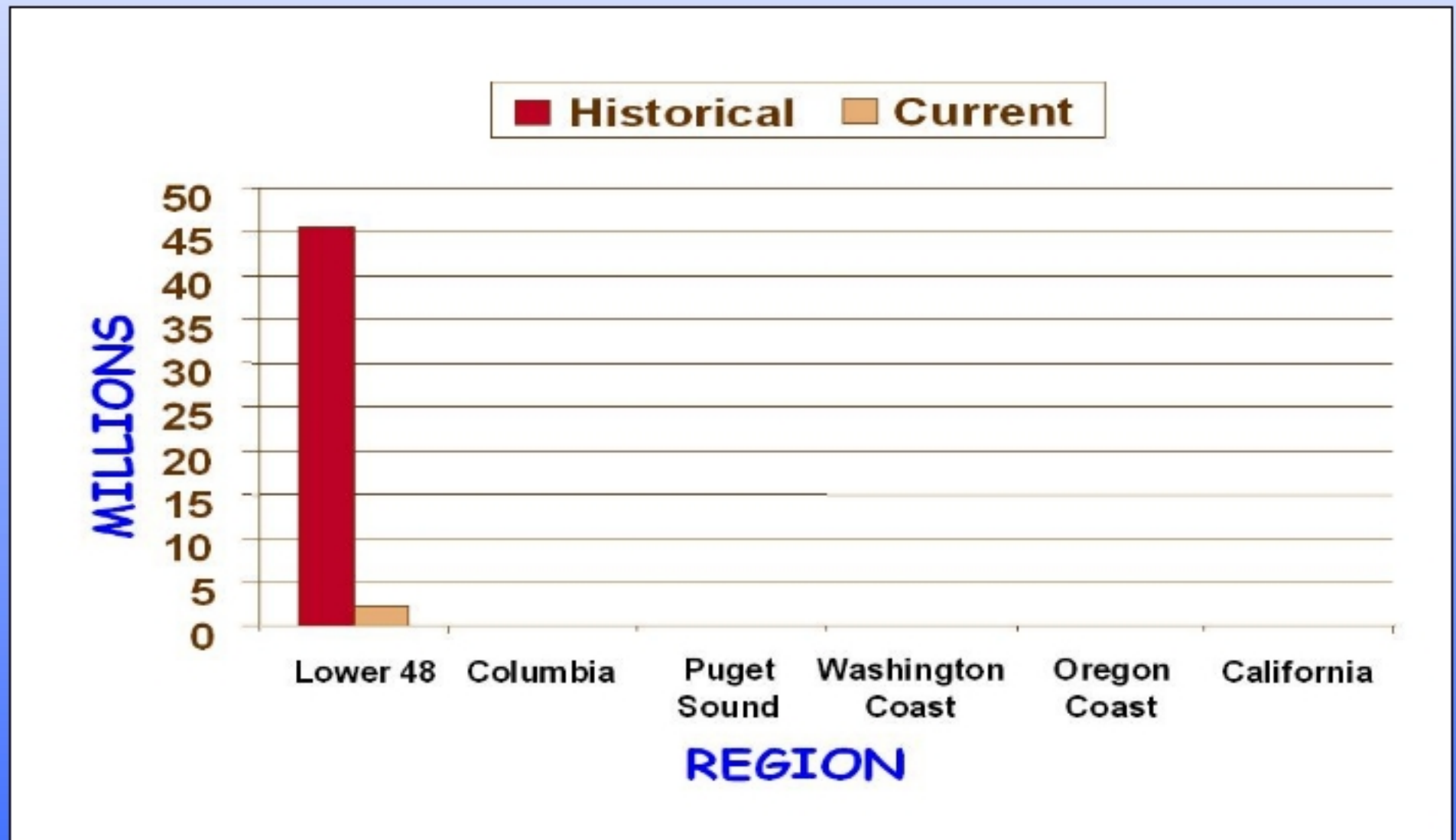


Changes in wild salmon numbers —

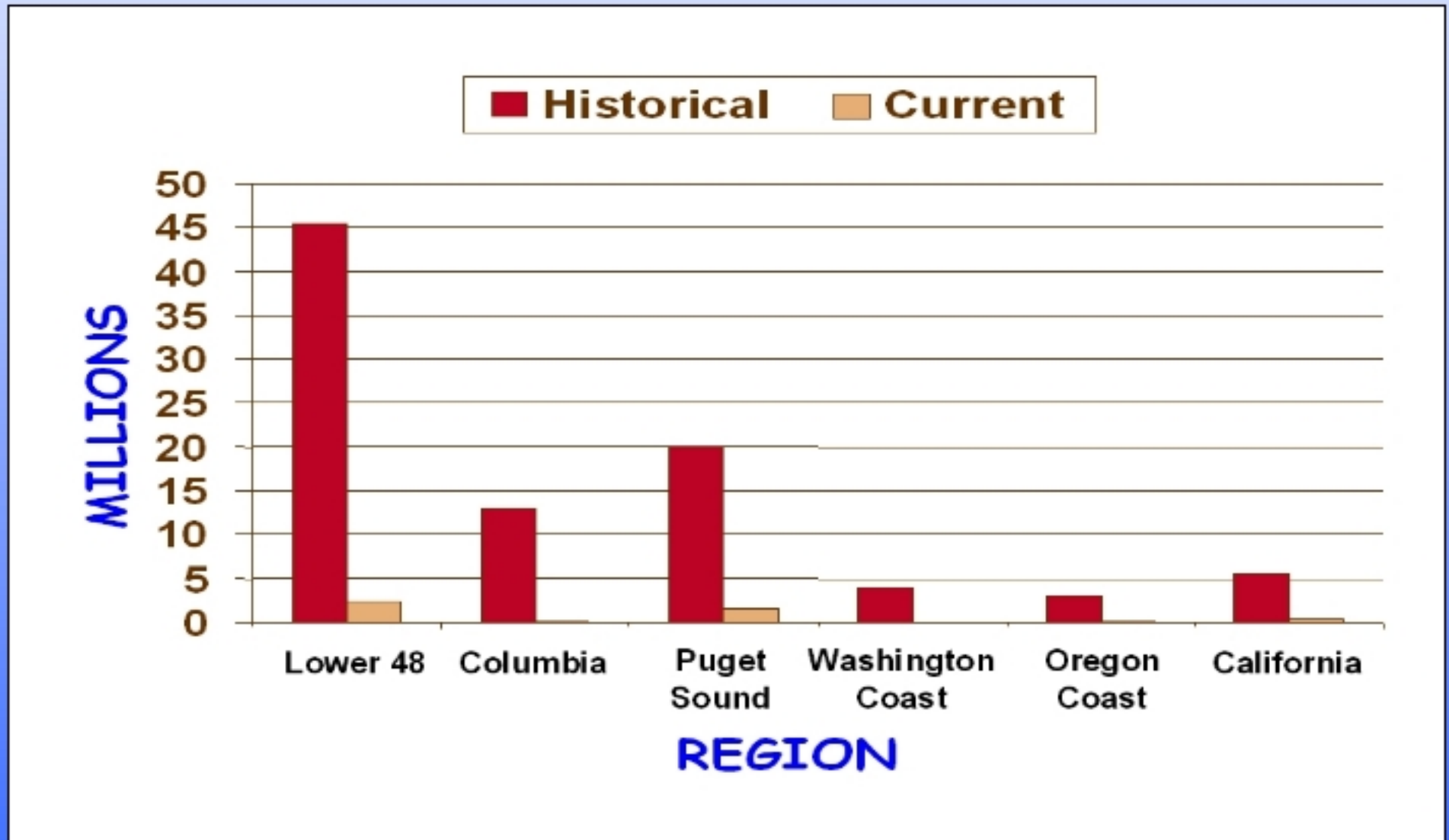
(historical vs. current) - 30 year averages



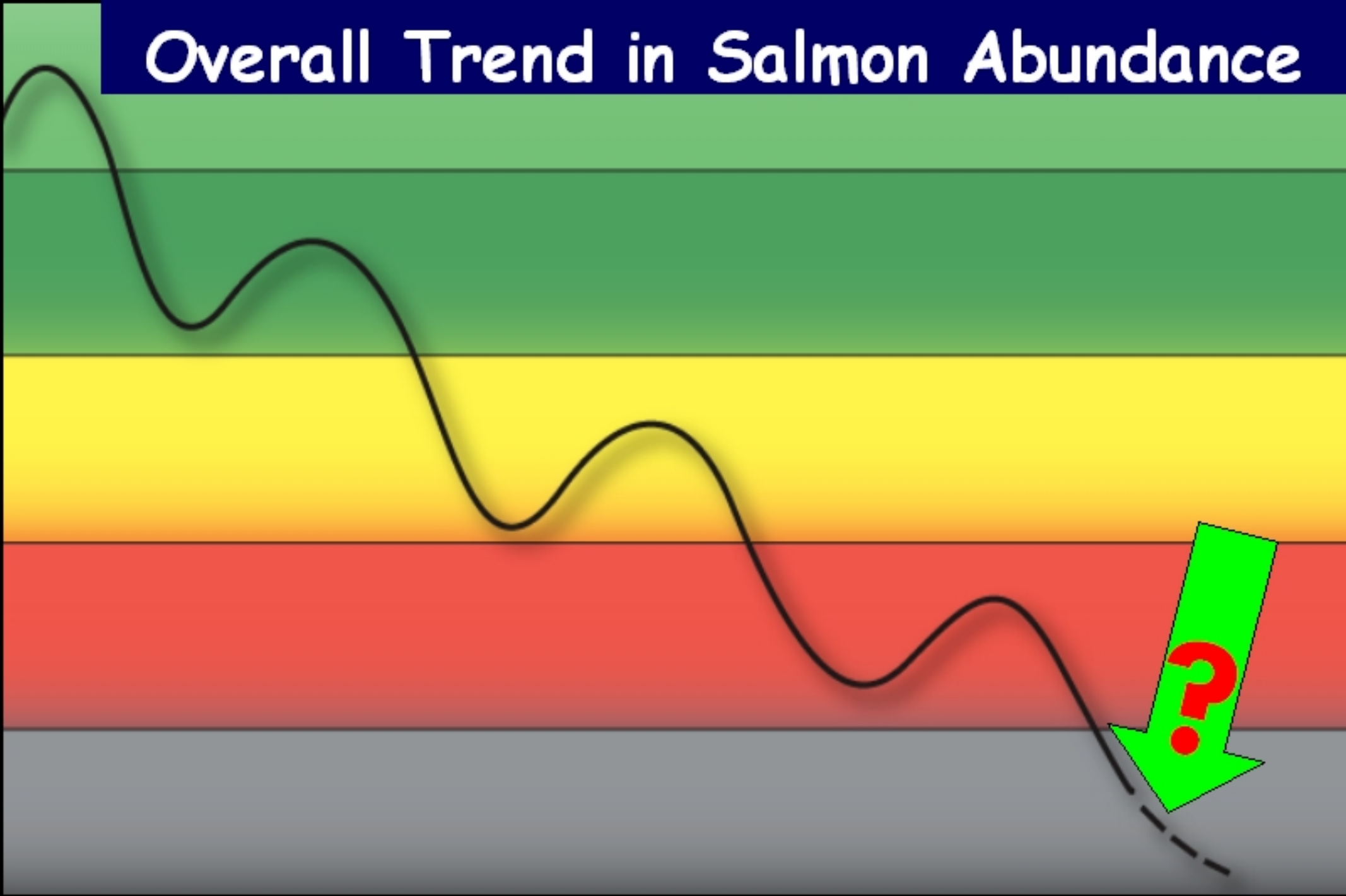
Wild salmon decline —



Wild salmon decline —



Overall Trend in Salmon Abundance



1848 →

2006 →

FORECASTING TO 2100: *TWO ESSENTIAL FACTS*

1. Individual and societal choices determine the trajectory for wild salmon

2. There are ecological constraints on these choices



Ecological constraints — *society has minimal control*

Human caused
climate change

Oregon Climate Service

BRIC Factor



Ecological constraints — society has minimal control

Natural
causes
of
climate
change

Long-term Changes

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 altering an impact on spawning stocks, according to a Canada-U.S. research team in an article to be published today in *Nature*.

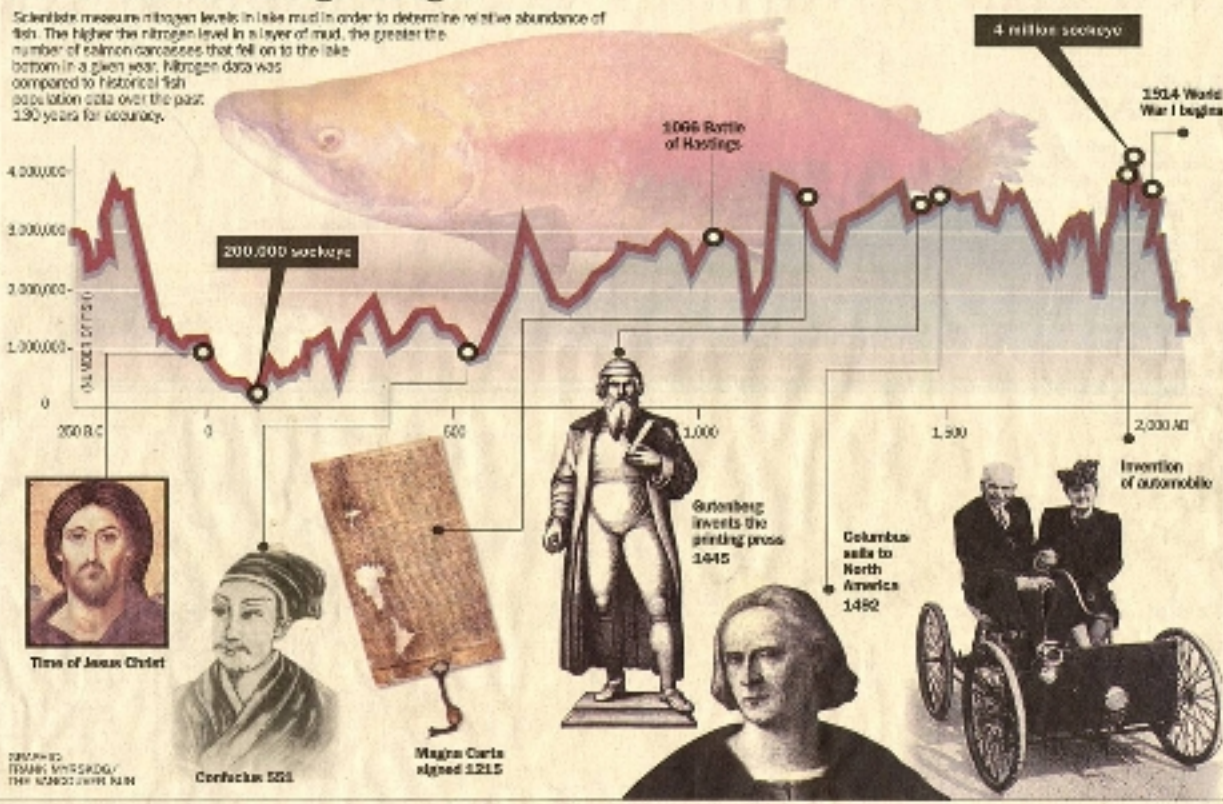
Using sediment samples from the bottoms of remote Alaskan lakes, a team of paleoecologists and marine biologists have unearthed evidence of the rise and fall of sockeye salmon populations over a period of time exceeding 2,000 years. In some cases, the sediment shows that troughs in salmon abundance persisted 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 300 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 the 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 190 years for accuracy.



DRAWING: ISHAKI WITKOSKI/THE NEW YORK TIMES

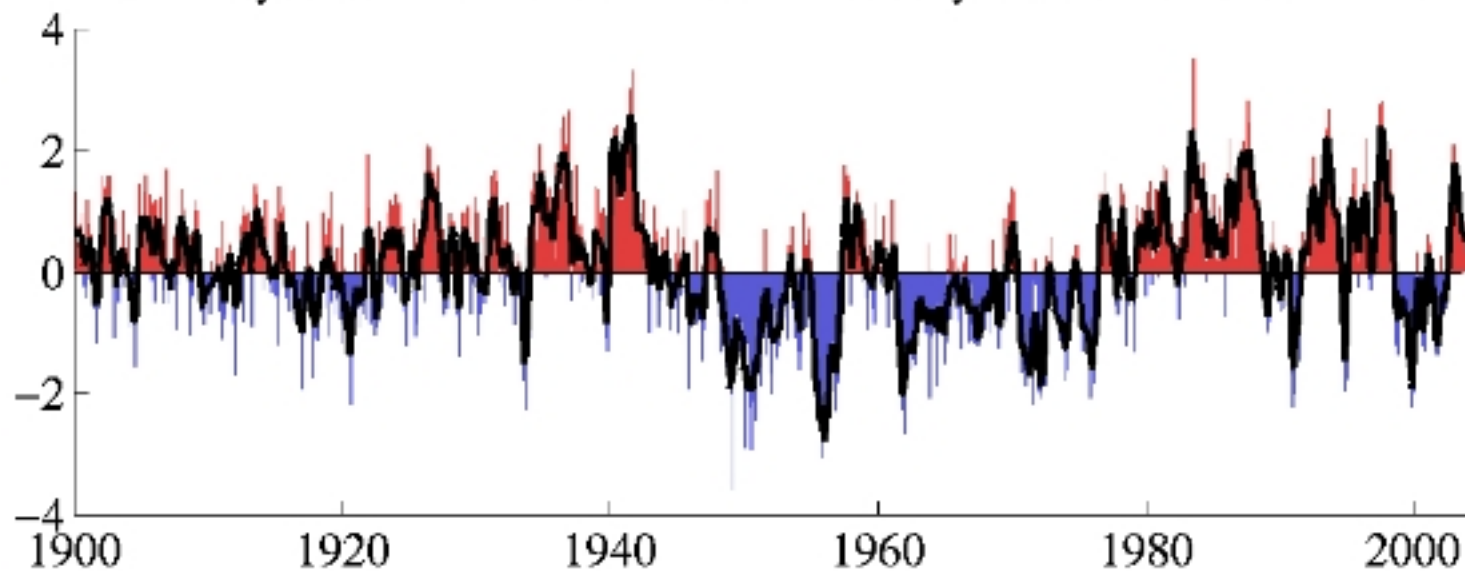
Ecological constraints —

society has minimal control

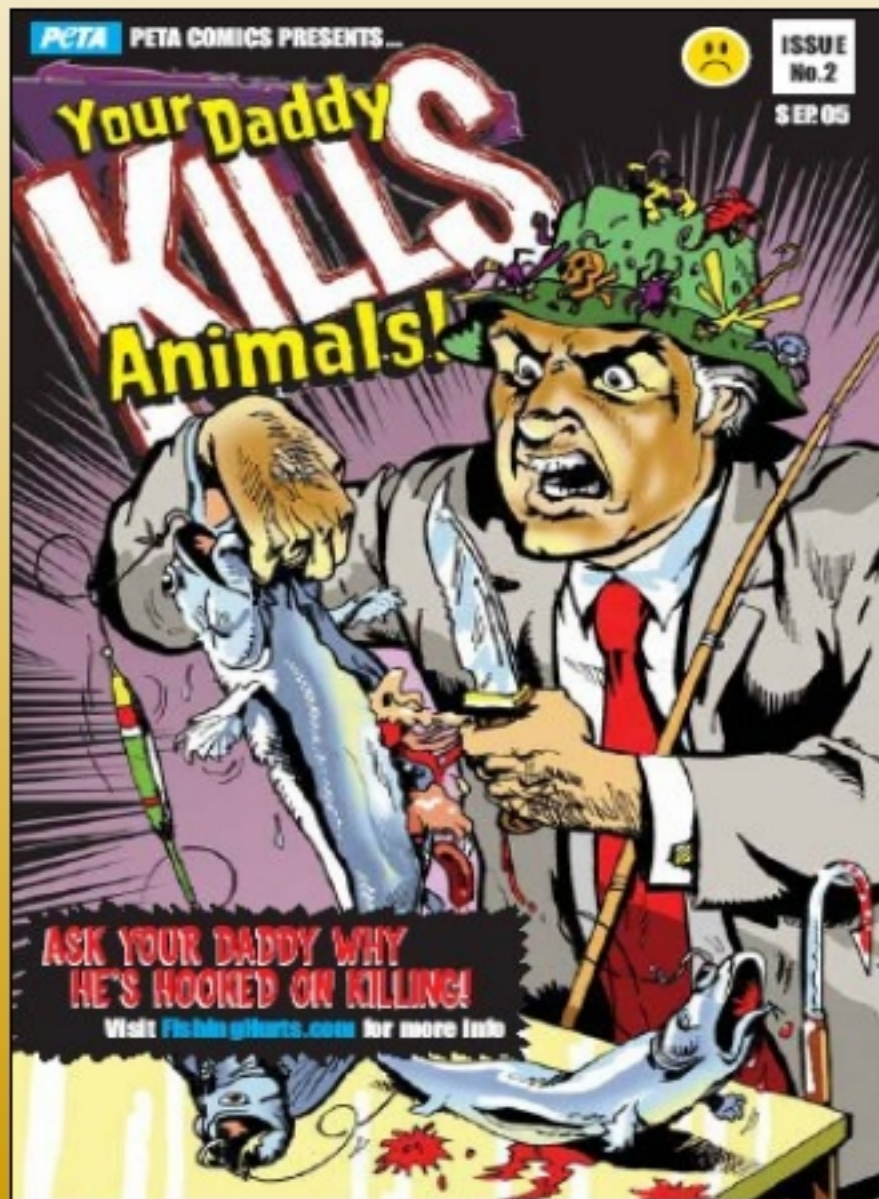
Natural
causes
of
climate
change

Short-term Changes

monthly values for the PDO index: January 1900–December 2003



BEYOND ANTICIPATION



Dramatic
value
shifts

Key policy drivers —

determine future of wild salmon



Drivers that are key to future:

- realistic chance to alter
- would change the trajectory

Key policy drivers —

4

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 — *determine collective priorities*

Rules of commerce: *general characteristics*

Individual choice — *determine collective priorities*

Personal freedom — *trumps collective good*

Rules of commerce: *general characteristics*

Individual choice — *determine collective priorities*

Personal freedom — *trumps collective good*

Externalities — *handled outside market place*

Rules of commerce: *general characteristics*

Individual choice — *determine 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

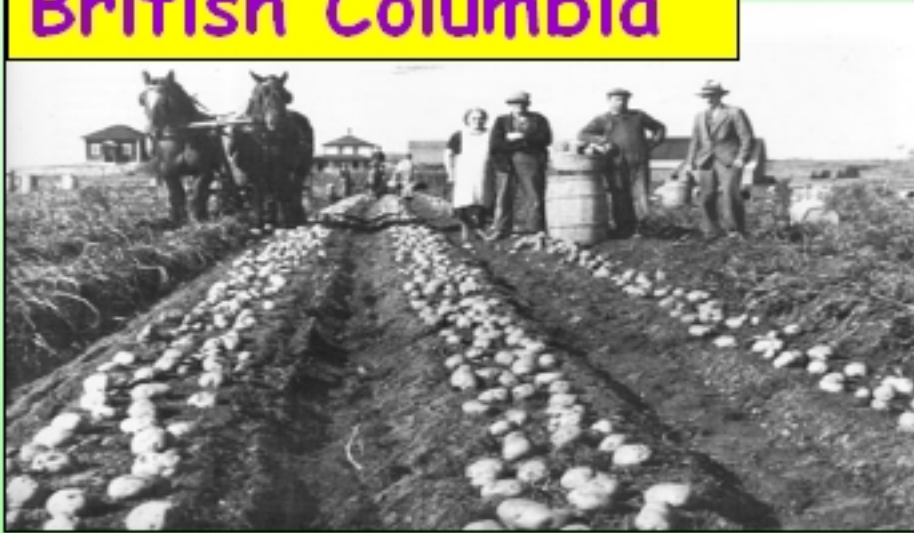


Market-driven competition



Market-driven competition

British Columbia



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”

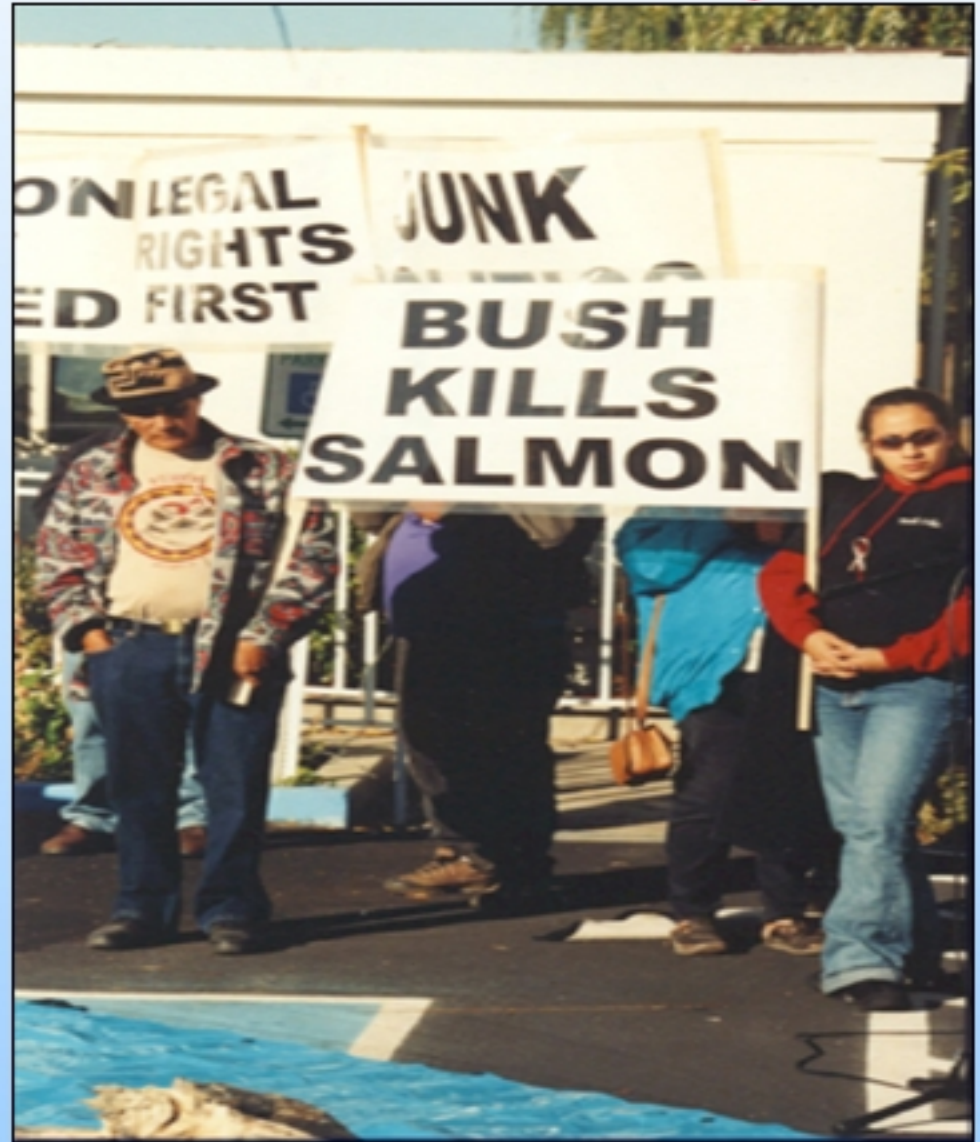


Escalating competition for a largely finite water supply



Increasing demand

Conflicts over water: *will increase with scarcity*

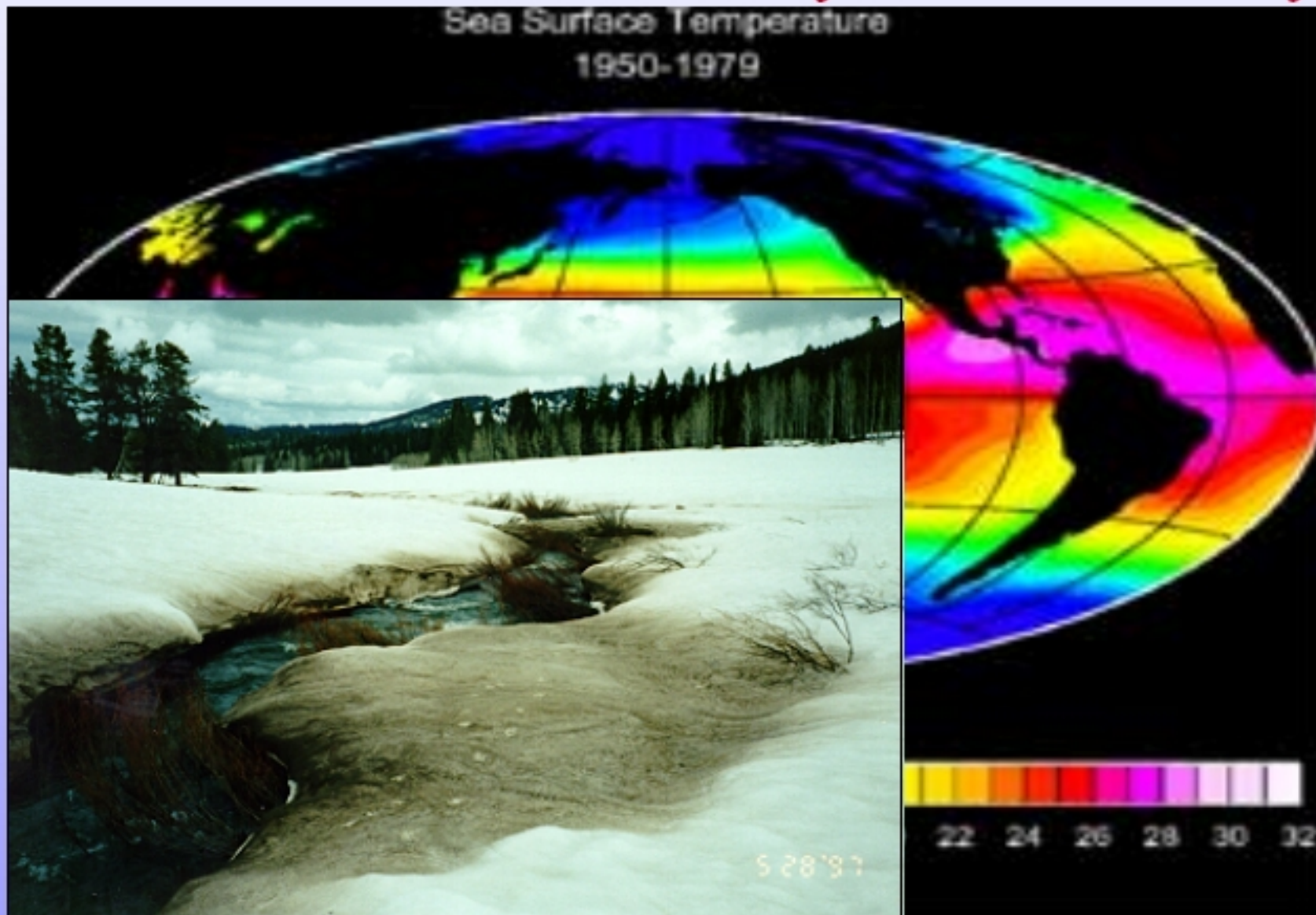


Salmon *vs.* other important uses for scarce water



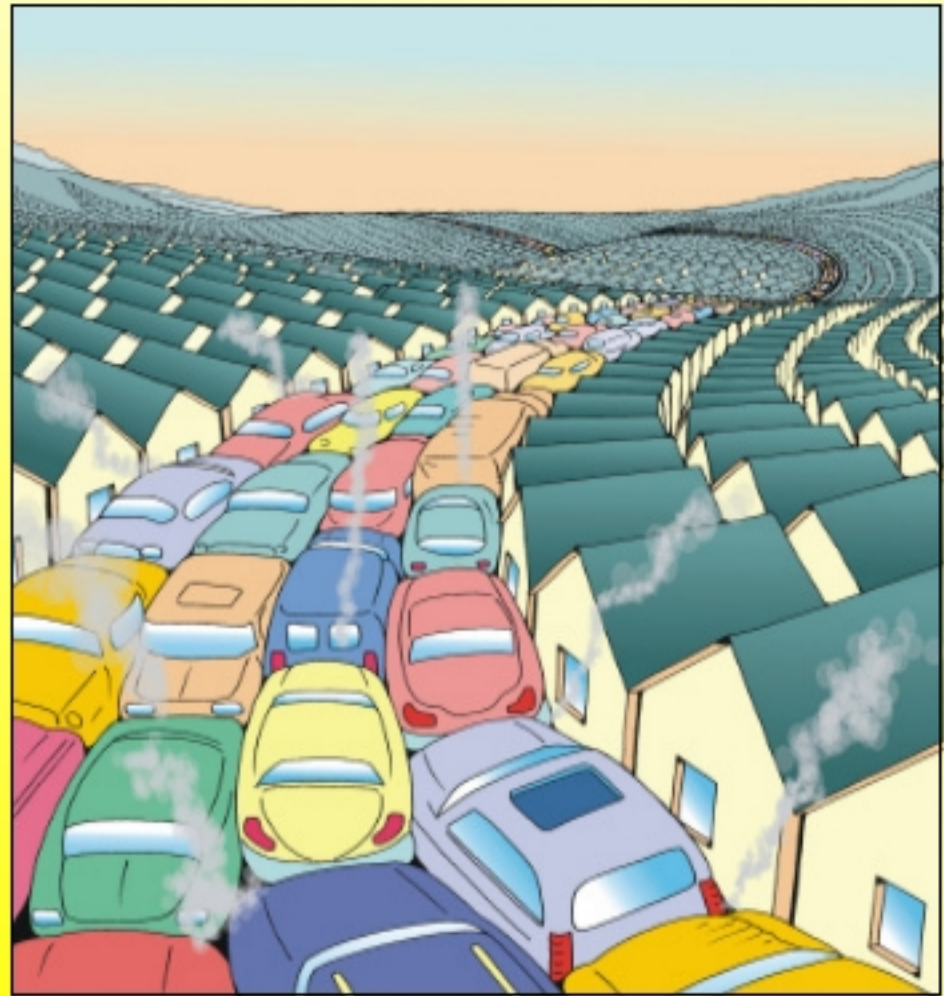
No substitution options!

Climate change — *decreased snowpack likely?*

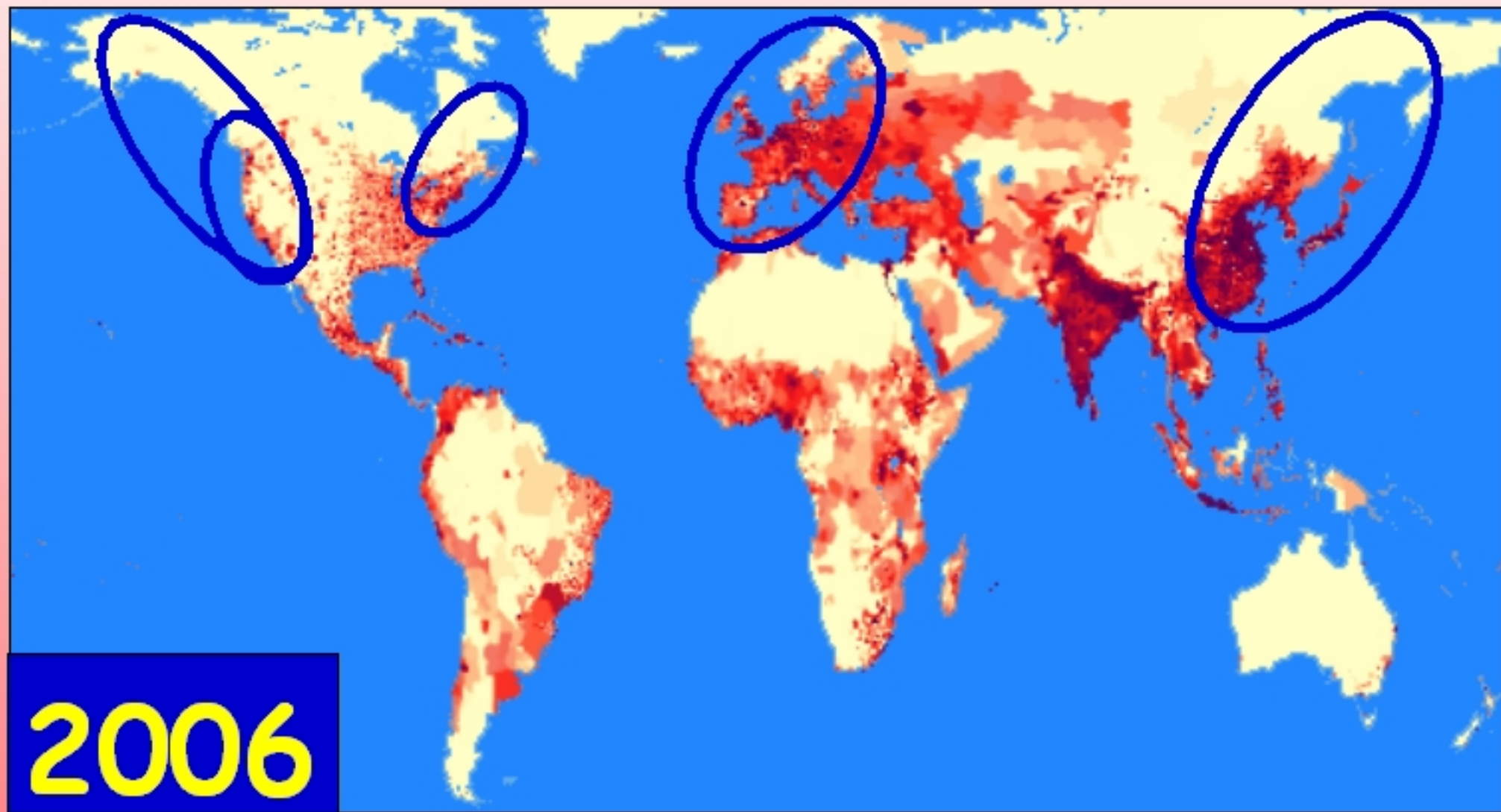


Core policy driver #3: *Human Population in the Region*

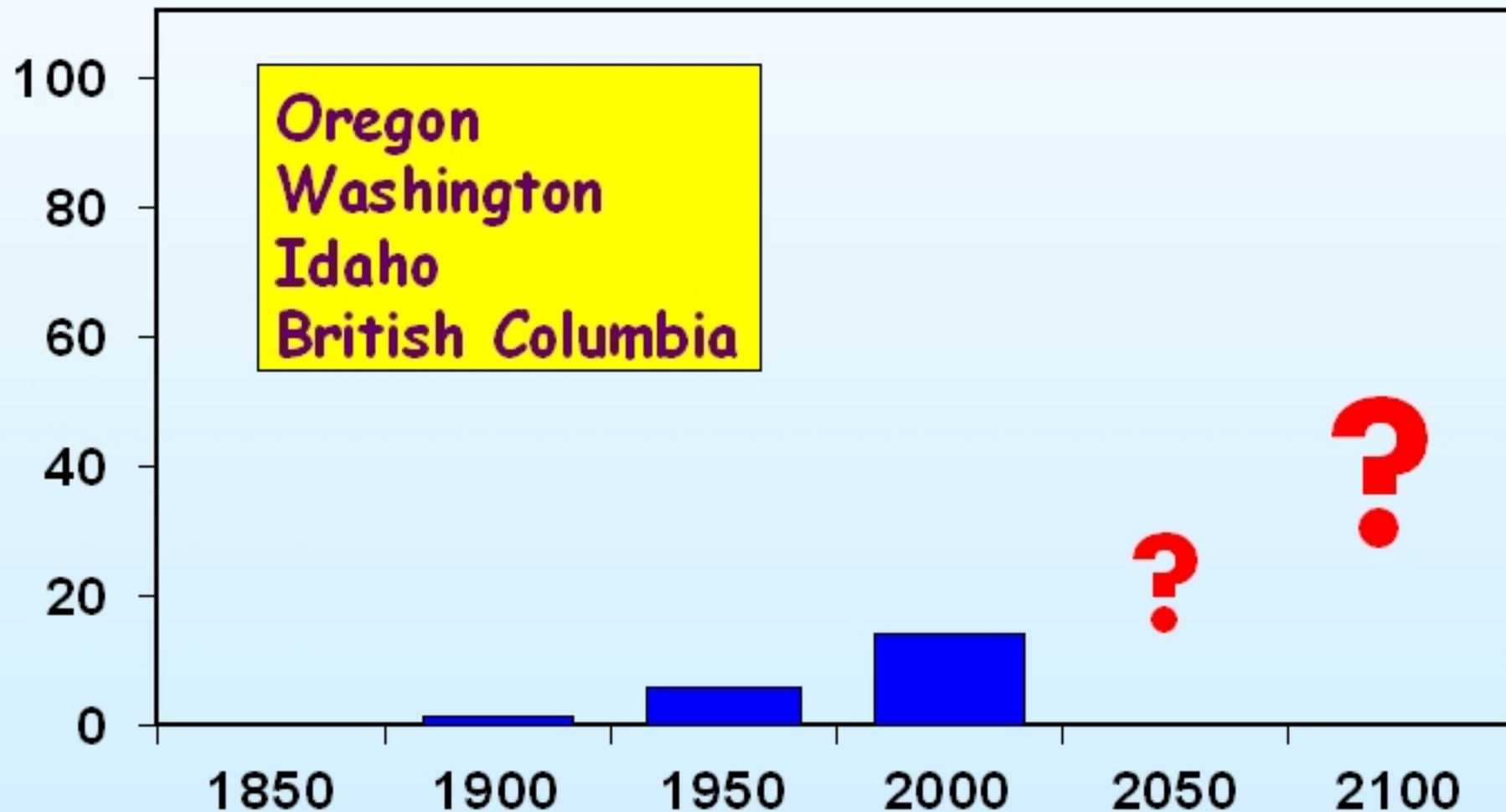
"The number of humans in the region will increase — and their aggregate demands to support chosen life styles will constrain the abundance of wild salmon"



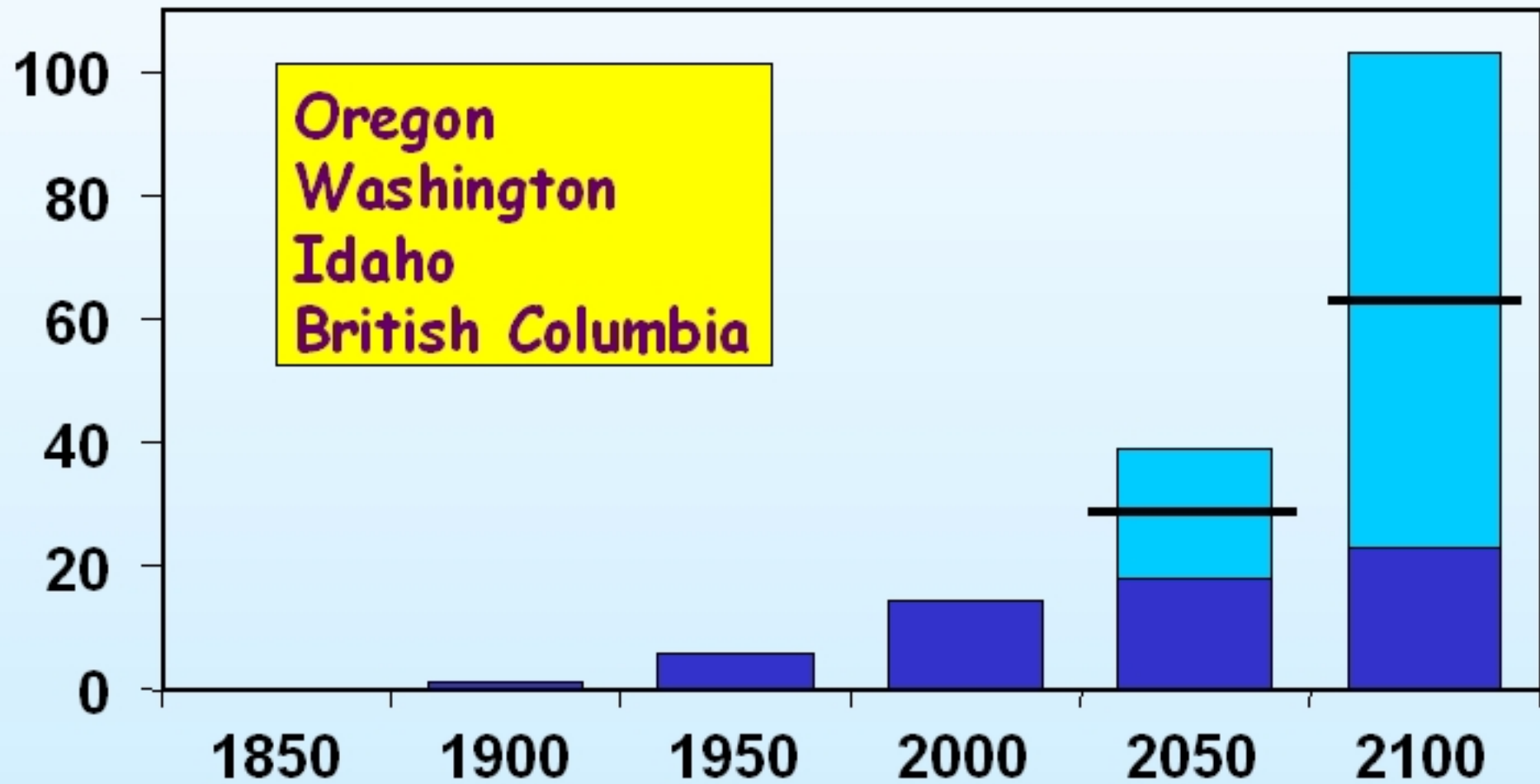
Relationship between human and salmon abundance ????



PNW: growth projections



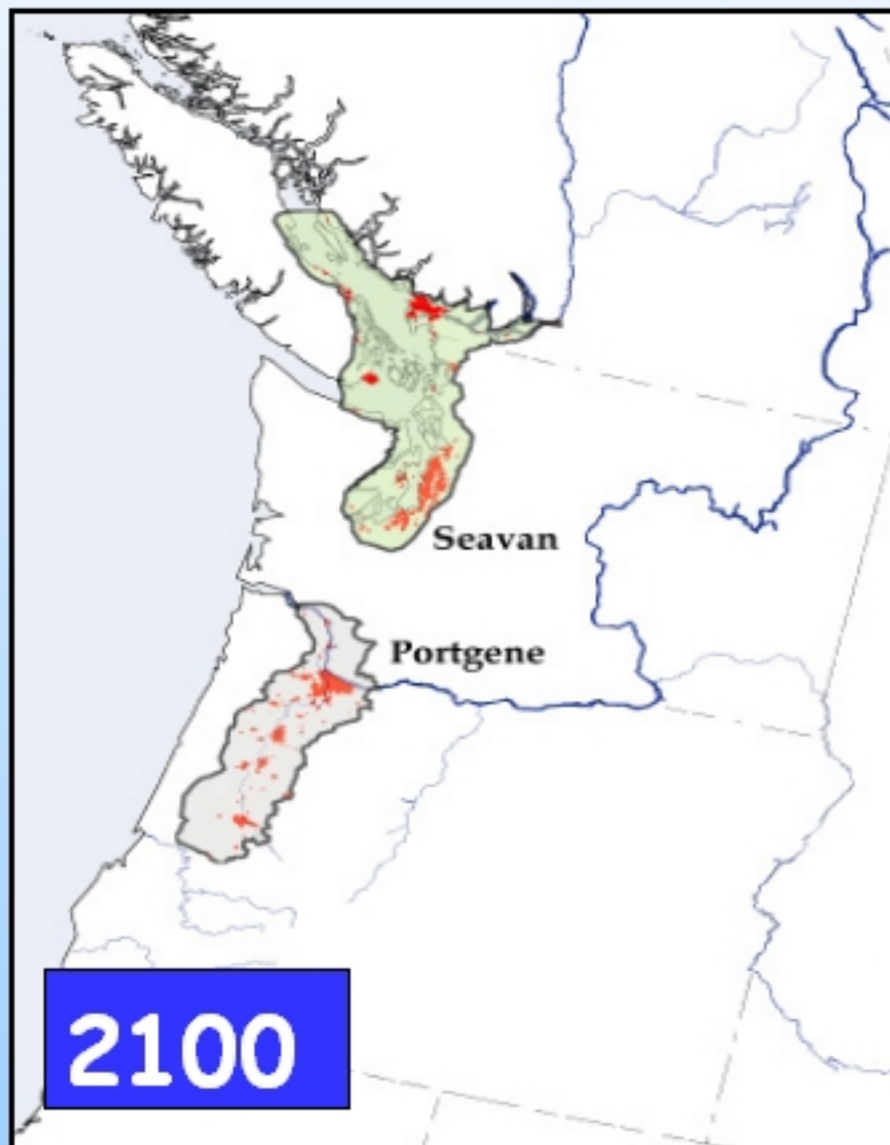
PNW: growth projections



Salmon-centric view of PNW human population growth



Forecasting the future — *Looking out to 2100*



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”

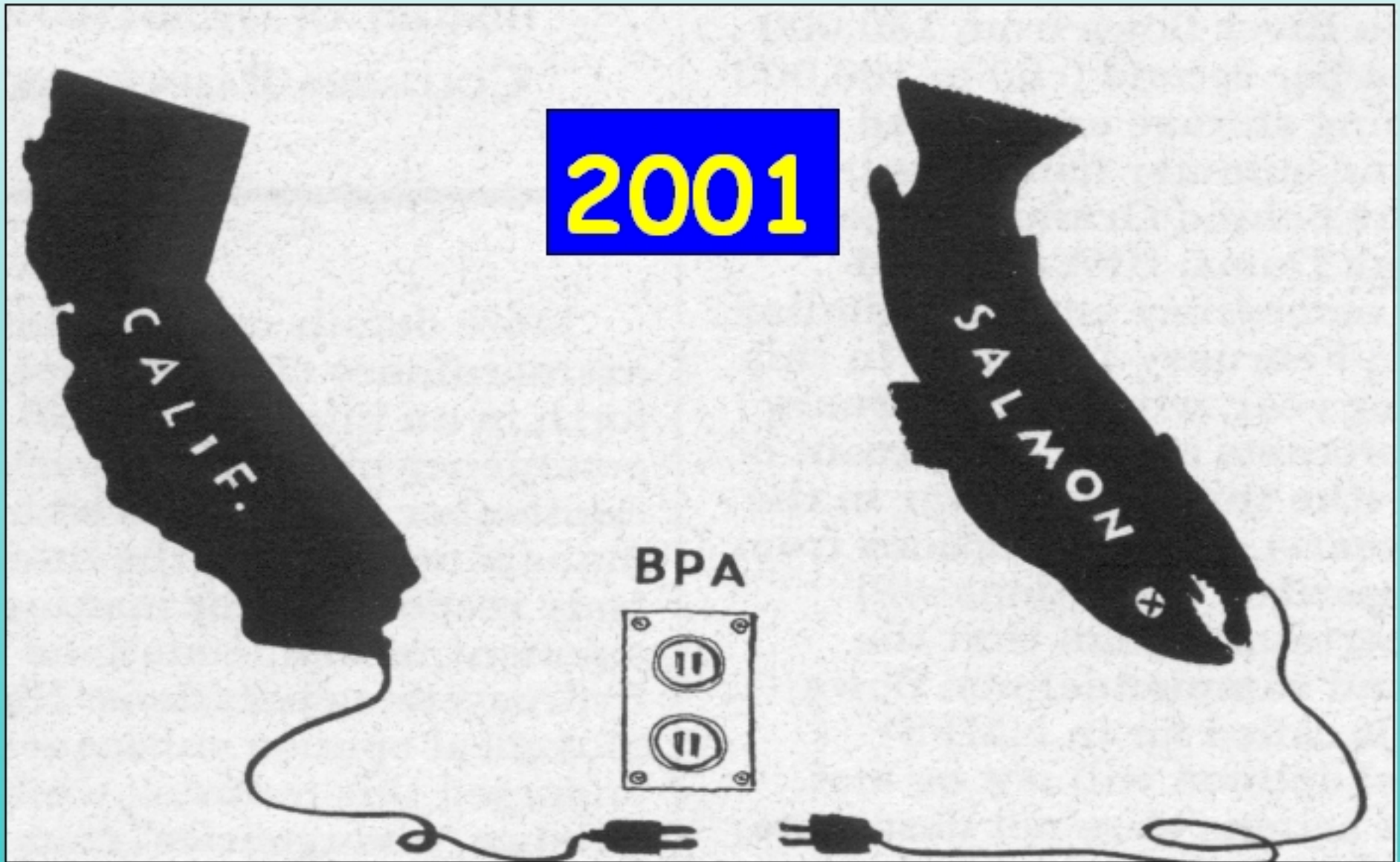


Personal and societal priorities — *are they changing or will they change?*

Best indicator — *not polls; look at people's behavior!*



Personal and societal priorities — *are they changing or will they change?*



Neither good nor bad



VS.



The Future?



What is the most probable forecast for "southern" wild salmon in 2100?

2100 salmon forecast

GIVEN the core policy drivers:

Rules of commerce

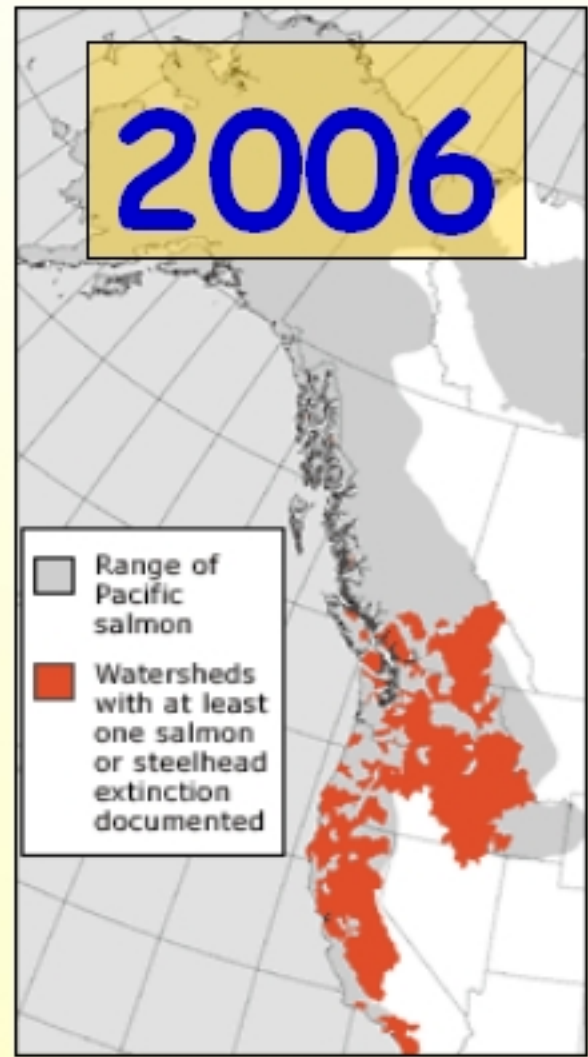
Scarce natural resources

Human population growth

Individual/collective priorities

THEN the most likely forecast:

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



Not extinct!



But remnant runs in some coastal watersheds in 2100

**MAJOR CHANGES ARE NEEDED IF
SOCIETY WISHES TO SUSTAIN
SIGNIFICANT RUNS THROUGH 2100**



**OK ... WHAT ARE
MY OPTIONS IF I
DON'T LIKE THE
LIKELY SCENARIO?**

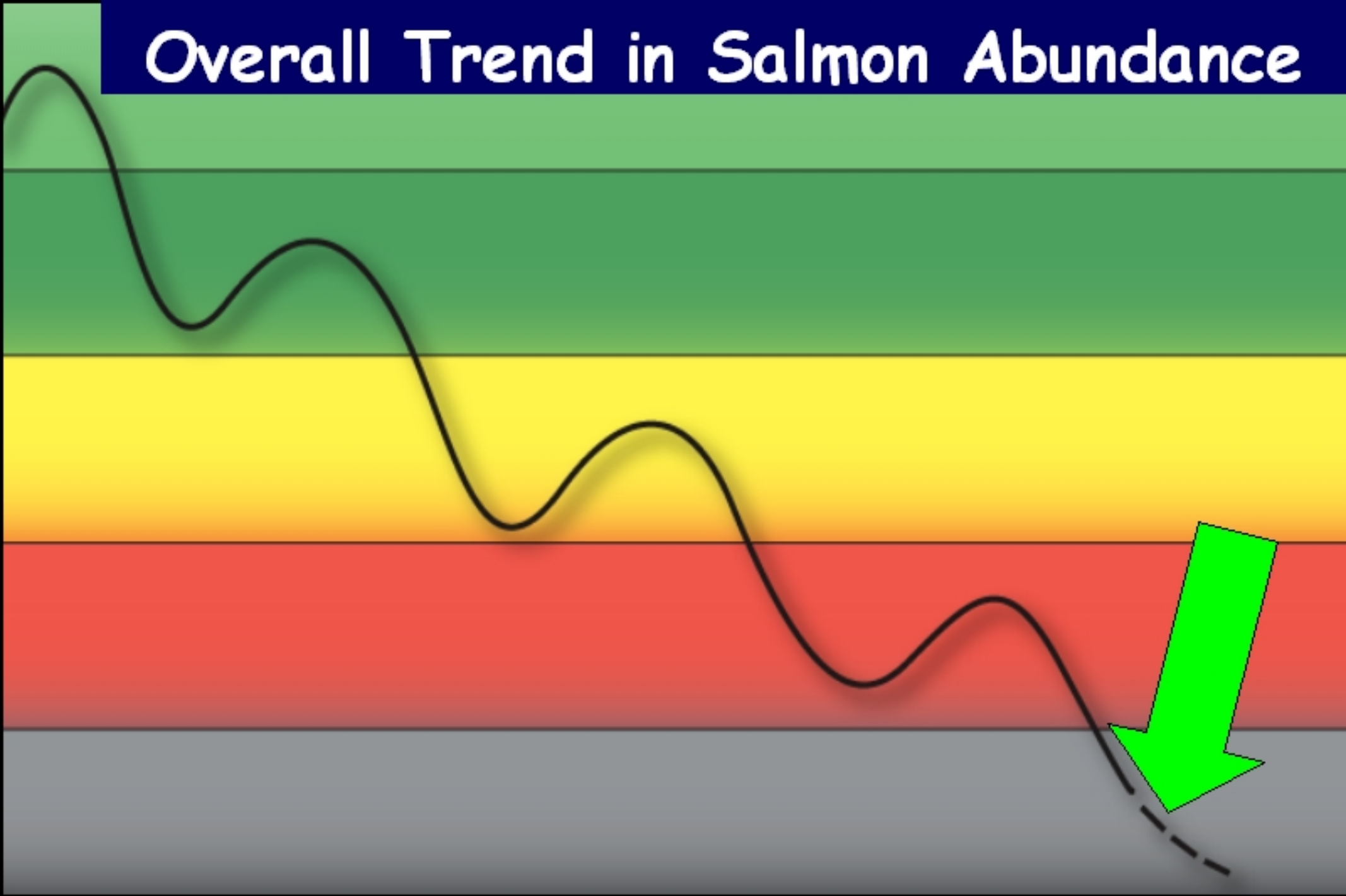


Developing alternative policy options to restore salmon



Salmon
2100
Project

Overall Trend in Salmon Abundance



1848 →

2006 →

Project participants

Kenneth I. Ashley

Xanthippe Augerot

Larry L. Bailey

David A. Bella

Gustavo A. Bisbal

Michelle Boshard

Ernest L. Brannon

James L. Buchal

Russell A. Butkus

Carl J. Cederholm

Jeff Curtis

Jeffrey J. Dose

Eric G. Doyle

Peter F. Galbreath

Gordon F. Hartman

David T. Hoopes

E. Eric Knudsen

Steven A. Kolmes

John H. Lombard

Kaitlin L. Lovell

Donald D. MacDonald

James T. Martin

John H. Michael, Jr.

Jay W. Nicholas

Thomas G. Northcote

Edwin P. Pister

Guido R. Rahr

William E. Rees

Brent S. Steel

Cleveland R. Steward

Benjamin B. Stout

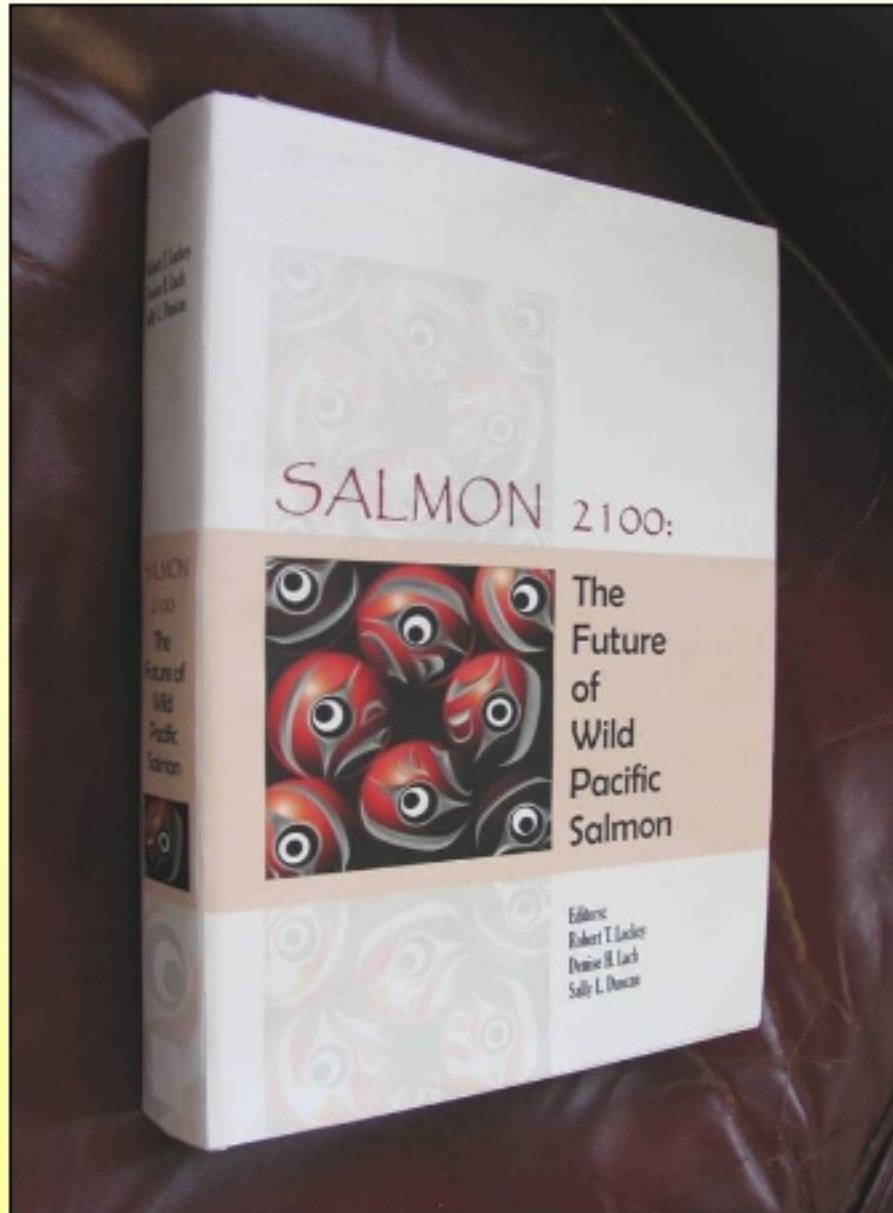
Andre J. Talbot

Jack E. Williams

The Question:

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

23 Policy Prescriptions



Summer, 2006

Alternative Future 1 —

Current recovery efforts overall have a low probability of successfully restoring or even sustaining wild salmon runs through 2100 in CA, OR, WA, ID, and southern BC

*Most likely
future*

Alternative Future 2 —



*Use
technology*

Alternative Future 3 —



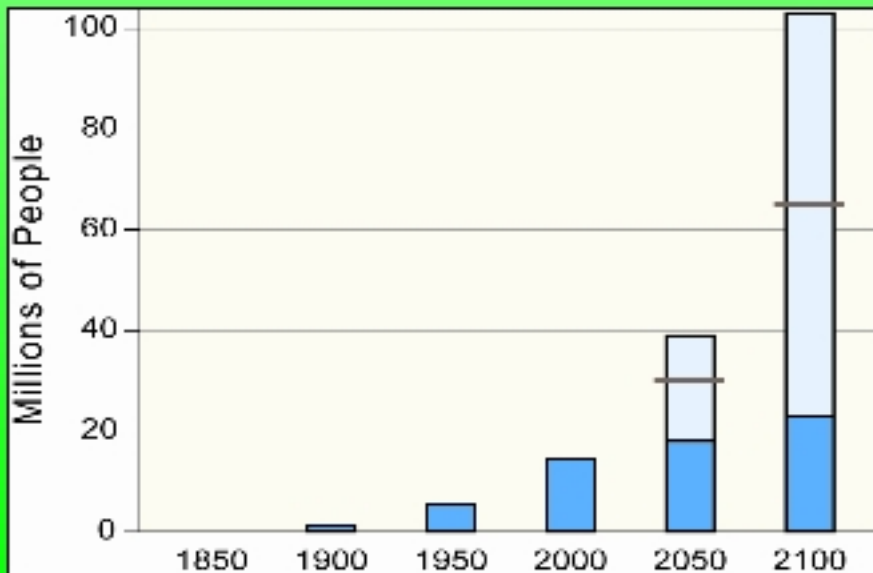
Apply triage

Alternative Future 4 —



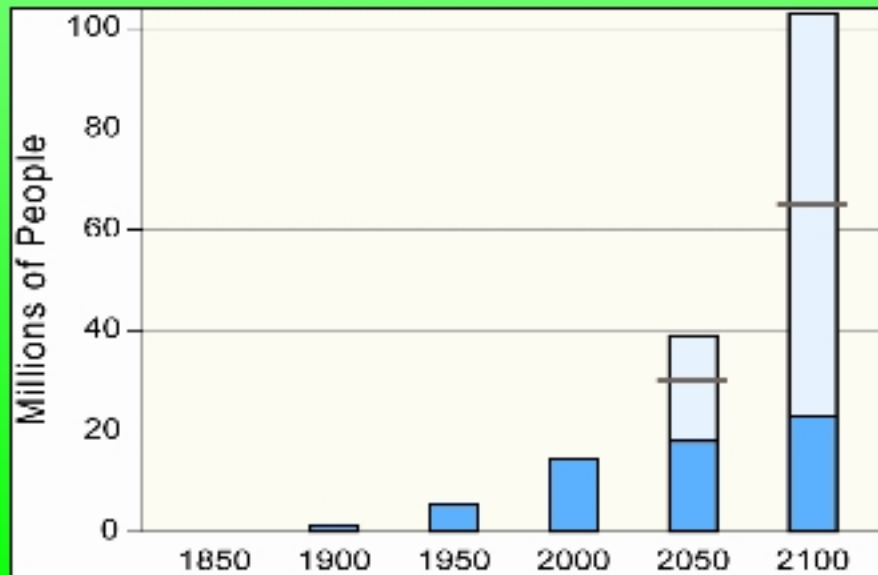
*Overhaul
bureaucracy*

Alternative Future 5 —



*Change
individual
behavior*

Alternative Future 5 —



Alternative Future 5 —



Alternative Future 5 —

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

Should society adopt a policy prescription
that would likely recover wild salmon?

No?



Yes?



Presenter's bio

Dr. Robert T. Lackey, senior fisheries biologist at the U.S. Environmental Protection Agency's research laboratory in Corvallis, Oregon, is also courtesy professor of fisheries science and adjunct professor of political science at Oregon State University. Since his first fisheries job more than four decades ago mucking out raceways in a trout hatchery, he has dealt with a range of natural resource issues from positions in government and academia. His professional work has involved many areas of natural resource management and he has written more than 100 scientific and technical journal articles. His current professional focus is providing policy-relevant science to help inform ongoing salmon policy discussions. Dr. Lackey also has long been active in natural resources education, having taught at five North American universities. He continues to regularly teach a graduate course in ecological policy at Oregon State University and was a 1999-2000 Fulbright Scholar at the University of Northern British Columbia. A Canadian by birth, Dr. Lackey holds a Doctor of Philosophy degree in Fisheries and Wildlife Science from Colorado State University, where he was selected as the 2001 Honor Alumnus from the College of Natural Resources. He is a Certified Fisheries Scientist and a Fellow in the American Institute of Fishery Research Biologists.