

# A Salmon-Centric View of the 21<sup>st</sup> Century in the Western United States

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# A Salmon-Centric View of the 21<sup>st</sup> Century in the Western United States<sup>1</sup>

Robert T. Lackey<sup>2</sup>

## Abstract

Throughout the far western contiguous United States (California, Oregon, Washington, and Idaho), many wild salmon stocks have declined and some have disappeared. The decline has taken place over the past 150 years and, although there have been decades when the numbers increased, overall, wild salmon runs generally are now less than 10% of 1850 levels. The decline was caused by an extensively studied, but still poorly understood, combination of factors, including intense commercial, recreational, and subsistence fishing; freshwater and estuarine habitat alteration due to urbanizing, farming, logging, and ranching practices; dams built and operated for electricity generation, flood control, irrigation, and other purposes; water diversions for agricultural, municipal, or commercial requirements; stream and river channel alteration, especially diking; hatchery production to supplement diminished runs or produce salmon for the retail market; predation by marine mammals, birds, and other fish species; competition, especially with exotic fish species, many of which are better adapted to the altered aquatic environment; diseases and parasites; loss of marine-derived nutrients to watersheds, replenished annually from the decomposition of spawned salmon and likely important for helping sustain healthy salmon runs; and possibly others. Determining the relative importance of the many causal agents has been complicated by the overlapping influences of random and cyclic changes in ocean and climatic conditions. The runs remain relatively low for many of the same reasons that caused the original decline. In spite of the failure of most wild salmon restoration efforts, the goal (and legal requirement) of restoring these runs appears still to enjoy widespread public support. Billions of dollars continue to be spent in a so-far-failed attempt to reverse the long-term, overall decline. How can it be that the direct causes of the decline are reasonably well known, have been studied in great detail, and the public appears to be supportive of changing the downward trajectory for wild salmon, yet the long-term prognosis is poor for California, Oregon, Washington, and Idaho? The answer is that effecting any change in the long-term downward trend for wild salmon is probably futile in the absence of substantial shifts in the core drivers that are reflected in the proximal causes of the decline. Except for climate and ocean conditions, core drivers over which society has minimal control, society can control other core drivers: (1) the economic rules of the game, especially the international and domestic drive for economic efficiency; (2) the increasing scarcity and competition for key natural resources, especially for high quality water; (3) the rapidly increasing numbers of humans in the region and the requirement to meet their basic needs; and (4) individual and collective lifestyle choices and priorities. Without substantial changes in these four, interrelated core drivers, the status of wild salmon through this century will likely continue the well documented, downward path of the past 150 years. An impartial assessment of current individual and societal priorities, as revealed by actual choices and behavior to date, provides little indication that the public appears willing to make substantial changes in any of the core drivers. Not all salmon restoration options require draconian changes in these drivers. There are options that are likely to be ecologically achievable and appreciably less socially disruptive than current wild salmon recovery strategies, but these options also have much more modest restoration objectives, require extensive hatchery intervention, and/or involve creating protected areas.

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## Introduction

So far we've heard mostly about the current status of salmon, the causes of past declines, and the relative importance of this or that causal factor. In short, the how and the why of how we got to where we are today.

Now its time to move to the future.

The program committee asked me to look forward — to speculate on the most likely future of salmon through this century — AND to identify those factors that would have to change if the long-term downward trajectory is to be reversed.

Say what . . . A century ahead!

When I first read the title of this talk in the published program, my reaction was probably like yours:

*Where did they find some poor soul willing to publicly speculate about the future of wild salmon in front of this audience? Good question!*

For sure, most of us secretly have a forecast about the long-term future of wild salmon — but we keep it to ourselves — or perhaps we share it with a few, close, discrete colleagues. Most of us are not willing to publicly speculate about wild salmon over the longer term.

But — at least in some ways — it is easier to forecast the long-term. It does tend to dampen the confusion caused by year-to-year and decade-to-decade variations in ecological and social factors that often mask fundamental, underlying trends.

And, it often takes 50 years or more to see the effect of human actions on salmon runs — so the long term is much more realistic. In a sense, it is arguably easier to predict the status of salmon in 2100 than it is in 2010.

But — whatever the intellectual or practical value — the big risk is that the forecaster will be highlighted a century from now in one of those Believe It or Not cartoons about how naive people were in the old days.

You know the kind of forecasts — like the one by the leading urban planner of 1900. He predicted that disposing of mountains of horse manure will be the great engineering challenge facing cities in the 20<sup>th</sup> century. Its easy to make fun of such a forecast now, but at the time it was based on a reasonable extrapolation of current knowledge.

To cut my risk, I am going to mostly limit my policy focus to the future of wild salmon in California, Oregon, Washington, and Idaho. I'll slip occasionally into including southern British Columbia because — current political boundaries aside — the same forces that will drive the future status of wild salmon below the 49<sup>th</sup> parallel also apply in southern

BC.

I'll also try to be candid and frank. You may well argue with my take on the rest of this century, but I don't want to be pollyannaish — nor fatalistic about it. So forget optimism — forget pessimism — here's my stab at realism.

And just to be sure, in case anyone out there is taking names and notes, my comments are my own and not necessarily those of any organization.

To begin, let me start with a simple statement of fact, one that, even in an audience of contrarian scientists, will likely engender little argument:

*... in spite of abundant uncertainty about the relative importance of the various factors that drove the decline of wild salmon in California, Oregon, Washington, and Idaho, we fundamentally recognize — we fundamentally know — the direct causes of the long-term decline.*

As we have examined at this conference, the causes have been, and often still are:

- intense commercial, recreational, and subsistence fishing and, especially these days, mixed stock fishing;
- freshwater and estuarine habitat alteration due to urbanizing, farming, logging, and ranching;
- dams built and operated for electricity generation, flood control, irrigation, and other purposes;
- water withdrawals for agricultural, municipal, or commercial requirements;
- stream and river channel alteration, diking, and riparian corridor modifications;
- hatchery production to supplement diminished runs or produce salmon for the retail market;
- predation by marine mammals, birds, and other fish species, often exacerbated by unintentionally concentrating salmon or their predators;
- competition, especially competition with exotic fish species, many of which are better adapted to the highly altered aquatic environments we now have in this region;
- diseases and parasites;
- reduction in the annual replenishment of nutrients from decomposing, spawned-out salmon; and

- just to be safe — possibly others.

To no one's surprise, it is a long list. And it covers most of the entire human enterprise. And we also know that ocean and climatic conditions have a big influence on salmon abundance even if we don't understand exactly how they work.

But we know even more — even if many of us don't like to acknowledge it — we know much more about the decline of wild salmon.

We know about the trajectory. Let me offer a second statement of fact:

*... as we move into a new century in California, Oregon, Washington, and Idaho — in spite of ups and downs — good years and bad years — favorable and unfavorable ocean conditions — even newspaper headlines proclaiming record runs — wild salmon have been on a 150 year downward trend — and wild runs are now at very low levels.*

Yes, newspapers regularly trumpet the fact that runs of both wild and hatchery fish in the Pacific Northwest are generally higher than the past several decades — not surprising because of shifting ocean and climatic conditions — but for assessments of the future, we need to focus on long-term trends — and not get lead astray by short-term variations in background conditions.

In these four states, wild salmon are well on their way to attaining a status enjoyed by some of their notable brethren — wolves, condors, grizzlies, bison — wild animals that are unlikely to disappear entirely, but struggle to hang on as remnants of once flourishing species in small portions of their original range.

OK. Those are my two scientific facts if you will:

- (1) *We pretty much know the direct causes of the decline; and*
- (2) *Wild salmon runs have been in a century and a half decline and are now at very low levels.*

But how can it be that the direct causes of the decline are reasonably well known, have been studied in great detail, and the public appears to be supportive of altering the long-term downward trend, yet the recovery prognosis is poor in these four states?

The answer, as we all know, is a simple policy statement of fact:

*... effecting any change in the long-term downward trend for wild salmon is futile in the absence of shifts in the core drivers.*

It is the core policy drivers — the root causes — that have determined the status of wild salmon — and will continue to determine the status of wild salmon through this century. Habitat alteration, dams, water withdrawals, fishing, hatcheries — and many more — are

simply the way in which the core policy drivers are expressed.

What are these elusive drivers of the future status of wild salmon in California, Oregon, Washington, and Idaho — these agents of decline that must also be the agents of any recovery?

Today, I'll make my case that there are 6 core policy drivers. I am going to briefly talk about 2 that society really can't do much about, then spend most of my remaining time on the other 4 which fall — at least potentially — within the public policy arena.

The first two are changes in climate and changes in ocean conditions, two core drivers over which society has minimal control. In a policy sense, these are largely givens — essential for assessing the relative importance of the direct causes of the decline, but pretty much beyond our control.

To be sure, to the extent that human actions are affecting changes in ocean and climate patterns — we could conceivably do something about that — at least over the long-term. Reducing green house gas emissions may have some effect on wild salmon by the end of this century, but climatic and ocean cycles are predominantly independent of human influences — as the 500-year reconstructions of salmon, sardine, and anchovy abundance clearly demonstrate.

The other four core drivers are ones society can control and could change. So, for the rest of my time, I'll briefly elaborate on these other core policy drivers — and defend why I think each must be at the crux of any serious effort to restore wild salmon in California, Oregon, Washington, and Idaho.

## Core Driver #1 — Rules of Commerce

The first core driver is an overarching one and, like everything else in salmon policy, difficult to rigorously quantify as to its influence on wild salmon. It is:

*The rules of commerce, especially trends in international commerce and trade and reflected in increased market globalization, tend to work against increasing the numbers of wild salmon.*

The drive for economic efficiency and low cost production is a widely professed approach to trade, both within nations and between nations. My purpose today is not to argue for — or against — such a philosophy of commerce, but rather to note its impact on wild salmon.

My assumption is that economic efficiency — and the corollary of “free trade” — will continue to be a dominant government policy through this century. One upshot of such an approach to commerce is that non-economic values — such as preserving remnant wild

salmon runs — tend not to get weighted very heavily in decision-making.

We obtain our computers from where they can be manufactured most cheaply. We move our automobile assembly plants to where they can produce cars most inexpensively. We tend to produce electricity in the most cost-effective way. We obtain most of our wheat where it can be grown most productively and consistently. We obtain wood products where they can be grown and harvested most efficiently and sold at the lowest price, notwithstanding the current North American dispute over softwood trade.

Even closer to home, we buy our salmon from Chile, Scotland, Norway, and British Columbia. Most consumers aren't willing to pay a premium for wild fish, nor are they willing to limit their salmon consumption to only a few months of the year.

The benefits of public policies that favor economic efficiency are well recognized, but there are also consequences that — in my view — are not all that favorable to wild salmon. How much more are people willing to pay for bread, for electricity, or for automobiles produced in ways that will help restore wild salmon? Don't hide behind the pablum that bread, electricity, and automobiles can be produced just as cheaply in a salmon-friendly manner. As with all policy choices, there are winners and there are losers and we should make that point clear to the public.

Each of you can also speculate, but as I observe consumer behavior today and guess about the future, I don't see much willingness on most people's part to pay much more for salmon-friendly products.

## **Core Driver #2 — Increasing Scarcity of Key Natural Resources**

The second core policy driver is reflected in many of the past, current, and likely future proximal causes of the decline of wild salmon. It is:

*The demand for critical natural resources, especially for high quality water, will continue to be great (and increase) through this century.*

Many rivers in California, Oregon, Washington, and Idaho suffer from severe water shortages — especially shortages of high quality water. Our seemingly insatiable demand for fresh water shows little sign of letting up — nor do I expect it to do so anytime soon.

I am not arguing that allocating water for salmon is more — or less — important than allocating it for alternative uses, but, as competition for scarce water continues and gets much more intense, how will advocates for wild salmon fare relative to advocates for competing priorities:

— water for drinking

- water for irrigation
- water for manufacturing
- water for generating electricity
- or water for any of a thousand other needs?

The on-going water war in the Klamath Basin — which is along the California/Oregon border — gives us an indication of the future — with farmers defying law enforcement agents — illegally opening locked valves and releasing water to irrigate their fields — with streams choked with dying salmon caused by low water flows and poor water quality — with lawyers from various competing interest groups dueling in court over who will get how much water. And — at the end of the day — every faction in the battle being dissatisfied with the result — feeling their interest didn't get a fair share of the water — and figuring out ways to be more politically effective in next year's battle.

And it's not just water that is becoming increasingly scarce. Land — somewhere to build a second home — a place to build the next Disneyland — a mountain watershed to accommodate the next Whistler.

Life for an individual — as well as for society — is a series of trade-offs — of choices — of selections between appealing alternatives.

As key natural resources become more scarce through this century, the individual and collective choices that permit long-term salmon abundance will become increasingly unacceptable to more and more people — at least that is the way I read society's collective current and likely future behavior.

### **Core Driver #3 — Regional Human Population Levels**

The third core driver which will determine the status of wild salmon through this century is:

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

The most probable scenario for the human population trajectory through this century in this region — the most nearly certain scenario — is upward — substantially upward. As core drivers go, population growth is right up there at the top.

Its not popular to raise this issue these days. It has become a taboo subject in most circles. Environmental advocacy groups avoid it like the plague even though it dwarfs most of the human behaviors they are trying to modify. Wild salmon advocacy groups rarely even mention it, much less take policy positions.



Advocacy groups avoid raising it for some very good reasons . . .

As one of my colleagues told me when we talked about what I might say here:

*“Bob, you are absolutely right, most people already know it, and that’s exactly why you should let it rest. Back off. You’ll leave the proponents of wild salmon restoration depressed. Worse, you’ll have the rest of the audience wondering why you are pontificating on the intuitively obvious. And you run the risk of being attacked as a racist, nativist, xenophobe, cultural imperialist, or, at the least, an economic elitist.”*

Undoubtedly very good advice.

However . . . if society wishes to do anything meaningful about moving wild salmon off their current trajectory . . . then something must be done about the unrelenting growth in the number of humans in the Pacific Northwest. I am not here to argue that we collectively ought to necessarily change any policy, but the simple and inescapable fact is that the human population level in this region that we should realistically anticipate through the rest of this century is a serious barrier — a show stopper — a show stopper to achieving any significant long-term wild salmon recovery.

Many of you may wish it otherwise, but that’s the way it looks to me.

Yes, the latest demographic forecasts show a flattening of the world population growth rate toward the end of this century and such may well be the case. But, for the Pacific Northwest there is another story. It largely one of immigration — continuing immigration. Immigration to the Pacific Northwest from all directions.

Currently, Washington, Oregon, Idaho, and British Columbia are home to 15 million humans. Assuming a range of likely human reproductive rates, migration to the Pacific Northwest from elsewhere in Canada and the United States, and continuing immigration policy and patterns, by 2100 this region’s human population will not be its present 15 million . . . but rather will be somewhere between 50 and 100 million — a quadrupling — or more — of the region’s human population by the end of this century — less than 100 years from now.

Visualize 50 or 100 million people in this region, and their demands for:

*. . . housing, schools, tennis courts, football stadiums, expressways, planes, trains, automobiles, Starbucks, McDonalds, WalMarts, electricity, drinking water, pipelines, marinas, computers, DVDs, 12 screen movie theaters, ski resorts, golf courses, lush, weed-free lawns, big city hotels, and university conference centers.*

Lets speculate about 2100 and the footprint of the human population we should plan for.

Visualize Washington and southern British Columbia in 2100 with its metropolis of

Seavan. You know Seavan — it mushroomed into a truly great city as smaller, discrete cities back in 2003 grew together. Seavan in 2100 stretches from Olympia in south Puget Sound northward through the once stand-alone cities of Tacoma and Seattle, and on to Vancouver, east to Hope, and west to cover the southern half of Vancouver Island.

Rather than the 6 million people back in 2003, Seavan in 2100 rivals present day Mexico City and Tokyo with its 24 million inhabitants.

Visualize Oregon and southern Washington in 2100 with Portgene — the other great metropolis in the Pacific Northwest. Portgene extends from its southern suburbs of what was once the stand-alone city of Eugene northward to Portland and across the Columbia River to Vancouver, Washington and onward to sprawling suburbs to the east, west, and north.

Remember back in 2003, of what was to eventually grow into Portgene, its population then was a mere 3 million. In 2100, it is a whopping 12 million.

You don't have to visualize California. We already have similar metropolises there today.

Regardless of whether my assessment turns out to be right or wrong, population issues are not easy ones to raise, much less discuss without resort to policy advocacy. There are understandable, strategic reasons why the big environmental groups — most groups in fact — stay clear of population issues these days.

But the current and expected population level in this region is at the core of any credible analysis of potential recovery strategies, or at least those strategies that are offered as serious attempts to actually recover wild salmon.

#### **Core Driver #4 — Individual and Collective Preferences**

Let me offer a fourth and final core policy driver — one that is very closely tied to the prior three:

*Individual and collective preferences directly determine the future of wild salmon, and substantial and pervasive changes must take place in these preferences if the current long-term, downward trend in wild salmon abundance is to be reversed.*

This core driver is perhaps the most obvious and arguably the most important. Among most folks like us, it is easy to assume that salmon are near the top of the public's priorities. Just look at the polling results. Everyone supports salmon and especially wild salmon! But, the fact is that salmon recovery is only one of many priorities that society professes to rank high.

It is difficult for me to conceive this, but that's the situation out there. Even my kids who I've had three decades to inculcate, regularly admonish me:

*“Dad, get a life. Most people out here in the real world just don't care that much about restoring wild salmon. They have other things to worry about!”*

Society's collective behavior — its actions — not public opinion polls — not thick recovery plans — people's individual and collective behavior — gives us the best indication. Let me offer a recent example for California, Oregon, Washington, and Idaho.

Remember what happened in this region in 1991. The first salmon “distinct population segment” was listed under terms of the U.S. Endangered Species Act. With this listing of salmon as a protected species, the policy debate shifted in these four states — it shifted away from restoring salmon runs in order to support fishing — to protecting wild salmon runs from extinction — two very different policy objectives.

In 1991 protecting at-risk runs of wild salmon won out over providing fishing opportunities through supplemental stocking or other efforts to put fish on the hook — or fish in the net. The residents of the western United States apparently made a choice. Did they?

Jump ahead 10 years to 2001. Just a decade after the first salmon listing, a severe drought — combined with ongoing electrical blackouts — provoked the Bonneville Power Administration to declare a power emergency — abandon previously agreed upon interagency salmon restoration commitments — and generate electricity flat out using water reserved to help salmon migrate.

In one of the most striking recent barometers of competing societal priorities, air conditioners — electricity — won out over both wild and hatchery-bred salmon — and with scant public opposition.

No street protests. No legal challenges. No elected officials publicly pleading for salmon. No environmental group blanketing the Internet with calls to mobilize fax machines in defense of salmon. Near complete silence.

Over the past 150 years, we have made plenty of these kinds of choices — contradictory, opposing, apparently inconsistent — and these choices roughly reflect our collective and relative priority for wild salmon. These choices are tradeoffs — and we continue to make them — and these choices are a real measure of the relative importance of salmon to society.

Now, I'm not here to cheerlead for wild salmon — or for electricity — or for property rights — or for hatcheries — or for dredging shipping channels — or for having a McDonalds, Tim Hortons, and Starbucks on every corner — but it is naive to consider

salmon recovery as anything but one element — one often minor element — in a constellation of competing — often mutually exclusive — wants, needs, and preferences.

## Conclusion

Let me close with a few take-home messages . . .

You have now heard my take on the 21<sup>st</sup> century from a salmon-centric perspective — a perspective driven by assessing four core drivers that largely will determine the future of wild salmon in this region.

The core policy drivers are:

- (1) the economic rules of the game, especially the international and domestic drive for economic efficiency through market globalization;*
- (2) the increasing scarcity and competition for key natural resources, especially for high quality water;*
- (3) the rapidly increasing numbers of humans in the region and meeting their basic needs; and*
- (4) individual and collective life style choices and priorities.*

For those of you who have a policy predilection to restore wild salmon, I am sure that it is not a cheerful message.

For those of you who rank restoring wild salmon as just one of many societal priorities, my forecast also may not be all that uplifting — because we will probably continue to spend billions of dollars in a restoration effort that will likely be only marginally successful over the long-term.

I recognize that by making a few different assumptions about the future, my salmon forecast would be different. But in making the assumptions I did, I struggled to avoid succumbing to unfounded pessimism — or to baseless optimism.

I'll end with a prediction and also offer a challenge to wild salmon advocates — its also an opportunity:

*“ . . . any policy or plan targeted to restore wild salmon runs must at least implicitly respond to these four core drivers or that plan will fail. It will be added to an already long list of prior, noble, earnest, and failed restoration attempts.”*

Look down the road to the end of this century, to 2100:

- less than 10 decades away;
- only a few dozen generations of salmon beyond today's runs;
- just 2 or 3 Pacific Decadal Oscillations from now;
- to a time when this region's human population will not be its present 15 million, but rather will be somewhere between 50 and 100 million;

Even given all this, there are still salmon recovery options that are likely to be ecologically viable and probably socially acceptable, but the range of options continues to narrow. For professional fisheries experts — for fisheries scientists, technocrats, analysts, and managers — for those of us who are involved with salmon issues in California, Oregon, Washington, and Idaho:

- it is a time for neither crippling pessimism, nor for delusional optimism
- rather it is a time for uncompromising ecological realism and forthright policy analysis.

Thank you.

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## Author Biographic Sketch

*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 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 Honored Alumnus from the College of Natural Resources. He is a Certified Fisheries Scientist and a Fellow in the American Institute of Fishery Research Biologists.*

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