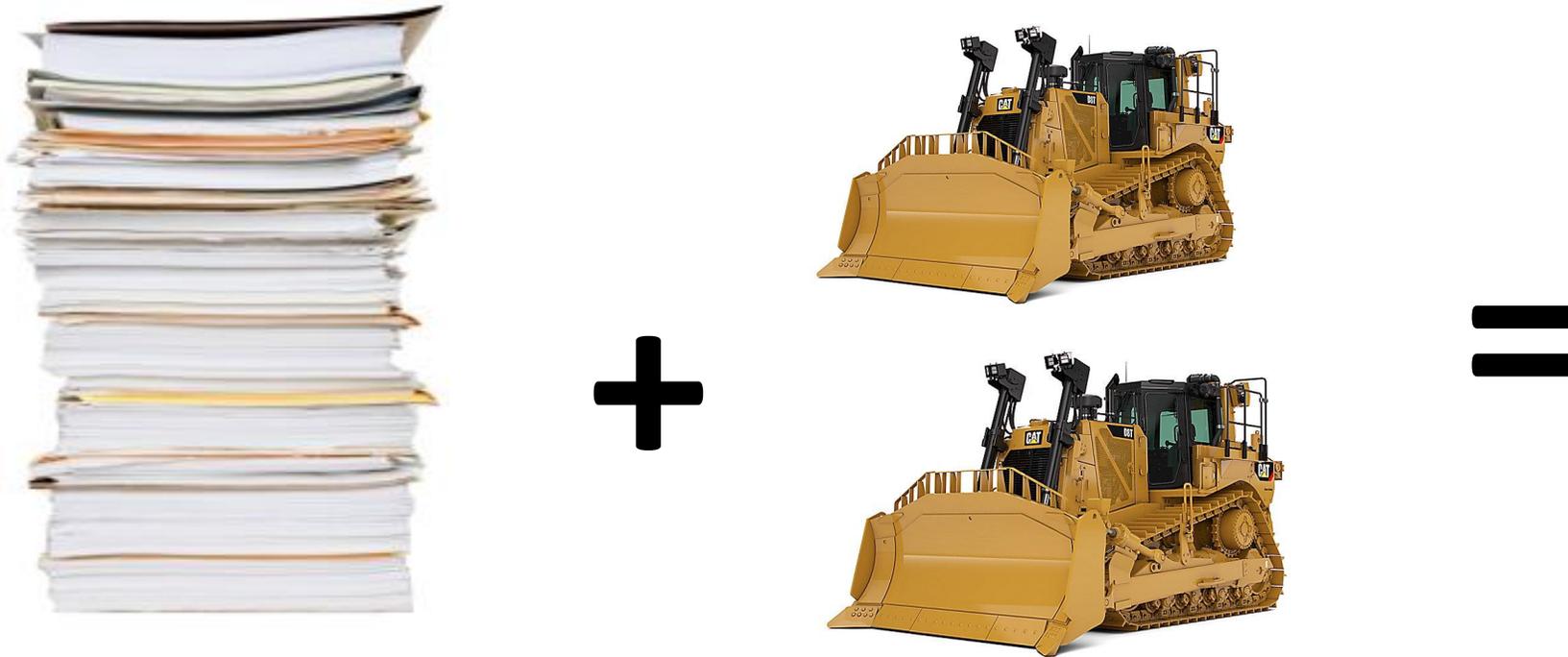


How to Breach the 4 Lower Snake River Dams with a Pile of *Policy* Papers and Two D-8's



- Prepared by Jim Waddell Civil Engineer, PE USACE Retired



Lower Granite Dam with Channel Bypass

Why Breach? Not a Topic of This Presentation, but to give 3 overarching reasons

- The 4 LSRD's have never been economically viable and recent calculations indicate the BCR is well below 1 **compared** to Breaching which ranges between 4 to 1 and 19 to 1-----depending on the desire to replace the lost power.
- Fullup costs to tax and ratepayers appear to have exceeded power revenues for the last 5 years and is adding to BPA "dire financial situation"
- In spite of over \$1 Billion in passage improvements since 2002 EIS signed, the 4 dams and reservoirs are still the major cause of failure to meet Recovery goals and ESA requirements.

And, it needs to be done quickly!



Lower Granite



Lower Monumental



Little Goose



Ice Harbor

The 5 Polices or Means That Make Breaching Feasible in a Short Time Frame

1. The Corps needs no new authorities to place the 4 LSRD's into a "non-operational" status while normative river flows are reestablished by removing the dams' earthen portions.

Details in Source Document [Five Means for Breaching 4 Lower Snake River Dams, Jim Waddell, 9.19.2017](http://damsense.org/reports/)
<http://damsense.org/reports/>

**The 5 Polices or Means That Make Breaching
Feasible in a Short Time Frame, Cont.**

2. The Corps' 2002 Environmental Impact Statement and Record of Decision provide the necessary NEPA coverage for breaching, although some updating may be required, 3-4 months.

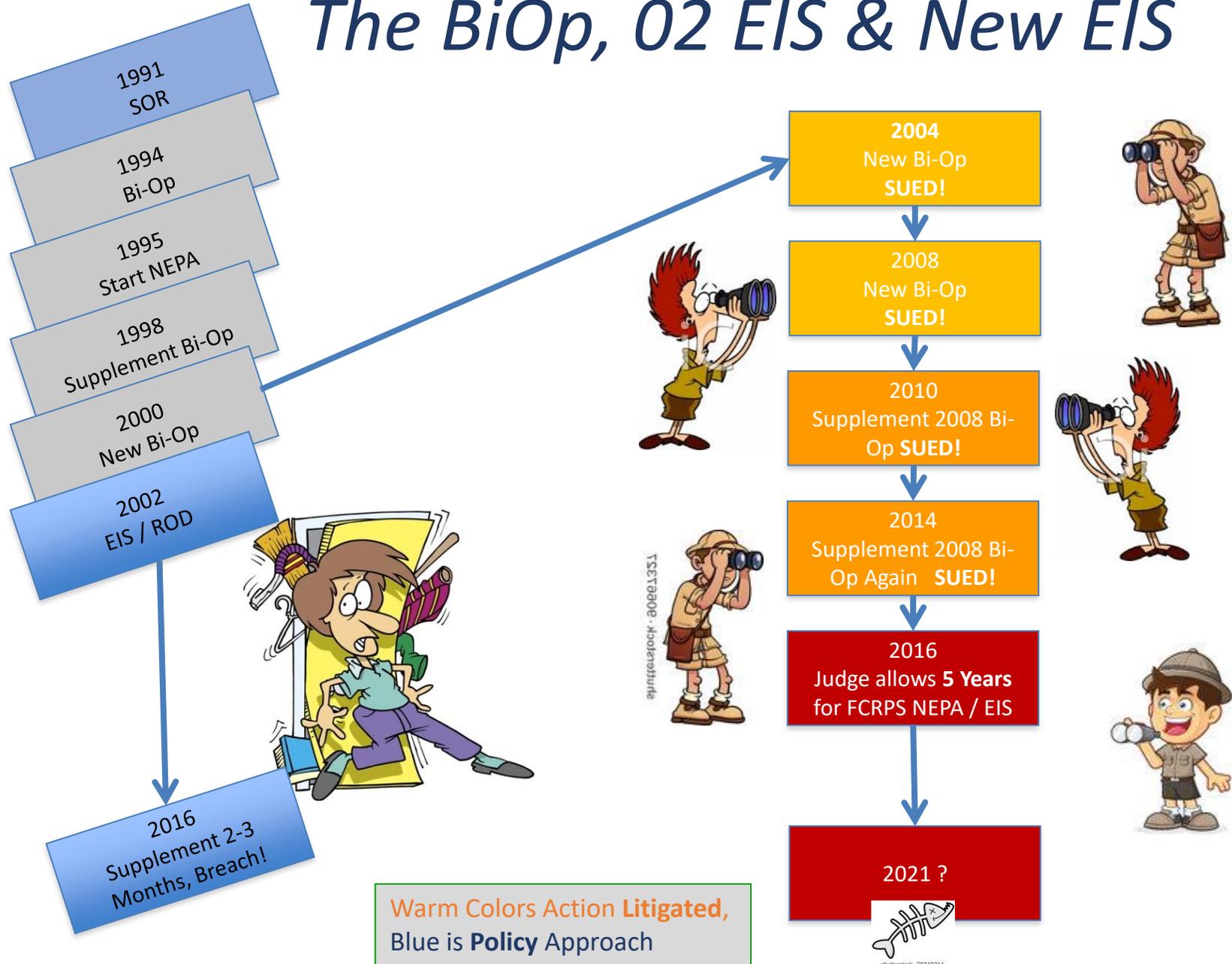
Details in Source Document [Five Means for Breaching 4 Lower Snake River Dams, Jim Waddell, 9.19.2017](http://damsense.org/reports/Five%20Means%20for%20Breaching%204%20Lower%20Snake%20River%20Dams)
<http://damsense.org/reports/>

**The 5 Polices or Means That Make Breaching
Feasible in a Short Time Frame, Cont.**

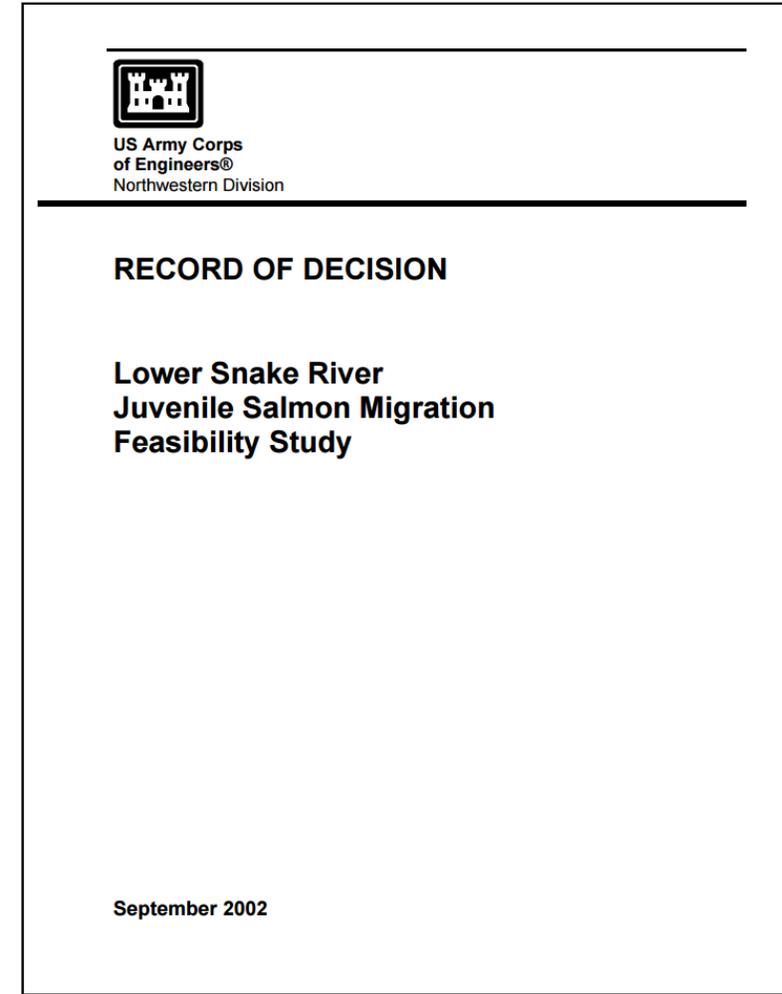
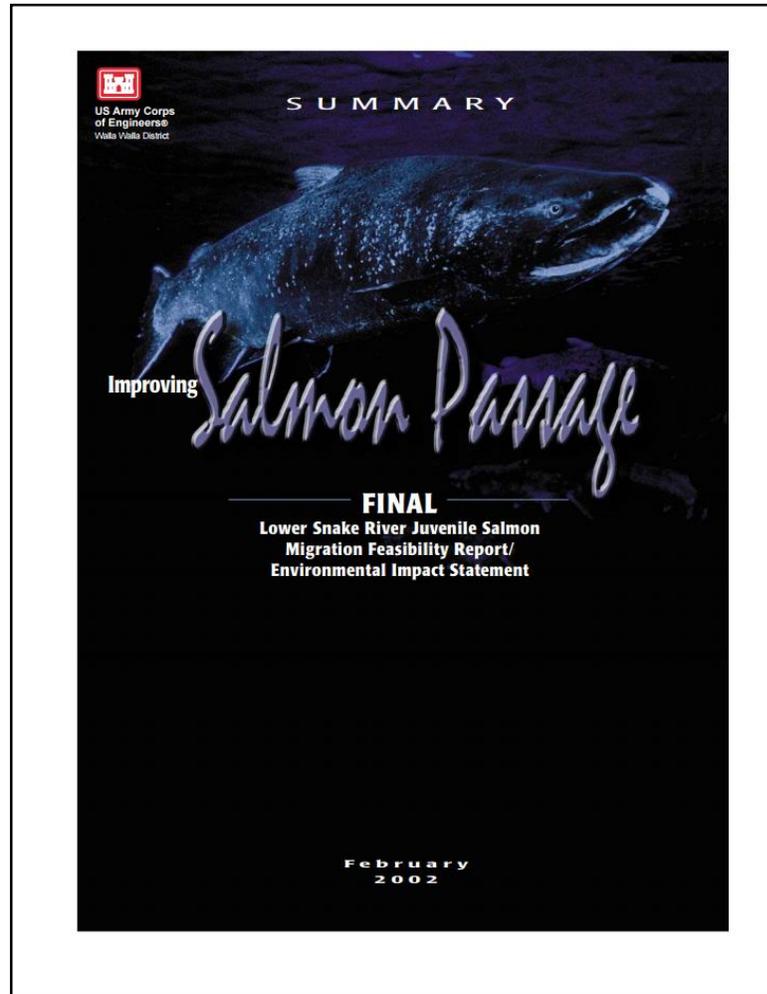
**3. Neither the ongoing litigation over the
2014 Federal Biological Opinion nor the
Court's order for a new EIS constrains the
Corps from breaching the dams through
channel bypass *now*.**

Details in Source Document [Five Means for Breaching 4 Lower Snake River Dams, Jim Waddell, 9.19.2017](http://damsense.org/reports/five-means-for-breaching-4-lower-snake-river-dams)
<http://damsense.org/reports/>

The BiOp, 02 EIS & New EIS



You will
love what
it says on
page 25.



<http://www.nww.usace.army.mil/Library/2002-LSR-Study/>



DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
CIVIL WORKS
108 ARMY PENTAGON
WASHINGTON DC 20310-0108

JAN 17 2017

Mr. Jim Waddell
289 Ocean Cove Lane
Port Angeles, Washington 98363

Dear Mr. Waddell:

This is in response to your letter co-signed with Ms. Sharon Grace, regarding immediate action to breach the four lower Snake River dams. An identical letter is being provided to Ms. Grace. I apologize for the delay in responding.

As you note in your letter, the U.S. District Court for the District of Oregon issued an Opinion and Order on May 4, 2016. The Order directs the Army Corps of Engineers (Corps) and the Bureau of Reclamation (Reclamation) to prepare a comprehensive Environmental Impact Statement (EIS) for operation and maintenance of the Federal Columbia River Power System. It emphasizes that the EIS prepared by the Corps and Reclamation should take a "hard look" at all reasonable alternatives, associated potential environmental effects, and ensure meaningful public involvement in the process; that hard look specifically mentions removing the four Snake River dams. The 2002 Lower Snake River Feasibility Report (FR/EIS) also mentions dam removal as an alternative; the other alternatives from that FR/EIS are the basis for ongoing mitigation actions.

The Corps is committed to conducting a National Environmental Policy Act (NEPA) process that is consistent with the guidance in the Order and satisfies Federal laws and regulations; the Corps will be accepting public input on issues to consider and will analyze all alternatives in its upcoming NEPA process to determine the appropriate way forward. Meanwhile it is also committed to following the guidance in the 2002 FR/EIS as a framework for its actions, which includes ongoing assessments as to the efficacy of the alternatives it has implemented to date; the results of those assessments will inform our next steps while the NEPA process is underway, and the NEPA process itself.

Thank you for continued interest in the Snake River dams.

Very truly yours,

Jo-Ellen Darcy
Assistant Secretary of the Army
(Civil Works)

Letter from the Assistant Secretary of the Army (Civil Works), Jan 2017. It reaffirms a basic policy for the use of an EIS on an ongoing project.

“The 2002 Lower Snake River Feasibility Report (FR/EIS) also mentions dam removal as an alternative”

“Meanwhile it is also committed to following the guidance of the 2002 FR/EIS as a framework for its actions”

The 5 Polices or Means That Make Breaching Feasible in a Short Time Frame, Cont.

4. Breaching can be financed through existing debt reduction and credits mechanisms as a fish mitigation action or direct funding by BPA. New appropriations are not necessary.

Details in Source Document [Five Means for Breaching 4 Lower Snake River Dams, Jim Waddell, 9.19.2017](http://damsense.org/reports/)
<http://damsense.org/reports/>

**The 5 Polices or Means That Make Breaching
Feasible in a Short Time Frame, Cont.**

5. Breaching the 4LSRD's is far easier than originally planned, making it possible to move from a decision to breach, to breaching in a matter of months, not years. And does not cost a billion or two, \$300-340 Million with contingencies for adaptive construction.

So lets look at the cost of breaching

- The 2002 FR/EIS provided two costs; Complete Dam Removal and Channel Bypass, both often referred to as "breaching"
- Dam Removal \$1,785 Million, True "sticker shock", BCR for keeping the dams goes well over 1 by avoiding this cost.
- Bypass \$859 million, still a lot and keeps the BCR over 1 for keeping the dams
- This is why we constantly hear breaching is going to cost billions no matter the method

The Corps selected Bypass since it would provide for salmon passage, but still unaffordable.

A careful review of the breach approach Appendix D of the FR/EIS cost reveals significant over estimates

1. Its not the math or the calculations.....its the assumptions
2. And, simplifications in the breach are evident in the docement, but ignored, overlooked,...?

An Example

Road and Railroad Damage Repair at Lower Granite Dam Estimated at \$109 Million Based on the assumption that that there would be damage due to rapid drawdown thus slope failure, as observed in the 1992 Drawdown Test.

The \$109 million was for armoring to prevent this damage.

However, a review of the widely distributed 1992 Drawdown Report revealed a “bit” different story:

This report gives the cost of actual repairs for Roads and Railroads damaged by drawdown at \$519,000.

So the Corps was going to spend \$119 **million** to *prevent* \$519 **thousand** in damages.....you gotta love that “riprap” mentality.

Corrected Cost: \$1 million, saving \$118 million on one feature

There were dozens more assumptions like this that drove the cost of armoring/riprap of embankments, bridge piers, abutments, etc, thru the roof.....and these features were roughly 70% of the breach cost.

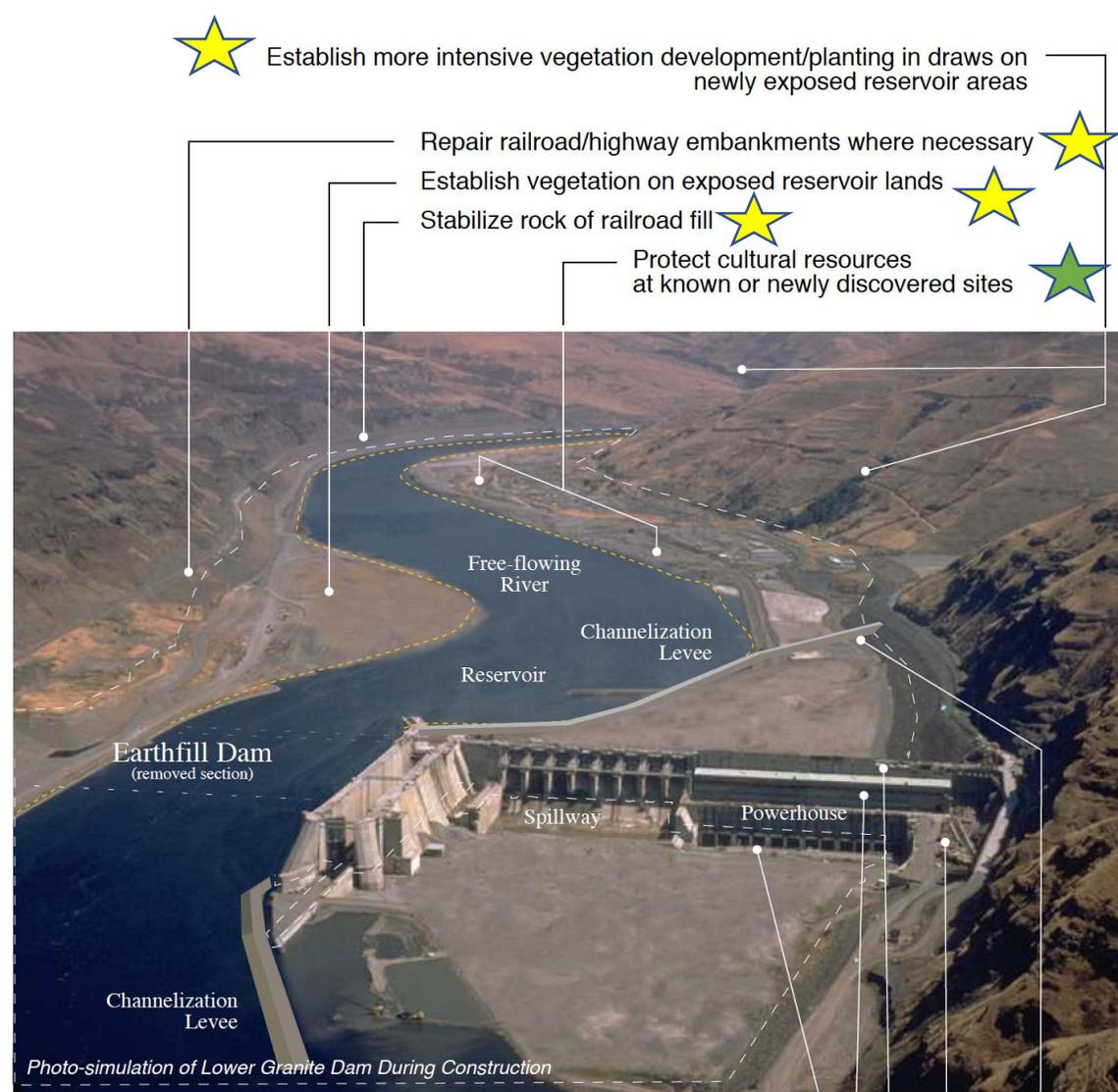
Image from 2002 EIS Summary, pg 19, showing various features of work.

Red Star indicates features not required.

Yellow Star reduced in cost by changed assumptions.

Green Star needed.

Most changed assumptions can be correlated with photographic evidence, the FR/EIS, related documents, or known practices at the time of construction.



Yellow Star Establish more intensive vegetation development/planting in draws on newly exposed reservoir areas

Yellow Star Repair railroad/highway embankments where necessary

Yellow Star Establish vegetation on exposed reservoir lands

Yellow Star Stabilize rock of railroad fill

Green Star Protect cultural resources at known or newly discovered sites

Red Star Modify draft tube bulkheads (visible openings on powerhouse tailrace)

Red Star Modify turbines and support equipment for outlet use

Red Star Modify intake gates for proposed turbine operation (top of powerhouse)

Red Star Construct temporary adult fish passage facilities at Little Goose and Ice Harbor

Green Star Install site security to prevent unauthorized access to abandoned site (fence and gates on top of the levee and around facility)

Photo-simulation of Lower Granite Dam During Construction

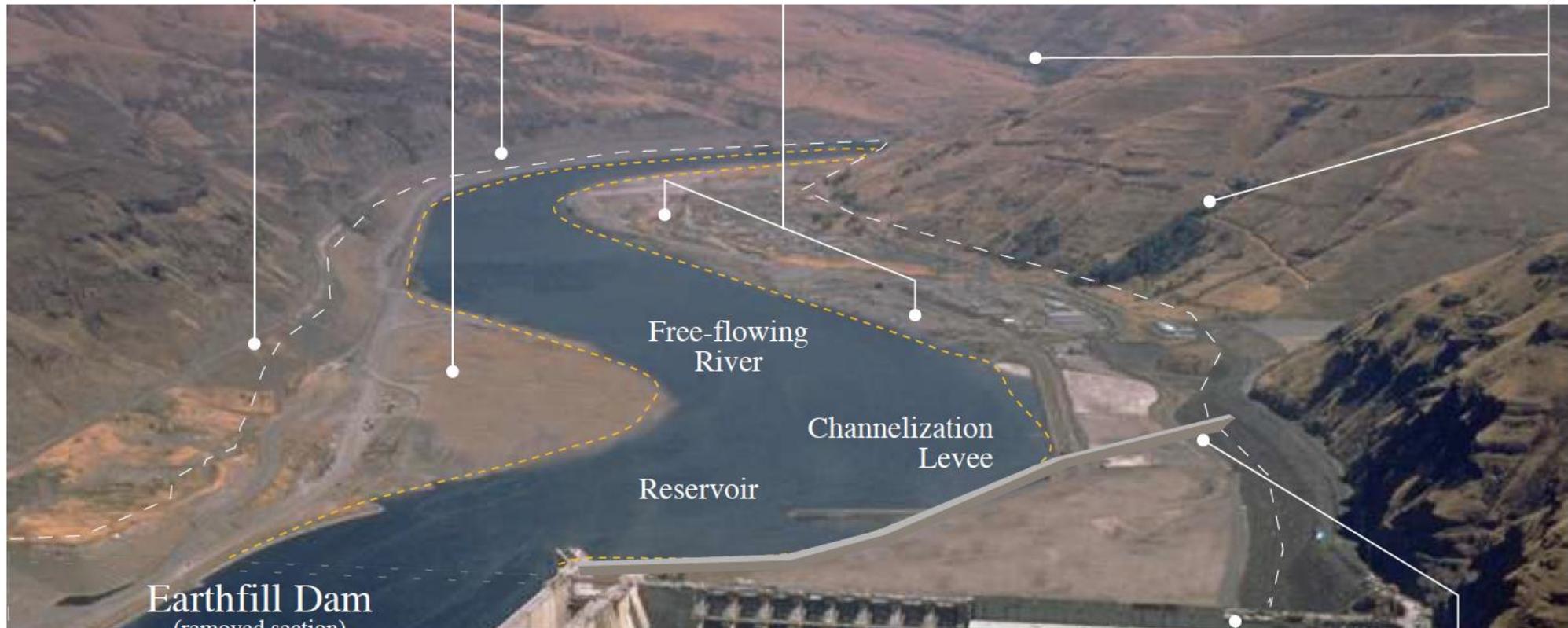
★ Establish more intensive vegetation development/planting in draws on newly exposed reservoir areas

Repair railroad/highway embankments where necessary ★

Establish vegetation on exposed reservoir lands ★

Stabilize rock of railroad fill ★

Protect cultural resources at known or newly discovered sites ★





Note the raised construction area, this was left in place. This area exposed to free flowing river for several years.

Costs for dike construction and Channelization substantially reduced.



Note Bridge pier armor, reinforced when project levees encroached on channel width. Cost engineers assumed this would need to be substantially replaced. Not likely, it was built to protect against high velocities for several years then covered by 14' of backwater. Image from 92 drawdown.



- ★ Modify draft tube bulkheads (visible openings on powerhouse tailrace)
- ★ Modify turbines and support equipment for outlet use
- ★ Modify intake gates for proposed turbine operation (top of powerhouse)
- ★ Construct temporary adult fish passage facilities at Little Goose and Ice Harbor
- ★ Install site security to prevent unauthorized access to abandoned site (fence and gates on top of the levee and around facility)

So lets look at those red stars to see how “easier” further reduced costs.

1. The supplemented breach used a one dam per year schedule as the two dams per year the Corps proposed. Thus tailwater from lower reservoir allows turbine use w/o modifications. However.....there is now a need to breach the 1st two dams in year 1

2. Corps original plan calls for removing turbines to dewater the reservoir below spillway crest. Unnecessary, as **their** model runs show turbines can be run with just 20 feet of head for long enough to dewater.....so why did they ignore this....?

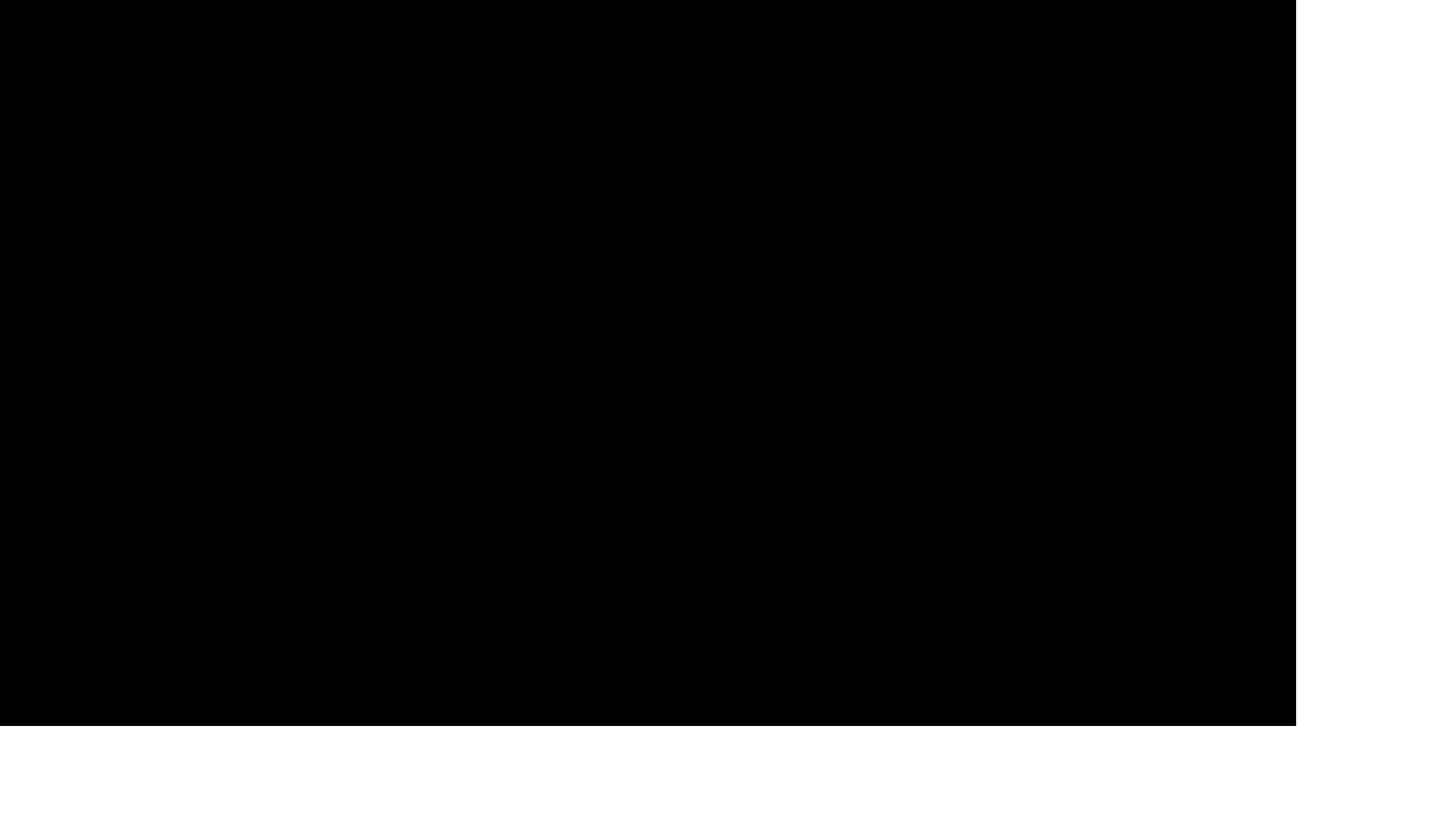
3. Corps plan uses a "rapid drawdown" rate of 2 feet per day, with little explanation of why except that was the rate in the 92 test*. Revised plan starts at 6 inches per day and slowly speeds up as the reservoir is drawn down. This lessens risk of slope failure and lowers seeding and cultural protection costs.

4. Corps plan used mechanical excavation and hauling to an offsite location requiring nearly round the clock effort with many pieces heavy equipment until they are working in the "wet" between coffer dams. The remaining 20 feet of dam would be hydraulically washed out by river flows.

Revised plan cuts a notch in the earthen portion requiring two dozers (one is really a backup) to 20 feet below spillway crest. Material is pushed down the face of the dam, not hauled off. At this point a controlled hydraulic breach is started using turbine wicket gates to control flow to a desired CFS.

This saves \$54 million on Lower Granite and Little Goose, the first two to go.

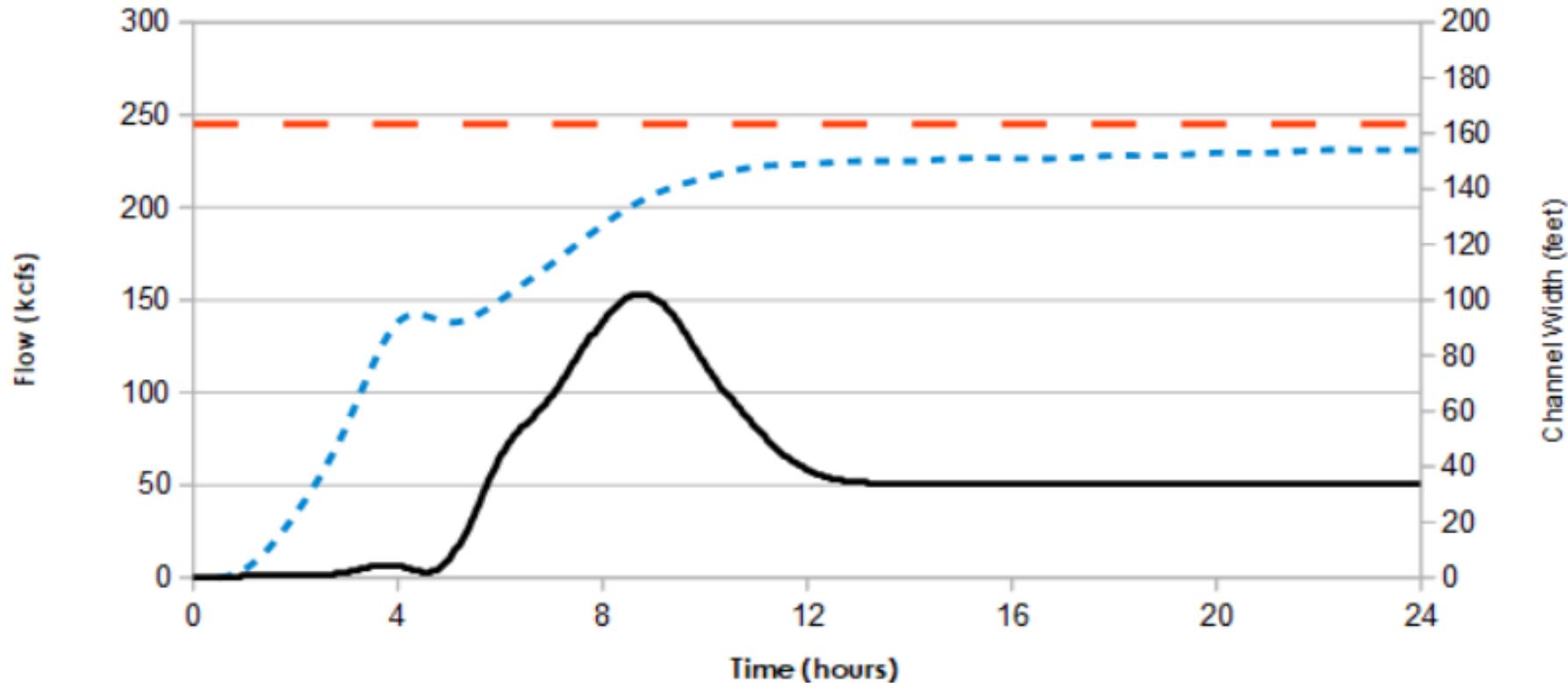
Lower two breaches will require cutting into the earthen abutments so savings will depend on soil type.



Dam Breach Discharge and Channel Width

Lower Granite

WinDam B software used for breach modeling



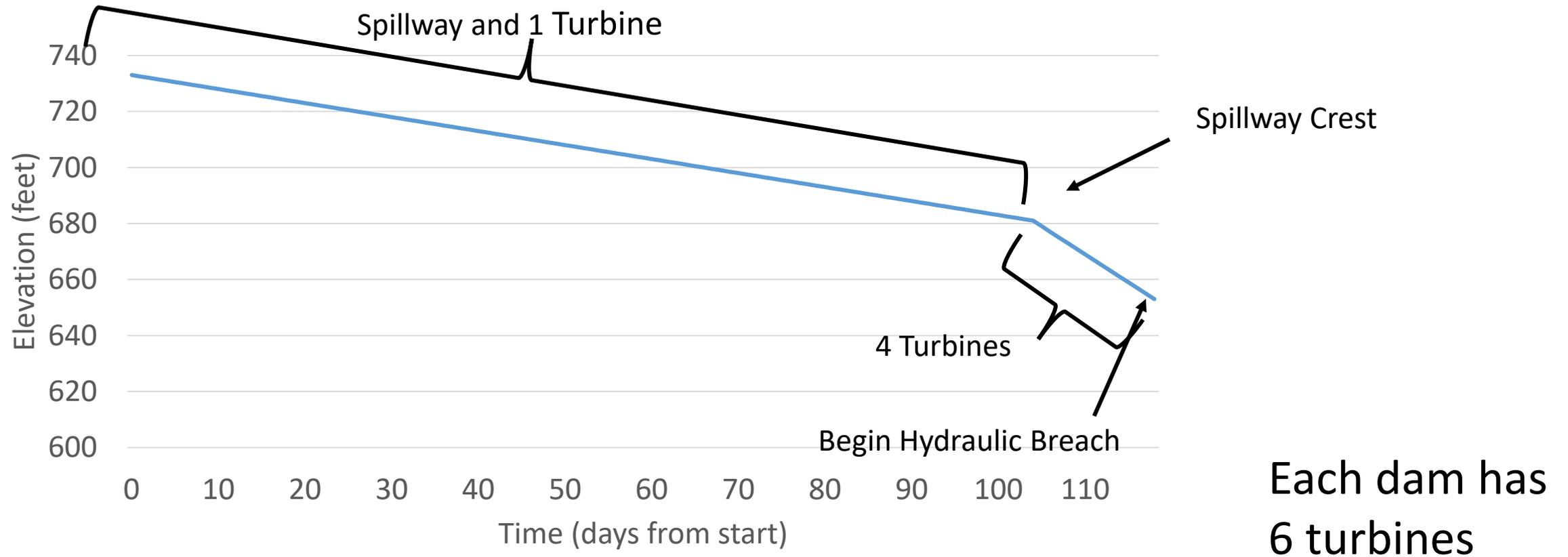
— Max Flow, 1950 to Present (kcfs)* — Discharge (kcfs)
- - - Breach Width (feet)

*by comparison, spillway capacity is 850 kcfs!

Note that 100 more CFS could be used for breaching and not exceed max spring flows.

With a faster drawdown and higher breach discharge 1st two dams could be breached in one in water work window.

Drawdown Pool Elevation, at spillway crest only 25% of the reservoirs volume remains



Walla Walla District approach for original plan was to use “fixed Price” contracts. This would have required plans, engineering and design (PED) of \$55 million, plans & specs and contract docs another \$25 million.

But as you can see, this is no more than a rental or “time and materials” contract requiring a “design” effort of less than \$1-2 million.

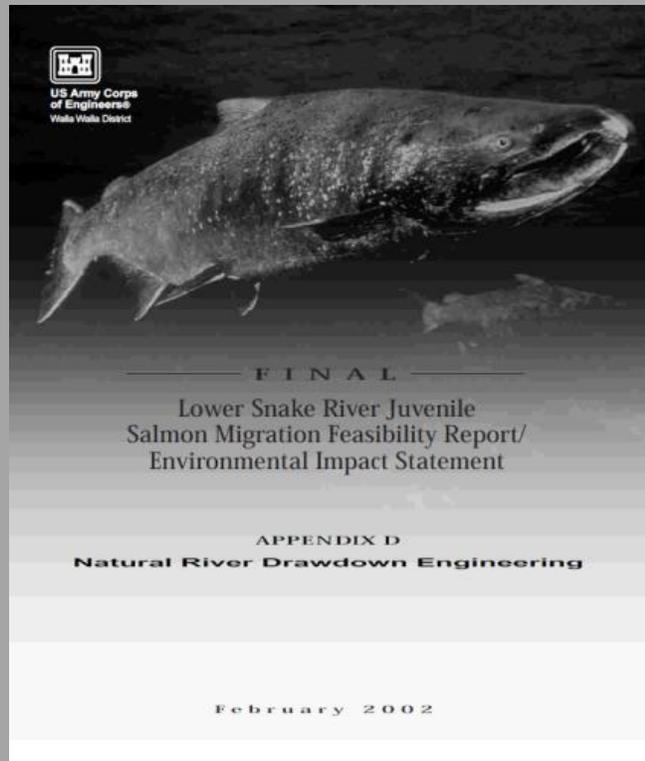
Table 8: Four Dam Totals

(Costs shown in the tables are in thousands of 1999 dollars)

	Original Cost	Corrected Cost	Difference
Grand Totals (thousands of dollars)	\$858,939	\$255,026	\$603,913
Power House Turbine Modifications	\$31,707	\$6,341	\$25,366
Dam Embankment Removal	\$161,930	\$83,000	\$78,930
River Channelization	\$148,202	\$54,000	\$94,202
Temporary Fish Handling Facilities	\$37,754	\$0	\$37,754
Project Dam Decommissioning	\$6,009	\$6,009	\$0
Railroad Relocations	\$20,182	\$18,705	\$1,477
Bridge Pier & Abutment Protection	\$51,858	\$11,371	\$40,487
Reservoir Embankment Protection	\$178,815	\$15,104	\$163,711
Drainage Structure Protection	\$8,556	\$8,556	\$0
Railroad/Roadway Damage Repair	\$130,007	\$3,000	\$127,007

These estimates still include about 30% contingency

Draft (21 Feb 2016)
REEVALUATION of The Lower Snake River
Juvenile Salmon Migration Feasibility Report
And
SUPPLEMENTAL Environmental Impact Statement
Appendix D
Natural River Drawdown Engineering
Prepared by
Jim Waddell, PE/CE, USACE retired, Lead Author
John Twa, ME, Technical Support/Editing/Graphics
Anon Fisheries Biologists & Planners, USACE

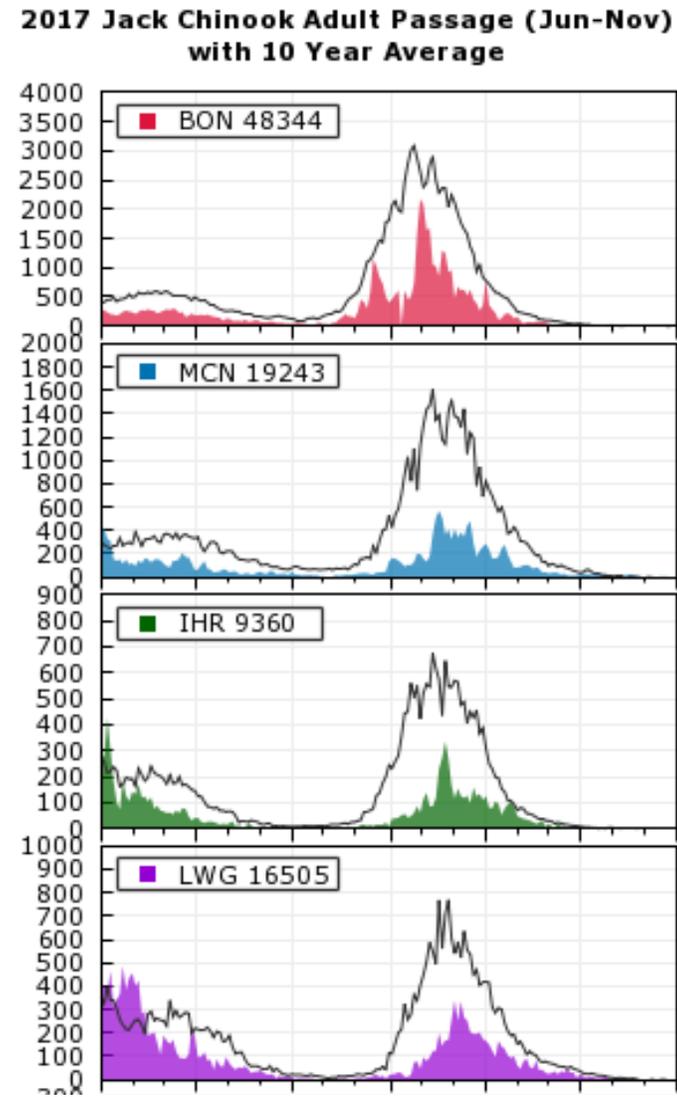
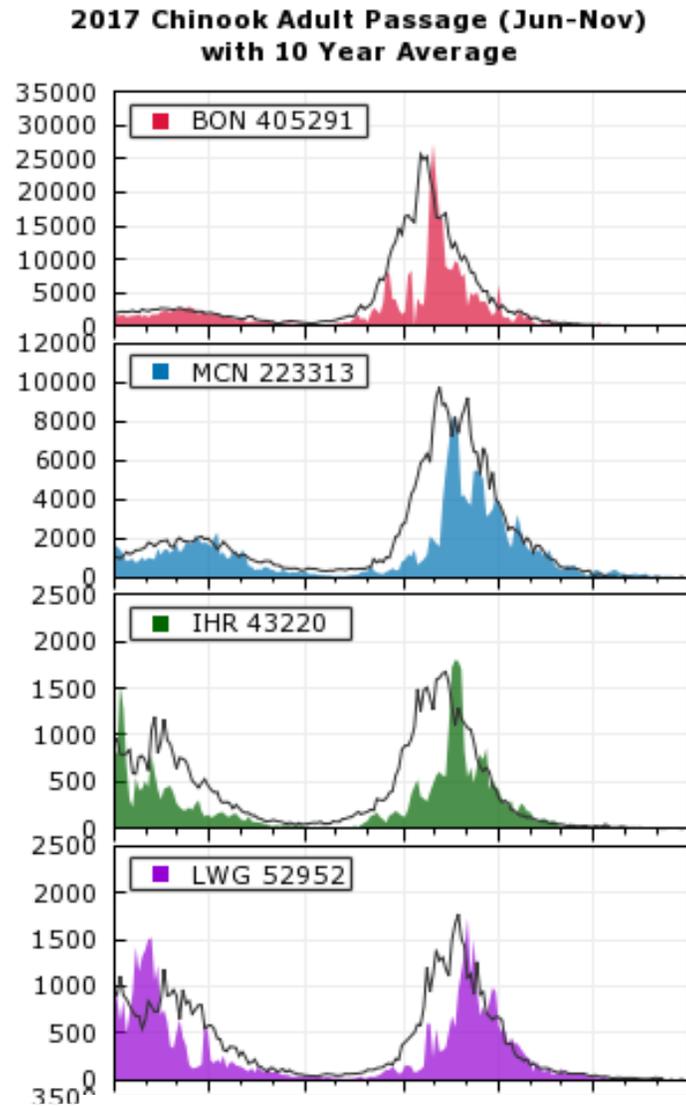


It is all right here.

NEPA pros at Corps estimate a team of 5 could complete this supplement from scratch in 2-3 months. But it is mostly done here and from publically available documents.

<http://damsense.org/reports/>

What Is the Current Situation with Returns? Biologist tell me it is a “disaster”

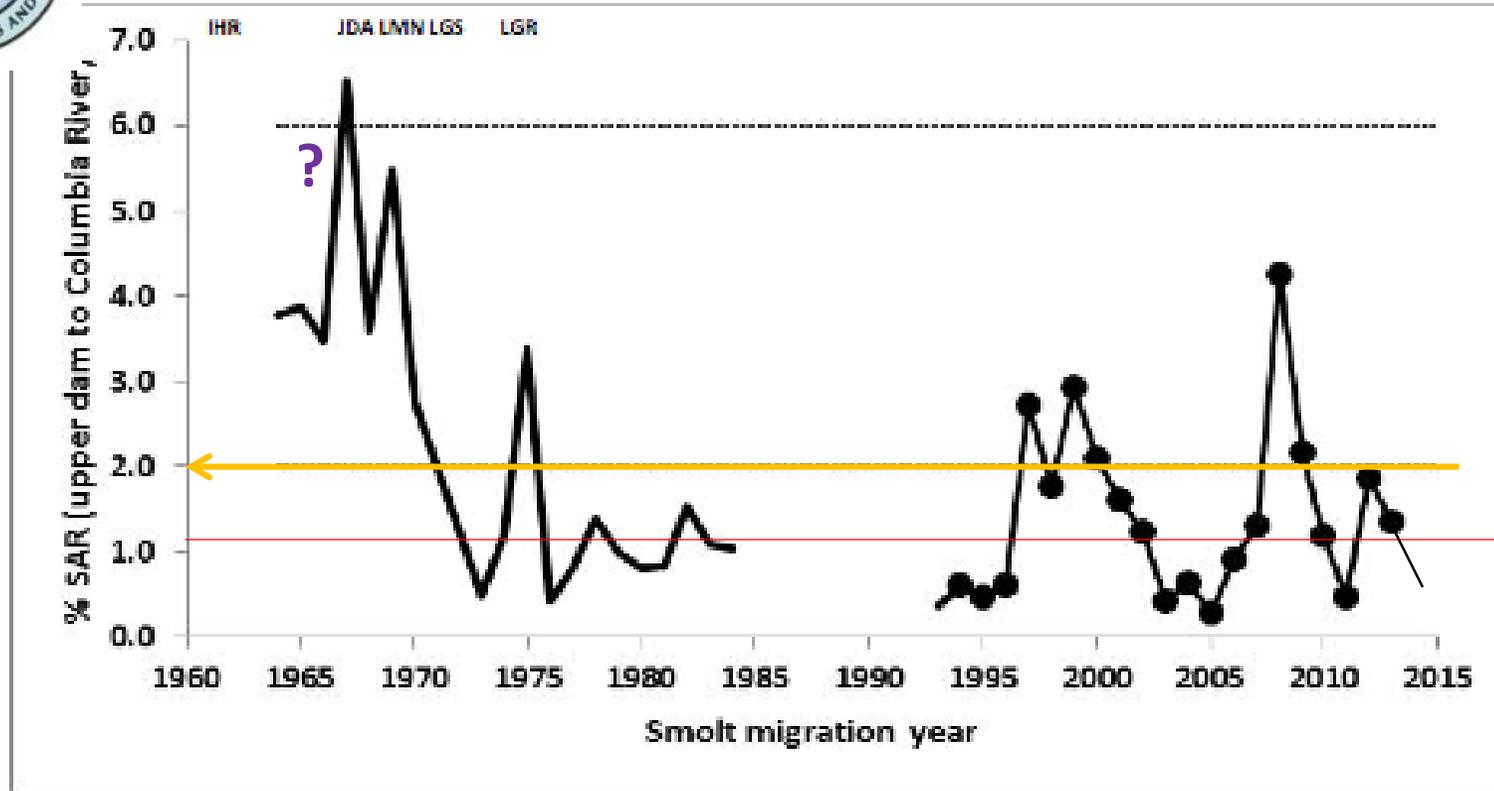


Hence, the Urgency more so than each previous year

Source: Columbia Basin Research



Wild Salmon Survival



“Figure 4.1. SARs from smolts at uppermost Snake River dam to Columbia River returns (including jacks) for wild Snake River spring/summer Chinook, 1964-2013. ... The NPCC (2014) 2%-6% objective for listed wild populations is shown for reference; SAR for 2013 is complete through 2-salt returns only.”

Reference: Fish Passage Center 2015 CSS Annual Report



Hatchery Fish Survival

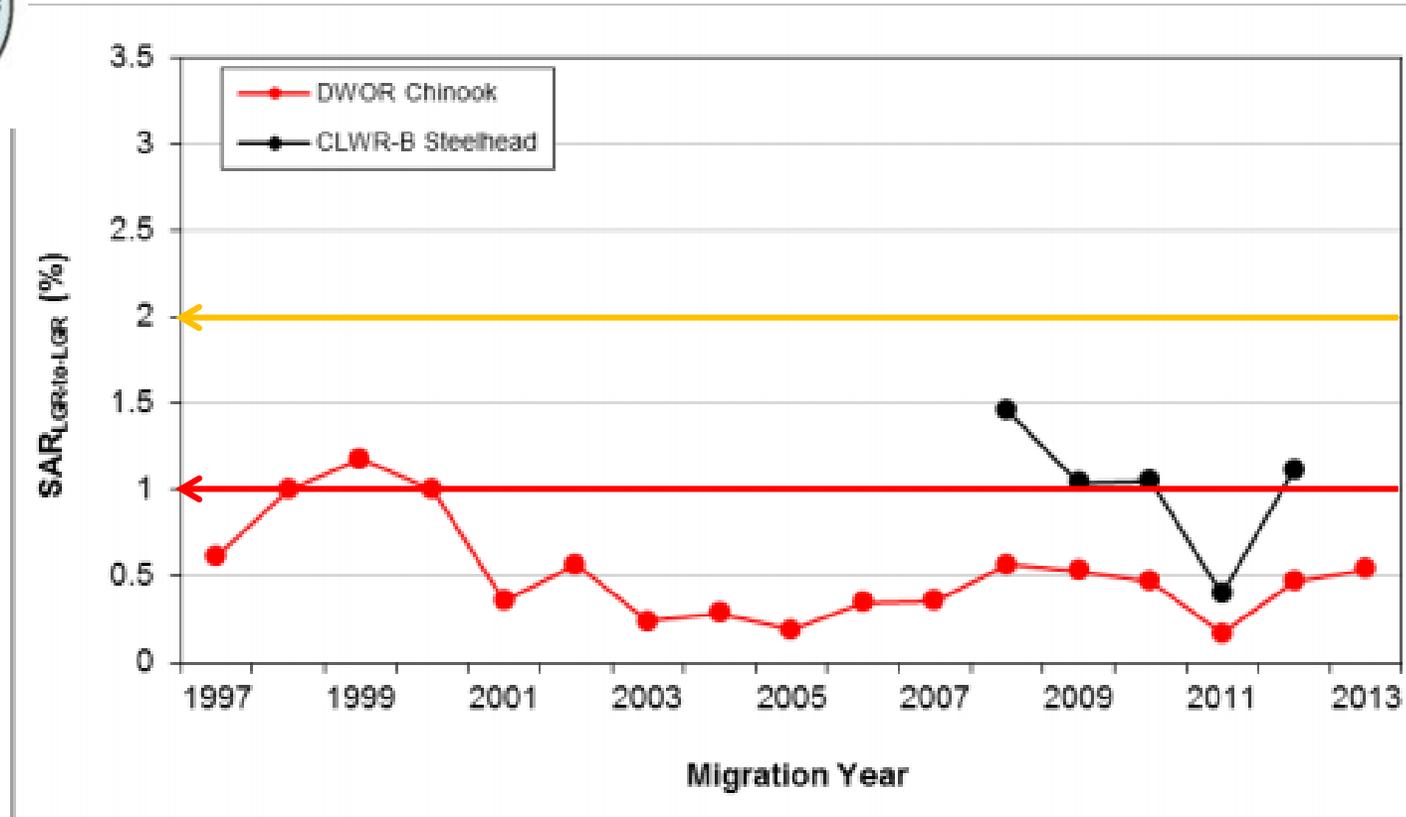


Figure 9. Weighted SARLGR-to-LGR for Dworshak NFH spring Chinook (1997–2013) and Clearwater-B hatchery steelhead (2008–2012). Migration year 2013 is incomplete for yearling Chinook, with Age 2-salt adult returns through 9/14/2015. <http://www.fpc.org/hatchery/dworshakhatchery2015.pdf>

The Five Critical Policy Means Allow for Immediate Breach

1. The Corps needs no new authorities to place the 4 LSRDs into a “non-operational” status while normative river flows are reestablished by removing the dams’ earthen portions.
2. The Corps’ 2002 Environmental Impact Statement and Record of Decision provide the necessary NEPA coverage for breaching, although some updating may be required.
3. Neither the ongoing litigation over the 2014 Federal Biological Opinion nor the Court’s order for a new EIS constrains the Corps from breaching the dams through channel bypass *now*.
4. Breaching can be financed through existing debt reduction and credits mechanisms as a fish mitigation action by BPA. New appropriations are not needed.
5. Breaching is far easier than originally planned, making it possible to move from a decision to breach, to breaching in a matter of months, not years.



2002 EIS

- Breaching is the “preferred environmental alternative”
“**further improvements in the hydro system passage system are unlikely to recover listed Snake River stocks**”
- 7 Years & \$33 Million
- Dam maintenance underestimated
- Cost of breaching overestimated
- Remains the operable EIS for the dams, Asst Sec Army Reaffirmed this basic policy
- NO matter what the BiOp says, it is still an opinion for an action agency, ie., the Corps, to ***consider*** in an EIS

2002 EIS Summary

“...the chance of meeting NMFS survival and recovery criteria for the four listed species Alt 1 [doing nothing] would likely be the same or slightly better than Alternatives 2 and 3 [passage improvements]. Alternative 4 (breaching) provides the highest probability of meeting the survival and recovery criteria..... The analyses indicate that **further improvements in the hydrosystem passage system are unlikely to recover listed Snake River stocks...**”

Conclusion.....we gambled over a billion dollars on doing something that was slightly worse than doing nothing, lost, and point fingers at habitat loss, fisherman, birds, and marine mammals and the catch all excuse, Ocean Conditions.

**And Wasted Several Billion Dollars or Your Tax Money
and Caused Your Power Bills to Go Up.**

A Few More Recent Gov Statements

- **NOAA's** 2016 & 2017 Snake River Spring/Summer Chinook Proposed Recovery Plan sums this up with this statement on page 219: *This recovery plan contains an extensive list of actions to move the ESU and DPS towards viable status; however, the **actions will not get us to recovery.***
- *For more than 20 years, the federal agencies have focused on essentially the same approach to saving [Snake River] salmon—minimizing hydro mitigation efforts and maximizing habitat restoration. Despite billions of dollars spent on these efforts, the listed species continue to be in a perilous state. Judge Michael Simons, May 2016.*
- Wild Snake river runs are trending down the last few years, NOAA data

Breaching's Effect On Other Recovery Efforts, eg., Habitat?

- Habitat restoration investments will be optimized in the Snake basin due to large numbers of returning fish that can make use of previous improvements.
- Opens roughly 80 miles of Chinook spawning and rearing habitat
- Millions in fish passage mitigation funding can shift to riparian restoration on lower Snake and habitat work on other tributaries.
- More Corps funds available to other restoration initiatives such as Puget Sound Near Shore Restoration.
- Increased Snake runs relieve fishing and prey pressures on Salish Sea and Coastal stocks speeding their recovery.

*After Breaching, Lower Granite Dam
will look like this...*



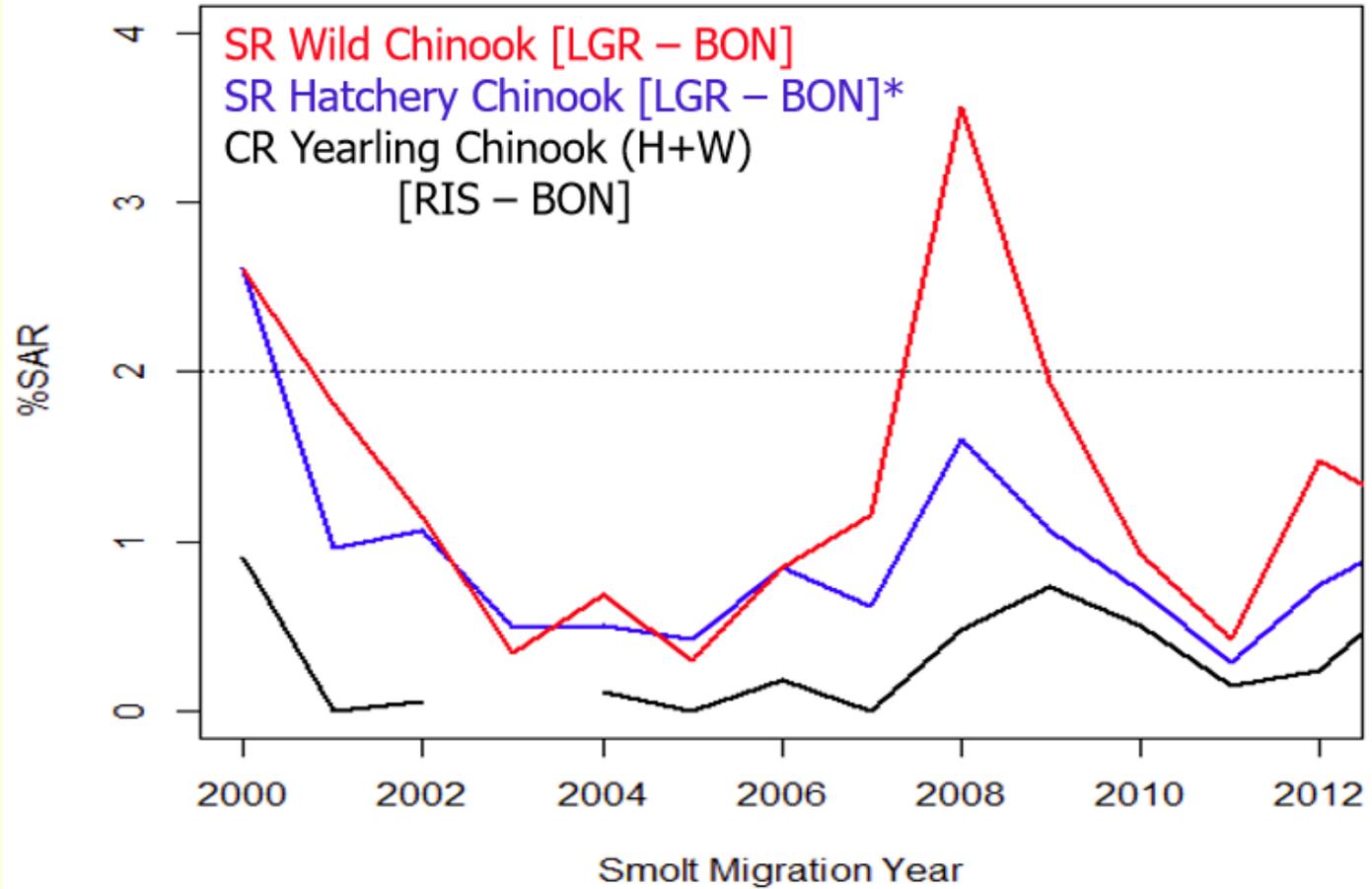
Image from the Corps 2002 EIS.....So they did study it!!

Four Lower Snake Dams

Cost/Economics

- Benefit to Cost ratio over the life of the four dams is **.15 to 1**
- Annual expenditures over the last 5 years have exceeded earnings
- LSR Dams are 2-4 times more expensive than mainstem dams on Columbia
- Three Turbine rehabs at Ice Harbor are now 3-4 times costlier than original estimates and 10 years behind schedule.
- Turbine rehabs of remaining 21 turbines not economically viable for BPA thus consumers.
- \$2.5 billion spent on passage improvements with no improvements in SAR's for Snake runs
- Oversupply of power in PNW increasing due to conservation, wind & solar.

Chinook SARs by Basin



LGR to BON is approximately 286 miles [7 dams]

RIS to BON is approximately 308 miles [6 dams]

*Snake River Hatchery Chinook is an average of annual hatchery specific estimates

Cost/Economics with Natural River

- Corrected breach cost now around \$340 million, not 1 or 2 billion
- Benefit to cost ratio is at least 4 to 1 if the hydro power is replaced
- But, not really needed and will free up grid space allowing more wind and solar, 2000 megawatts of solar alone in BPA Integration queue
- Breaching will save money for BPA/Corps which can be used on higher value dams and habitat restoration efforts. Eg., Puget Sound Near Shore, \$400 million needed.
- Provides 7-8 thousand more jobs in State
- Land lease for restored viticulture and orchards could add \$30 million a year to State School budgets and \$200 million in direct economic benefit
- ETC...

But, Can It Be Done and In Time, YES!!

- Corps can place dams into a “non-operational” status without Congressional authorization since dams do not provide an economic benefit and are causing significant harm to the environment.
- Since dams are 92% hydro, BPA pays the breach bill under the allocation rules and the 1980 Power Planning Act as Fish Mitigation.
- NEPA? The Corps has the **2002 EIS** that covers breaching, the only remaining reasonable alternative, can be updated in a matter of months.
- Breaching via removal of earthen berm portion of dam by controlled hydraulic breach requires little further engineering or complex contracting.
- Could and should begin in December of 2017!

Harvest

- More salmon and steelhead for fisheries, endangered Southern Resident Killer Whales, other marine mammals and critters.
- Removes stocks from endangered status thus eliminating incidental take restrictions in mixed stock fisheries.
- Increased fishing of ever more larger fish has numerous spinoff economic benefits to the State and region.

Hatcheries

- Lower Snake Compensation Plan hatcheries built to mitigate salmon losses due to dam construction along mainstem should be closed, others modified or phased out over time, BPA savings go to other hatchery programs or restoration efforts.

And lets not forget the greater PNW ecosystem

- Greater numbers of larger salmon will increase the amount of biomass and nutrients moving from the ocean to the interior
- Other endangered aquatic species such as lamprey and sturgeon will benefit with breaching
- Riparian areas in the Snake basin will see sustainable increases in overall diversity and population density.
- Fewer algae producing reservoirs reduces methane emissions, a powerful global warming gas.

So What Are We Waiting For?

- Many elected officials, government leaders, environmental NGO's and the media are fixated on the BiOp litigation over the last 15 years
- And, seemed to have gone out of their way to forget that the Corps is operating and conducting mitigation activities today with the 2002 EIS
- While a litigation "victory" for some NGO's, another decade of studies to develop the programmatic FCRPS EIS and then a breach EIS, is too long for salmon.
- Meanwhile actions in the 2002 EIS are an ongoing track and independent of the Court ordered studies, which do not relieve the Corps from acting sooner.
- These Court actions do not relieve the Corps from their inherent responsibilities to meet the Federal Objective and the Endangered Species Act.
- The 02 EIS has breaching as the only remaining reasonable alternative

Senior Corps officials have noted that neither the State, NW Delegation, Environmental NGO's nor the Tribes have actually asked *the Corps* to breach the dams since 2000. They have asked for many other things, such as more spill, flow augmentation, studies, even studies to honestly consider breaching, but not immediate breach.

And Then There Is the Money

\$2.5 Billion spent since 1988 on the 4 LSRD's with No improvement

“Record Runs” are achieved by putting ever more hatchery fish into the Snake, since their SAR's are so low and will continue to decline because they are genetically inferior and depend on an ever declining number of wild stocks to boost their genetics. About \$35 mill this year escalating at 5% per year.

Big loser is habitat investments that could have been made with this money.

Habitat investments that were made are sub optimized by lack of Snake stocks in the ecosystem.

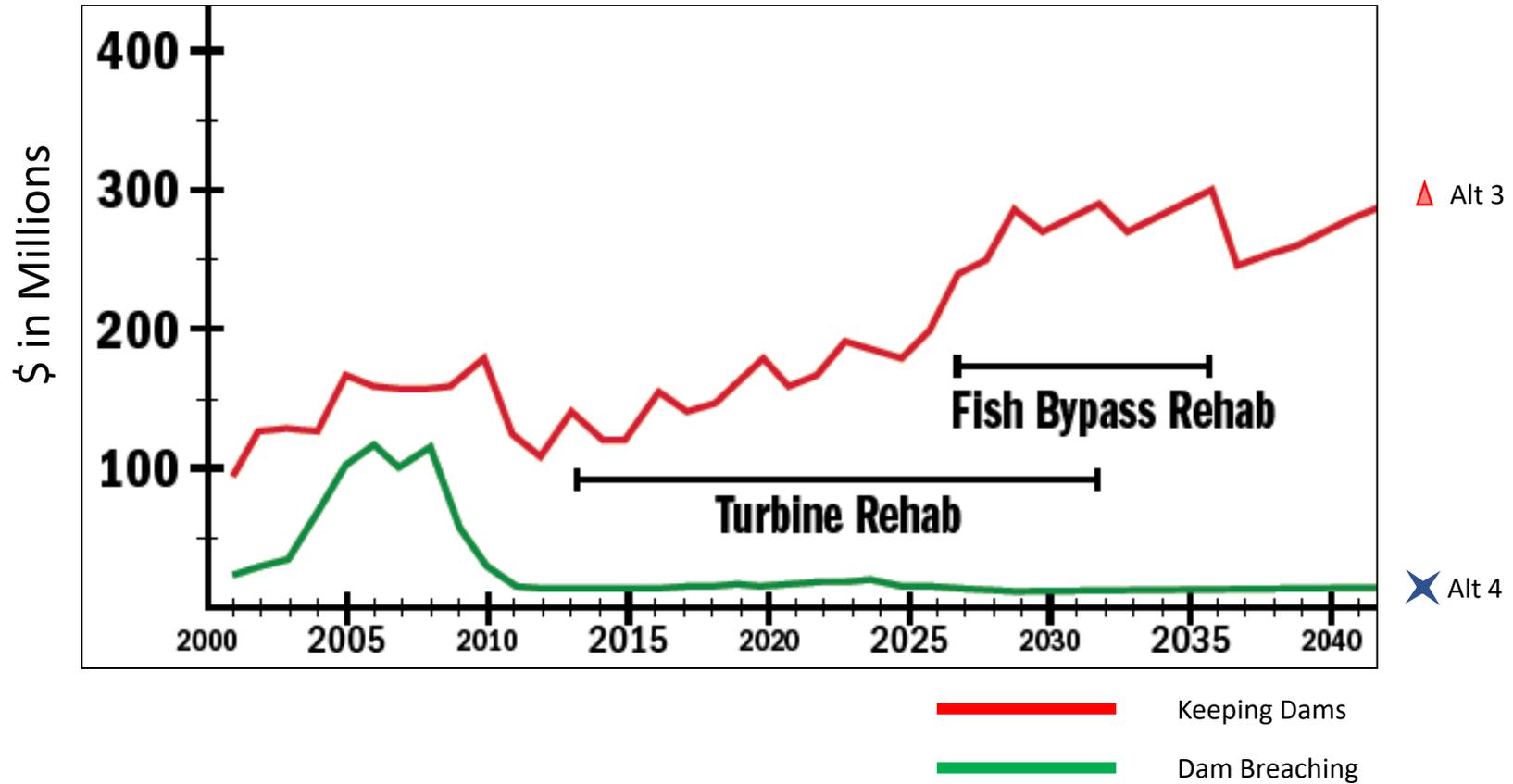
Benefit Cost Ratios

Economic / Ecologic Change
 Positive Neutral Negative

AA = Average Annual Cost at 6.8% Discount Rate

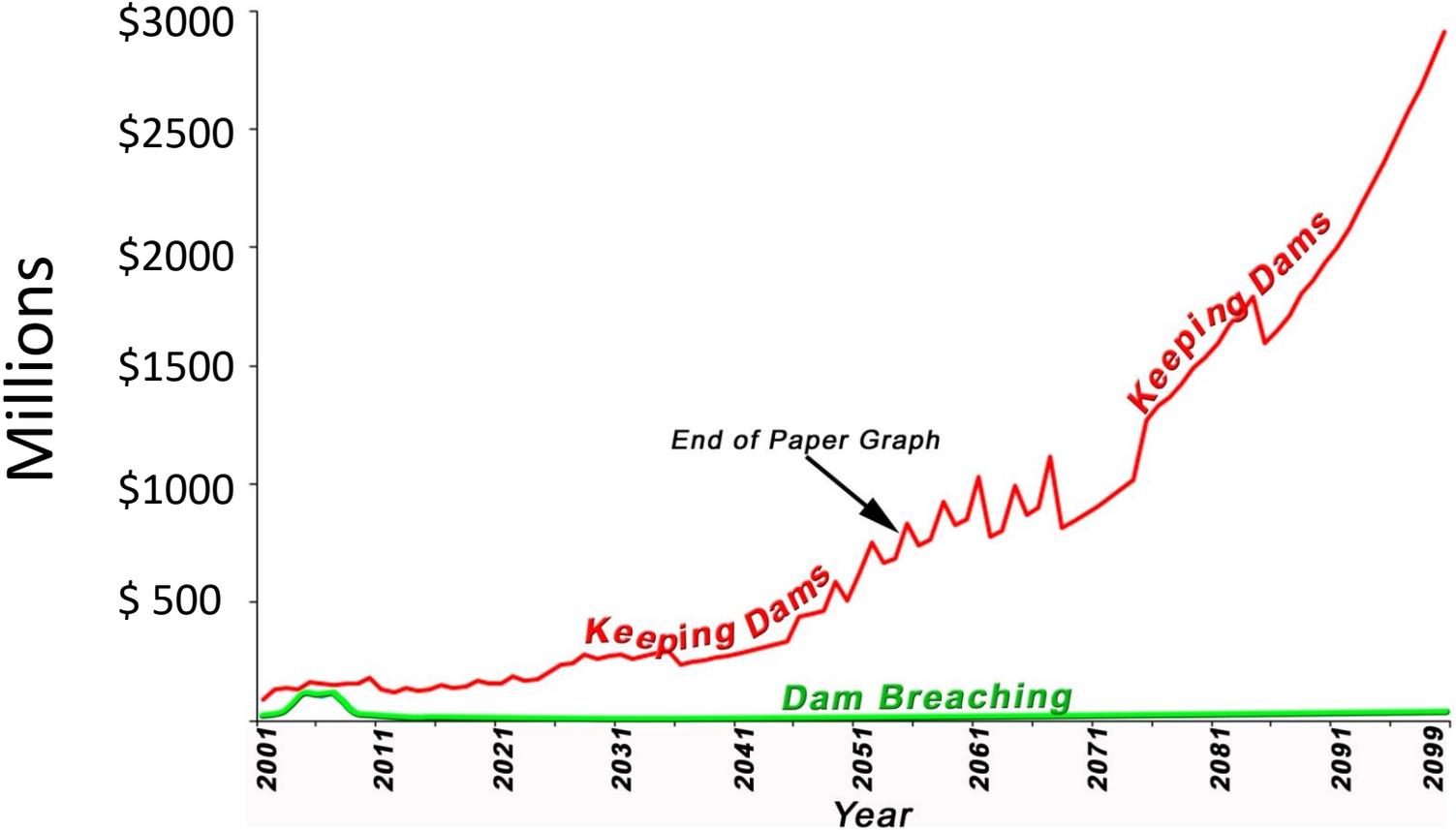
	Keep the Dams	Remove the Dams
National Economic Development Benefit Cost Ratios →	15¢ return on \$1 spent	\$4.30 – \$19.76 return on \$1 spent
Endangered Species Mitigation		
Endangered Southern Resident Killer Whales (SRKW) & Salmon Species	The USACE spent \$800.0M over 15 years on failed system improvement efforts for juvenile salmon passage thru the four dams	Only remaining alternative in EIS for ecosystem recovery, increasing salmon numbers <i>and</i> prey availability for SRKW
Climate Change Challenges	Warming reservoirs kill salmon and favor predators, methane emissions increase	Diurnal cooling in natural rivers increases fish survival, allowing more fish to utilize high elevation spawning grounds in Idaho
Hydropower		
Hydropower	Benefit \$202.6M AA, <i>high side</i> Power generated is 2.9% of regional, with production trending downward due to aging infrastructure and the benefit likely a transfer from idle wind turbines	Cost \$0 - \$261.8M AA Shift to wind or other surplus sources; costs trending downward, regional grid surplus is 5 times production of LSR dams
Life Cycle Implementation	Cost \$269.4M AA, 91% of costs	Cost \$29.0M AA, breach 1 dam / yr
Transportation		
Inland Navigation	Benefit \$7.6M AA, <i>high side</i>	Cost / Loss \$7.6M AA, 9% of dam
Overhead Power Lines	Benefit \$100M	Cost / Loss \$100M
Agriculture		

2002 Corrected + Future Costs



Reference: Cost Report, July 2014, Jim Waddell

Lower Snake River (LSR) Dam Costs



Lower Snake River Slack Water





Reasons For Breaching

Dams are driving species to extinction

\$2.5 **Billion** failed efforts for salmon passage

Climate change poses new challenges

Dams could violate U.S. Treaties



River transportation in long-term decline, farmers shifting to rail

Hydropower already replaced

Corps Walla Walla District understated cost of keeping the dams by \$161M per year



Dams cost millions in lost economic benefits

Increased recreation will provide 2,350 – 4,100 jobs

The Corps can no longer afford non-productive infrastructure

Why The Universal Belief That Dam Breaching Is Too Costly?



Ice Harbor Dam

Photo USACE Walla Walla District



2002 EIS Keep vs Breach

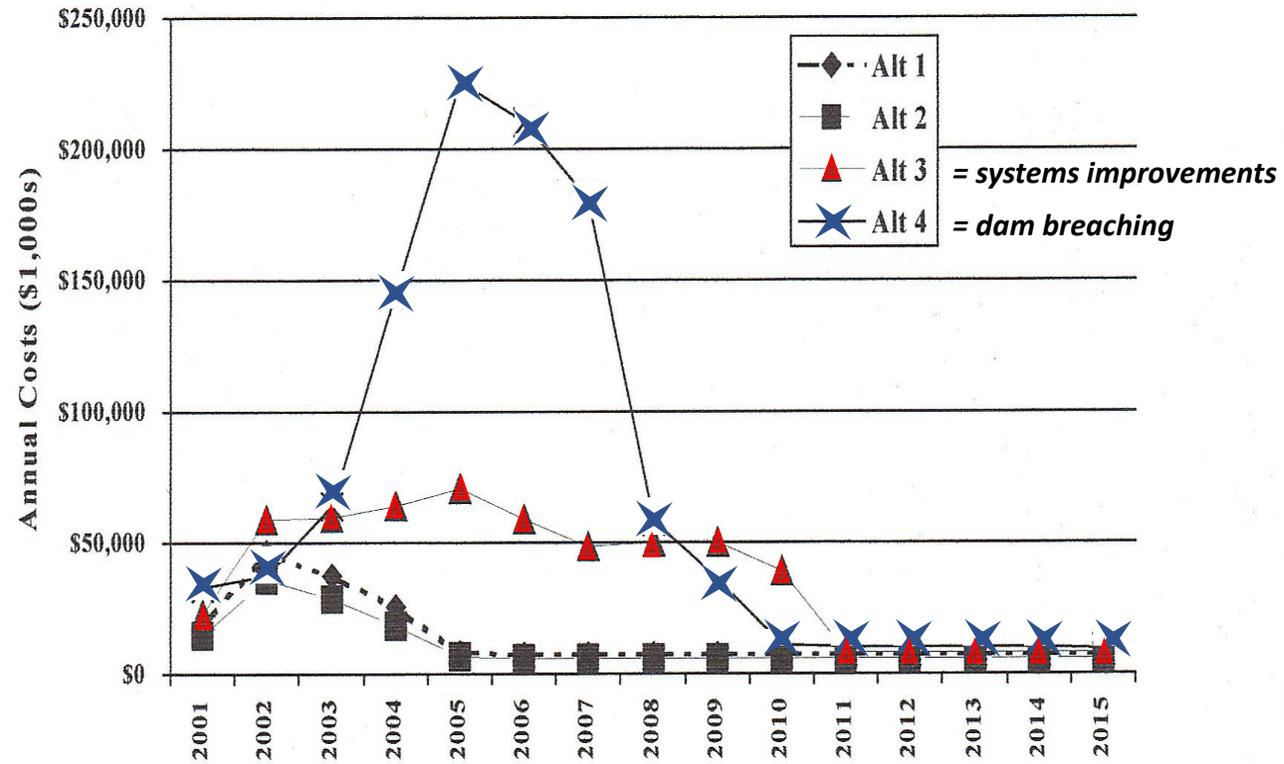
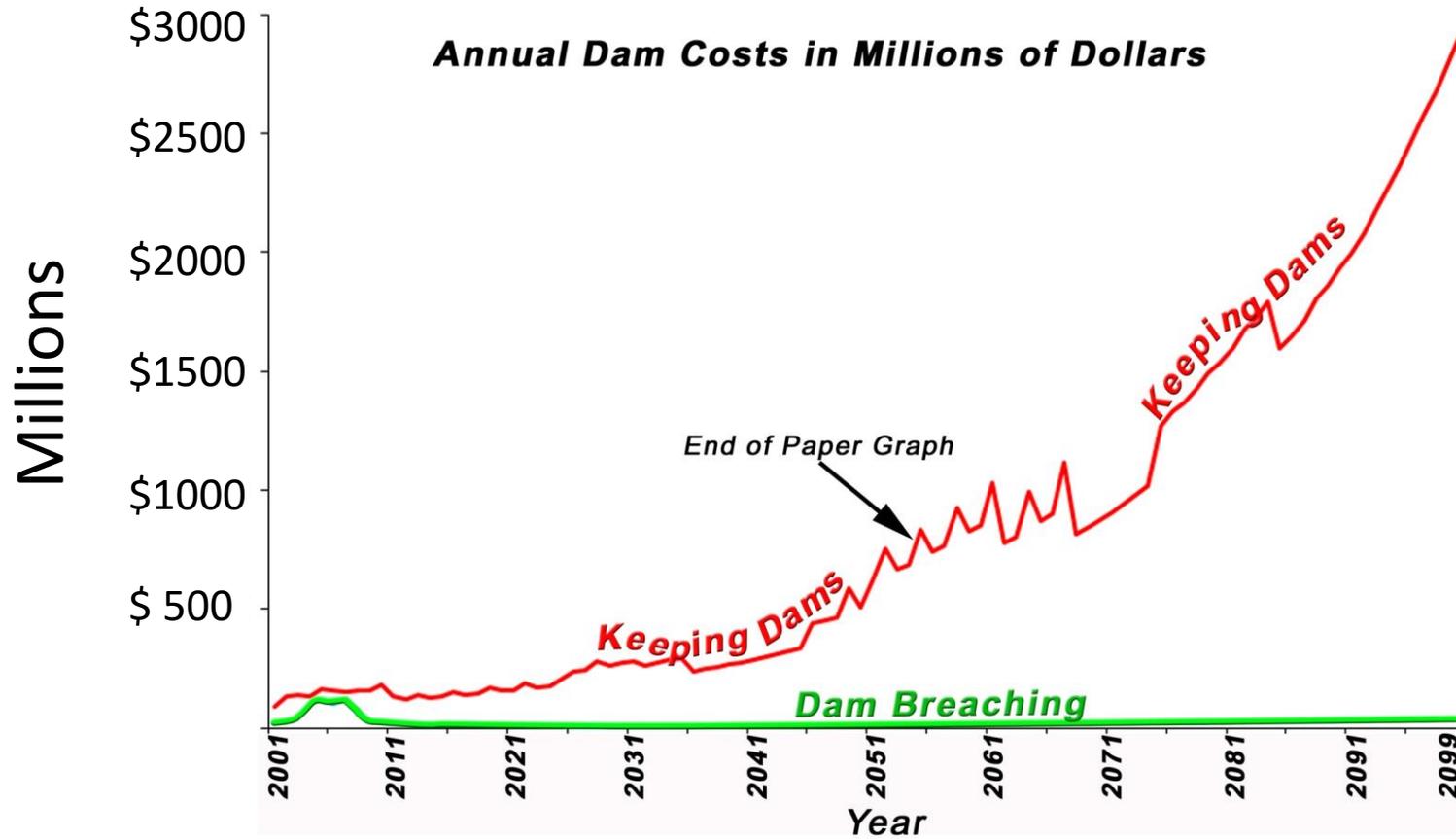


Figure 3.8-1. Comparison of Annual Implementation Costs

Reference: Lower Snake Feasibility Report / Environmental Impact Statement

2002 Corrected Annual Costs



Reference: Cost Report, July 2014, Jim Waddell

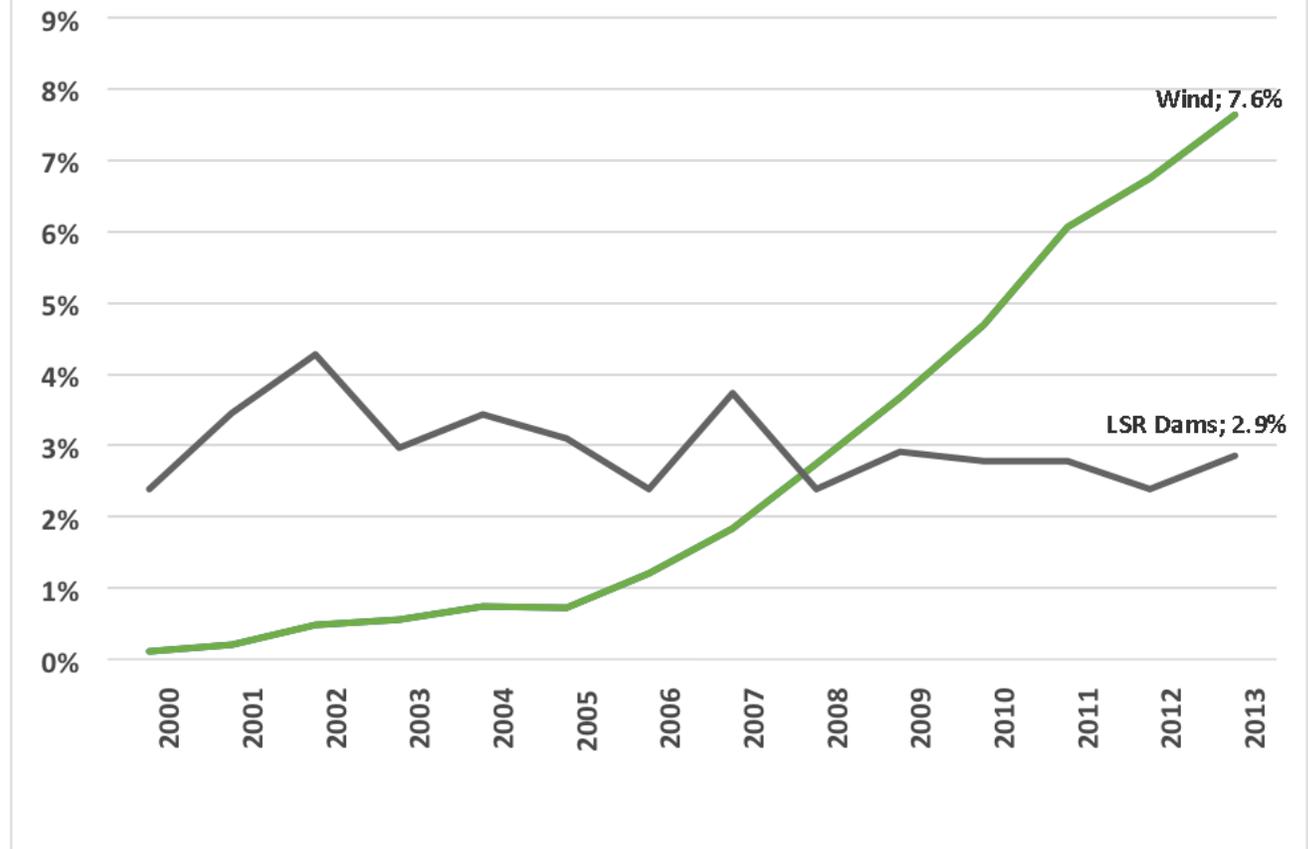
- Cost errors revealed & corrected

- Breaching dams
 - Most Reasonable and Prudent Alternative

 - Frees up millions of dollars

 - Increases economic benefits

Wind Vs. Hydro Contribution to NW Electricity Generation



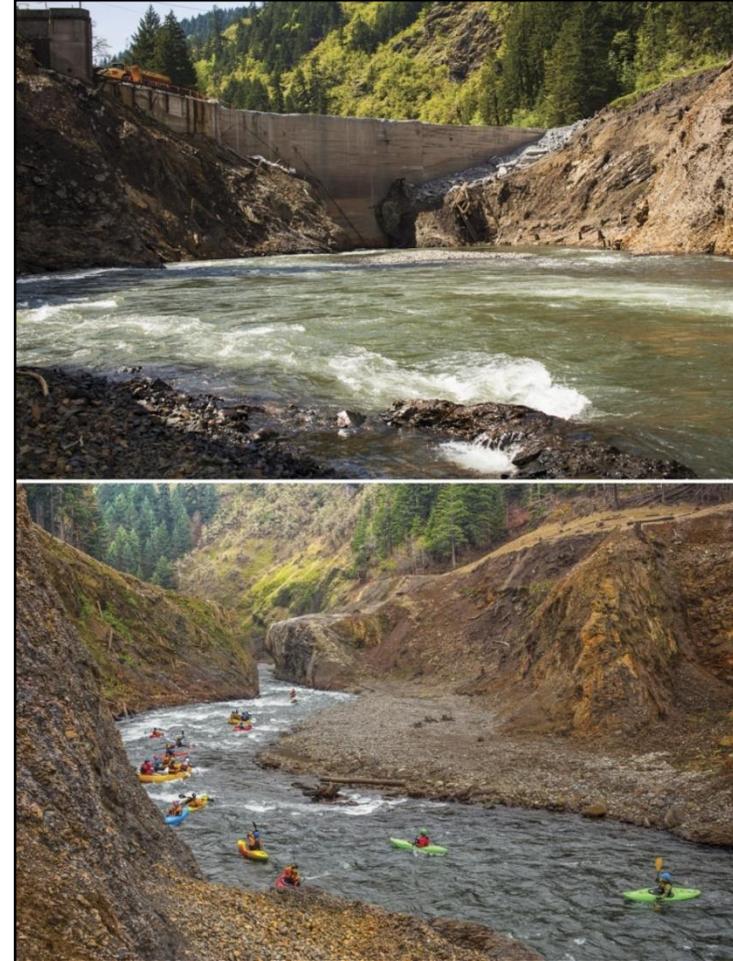
Reference: Mojica, J., Cousins, K., Briceno, T., 2016. National Economic Analysis of the Four Lower Snake River Dams: A Review of the 2002 Lower Snake Feasibility Report/Environmental Impact Statement. Economic Appendix (I). Earth Economics, Tacoma, WA.

Recreation

 **\$290 - \$501 Million**

 **2,350 - 4,100**

Jet boaters & skiers, rafters,
kayakers, canoeists,
swimmers, picnickers,
campers, hikers, mountain
bikers, hunters & anglers



White Salmon Before and After Condit Dam

Photo Ben Knight

The spending associated with recreation along a free-flowing LSR will generate substantial economic activity throughout the region, with the greatest economic activity occurring in the first four years.



Local & Regional Politics

- Leaders have been misinformed since 2002
- Political Mission Impossible: keeping salmon *and* the four lower Snake River dams
- Lack of political will
- Lack of community insistence to breach dams *now*



Biological, technical, economic and financial data support dam breaching



US Army Corps
of Engineers®



EIS provides authority to breach and funding mechanisms in place: freed up money can be re-applied to Columbia River dams and Habitat work



Congressional action not necessary



What Legacy Will We Leave?

A Free Flowing Snake River with Salmon for Life

or

Extinctions for Salmon and SRKWs

***“You can always count on Americans to do the right thing –
after they’ve tried everything else!”***

Winston Churchill

Lower Snake River Feasibility Study

Summary - Economic Effects

(Relative Average Annual Costs - \$Millions)

USER AREA	MAX TRANSPORT	SYSTEM IMPROVEMENT	DAM BREACHING
COST			
Power	-	-	(\$271)
Navigation	-	-	(\$24)
Irrigation	-	-	(\$15)
Implementation	-	(\$6)	(\$49)
S/T Costs	-	(\$6)	(\$359)
BENEFITS			
Comm. Fishing	-	-	\$2
Avoided Costs	-	-	\$29
Implementation	\$4	-	-
Recreation	\$2	\$2	\$82
Power	\$8	\$8	-
S/T Benefits	\$14	\$10	\$113
NET ECONOMIC EFFECT	\$14	\$4	(\$246)

Note: Numbers reflect change from current condition (base case).

FROM CORPS 1999-2000 INFORMATION BRIEFINGS

Lower Snake River Feasibility Study

Summary - Economic Effects

(Relative Average Annual Costs - \$Millions)

USER AREA	MAX TRANSPORT	SYSTEM IMPROVEMENT	DAM BREACHING
COST			
Power	-	-	(\$271) ?
Navigation	-	-	(\$24) (\$2)
Irrigation	-	-	(\$15) (\$8)
Implementation	-	(\$6)	(\$49) (\$39)
S/T Costs	-	(\$6)	(\$359) (\$320)
BENEFITS			
Comm. Fishing	-	-	\$2 ?
Avoided Costs	-	-	\$29 \$ 217
Implementation	\$4	-	-
Recreation	\$2	\$2	\$82 \$ 172
Power	\$8	\$8	-
S/T Benefits	\$14	\$10	\$113 \$ 389
NET ECONOMIC EFFECT	\$14	\$4	(\$246)

Note: Numbers reflect change from current condition (base case). ~~\$ 69 MILL AVRG. ANL.~~ **BENEFIT**

As of 1 JAN 2015

A DIFFERENCE OF \$ 315 MILLION!!

Lower Snake River Feasibility Study

Summary - Economic Effects

(Relative Average Annual Costs - \$Millions)

CORRECTED NUMBERS BROUGHT FORWARD to 2015 @ 6.88% DISCOUNT RATE

USER AREA	MAX TRANSPORT	SYSTEM IMPROVEMENT	DAM BREACHING
COST			
Power	-	-	(\$271) ?
Navigation	-	-	(\$24) (\$2)
Irrigation	-	-	(\$15) (\$8)
Implementation	-	(\$6)	(\$49) (\$50)
S/T Costs	-	(\$6)	(\$359) (\$331)
BENEFITS			
Comm. Fishing	-	-	\$2 ?
Avoided Costs	-	-	\$29 \$313
Implementation	\$4	-	-
Recreation	\$2	\$2	\$82 \$172
Power	\$8	\$8	-
S/T Benefits	\$14	\$10	\$113 \$489
NET ECONOMIC EFFECT	\$14	\$4	(\$240)

12

\$158 MILLION AVRG. ANL.

Note: Numbers reflect change from current condition (base case). BENEFIT

Navigation / Transport

Overall, freight volumes passing through the Ice Harbor locks (the lowest on the Snake River) have declined 20 percent since the 2002 study. Barges on LSR reservoirs are used to transport wood chips, wheat and barley, pulses (e.g., garbanzo beans), and rapeseed (canola). Commodity producers can choose shipping via rail or road. Since 2008, in large part a pipeline has moved petroleum to a refinery in Salt Lake City. Container-on-barge shipping down the Columbia effectively ended after container ships abandoned the Port of Portland in 2015.

Table 3: Tonnage by Commodity Group (000 tons)

Commodity	1987-96	1992-97	2010-14	Percent change 1987-96 to 2010-14	Percent change 1992-97 to 2010-14
Wood chips	550.5	634.0	236.0	-57%	-63%
Grain	3,051.4	3,038.0	2,800.0*	-8%	-8%
Petroleum	116.4	120.0	15.8	-86%	-87%
Total	3,718.3	3,792.0	3,051.8	-18%	-20%

Reference: Mojica, J., Cousins, K., Briceno, T., 2016. National Economic Analysis of the Four Lower Snake River Dams: A Review of the 2002 Lower Snake Feasibility Report/Environmental Impact Statement. Economic Appendix (I). Earth Economics, Tacoma, WA.

Water Supply

WATER SUPPLY

Approximately 34,000 acres of irrigated farmland use the reservoirs produced by the Lower Snake River dams for water supply. Should the dams be breached, these farms would either need to drill wells to reach the aquifers or modify their water withdrawal systems. The water supply values do not reflect the value of the water that is supplied, but the modification costs that would be incurred if the dams were to be breached. Because of this, there are no costs or benefits associated in the “with dams” scenario.

WITH DAMS

Although the Snake River reservoirs provide irrigation to approximately 37,000 acres of farmland, the costs versus benefits have not been calculated as the 2002 FR/EIS assessed this as a net change over the existing with dam condition.

BREACH DAMS

There have been no additional studies conducted on the cost of not having a reservoir for irrigation, and therefore the point estimate used in the analysis is the \$15.4 million (\$22.5 million in 2015 dollars) estimate from the 2002 FR/EIS. However, review to date indicates that the pumping capacity used to calculate these increased pumping costs is significantly overstated. The FR/EIS shows that the increased pumping costs would yield 1 foot of water across 37,000 acres every 19 days. The FR/EIS also assumes that the land would no longer be used for crop production, as opposed to switching to crops that demand less water, e.g., wheat or wine grapes.

USACE 2002 Lower Snake River Juvenile Salmon Migration Feasibility Report / Environmental Impact Statement, Appendix I: Economics, Table 3.4-16 (pp 13-147), available at: www.nww.usace.army.mil/Library/2002LSRStudy.aspx

Reference: Mojica, J., Cousins, K., Briceno, T., 2016. National Economic Analysis of the Four Lower Snake River Dams: A Review of the 2002 Lower Snake Feasibility Report/Environmental Impact Statement. Economic Appendix (I). Earth Economics, Tacoma, WA.

Recreational Expenditures & Jobs Without Dams

The spending associated with recreation along a free-flowing LSR will generate substantial economic activity throughout the region, with the greatest economic activity occurring in the first four years.

- Jet Boating, Jet Skiing
- Raft / Kayak / Canoe
- Swimming
- Picnic / Primitive Camping
- Developed Camping
- Hike and Mountain Bike
- Hunting
- Angling

Table 5. Expected expenditures as a result of recreation from a free-flowing Lower Snake River (Values in millions, 2015 USD)

Year	Total	Asotin	Columbia	Franklin	Garfield	Walla Walla	Whitman
Year 1	\$501.1	\$120.4	\$23.6	\$141.8	\$30.1	\$50.5	\$134.7
Year 5	\$291.6	\$74.5	\$13.1	\$77.4	\$19.5	\$28.8	\$78.1
Year 10	\$347.9	\$86.8	\$16.0	\$94.7	\$22.4	\$34.7	\$93.4
Year 20	\$373.1	\$92.4	\$17.2	\$102.5	\$23.7	\$37.3	\$100.2

TABLE 7. JOBS SUPPORTED BY RECREATION EXPENDITURES

	Total	Asotin	Columbia	Franklin	Garfield	Walla Walla	Whitman
Year 1	4161	1104	181	1177	219	529	951
Year 5	2380	663	99	640	135	294	526
Year 10	2876	788	121	785	157	357	640
Year 20	3098	843	131	849	168	385	691

Reference: Mojica, J., Briceno, T., 2016. Regional Economic Analysis of the Four Lower Snake River Dams: A Review of the 2002 Lower Snake Feasibility Report/Environmental Impact Statement. Economic Appendix (I). Earth Economics, Tacoma, WA.

The 4 Dams Need to Be Breached Now But How?

- Reevaluate Corps 2002 Report
- Value Engineer Breach Plan
- Update the EIS
- Update the Cost and Economics
- Develop Financial Strategy
- Inform ALL of new & corrected information
- Develop Breach Execution Plans

Likely Last Call for Snake River Wild Salmon



Susitna River Wild Salmon

Photo Matt Stoecker

*Like the Free Flowing Elwha Below
Snake River Will Recover If We Let It*



Elwha River

Photo Ben Knight