Northwest **Power** and **Conservation** Council

April 29, 2014

MEMORANDUM

TO: Council Members

FROM: Jeff Allen

SUBJECT: Review of the 2013 Snake River Fall Chinook Returns

Presenters: Dave Johnson, Nez Perce Tribe & Steve Yundt, U.S. Fish & Wildlife Service

The presentation will focus on the 2013 Snake River Fall Chinook returns and the Snake River Fall Chinook program in general. We believe it is important for the Council to understand the breadth of the program - beyond information that they may have seen in the various media reports for the return this past year. To this end, we intend to discuss the following:

1) Highlight SR fall Chinook 2013 returns and provide background on the current program

2) Describe the history of the program in light of the circumstances that we now find ourselves in – an altered ecosystem (blockage of 85 % of the historic habitat); low juvenile survival; listing of the species; potential use of the hatchery tool and the US v Oregon agreement to supplement that natural spawning population in areas where natural spawning occurs; highlight the collaboration/partnership that has developed after a contentious start.

3) Description of Recent Success with focus on 2013

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a. Escapement numbers relative to management goals
b. Harvest relative to goals
c. Redd counts
d. Natural-origin abundance trends relative to Snake River spring and summer Chinook trends

4) Describe the multi-faceted issue with remaining uncertainties (harvest, ocean, spill/passage, stable flows, hatchery)

5) HGMP Process

a. Time involved and the results
b. Physical and financial constraints in monitoring a large river spawning population.
c. ISRP review of proposals and LSRCP review.

6) Marking

a. US v Oregon (state/federal/tribal) agreement on production priorities, release locations and marking strategies.
b. HGMP required marking.

7) Future

a. Fishery plans
b. ESA Recovery planning
c. Mitigation goals
d. HCC FERC relicensing
e. Results from Transportation study with respect to spill.

8) Summary of success

a. Adult returns
b. Increased production
c. Increased collaboration
d. Good ocean conditions

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Fall chinook back on the hook?

By ERIC BARKER of the Tribune | Posted: Sunday, April 13, 2014 12:00 am

Fall chinook smolts are sampled to determine fish per pound prior to their release into the Snake River.

The numbers are rising for the endangered fish, but is it enough to get fall chinook ... Back on the hook?

Fisheries biologists say the surge in fall chinook returning to the Snake River of late is exciting, incredible and nothing short of amazing. The numbers are so high that some people are even asking in hushed tones what it might take for the threatened species to shed its protected status under the Endangered Species Act. The short answer is quite a lot, and it won't happen any time soon. But the fact that the question can be asked with a straight face is amazing.

In 1990, just 78 adult wild fall chinook were counted at Lower Granite Dam. Last year, more than 27,000 wild, or natural origin, fall chinook, returned past the dam, while the total run, including hatchery fish, topped 55,000, plus about 20,000 jacks. This year, the total run could exceed 47,000 with more than 34,000 wild fish.

"It's incredible," said Billy Connor, a fisheries biologist for the U.S. Fish and Wild Service, who has spent much of his career working to save the fish.

He credits a high level of cooperation between several state and federal agencies, the Nez Perce Tribe and Idaho Power Co., working on a number of fronts that include harvest reform, hatchery programs, habitat work, dam passage and a big contribution from healthy ocean conditions during the past several years.

"We have incredible cooperation within our extended family. It's all coming together and it's important to recognize the work done in hatcheries and harvest, and improvements in passage, and climate conditions have been in our favor," he said. "It's a fascinating story. I think it's pretty safe at this point to call it a success story."

So many fish are expected to return this year that Idaho and others are seeking permission to allow anglers to keep wild fish. But recovery isn't yet complete.

Hatchery workers sort male fall chinook to see which ones are ready to spawn at the Nez Perce Tribal Hatchery on the Clearwater River at Cherrylane.

Ocean conditions remain a big unknown in recovery efforts

Many fisheries managers want to see how the run performs if ocean conditions deteriorate. "It's really nice to see this big bump right now, but if ocean conditions turn poor again we may see a substantial decline," said Glen Mendel, district fish biologist for the Washington Department of Fish and Wildlife at Dayton. "We are going to have to wait and see and get more years of information."

An initial target of 3,000 wild fish returning annually averaged over 10 years was set years ago but it isn't a formal goal. Officials at the fisheries division of the National Oceanic and Atmospheric Administration are working on a recovery plan for the fish that will for the first time lay out concrete standards that must be met for the fish to be taken off the endangered species list. It will look at wild fish abundance and other measures such as the productivity of wild fish, how well they are distributed and genetic diversity.

Tribune/Steve Hanks

Austin Samuels of Nez Perce Tribe Fisheries swoops a net full of juvenile fall chinook prior to their release from the Captain John Acclimation Site on the Snake River south of Asotin. Mike Key, also with tribal fisheries, is in the background.

That recovery plan is expected to be released later this year. Although it is too soon to make a push for delisting, the federal fisheries agency is planning for the possibility.

"We are running some scenarios trying to get a sense of timing of when there could be delisting," said Elizabeth Gaar, senior policy adviser for NOAA Fisheries at Portland.

Although the federal agency is writing the plan, the agency is getting input from states and tribes. There will be road bumps.

Chief among them is the difficulty in establishing the degree to which the wild run is self-sufficient. It has been buoyed by a unique approach of using hatcheries to both mitigate for declines caused by dams on the Snake and Columbia rivers and to boost spawning in the wild. That means many of the hatchery

fish produced at places like Lyons Ferry Hatchery on the Snake River and the Nez Perce Tribal Hatchery on the Clearwater are intended to return as adults and those not caught by anglers are supposed to spawn in the wild. Hatchery fish are acclimated and then released from a number of sites in the basin.

"It's not just a concrete to concrete program," said Becky Johnson, director of fish production for the Nez Perce Tribe. "We release fish in the habitat throughout the basin, so when they come back, if they are not caught, they spawn in nature."

It has been so successful that at times 70 percent of fall Chinook on spawning grounds have been hatchery fish. Since many of the returning wild fish are likely the offspring of hatchery fish that spawned in the river, it makes it difficult to measure the true productivity of the wild run. Or, in other words, would the wild fish numbers persist without help from hatcheries?

"Abundance is good. We have wild fish coming back but we also need to assess if those adults are replacing themselves so the population is growing," Gaar said. "There is a high proportion of hatchery- origin fish right now. Over the last 10 years, on average, the hatchery-origin returns have made up over 70 percent of fall chinook that pass on to natural spawning reaches."

"It's hard to truly evaluate how the wild population is doing. Is it really increasing if most of the fish are coming from a hatchery?"

Seemingly easy assessment not so easy

What would seem a simple way to find that out would be to turn off the hatchery spigot and see what happens. But the hatchery fish are produced to mitigate for the dams and provide harvest opportunities for tribal and sport anglers. Hatchery production is called for in federal law that predates the listing of fall chinook under the ESA and is spelled out in a court-negotiated settlement known as U.S. v. Oregon.

"Those fish are legally required to be produced to mitigate for the hydro system," Johnson said. She has little doubt that without the hatchery program, numbers of wild fish would decline because of continued problems at the dam.

"The bottom line is only 30 to 50 percent of our juveniles make it to Bonneville Dam. There are modifying factors outside of this basin that we can't control and in the ocean as well. We think if we turned the hatchery program off, the returns would decrease."

The federal fisheries agency isn't asking for that. Gaar said she wants a recovery plan that protects wild fish while also accommodating harvest mitigation. She said the agency is asking if there is a way in which hatchery and wild fish can be separated so they don't spawn in the same places.

"We understand and appreciate the mitigation objectives. We would just like to see a mitigation program that doesn't impede recovery of wild fish. Are there possibilities of trying to redistribute where some of those hatchery fish are spawning?"

There are a number of studies that will run through 2018 trying to determine the strength of natural production and to see if hatchery and wild fish can be separated. Jay Hesse, a fisheries researcher for the tribe, said it will be difficult to completely separate wild and hatchery fish, especially given the legal need for mitigation. Hatchery fish are being released in all the major spawning areas above Lower Granite Dam and in the Tucannon River. The spawning areas include the Clearwater, Grande Ronde and Snake River above and below the mouth of the Salmon River.

Hesse said one scenario federal fisheries managers are contemplating is excluding hatchery releases in the Snake River above the mouth of the Salmon River. But if that were to happen, fisheries managers don't know how many hatchery adults from other release sites might return there. To find out, they are using tracking devices to determine how much fidelity returning hatchery adults have to the areas they were released.

"That is the crux in terms of NOAA's perspective is managing for at least one major spawning area that would have low hatchery influence," he said.
Joe Oatman, harvest director for the tribe, said the performance of other species of wild fish like spring chinook and steelhead that spawn in areas without hatchery influence aren't doing as well as fall chinook.

"The tribe is skeptical about trying such an experiment unless it can be confident that smolt-to-adult returns are truly improved." Hesse said it could take decades for a spawning area with little hatchery influence to be established and that could push delisting into the 2030s.
But he also said given the growth of wild returns since the 1990s it's clear the hatchery program isn't impeding wild fish. "I think it demonstrates the hatchery program here is not a train wreck for natural fish production," he said. "We are seeing increasing natural origin fish, so it's not a fatal flaw to natural production."

Another potential hurdle to delisting could be the way the fish were listed. As a species, Snake River fall chinook were listed to include multiple populations, one in the Snake River and its tributaries below Hells Canyon Dam and two others above it. The population above the dam, which doesn't have fish passage, has long been extinct. The area below the dam accounts for only 15 percent of the habitat once used by Snake River fall chinook.

While there is a desire to one day reintroduce fish above the dam, that is not expected to happen for many decades. First habitat and water quality would have to be repaired above the dam and a passage system would have to be constructed at the three-dam Hells Canyon Complex.

Gaar said it is possible to delist the Snake River fall chinook prior to recovery above Hells Canyon Dam. But removing a single population from protection while the others are yet to achieve recovery is tougher.

"It's possible. A population above Hells Canyon Dam would certainly help reduce risk to the species and we would like to see that happen but we would like to see delisting first," she said. "That said, that means our burden of proof for that one population (below the dam) - we are going to have to demonstrate that one population is at very low risk and we are confident before we delist it."

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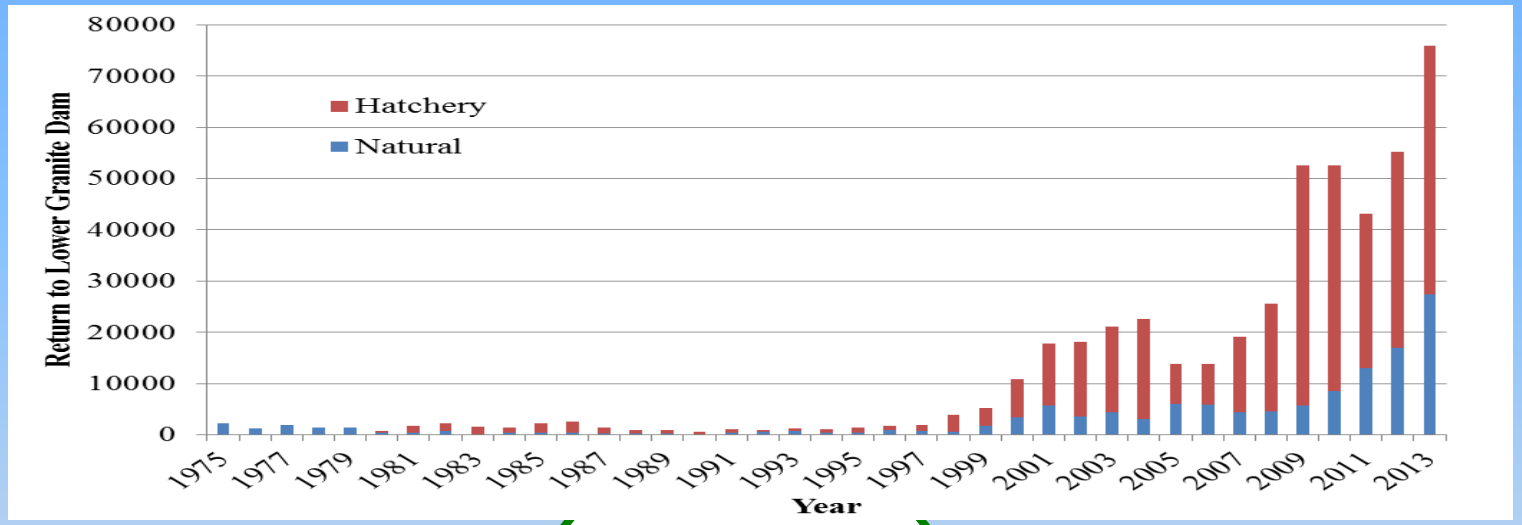
Snake River Fall Chinook Salmon Update and Overview



LOWER SNAKE RIVER COMPENSATION PLAN
Hatchery Program

NEZ PERCE FISHERIES

Washington Department of FISH and WILDLIFE

IDAHO FISH & GAME

OREGON Fish & Wildlife

US Army Corps of Engineers®

U.S. FISH & WILDLIFE SERVICE

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

USGS
science for a changing world

IDAHO POWER
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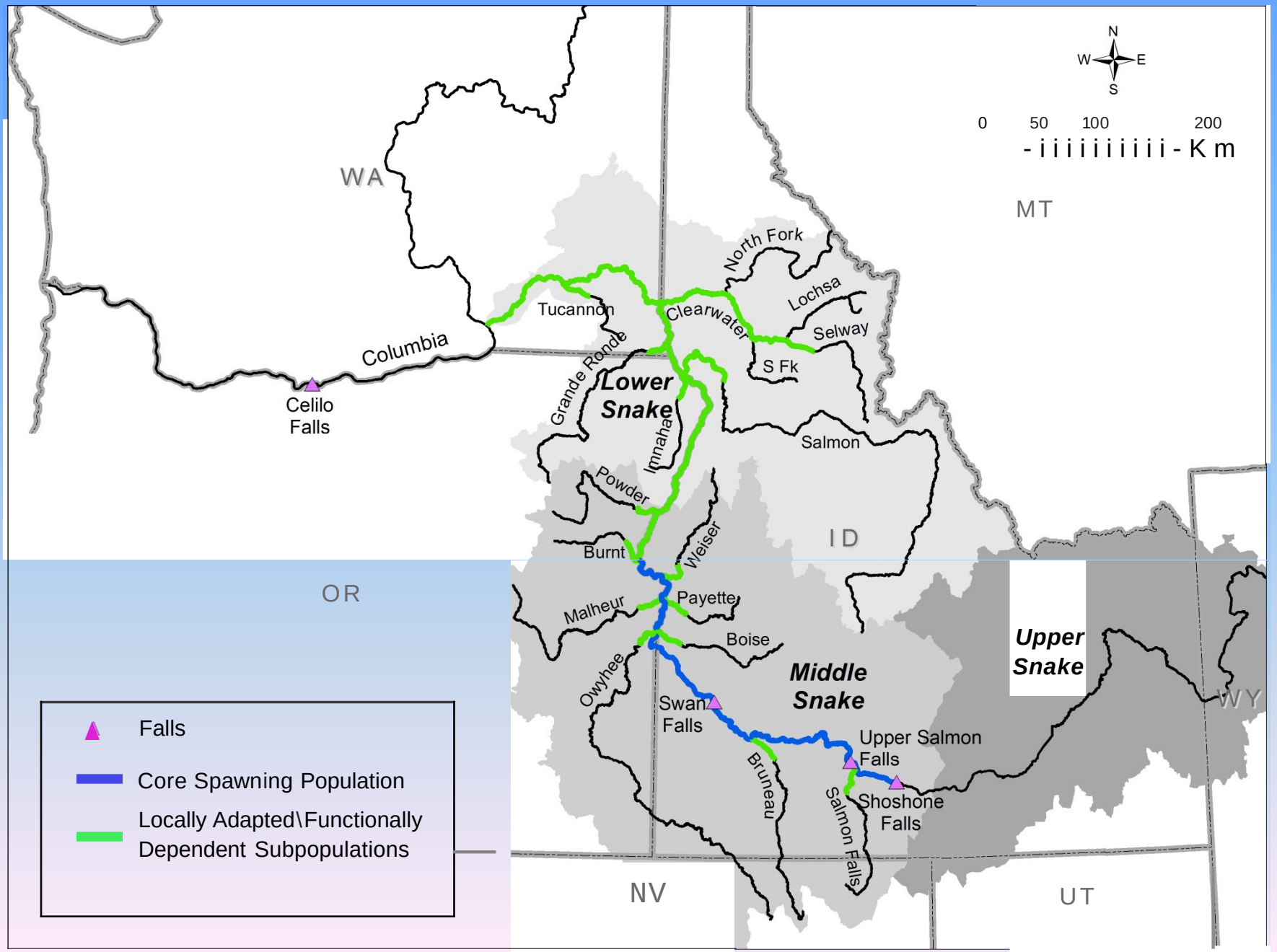
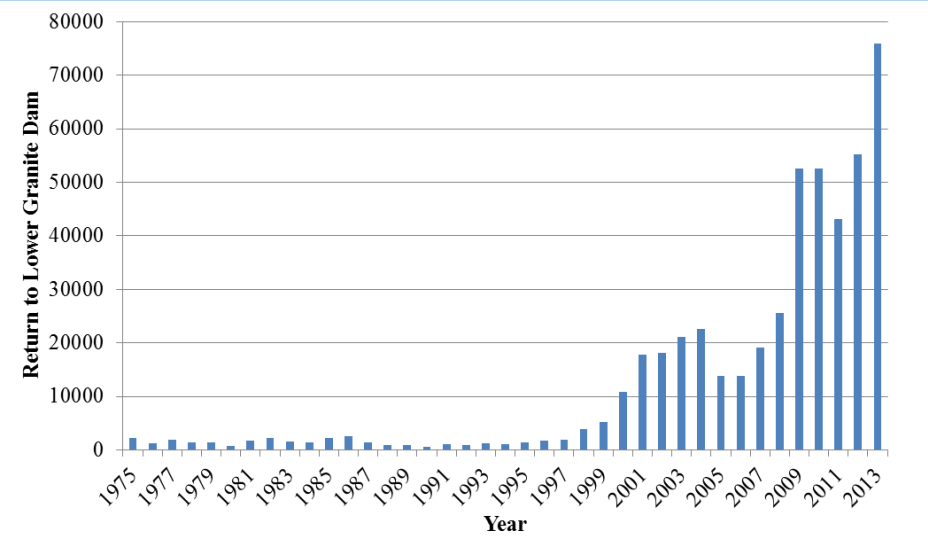
Snake River Fall Chinook Salmon Historically Used Habitat



Total Snake River Fall Chinook Returns to Lower Granite Dam

1990 575

2013 75,846

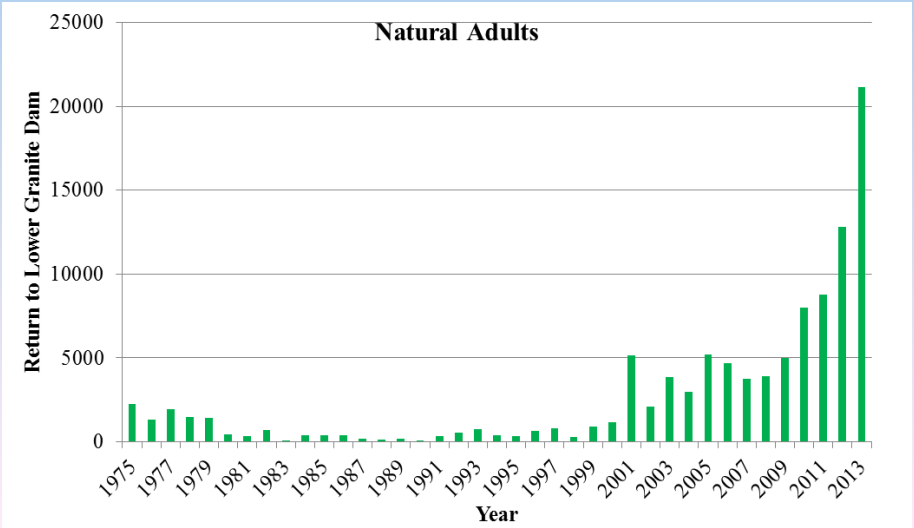


130 Fold Increase

Natural-origin Snake River Fall Chinook Adult Returns

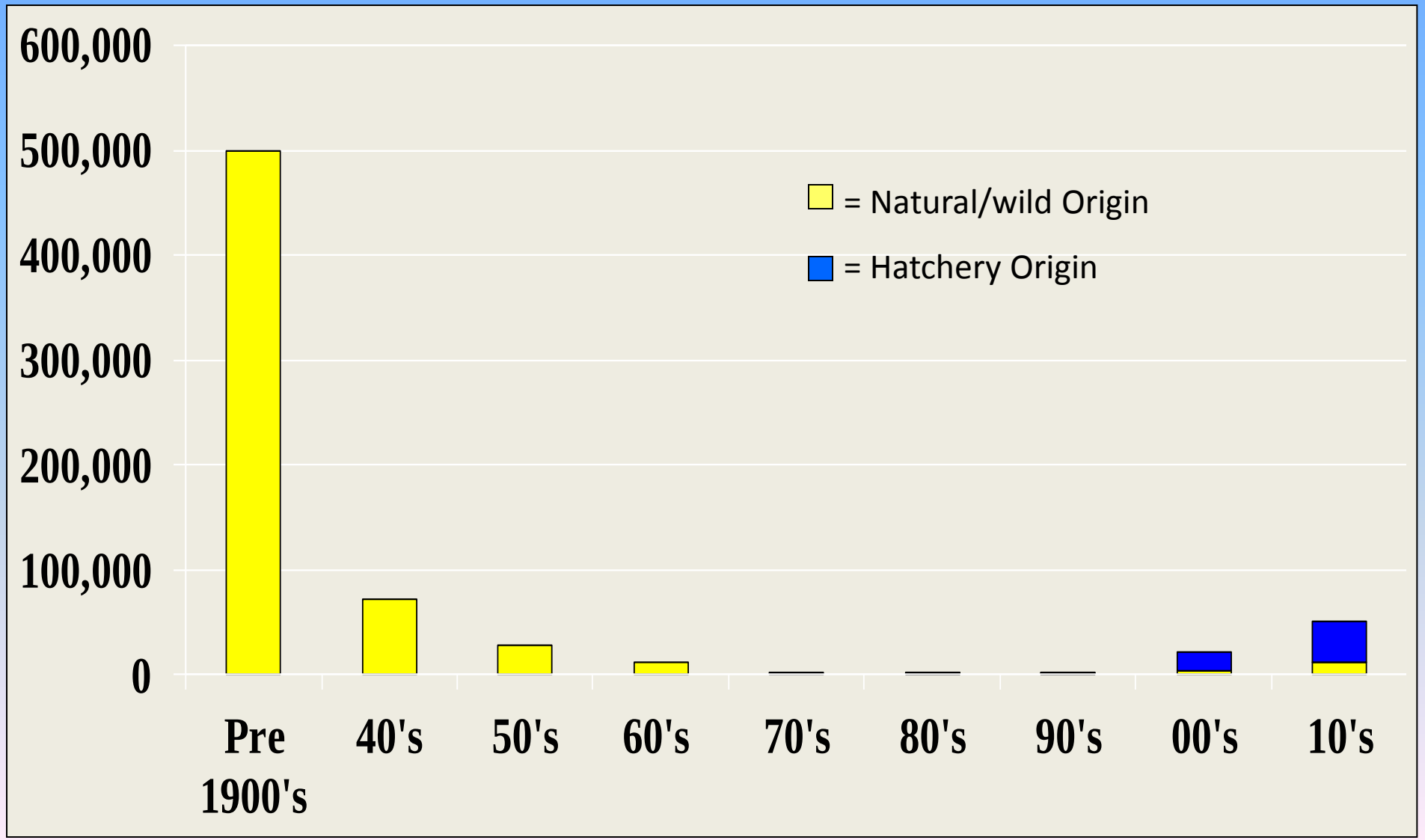
1990 **78**

2013 **20,222**



260 Fold Increase

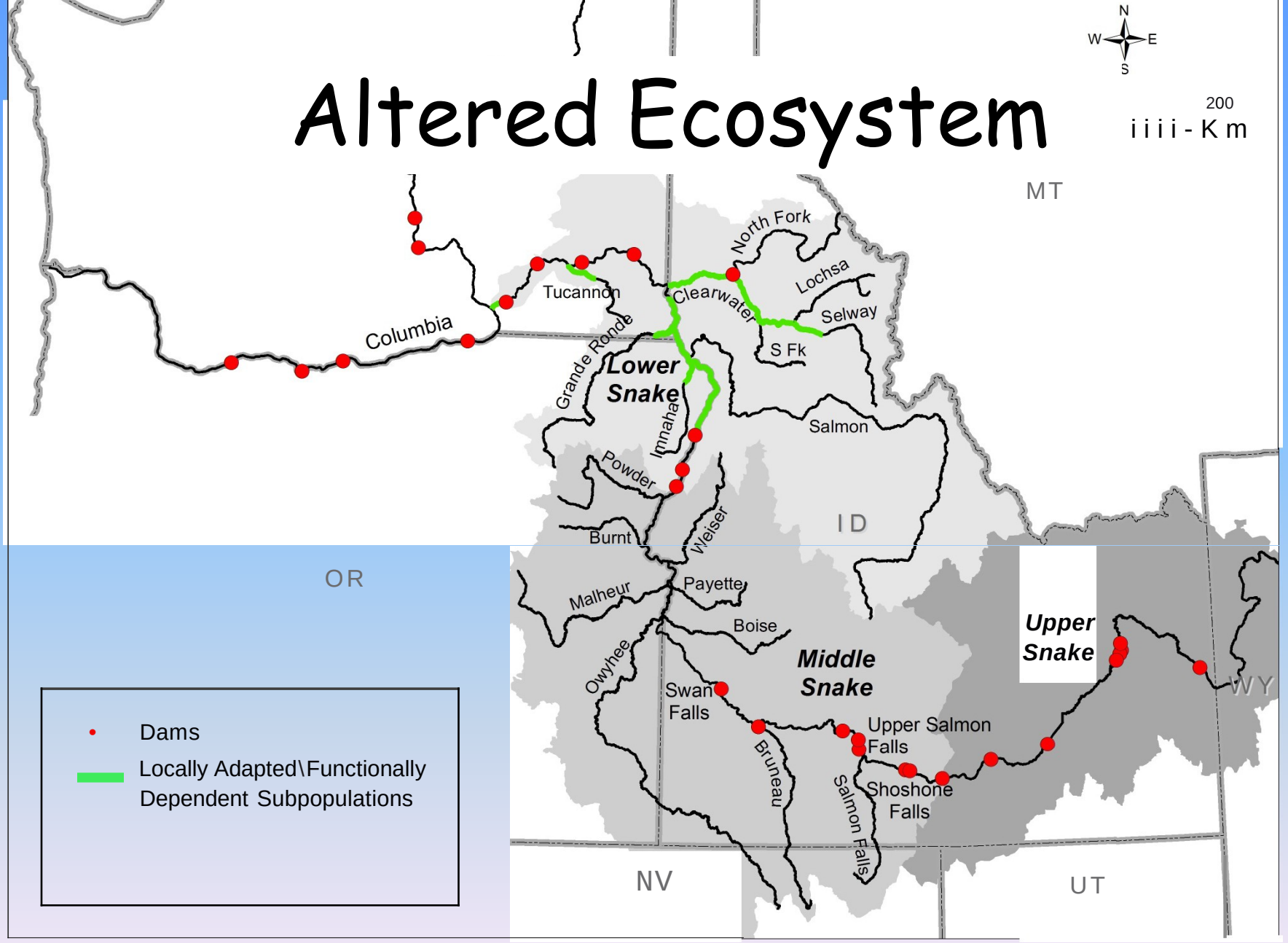
Average Fall Chinook Adult Returns to Snake River Basin by Decade



Reasons for Decline

- **Anthropogenic**
  - Over harvest
  - Habitat loss (85%)
    - **Irrigated Agriculture (water removal + sediments)**
    - **Logging**
    - **Gold Dredging**
    - **Dam construction**
    - **Peaking flows**
  - Hatchery efforts w/questionable old methods
- **Natural**
  - Drought
  - Ocean Productivity

Altered Ecosystem



Remaining accessible habitat for fall Chinook, 1975 (15% of historical).

Legal Mandates

Snake River Fall Chinook Hatchery Production

- Lower Snake River Compensation Plan – Public Law 94-587, 99-662, 103-316
- Idaho Power Company Hells Canyon Settlement Agreement
- Nez Perce Tribal Hatchery - Pacific Northwest Electric Power Planning And Conservation Act 16 U.S.C. § 839-839h
- U.S. vs. Oregon 2008-2017 Management Agreement
- Columbia Basin Treaty Tribes Accords
- FCRPS Biological Opinion
- ESA/Hatchery Genetic Management Plan

Lower Snake River Compensation Plan

- Lower Snake River Compensation Plan
  - Mitigation based on adult return goals
  - 9.16 million subyearling smolts (101,880 lbs)
  - In-place, in-kind = endemic Snake River Chinook

	Adult/jack Goal
Escapement to Project Area	18,300
Commercial/Tribal Harvest	54,900
Recreational Harvest	18,300
Total	**91,500**

1980 Idaho Power Company Hells Canyon Settlement Agreement (IPC, ID, OR, WA, NMFS)

- Requires IPC to "contract with appropriate state and federal agencies or otherwise provide for the trapping of sufficient fall Chinook salmon and the fertilizing and eyeing up of sufficient eggs to permit raising up to 1,000,000 fall Chinook salmon smolts." (FERC, 1980).

- Approximately 2,700 adults to the project area

Nez Perce Tribal Hatchery

- "to protect, mitigate and enhance the fish and wildlife, including related spawning grounds and habitat, of the Columbia River and its tributaries, particularly anadromous fish."

- 1.4 million subyearling smolts

- Adult return goal – 3,750 back to the project area

U.S. vs. Oregon
Harvest/Production Relationship

- 1995 agreement – Argument over 18 fish. Parties agreed to constrained in-river fisheries harvest rate on natural Snake River fall Chinook (for all fisheries).

- In exchange the agreement provided, for the first time, releases of Snake River fall Chinook into areas where they could support natural production.

Columbia Basin Treaty Tribes Accords

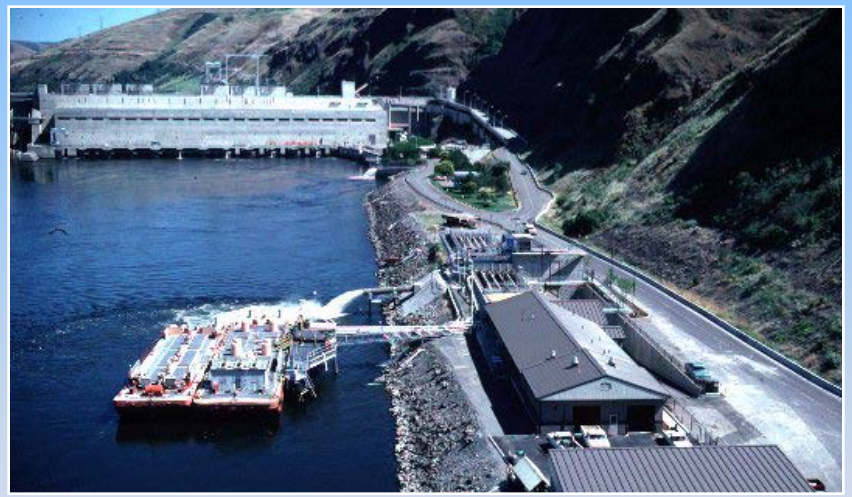
"…The Action Agencies understand that that Tribes' willingness to accept spill operations as outlined above is directly related to their expectation that the Lyon's Ferry production program remains stable and substantially unaltered than as currently designed for the term of this Agreement. Should that fundamental expectation be upset, the Tribes will consider this a material change and grounds for withdrawal from the Agreement, and may, after notice to the Action Agencies, advocate for spill actions that deviate from those contemplated in this Agreement…"

ESA/Hatchery Genetic Management Plan

- HGMP completed and submitted collaboratively in 2011
- BiOp & Sec 10 Permit received in Oct 2012
  - 16607 and 16615

Legal Mandates

The hatchery programs in the Columbia Basin are producing fish to mitigate for the development and operation of the hydrosystem. As long as the dams are in place there is a legal obligation to provide fish.



Congressionally mandated mitigation obligations associated with the FCRPS are substantial and are not supplanted by the need to comply with the Endangered Species Act

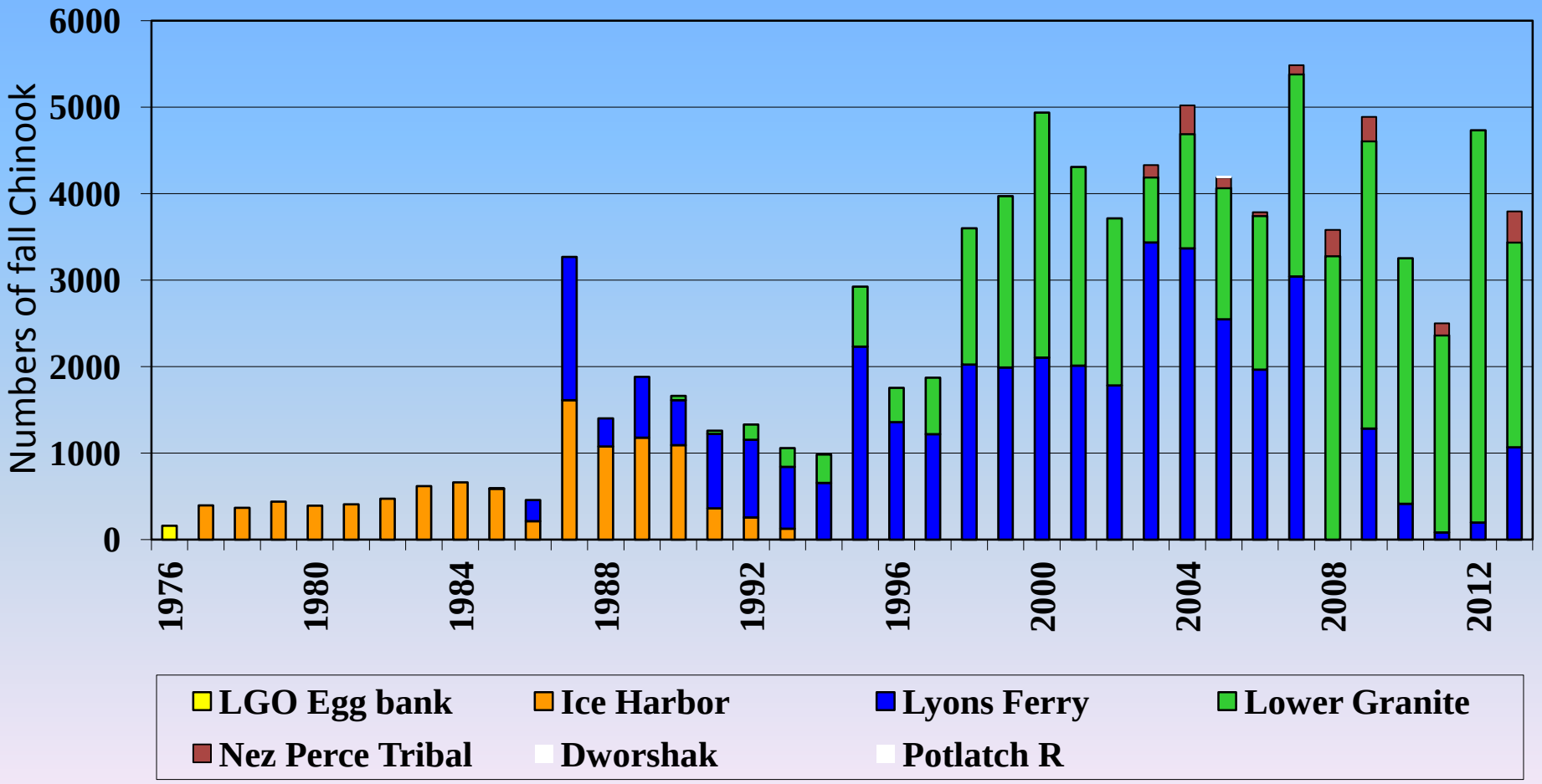
Hatchery Operations Past and Present

Category	Past	Present
Broodstock Collection Site	Ice Harbor Dam Lyons Ferry Kalama Hatchery (downstream of Bonneville Dam)	Lower Granite Trap Lyons Ferry Nez Perce Tribal Hatchery
Hatchery Facilities	Kalama/Hagerman Lyons Ferry	Lyons Ferry FCAP (acclimation ponds) Nez Perce Tribal Hatchery Irrigon/Oxbow
Purpose	Egg Bank/Mitigation	Supplementation/ Mitigation
Release Location	Downstream of Lower Granite Dam (limited by broodstock) Kalama Hatchery (downstream of Bonneville Dam - egg bank)	Upstream and Downstream of Lower Granite Dam
Broodstock	Mostly HxH (limited by high # strays)	HxN (up to 30% natural)

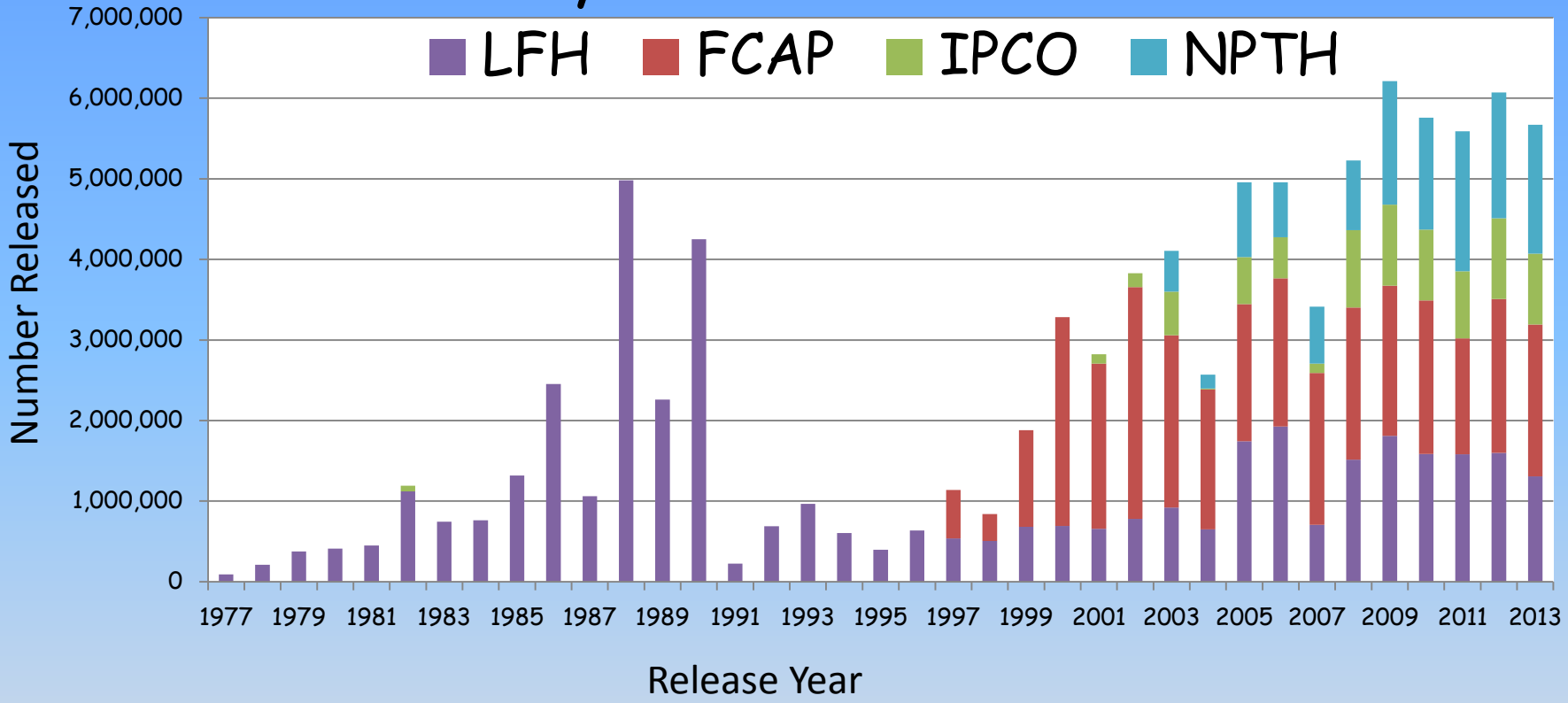
Current Snake River fall Chinook Salmon Production Goals

Funding Source	Production Facility	Production Capacity	
		1+	0+
Lower Snake River Compensation Plan (Bonneville Power Administration)	Lyons Ferry Hatchery	900,000	2,200,000
Idaho Power Company	Oxbow/Umatilla/ Irrigon Hatcheries	0	1,000,000
Bonneville Power Administration	Nez Perce Tribal Hatchery	0	1,400,000
Total		900,000	4,600,000

Trapping Locations
SNAKE RIVER Broodstock



Number of Snake River Fall Chinook Released Annually in Snake River Basin



Egg Bank

Lyons Ferry Hatchery

FCAP

NPTH
IPCO

Snake River Fall Chinook Salmon

Highly Coordinated and Integrated Hatchery Program

- Washington, Oregon, Idaho
- Nez Perce & Umatilla Tribes (U.S. v. OR parties)
- U.S. Fish & Wildlife Service, NOAA Fisheries, U.S. Army Corps of Engineers
- Bonneville Power Administration, Idaho Power Co.
- University & private consultant science guys

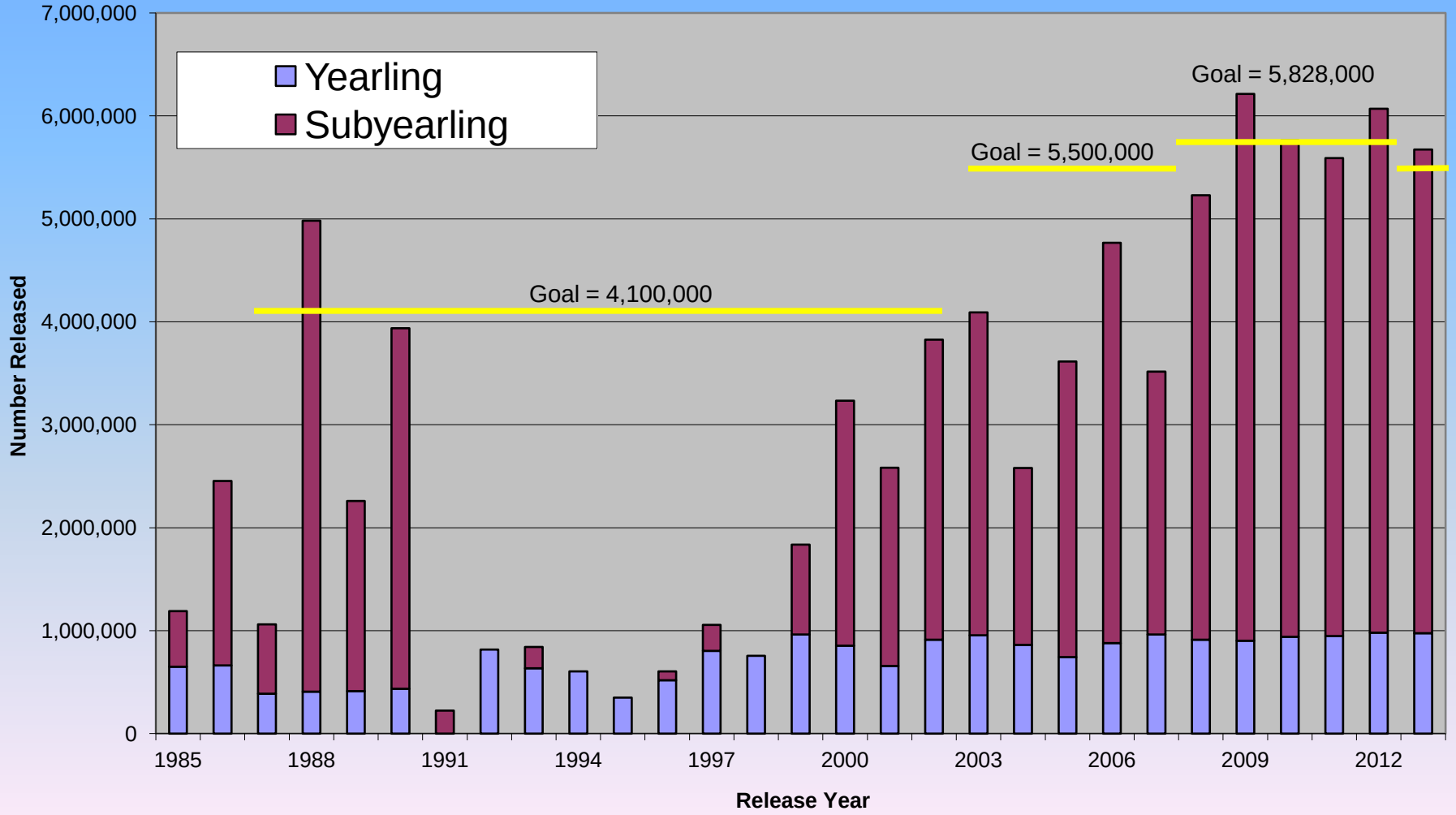
Bi-Annual Fall Chinook Coordination Meetings

Annual Operation Plan Meeting

In season weekly teleconference – GoTo Meeting

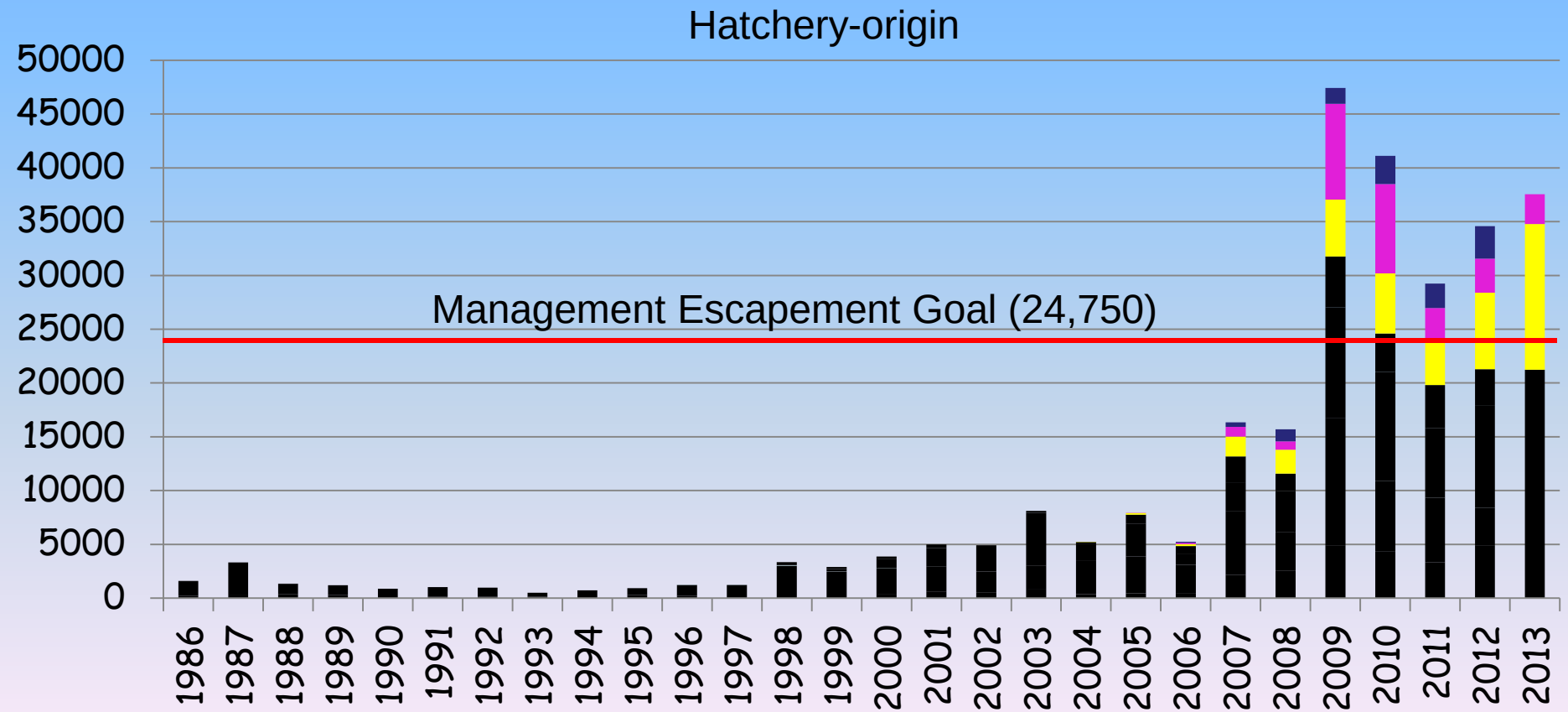
Hatchery Release Totals in Snake River Basin

Total Fall Chinook Releases in Snake River Basin

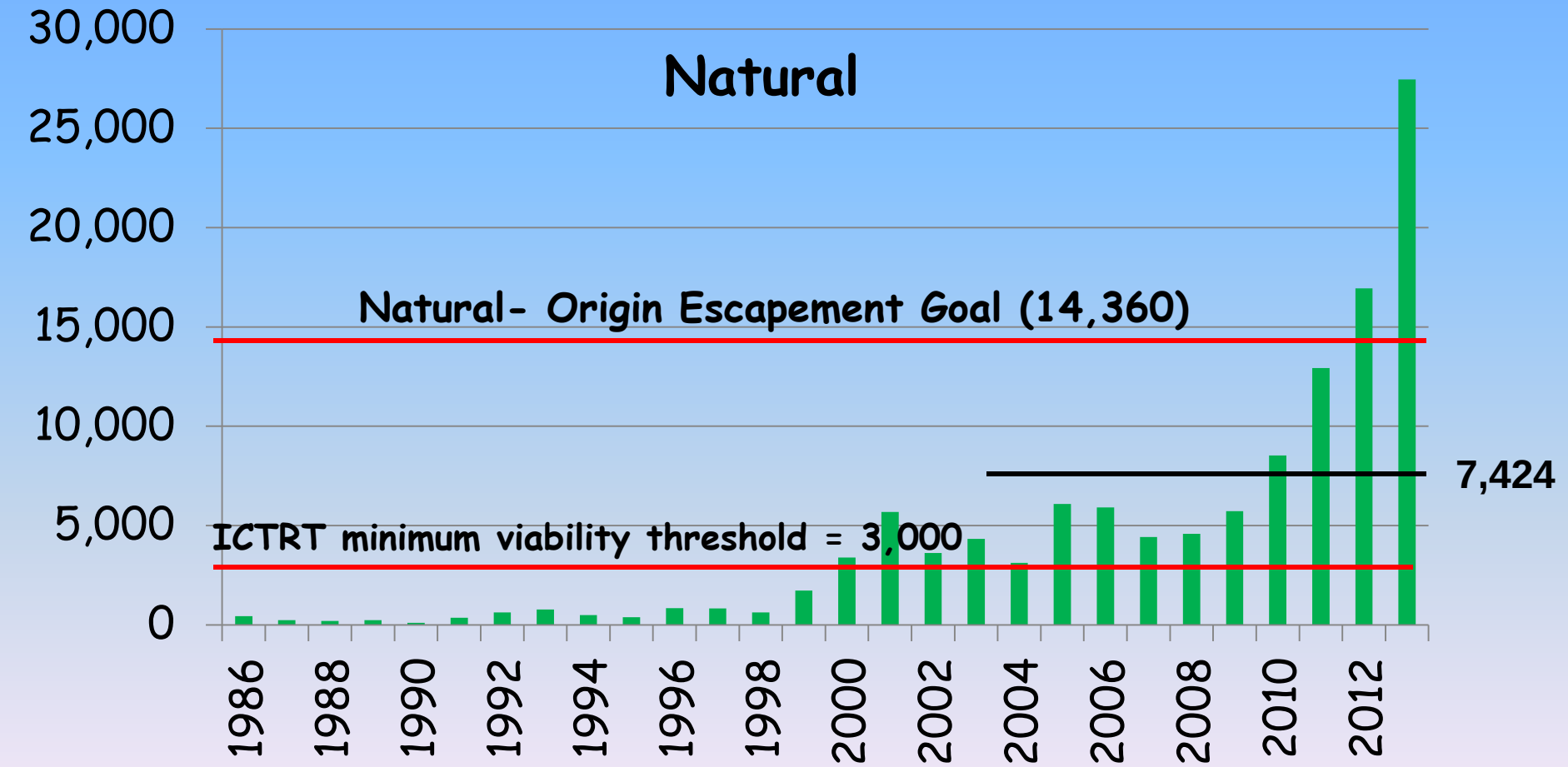


E… …ake River Basin

Lyons Ferry – 18,300
NPTH -3,750
IPC – 2,700

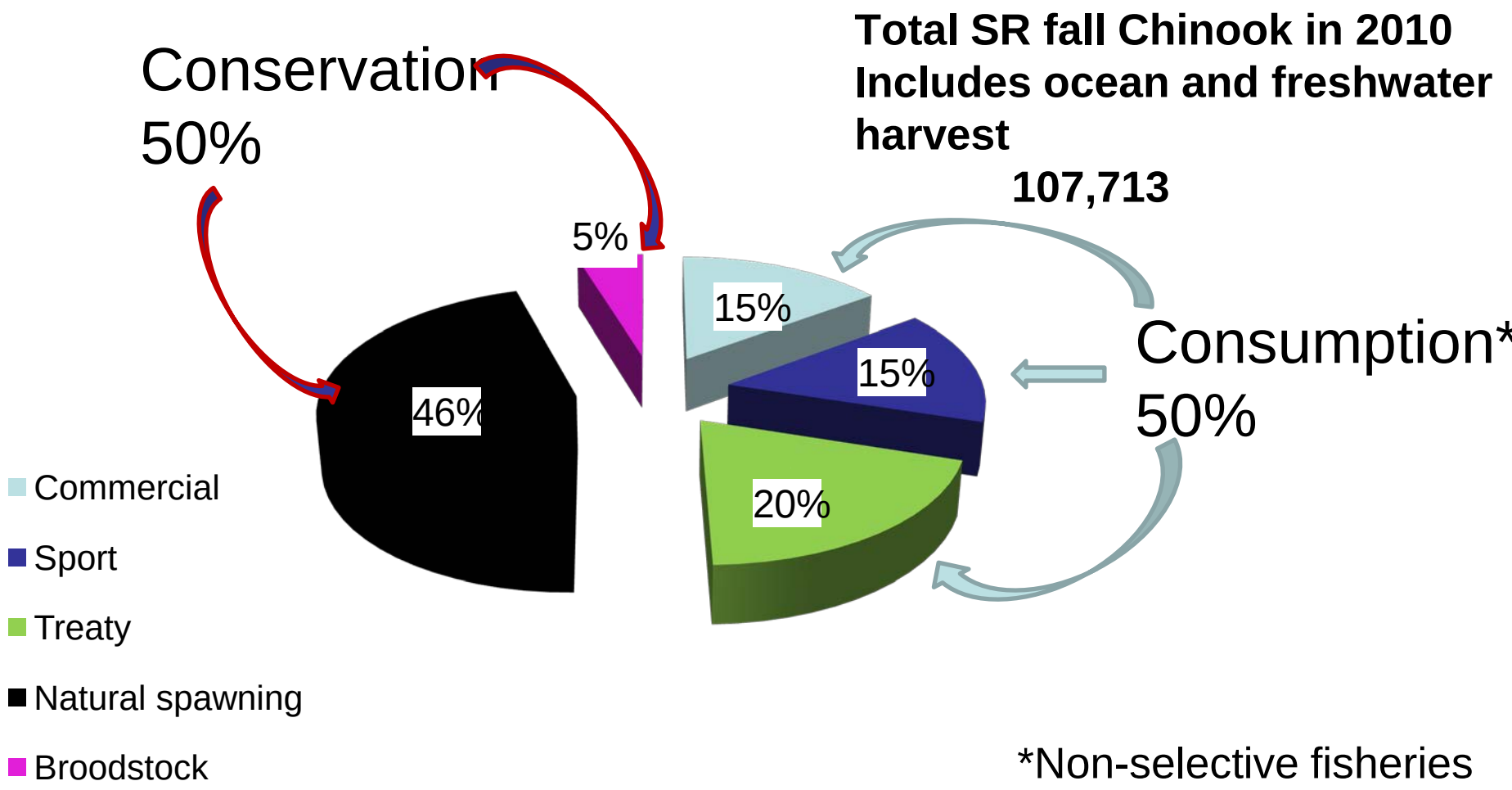


Fall Chinook Salmon Escapement to Snake River Basin



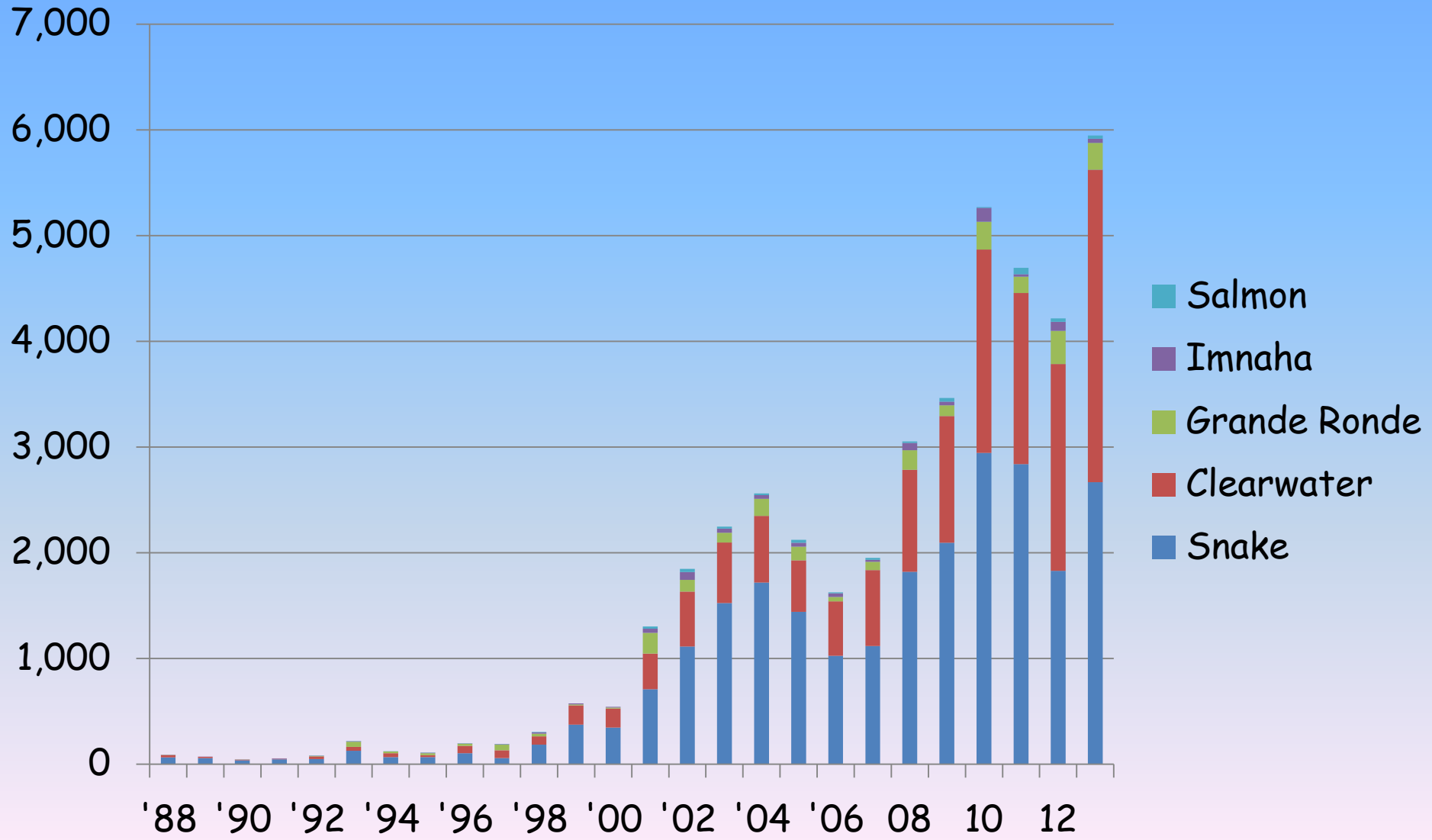
Snake River Fall Chinook Salmon

2010 Adult fall Chinook disposition estimates, hatchery + natural

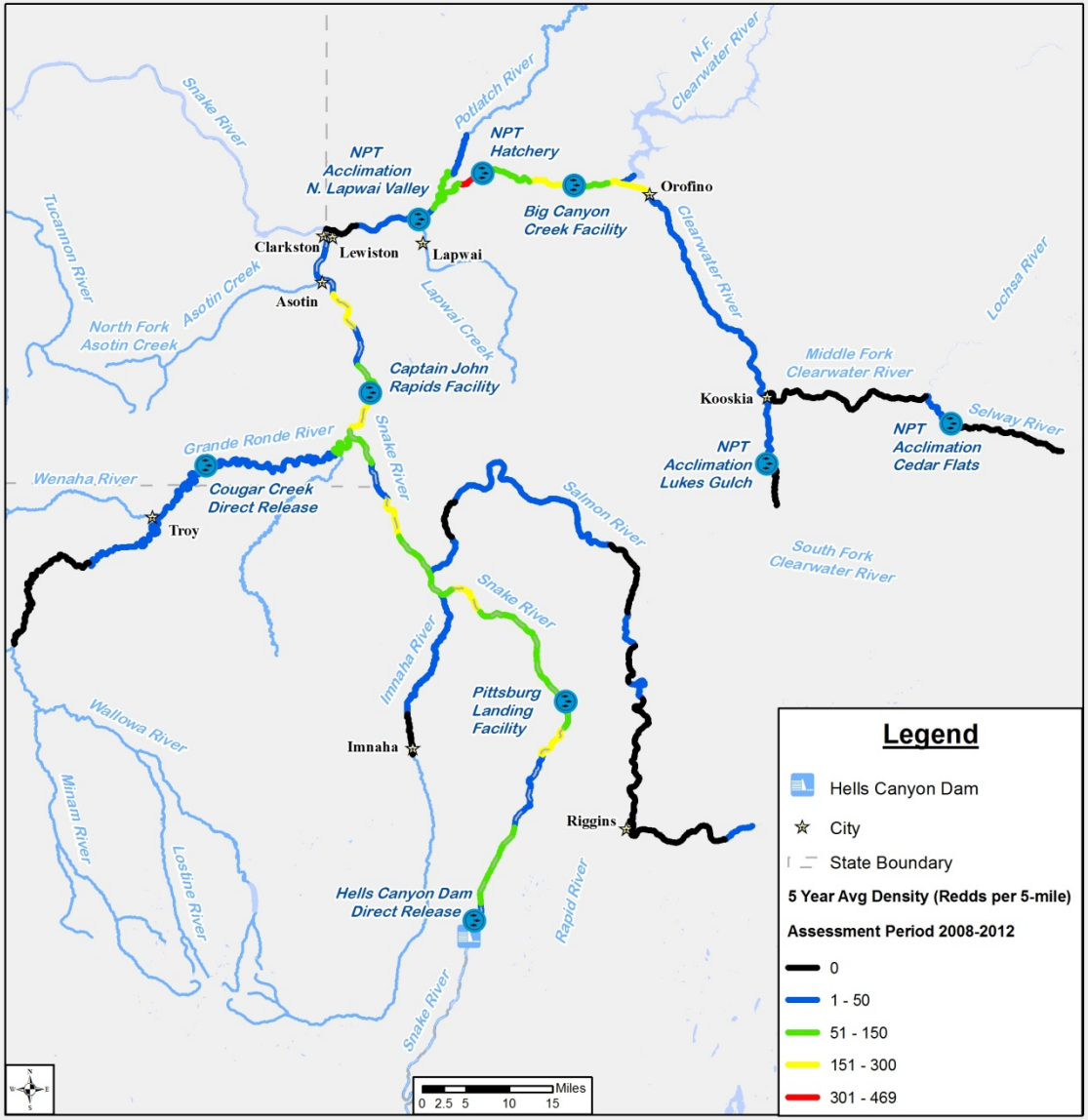


*Non-selective fisheries

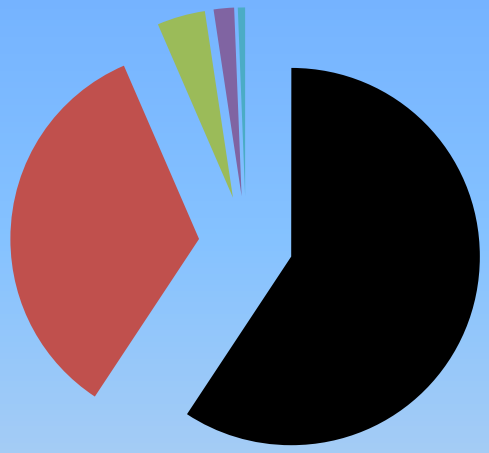
Number of Fall Chinook Redds Counted Upstream of Lower Granite Dam



Fall Chinook Salmon Spawner Distribution Upstream of Lower Granite Dam

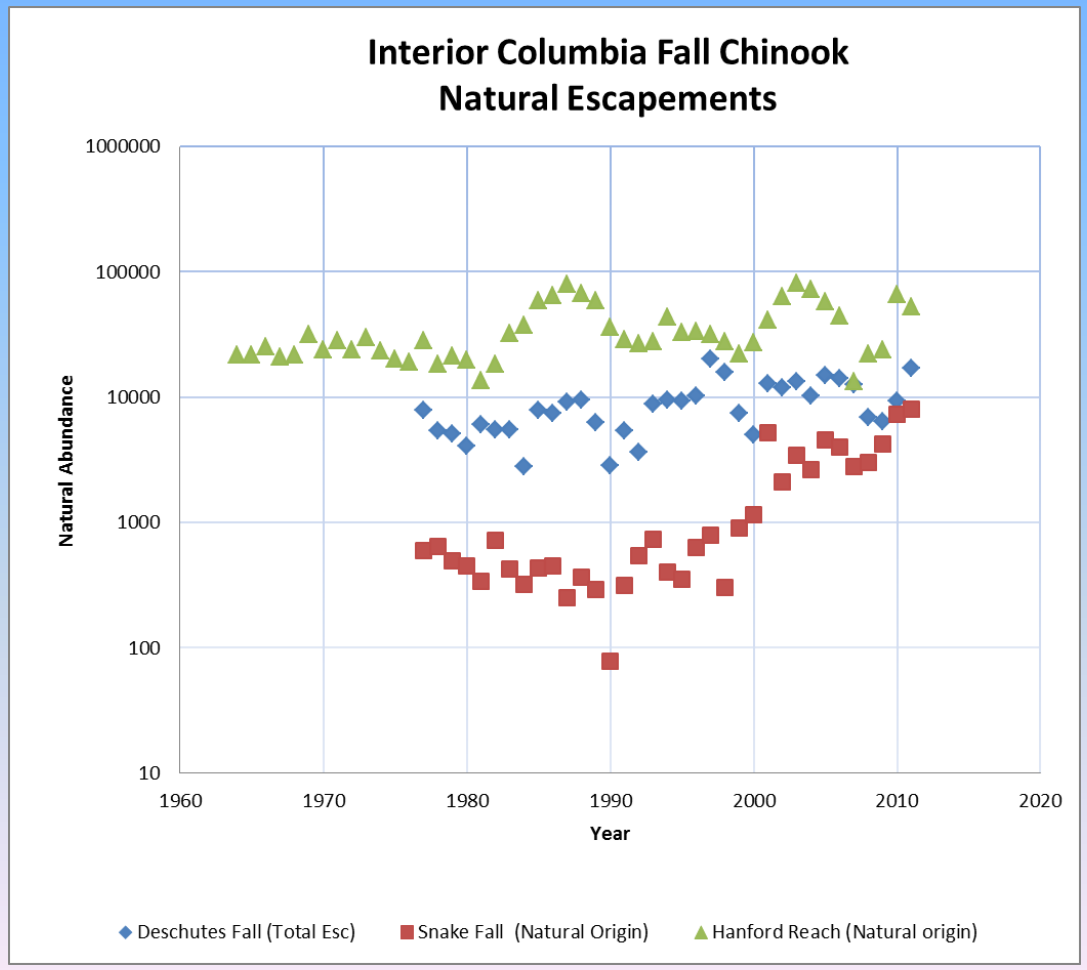


5 year average redd distribution



- Snake (59%)
- Clearwater (34%)
- Grande Ronde (4%)
- Imnaha (2%)
- Salmon (1%)

Natural-origin Adult Trends
Snake River
vs
Deschutes and Hanford Reach Fall Chinook



Graphic provided by Tom Cooney –NOAA Fisheries

Adaptive Management Actions

Hatchery
- Endemic Egg Bank
- Stray Exclusion
- Yearling and Subyearling release life stage and size
- Releases in spawning/rearing habitat
- Selective mating
- Increased pNOB
- Rearing vessel netting and cleaning
- Representative marking

Hydro-system
- Summer spill
- Transportation

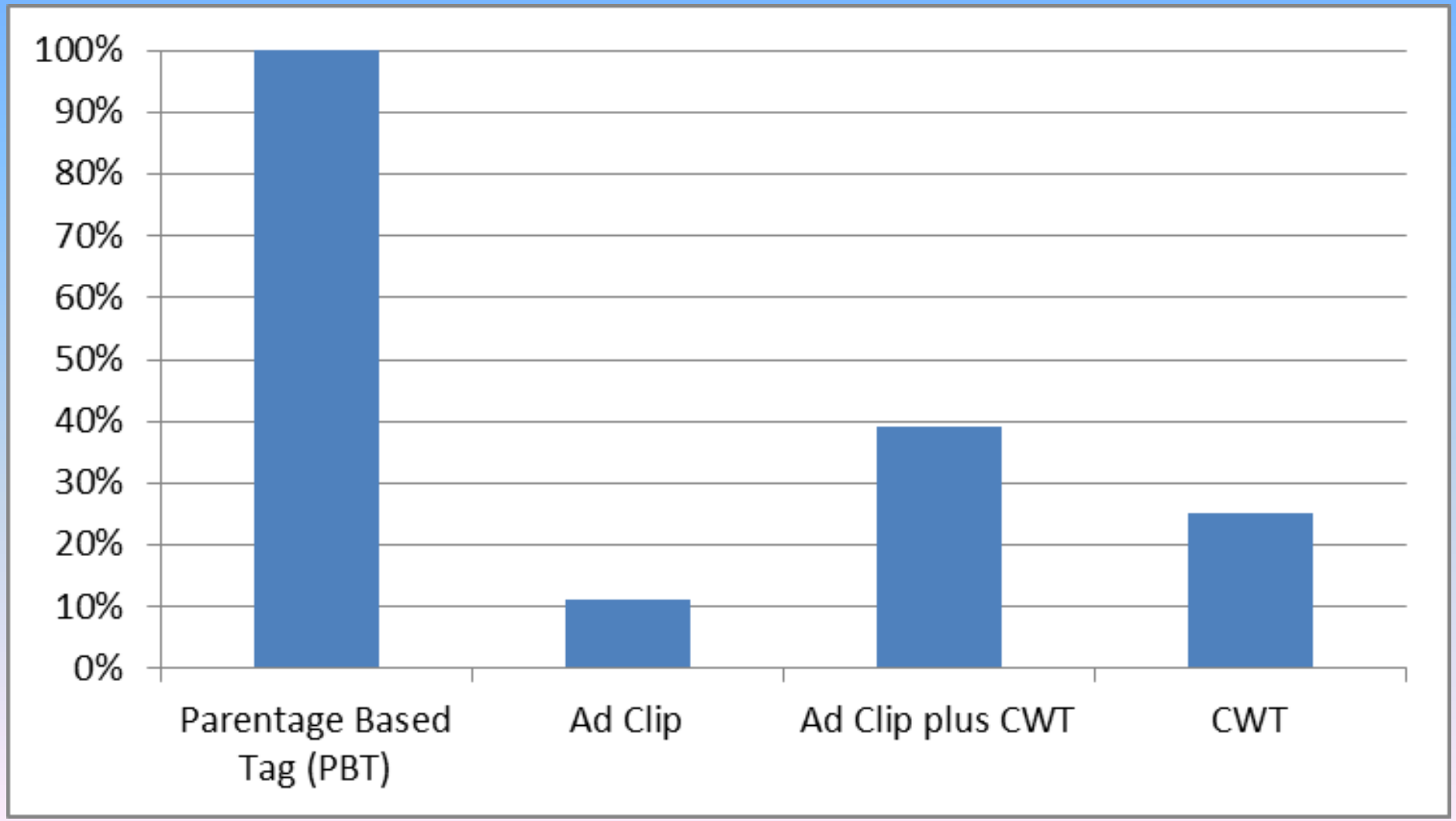
Habitat
- Summer flow augmentation
- Stable spawning flows
- Reduced power peaking

Harvest
- Abundance based
- Non-selective and selective

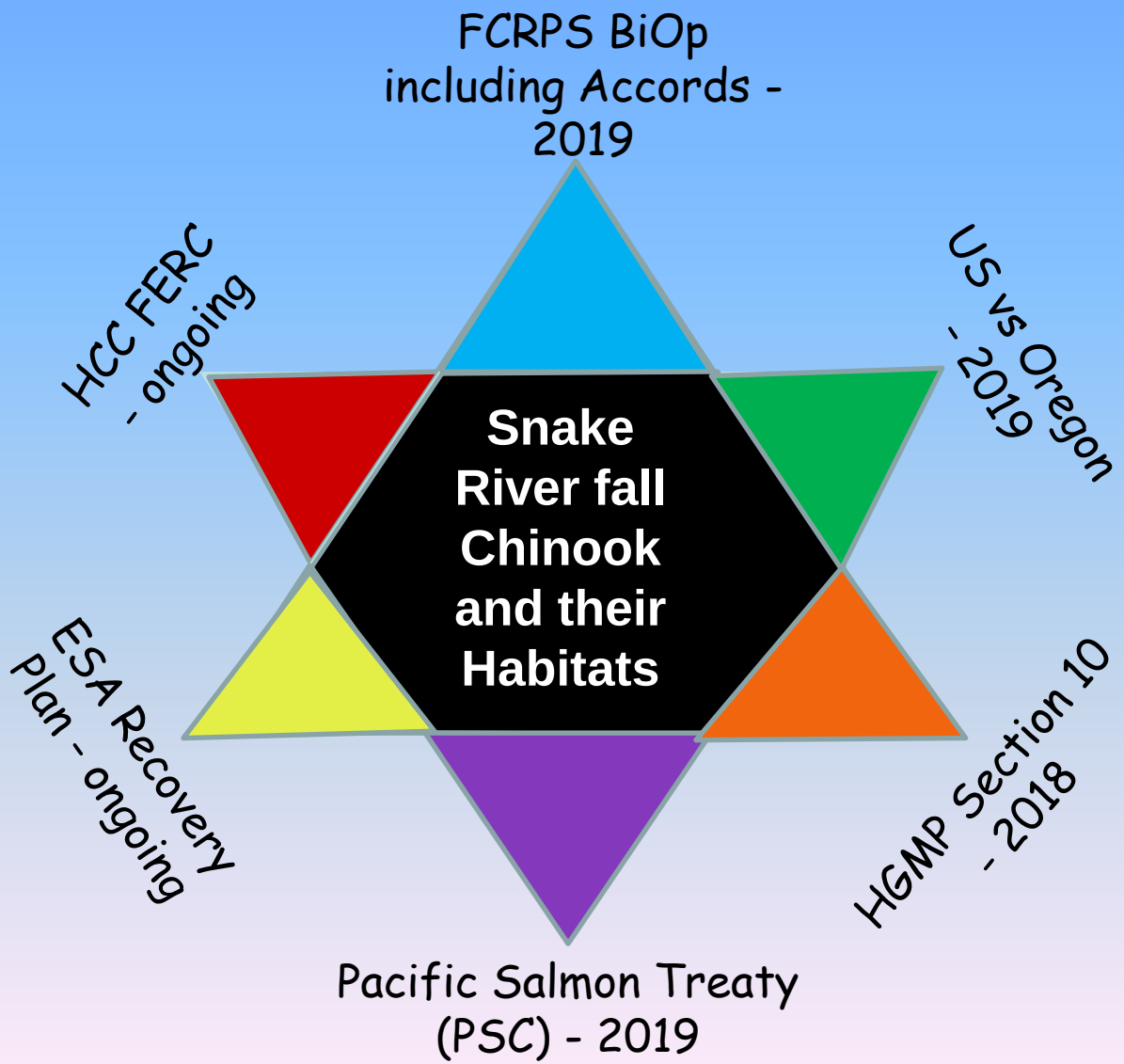
Table B4B. 2008-2017 *US v Oregon* Management Agreement

Priority	Rearing Facility	Number	Age	Release Location(s)	Marking [a]
1	Lyons Ferry	450,000	1+	On station	225KAdCWT+VIE 225K CWT +VIE
2	Lyons Ferry	150,000	1+	Pittsburg Landing	70K AdCWT 80K CWT only
3	Lyons Ferry	150,000	1+	Big Canyon	70K AdCWT 80K CWT only
4	Lyons Ferry	150,000	1+	Captain John Rapids	70K AdCWT 80K CWT only
5	Lyons Ferry	200,000	0+	On station	200K AdCWT
6	Lyons Ferry	500,000	0+	Captain John Rapids	100K AdCWT 100K CWT only 300K Unmarked
7	Lyons Ferry	500,000	0+	Big Canyon	100K AdCWT 100K CWT only 300K Unmarked
8	Lyons Ferry	200,000	0+	Pittsburg Landing	100K AdCWT 100K CWT only
9	Oxbow	200,000	0+	Hells Canyon Dam	200K AdCWT
10	Lyons Ferry	200,000	0+	Pittsburg Landing	200K Unmarked
11	Lyons Ferry	200,000	0+	Direct stream evaluation Near Captain John Rapids	200K AdCWT
13	Lyons Ferry	200,000	0+	Grande Ronde River	200K AdCWT
15	Umatilla	200,000	0+	Hells Canyon Dam	200K AdCWT
16	Lyons Ferry	200,000	0+	Grande Ronde River	200K Unmarked
17	Umatilla	600,000	0+	Hells Canyon Dam	600K Ad only

Marking Strategy
Hatchery-Origin Fall Chinook



PENDING LEGAL AND MANAGEMENT AGREEMENT REVISIONS



Things we now know

- **Adult abundance has increased significantly**
  - Getting closer to meeting in and out of basin mitigation goals
  - Natural-origin adult abundance above delisting criteria.
  - Total abundance is well below historical levels
- **Adult distribution via annual aerial redd counts.**
  - 60/40 rule between Snake and Clearwater.
  - Large number of hatchery fish on the spawning grounds
- **Significant mainstem state and tribal harvest via coded-wire tag recoveries and creel surveys.**

Things we now know, and don't know

- **Fall Chinook abundance has increased**
  - Relative contribution of management changes vs environmental conditions?
- **Management effects?**
  - Hatchery production/Supplementation
    - Meeting full broodstock objectives.
    - Increased number of naturally-spawning hatchery fish.
    - Reduced proportion of out-of-basin strays.
    - Smaller size and age at return.
  - Decreased ocean and lower Columbia River harvest rates
    - Allowed for increased adult returns to the Snake River?
  - Corridor improvements = survival benefits
    - Summer transport/spill?
- **Environmental effects?** (ocean, long-term weather patterns)
  - Increased SARs/productivity - similar to other stocks/species

Things we don't know

- The level of contribution to increased adult abundance from supplementation compared to contributions from large increases in total hatchery production & higher SARs
- The contribution/influence of hatchery fish on natural fish productivity
- The productive capacity of remaining habitat (altered and dynamic).
- Whether hatchery programs are affecting the life history structure of the natural population
- Long-term viability of an ESU with only a single extant population

Successes

- Avoided extinction
- Maintained native (endemic) stock structure
- 260 fold increase in natural-origin fish abundance
- Provided considerable down-river and ocean harvest
- Re-established tributary fisheries
- Re-established marine derived nutrient food-web connection
- Meeting project areas adult mitigation goals
- Multi-entity Collaboration (funding and implementation)

Cooperative and Joint Management Effort

	Funding Source	Implementers
Hatcheries	LSRCP BPA/NPCC IPC	WDFW, NPT, IPC, CTUIR, ODFW, IDFG
Monitoring and Evaluation	LSRCP BPA/NPCC BLM IPC COE PSC	Redd counts (NPT, IPC, USFWS, WDFW) Juvenile behavior and survival (USFWS, NPT, USGS, NOAA) Hatchery performance (WDFW, NPT) Run reconstruction (WDFW, NPT, IPC, NOAA, UI, USvOR-TAC)

2014 Forecast

Fall Chinook at Lower Granite Dam

70,000

27,500 Natural-origin adults
25,500 Hatchery-origin adults
17,000 Jacks