



FISH PASSAGE CENTER

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MEMORANDUM

TO: Rod Sando
Executive Director, CBFWA

Michele DeHart

FROM: Michele DeHart

DATE: July 30, 2002

RE: 2002 Spring Chinook Jack Return

In response to your request the FPC staff reviewed the spring chinook jack return for 2002 and the attached article, which appeared in The Oregonian newspaper on July 30, 2002. The article appears to be, in part, based upon a June 24, 2002 memorandum from Michael Schiewe, NMFS, to Brian Brown, NMFS, (attached). The NMFS memorandum is simply an observation of the final jack counts in 2002 compared with previous years and the magnitude of the hatchery release. The article in the Oregonian seems to expand and stretch the actual information in the NMFS memorandum. The information in the NMFS memorandum is presented without qualification or context, which in turn leads to the expansion and sweeping conclusions in the Oregonian article.

Because in-river migration conditions were so deadly in 2001, the region was forced to implement a singular passage strategy of complete reliance on transportation of smolts. Reliance on a singular passage strategy amplifies the risk of one strategy and the impact of uncontrollable variables such as ocean conditions. The data is clear regarding the impact of low flows and no spill, in 2001, on juvenile survival of chinook and steelhead that migrated in river. The NMFS memorandum clearly states the effect of low flow and minimal spill conditions, specifically that the out migration conditions and resulting juvenile survivals were the poorest that have occurred in the last decade. The spring chinook jack return is near the ten-year average. **The actual results of implemented passage strategies in 2001 cannot be determined until all of the adult return data from transported and in-river migrating fish in 2001 is analyzed.** Our specific comments and observations follow.

“Early Indicators Banish Gloomy Forecasts For Salmon” – The Oregonian - July 30, 2002

- The initial context of the Oregonian article (attached) is difficult to understand, since it does not identify the “gloomy forecasts” either specifically or by source. It however

infers that a forecast of the adult return was generated before the 2002 jack count was available. We are unaware of any early forecasts of adult returns that were made prior to the jack counts. In general predictions of adult returns are based partially on jack counts. We reviewed presentations and data summaries that were prepared; none included a prediction of adult returns. However, the in-stream migration data was reported and the point was emphasized that the 2001 out migration was relying on transportation and good ocean and estuary conditions because in-river conditions were the worst in recent history.

- The “gloomy” information that was available prior to the jack counts, was not a prediction of adult returns. It was the actual calculated survival of in-river migrating salmon and steelhead. The NMFS memorandum clearly states, and there is no disagreement, that the in-river migrants in 2001 had the lowest survival of any recent years. The memo also states that nearly 100% of the live fish that arrived below Bonneville Dam were transported as smolts. This statement only applies to smolts outmigrating above Lower Granite. Mid-Columbia yearling chinook and steelhead had 35% and 30% respectively, of smolts arriving at McNary Dam forebay, transported. There was no transportation of smolts arriving in the Columbia River below McNary Dam. All of these fish had to migrate in-river. This means that the adult returns from the 2001 migration will be the result of the single passage strategy of transportation and the effects of good ocean conditions.

In river migration in 2001

- As the result of low flows and minimal spill, in river survival for steelhead and chinook out migrants was the lowest observed since 1992. The estimated steelhead survival from Lower Granite tailrace to Bonneville tailrace was 4% in 2001 as compared to 39% in 2000. The estimated chinook survival through the same reach was 30% as compared to 49% in previous years.
- Passage timing and travel time was affected. Travel times were twice as long as those observed historically for chinook and steelhead juveniles. Passage indices of yearling chinook and steelhead (figure 1, attached) at Lower Granite Dam peaked during two periods of increased natural flow from rain. Flow averaged 60 kcfs during the middle 80% of the spring migrants at lower Granite with peak flows occurring between 80 and 90 kcfs.
- The passage conditions in 2001 affected the maximization of transportation strategy. The hatchery population arriving at Lower Granite Dam, the first transport site, was at least 10 percentage points lower than any of the past three years. The estimated population of wild steelhead and chinook and hatchery steelhead arriving at Lower Granite Dam in 2001 were also lower than the previous three years. (FPC, Annual Report 2001)

Spring/Summer chinook jack returns in 2002 – Are they surprising?

- The dam counts of jacks are based upon size criteria. Fish passing a counting window that are less than specific length are recorded as “jacks”. The term “jack” refers to age, a fish that has spent one year in the ocean. Age data for a returning population is determined by scale sampling and analysis, which determines the age of a fish. Past, scale age data collected since the mid-1980s, indicates that each year, some proportion of the “jack” count each year is actually fish that have spent two years in the ocean. For this reason run reconstructions are based in part upon scale analysis age data and

not simply jack counts. The result of the 2001 out migration will not be accurately determined until all of the data is analyzed.

- The spring/summer jack returns in 2002 are near the ten-year average for the 1991-2001 period. This is a considerable decrease from the returns of the last two years.
- Jack returns are a reasonable predictor of adult returns of both hatchery and wild Snake River chinook ($r^2=0.6$ to 0.8)
- In general Snake River hatchery populations have a higher proportion of jacks returning in the population than wild stocks. Summer chinook tend to have a higher proportion of the population returning as jacks when compared to spring chinook.
- The jack return to Lower Granite in 2002 is not surprising. When the range of SAR estimates for transported hatchery chinook from the CSS study is applied to the number of hatchery chinook transported in 2001, the returning hatchery chinook population estimate is in the range of 23,795 and 60,003. The average proportion of jacks in the returning hatchery population averages 11%. Applying this average to the estimated return, results in an estimated spring/summer chinook jack return to Lower Granite ranging from 2,617 to 6,600. The 2002 jack return is within that range and so the jack counts in 2002 are not unexpectedly high or low, which is an early indicator that transportation may have been only as effective as indicated by past data.
- The mid-Columbia spring chinook jack return in 2002 related to the number of chinook transported at McNary Dam is illustrated in figure 2. Jack returns increased through the past three years without transportation of spring chinook at McNary Dam and decreased with the implementation of spring chinook transportation at McNary Dam. However, Jack returns or total adult returns, as explained in the NMFS memorandum are not considered an evaluation of transportation of smolts.

Transportation of Smolts

- The total adult returns from 2001 will determine the results of the maximization of transportation strategy that NMFS was forced to implement in 2001 as a result of the low water year and the BPA financial crisis precipitated by California energy deregulation.
- All of the historic available data indicates that, when compared to the lethal passage conditions existing in-river in 2001, more adults should return from transportation. In their memorandum, NMFS states that the vast majority of returns seen to date or which will be seen are from transported fish. This is a safe assumption since the in-river conditions were documented to be lethal. The question remains, as to what the smolt-to-adult return rates (SARs) will be on transported wild and hatchery fish from the 2001 out-migration and whether or not those will reach levels required to recover listed stocks.
- The assessment of the success of the 2001 out migration and the passage strategies that were implemented will depend on the smolt-to-adult return rates achieved that year for hatchery and wild stocks, and whether levels needed to recover listed stocks were achieved by maximizing transportation.
- Although not mentioned in the NMFS memorandum, adult returns from transportation in 2001 will also reflect the condition of the smolts at the time of collection and transport. Physiological studies have shown that smolt condition can be reduced by stresses at the dams and in transportation as well as by a reduction in energy (lipid) reserve when migration is delayed. Visual observations Lower Granite Dam from the smolt monitoring

program in 2001 indicated that smolt condition during the spring migration was above average.

- 130 PIT tagged chinook jacks returned to Lower Granite Dam. Two of those PIT tags were from wild fish. One wild chinook (jack) was transported, the other wild chinook (jack) migrated in-river.
- The 2002 jack returns of PIT tagged fish were comprised primarily of CSS hatchery mark groups. The SARs of CSS jack returns in 2002 were compared with previous years for each mark group. The CSS groups that historically have a high proportion of production returning as jacks, Imnaha and McCall had lower SARs on jacks in 2002 than the previous four years. Those CSS mark groups with a lower proportion of jacks comprising the adult return, Dworshak and Rapid River, had SARs within the range observed in the past four years.

Conclusions

- The 2001 juvenile migration year clearly showed the effects of flow and spill on downstream juvenile migrants. The low in-river survivals resulting from the low flow and spill provide additional support and basis for the NMFS Biological Opinion flow and spill measures.
- It is too early to determine the combined effect of the 2001 out migration conditions, ocean conditions and transportation on listed and unlisted stocks of salmon and steelhead. Review of past data shows that the highest smolt to adult return rates for both in-river migrants and transported migrants occurs from out-migration years with higher flow and spill levels.
- The spring jack returns are within the expected range given the recent smolt-to-adult return rates for transported chinook generated through the CSS study.
- The complete result of the passage strategy implemented in 2001 will not be determined until all of the adult return data is available.
- Spawner to recruit ratios for wild stocks will be a key factor in determining the results of the passage strategies and ocean conditions which occurred in 2001.
- The statements regarding recovery in the Oregonian article are out of context. In order to determine if the passage strategy implemented in 2001 will accomplish recovery goals, the smolt-to-adult return rates on hatchery and wild stocks of steelhead and chinook will have to be calculated when all of the adult return tag data is analyzed. Key to this analysis will be the response of wild chinook and steelhead to transportation.
- Because the in-river migration conditions were lethal, and the ocean conditions were good, 2001 may represent the best possible results that can be expected from transportation of smolts.
- At this point, the 2001 implemented passage strategy, maximization of transportation of smolts, as it relates to recovery of listed stocks cannot be determined.

Early indicators banish gloomy forecasts for salmon

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News

Early indicators banish gloomy forecasts for salmon

07/30/02

JONATHAN BRINCKMAN

The drought and the energy crisis last summer sent power prices soaring and raised fears that Columbia River salmon and steelhead would be decimated. But it wasn't a catastrophe for fish after all.

Many conservationists and biologists predicted dire consequences for salmon runs after the federal government gave electricity generation priority over fish protection last year. Yet counts of yearling male salmon that return early to spawn -- they are called jacks -- indicate that spring and summer chinook numbers next year will be well above the average throughout the 1990s.

"Things aren't as bad as the gloom and doom that everybody said," said John Williams, a National Marine Fisheries Service biologist. "People were overly pessimistic."

It appears a combination of factors is responsible: aggressive barging of juvenile fish from hatcheries to the ocean, reducing mortality in migrations that occurred while dammed water was withheld for power generation; and cold upwellings in the ocean, carrying with them rich nutrient loads. No one is sure, however, which played the more critical role. The results are clear, however: Most of the young salmon that migrated down the Columbia River last year and survived will return as adults in 2003, after spending two years in the ocean. A small fraction of those fish, the jacks, return a year early. Their number provides a reliable indicator of the next year's adult run, biologists say.

About 14,000 spring and summer chinook jacks had been counted by Wednesday at Bonneville Dam. That's 4,600 more than the annual average for that date since 1990. State fish biologists predict that 250,000 to 300,000 spring and summer chinook will pass Bonneville Dam in 2003. Not counting this year and last year -- which saw much larger than average runs of spring and summer chinook -- 300,000 fish would be the largest spring/summer run since 1972.

The preliminary 2003 forecast for fall chinook, which arrive after spring and summer chinook, has not been completed.

Emergency measures

Last year, many biologists were pessimistic about the outlook for 2003 runs. The Bonneville Power Administration, which markets electricity generated at federal dams in the Columbia Basin, declared a power emergency in early 2001 because the drought had reduced river flows at the same time wholesale electricity prices soared to record levels. Declaring an emergency allowed the federal government to sharply reduce the amount of water it sends through spillways, an action normally required by the federal Endangered Species Act to give young salmon a way to get past dams without going through electricity-generating turbines. The turbines' spinning blades kill or injure some of the young

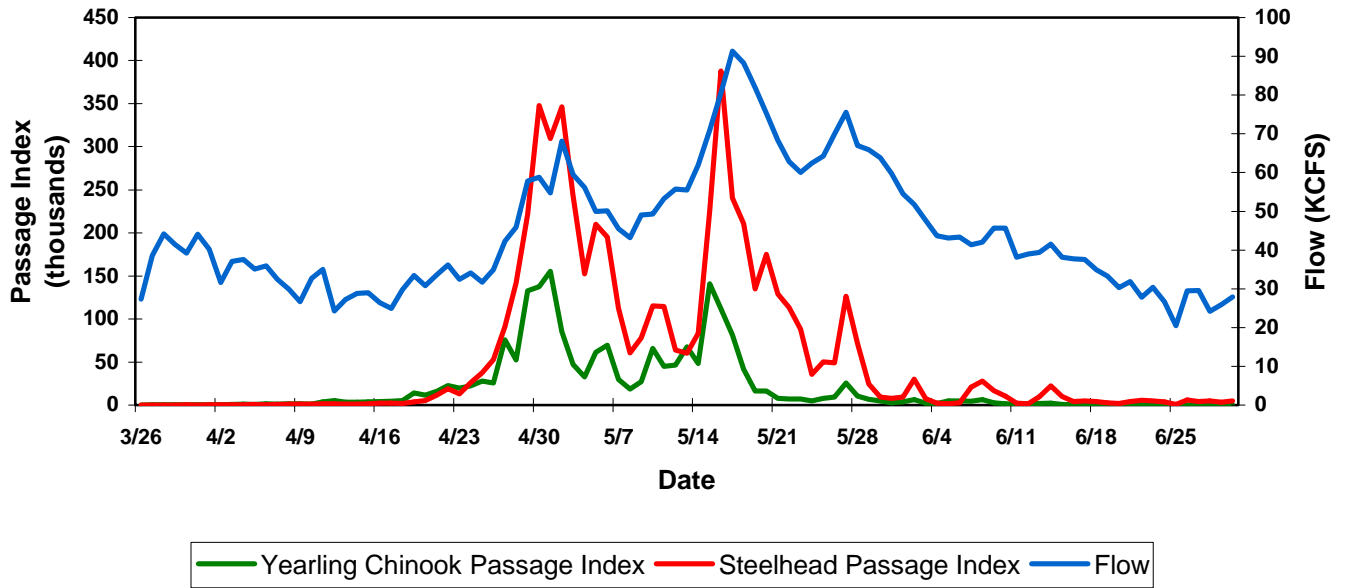
fish and can disorient the survivors, making them more vulnerable to predatory fish downriver from the dams.

BPA officials said they had no choice but to reduce the spill in order to meet regional demand for electricity. They said they spilled as much water as they could -- about 20 percent of what normally is required -- to help salmon as much as possible. In addition, about 90 percent of the young salmon and steelhead migrating down the Snake River were collected, loaded into trucks and barges, and transported around the dams to the ocean, which reduced the impact of the smaller spill, they said. But BPA officials also didn't anticipate that so many jacks would turn up this year. "The jack counts are very positive and much better than expected," said Greg Delwiche, the BPA's vice president of generation supply. "This should be good news for anyone interested in salmon recovery." The high jack counts show that transporting as many juvenile fish as possible is a good strategy during drought years, because it gets young fish out of the slow, warm and potentially lethal river, said officials at the BPA and the National Marine Fisheries Service, the federal agency in charge of salmon recovery. Ocean more nurturing But something else is also going on: Ocean conditions appear to be very favorable to salmon. Upwelling is bringing nutrients from deep water, providing food for the marine life that salmon feed upon in the ocean. Fish that safely reached the ocean appear to have survived at a high rate, biologists said. "Our ability to collect fish and transport them on barges seems to have worked," said Bill Muir, a research biologist with the fisheries service. "And then ocean conditions saved us."

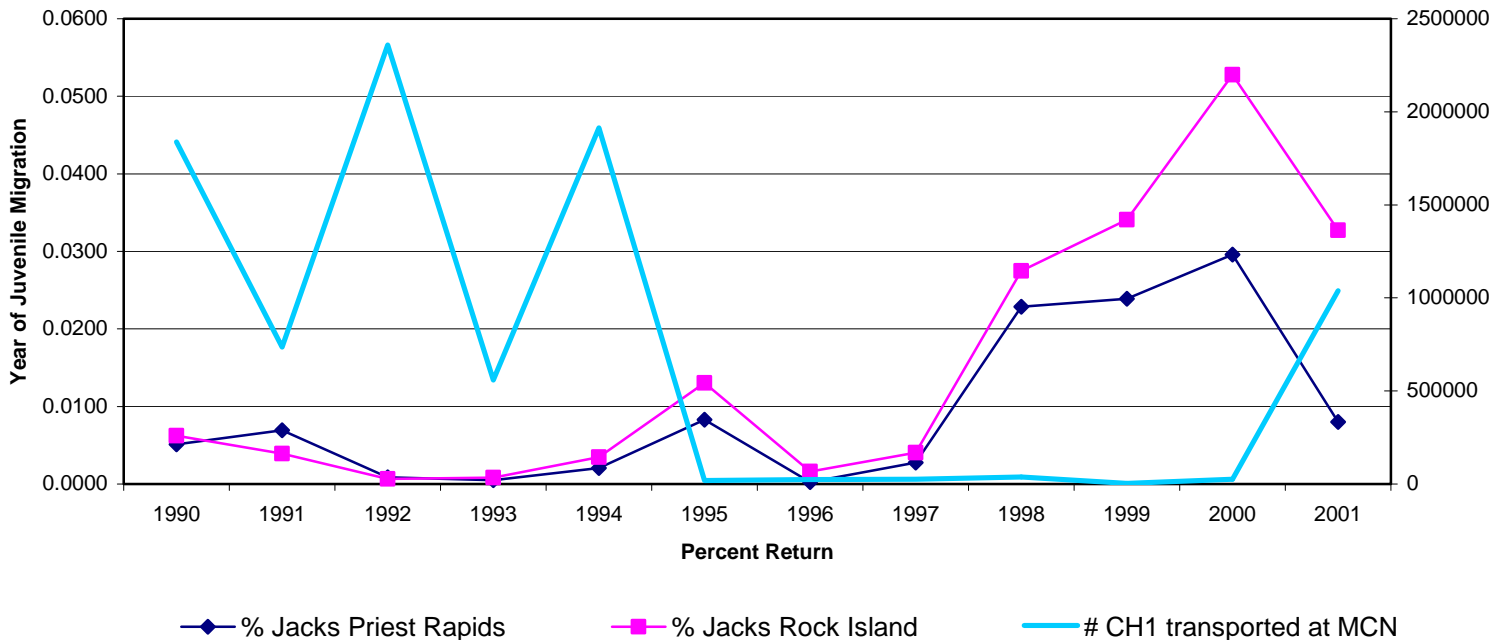
But some conservationists and sport fishing advocates are still critical of the way the federal government operated dams last year. Pat Ford, executive director of Save Our Wild Salmon, said it's not enough to beat the average of the past 10 years. Returns in the 1990s, he said, were low enough to put many salmon runs on the road to extinction. Liz Hamilton, executive director of the Northwest Sportfishing Industry Association, said the number of salmon returning next year would have been much smaller if ocean conditions weren't so good. "Right now the ocean conditions are like the stock market was in the '90s -- anything can succeed," Hamilton said. "But the fishing community is not satisfied, because we know things could have been a lot better."

You can reach Jonathan Brinckman at 503-221-8190 or by e-mail at jbrinckman@news.oregonian.com. Latest News | The Oregonian Links & Archives | User Agreement | Privacy Policy | Help/Feedback | Advertise With Us © 2002 OregonLive.com. All Rights Reserved.

Lower Granite Dam Spring 2001 Passage Indices and Flow



Spring Chinook Jacks as a Percent of Hatchery Release (Mid-Columbia)

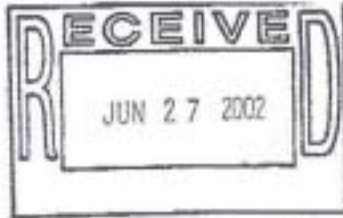


CSS PIT tagged hatchery yearling spring/summer chinook in migration years 1997 to 2001

Migration	Hatchery=>	DWOR	DWOR	RAPH	RAPH	IMNH	IMNH	MCCA	MCCA
Year	Category=>	T0	C0	T0	C0	T0	C0	T0	C0
1997	SAR jacks	0.00%	0.03%	0.00%	0.00%	0.56%	0.14%	0.12%	0.07%
1997	SAR adults	0.82%	0.43%	0.79%	0.45%	1.16%	0.86%	1.51%	1.09%
1997	T0/C0 jacks		N.A.		N.A.		4.13		1.57
1997	T0/C0 adults		1.91		1.73		1.36		1.38
1997	% jacks	0.0%	7.1%	0.0%	0.0%	32.4%	13.6%	7.1%	6.3%
1998	SAR jacks	0.13%	0.21%	0.09%	0.19%	0.71%	0.42%	0.58%	0.49%
1998	SAR adults	0.88%	1.32%	1.99%	1.23%	0.86%	0.57%	2.68%	1.38%
1998	T0/C0 jacks		0.61		0.46		1.71		1.18
1998	T0/C0 adults		0.67		1.63		1.50		1.95
1998	% jacks	12.6%	13.7%	4.1%	13.1%	45.3%	42.1%	17.8%	26.4%
1999	SAR jacks	0.041%	0.048%	0.13%	0.13%	0.91%	0.42%	0.49%	0.42%
1999	SAR adults	1.18%	1.19%	3.03%	2.33%	2.55%	1.43%	3.55%	2.40%
1999	T0/C0 jacks		0.85		1.05		2.17		1.17
1999	T0/C0 adults		0.99		1.30		1.79		1.48
1999	% jacks	3.3%	3.8%	4.2%	5.1%	26.2%	22.6%	12.2%	14.9%
2000	SAR jacks	0.011%	0.007%	0.019%	0.025%	1.20%	0.97%	0.62%	0.38%
2000	SAR adults*	0.49%	0.49%	1.35%	0.74%	2.49%	1.85%	2.94%	1.42%
2000	T0/C0 jacks		1.51		0.75		1.24		1.66
2000	T0/C0 adults*		1.01		1.82		1.35		2.06
2000	% jacks	2.2%	1.5%	1.4%	3.2%	32.5%	34.4%	17.5%	20.9%
2001	SAR jacks	0.06%	0.00%	0.11%	0.00%	0.36%	0.00%	0.32%	0.17%
2001	T0/C0 jacks		N.A.		N.A.		N.A.		1.87

Note: adults* include 2-ocean fish only

Note: 2001 SARs for jacks are preliminary values



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Northwest Fisheries Science Center
Fish Ecology Division
2725 Montlake Boulevard East
Seattle, Washington 98112-2097

June 24, 2002

MEMORANDUM FOR: F/NWR5 - Brian Brown

FROM: F/NWC3 - Michael H. Schiewe *Michael H. Schiewe*

SUBJECT: Preliminary jack returns from Snake River spring-summer chinook salmon juveniles that migrated during the 2001 low-flow conditions

Because of very low flow, compounded by lack of spill at Snake River dams, the 2001 smolt migration conditions were considered some of the poorest in the last few decades. Our estimate of survival for Snake River spring-summer chinook salmon smolts migrating downstream from Lower Granite Dam to the Bonneville Dam tailrace was approximately 26%. This was a fifth lower than the estimated 33% average survival for hydropower system migrants during the 1993 and 1994 outmigrations, prior to the implementation of BiOp spill, and approximately one-half of the estimated 50% average survival for hydropower system migrants during the 1995 through 2000 outmigrations.

Earlier this year we presented to the Northwest Power Planning Council and the Implementation Team estimates of survival for the 2001 outmigration. At that time, we stated that despite the poor migration conditions, the strength of the subsequent adult return would likely hinge mostly on conditions downstream from Bonneville Dam and in the ocean, because as seen in Figure 1, nearly 100% of the live fish below Bonneville Dam in 2001 arrived via transportation. We also pointed out that the percentage of live fish below Bonneville Dam that arrived via transportation in 2001 was not particularly unusual compared to previous years. Finally, we stated in our presentations that although most adult returns would come from transported fish, the size of subsequent adult runs was not an evaluation of transportation, nor did we intend to use these returns to advocate for or against transportation as a means to mitigate for Snake River dams. We merely noted that the vast majority of returns we have seen, or will see, are from transported fish.

Although not a perfect predictor, the return of 1-ocean fish (jacks) from an outmigration provides an indication of the expected subsequent adult return. Figure 2 provides Snake River chinook salmon jack return rates to Ice Harbor Dam through 23 June of this year compared to jack return rates through the



same date in previous years. The jack return rate is computed as total hatchery and wild returns divided by the total number of spring-summer chinook salmon smolts released at Snake River basin hatcheries the previous year. Based on these data, we expect that the complete adult return rate from the 2001 outmigration will likely fall in the range of those from the last few years.

The adult escapement of spring-summer chinook salmon to the Snake River in 2001 was the largest on record. This year's return will have the second largest escapement. These returns resulted primarily from large hatchery releases (10.9M in 1999 and 7.1M in 2000) coinciding with good survival in the ocean. While jack return rates this year are similar to those of recent years, we expect considerably fewer adult fish will return in 2003, as the hatchery release in 2001 was only 4.1M fish.

If you have any questions concerning these results, please call John Williams at (206) 860-3277.

cc: F/NWR - Lohn
F/NWC - Varanasi
F/NWR5 - Ruff
F/NWC3 - Ferguson
F/NWC3 - Matthews
F/NWC3 - Muir
F/NWC3 - Smith
F/NWC3 - Williams
F/NWC3 - Zabel

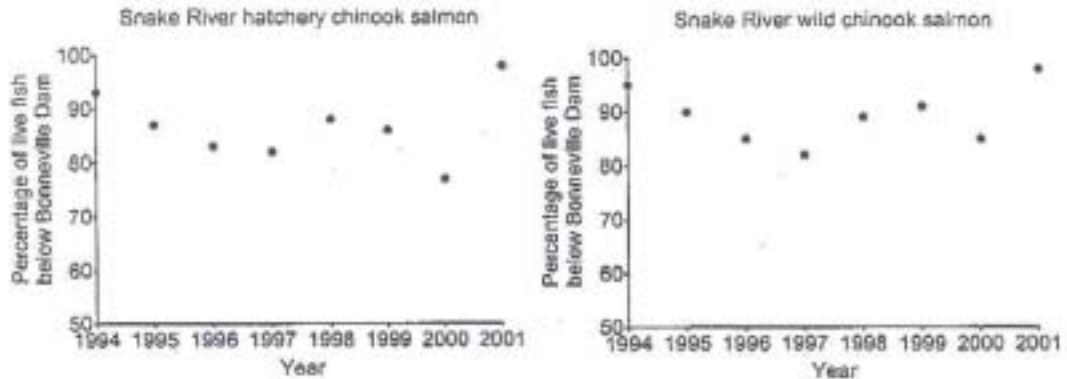


Figure 1. Percentage of live juvenile spring-summer chinook salmon smolts from the Snake River that arrived below Bonneville Dam via transportation. Assumed 98% of transported fish were alive at release. Applied annual system survival estimates to the percentage of the population that was not transported.

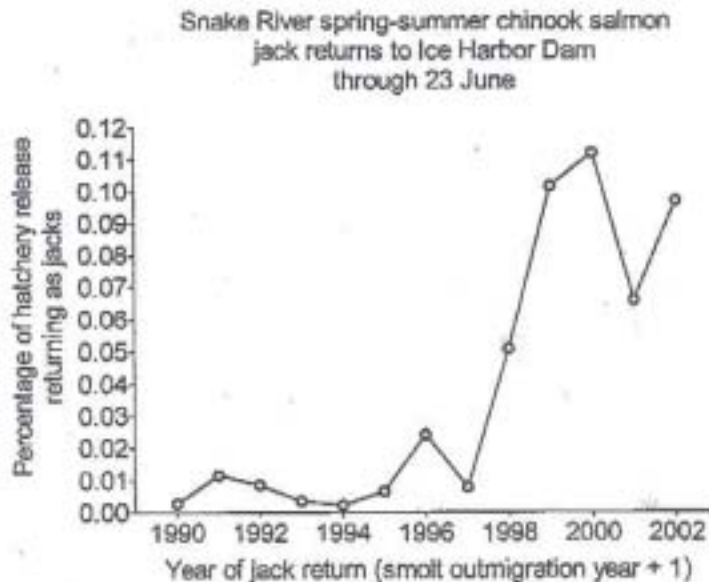


Figure 2. Annual percent return of jack spring-summer chinook salmon to Ice Harbor Dam through 23 June, based on the total number of spring-summer chinook salmon smolts released at Snake River Basin hatcheries (as reported in Fish Passage Center Annual Report) the previous migration year.