Lower Columbia Spring Chinook

Existing Populations

This SMU includes the Clackamas, Sandy, and Hood historical populations. The Clackamas and Sandy have been substantially influenced by hatchery fish. The Hood population is extinct. The SMU only met three of the interim criteria indicating the near-term sustainability is at risk.

Table 58. Population list and existence status for the Lower Columbia Spring Chinook SMU.

Exist	Population	Description
Yes	Clackamas	Clackamas River basin.
Yes	Sandy	Sandy River basin.
No	Hood	Hood River basin.

Habitat Use Distribution

The criterion was evaluated based on current and historically accessible areas because actual habitat usage by lower Columbia spring Chinook is unknown. It must be recognized that these estimates are derived at the 1:100,000 scale and thus ***will not*** capture habitat lost in many smaller (1:24,000) streams resulting from barriers such as culverts. Habitat lost in smaller streams will vary by population, but is not likely to account for 50% of any population, and thus does not alter assessment outcomes derived using data at the 1:100,000 scale. Data presented in this report on accessibility of habitat should be viewed as general approximations and not as a definitive analysis on habitat availability/accessibility. These issues will be more thoroughly addressed through the conservation planning process.

Table 59. Habitat accessibility data used in evaluating interim criteria for the Lower Columbia Spring Chinook SMU.

Population	Accessible (miles)	Inaccessible (miles)	Percent Accessible
Clackamas	138.5	0.0	100%
Sandy	89.6	17.5	84%
Hood[a]		*Extinct population*	

a. 56 miles of historic habitat remain accessible.

Abundance

Abundance estimates for the SMU were based on dam counts at North Fork Dam on the Clackamas River and Marmot Dam on the Sandy River. The primary spawning habitat in these basins is above these two dams. North Fork Dam counts were obtained from ODFW 2004, ODFW (pers. comm., Todd Alsbury, 1/28/05), and the Willamette-Lower Columbia TRT (pers. comm., Paul McElhaney, unpublished data). Marmot Dam counts were obtained from the Willamette-Lower Columbia TRT (pers. comm., Paul McElhaney, unpublished data) and PGE (pers. comm., Jim Bartlett, 1/10/05).

Beginning with the 1997 brood, all spring Chinook released in the Clackamas and Sandy were adipose finclipped. Those fish began returning in 2000. In 2000-2001, all non-finclipped fish were prevented from passing upstream of the dam, but not all hatchery returns were finclipped. The 2002 return year was the first year that all returning hatchery spring Chinook should have been adipose finclipped, and only non-finclipped fish were passed above the dams.

When possible, findings from studies of hatchery-to-naturally produced ratios of fish passed above the dams were used to determine naturally-produced abundance levels above the dams. A

significant portion of non-finclipped fish passed by the dams in 2002 and 2003, and later sampled on the spawning grounds were actually of hatchery origin. Otolith analysis revealed that 31% of non-finclipped fish spawning above North Fork Dam in 2002, and 24% in 2003 were hatchery origin. Similar analysis in the Sandy showed 19% in 2002, and 18% in 2003 of non-finclipped spawners were hatchery origin (Schroeder et al. 2003; pers. comm., K. Schroeder, 1/7/05). 2004 abundance estimates were derived by adjusting counts of non-finclipped fish passed above the dam by the average of hatchery fractions based on otolith analysis for each respective basin. ODFW (2001a) presents estimates of the proportion of spring Chinook spawning above Marmot Dam that are hatchery origin for 1996-2000.

It is likely that a significant portion of spawners in recent years are of hatchery origin and by using total dam counts to evaluate the abundance interim criterion we have underestimated risks for these two populations. Conversely, the 30-year average abundance for both populations was calculated using the abundance data described above. This method incorporates hatchery and naturally produced fish into the estimate in many years and sets the abundance criterion at an artificially high level, and may cause over sensitivity to abundance related risks. The 30-year average with both hatchery and naturally produced fish may be similar to full seeding levels for the Clackamas. In the Clackamas, the 30-year average abundance was 2,128. As part of the Northwest Power and Conservation Council's subbasin planning process, Mobrand Biometrics (2004) estimated the habitat potential of the Clackamas basin to produce adults was 2,434 if no harvest took place, and 1,620 with harvest.

Table 60. Adult abundance estimates used in evaluating interim criteria for the Lower Columbia Spring Chinook SMU. Numbers in bold italics represent estimates that include an unaccounted proportion of hatchery fish.

Population	30-Year Average	25% of Average	Abundance by Return Year 2000	2001	2002	2003	2004	No. Years >25% of Average
Clackamas	***2,128***	***532***	***2,243***	***3,692***	1,550	2,730	3,730	≥3
Sandy[a]	***1,579***	***395***	2,210	***2,445***	944	817	2,028	≥4
Hood	*Extinct population*							

a. Average abundance based on 28 years of data available since 1977.

Productivity

Productivity in the Clackamas could not be estimated based on data used for the abundance criterion because hatchery and naturally produced fractions of spawners were unknown prior to 2002. Productivity in the Clackamas was evaluated by developing estimates of the proportion of fish passed above North Fork Dam that were of hatchery origin back to 1991. In 2002-2004, the number of natural spawners was known based on data described in the "Abundance" section. We used data from 2002-2004 to estimate the proportion of fish arriving at North Fork Dam that were of hatchery origin by including both finmark rates observed at the dam, and otolith analysis of non-finclipped fish passed above the dam. In those three years, 77% to 81% of fish arriving at the dam were estimated to be hatchery origin. Next, we looked at the number of hatchery releases that produced those hatchery fractions in 2002-2004. The average release levels from four and five years prior were used because Clackamas spring Chinook return primarily at age-4 and 5 and in roughly equal proportions. Hatchery fractions between 1991 and 2001 were estimated by scaling the percentage of hatchery fish released in broods that produced returns for those years against the average release levels that produced the hatchery fractions observed in 2002-2004. That scalar was then multiplied by 79% (average hatchery fraction from 2002-

2004). The resultant hatchery fractions of fish arriving at North Fork Dam from 1991-2001 ranged from 73% to 93%. The estimates for 1999-2001 were adjusted to account for finclipped fish that were removed at the dam since in those years the first fin-clipped hatchery fish began returning to the Clackamas.

Since hatchery fractions were so high, parent abundance was only below the average natural abundance (calculated based on 1991-2004 naturally produced returns) in two years. In one of those two years recruits per spawner was below 1.2. Among the five years of lowest parent abundance, recruits per spawner was below 1.2 in three years. Based on these findings, and the extremely high proportions of hatchery fish in the naturally-spawning population through 2001, it was determined that the population failed the productivity criterion. The Clackamas may be more likely to pass the criterion in the future since all spring chinook hatchery releases in the Clackamas are now adipose finclipped, and clipped returns are not passed above the dam.

Using Marmot Dam counts, hatchery-to-naturally produced ratios from ODFW 2001(a) and ODFW (pers. comm., K. Schroeder, 1/7/05), and age composition of returns to the mouth of the Clackamas River (Foster and Boatner, 2002), we were able to estimate natural productivity in the Sandy for the 1992-1995 and 1998-1999 brood years. Since the hatchery-to-naturally produced ratio was unkown for the 2001 returns, productivity could not be estimated for the 1996-1997 broods. Recruits per spawner in 1992-1995 and 1998-1999 brood years ranged from 0.5-1.2. These estimates were not used to assess the population for the productivity criterion because parent abundance may have been high enough that density dependent mortality was occurring. Parent abundance in those years ranged from 1,503-5,803, and the 30-year average abundance in the Sandy above Marmot Dam is 1,579. It is worth noting that in the one year that parent abundance was below the 30-year average, productivity was 1.2. The Sandy failed the criterion citing insufficient data. Precautionary application of the interim criteria treat insufficient data as failure in assessment of risks to the SMU.

Table 61. Productivity estimates used in evaluating interim criteria for the Lower Columbia Spring Chinook SMU.

	Recent Complete Brood Years	Productivity (R/S)					
Population	**of Below Average Abundance**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Years ≥ 1.2**
Clackamas	*Insufficient data – 1 of 2 Years with data below 1.2 R/S*						*Fail*
Sandy	*Insufficient data*						*Fail*
Hood	*Extinct population*						

Reproductive Independence

Beginning in 1997, all spring Chinook released in the Sandy and Clackamas were adipose fin-clipped. Beginning in 2002, essentially all returning hatchey fish should have been fin-clipped. When possible, independent estimates of the proportion of hatchery fish that made up natural spawners in each population were used. These included estimates in the Sandy from ODFW (2001a) and estimates in the Clackamas generated for this assessment (see "Productivity" section). Estimates since 2002 were available for both basins from Schroeder et al. (2003) and ODFW (pers. comm., K. Schroeder, 1/7/05). Evidence suggests that the proportion of hatchery spawners in the natural population was high for both the Clackamas and Sandy populations.

Schroeder et al. (2003) found that in 2002, 31% of natural spawners above North Fork Dam were hatchery origin despite the fact that all fish passed above the dam were non-finclipped. Some of these fish were likely double-index fish (non-finmarked, coded wire-tagged) and mis-marked hatchery fish (fin clipping errors) that were passed upstream of North Fork Dam. In 2003, 24%

of non-finclipped spawners in the Clackamas were of hatchery origin. In 2002-2004, 60-64% of dam arrivals were adipose clipped.

In the Sandy basin, ODFW (2001a) presents estimates of the origin of fish passed above Marmot Dam for 1996-2000 based on CWT recoveries, Marmot Dam observations for 1999 and 2000, and mark rates of hatchery releases in the Sandy River. Estimates in those years ranged from 4% to 29% hatchery fish. No estimate was available for 2001, but Schroeder et al. (2003) estimated that 19% of non-finclipped fish passed above Marmot Dam in 2002 were of hatchery origin. In 2003, 18% were hatchery origin. Further, in 2002-2004, 50% to 72% of fish approaching Marmot Dam were adipose finclipped (unpublished data PGE data, pers. comm., Jim Bartlett, 1/10/05).

Table 62. Reproductive independence estimates used in evaluating interim criteria for the Lower Columbia Spring Chinook SMU.

	Percent of Spawning Fish of Hatchery Origin					Years
Population	**1999**	**2000**	**2001**	**2002**	**2003**	**≤10%**
Clackamas[a]	82%	72%	61%	31%	24%	0
Sandy[b]	15%	7%	--	19%	18%	≤1
Hood	*Extinct population*					

a. 1999-2001 estimates based on analysis described in the "Productivity" section. 2002 and 2003 estimates based on otolith analysis of non-finclipped fish passed above North Fork Dam.

b. 1999-2000 estimates presented by ODFW (2001a). 2002-2003 data based on otolith analysis of non-finclipped fish spawning above Marmot Dam.

Hybridization

Hybridization has not been identified as an issue for lower Columbia spring Chinook.

Assessment Conclusions

The Lower Columbia Spring Chinook SMU includes three populations in Columbia River tributaries including the Clackamas, Sandy, and Hood. The Clackamas and Sandy are still in existence, but have been influenced by hatchery fish to an unknown degree. The SMU does not have 80% of its historical populations still in existence and thus does not meet the first interim criterion of the NFCP. The SMU meets three of the interim criteria and is classified as "At Risk".

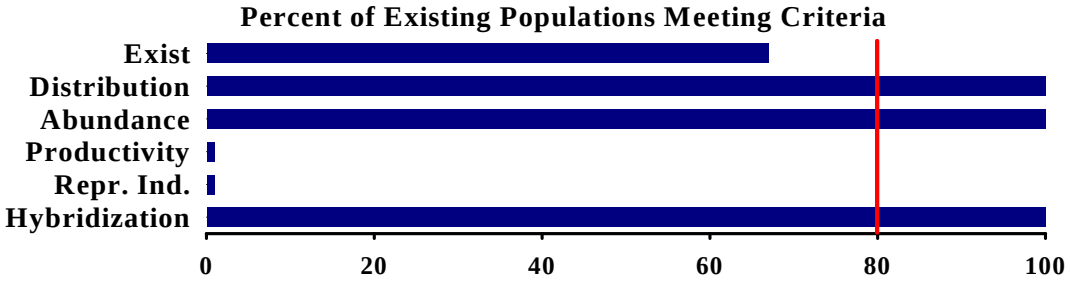
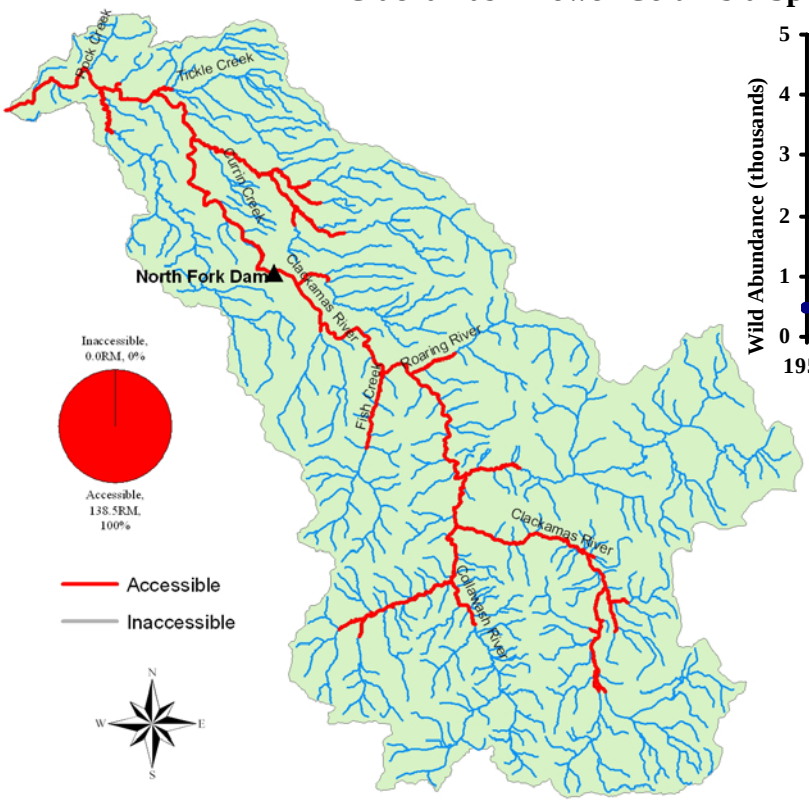
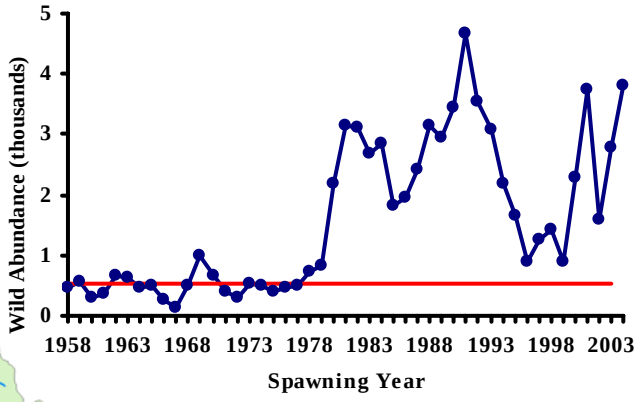


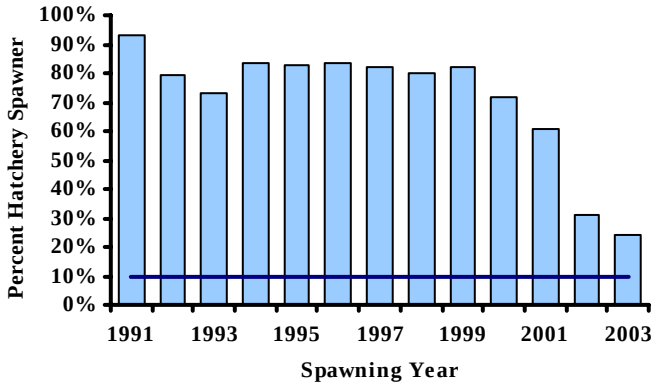
Figure 17. Assessment outcome for each of the six interim criteria with respect to the 80% threshold identified by the NFCP.

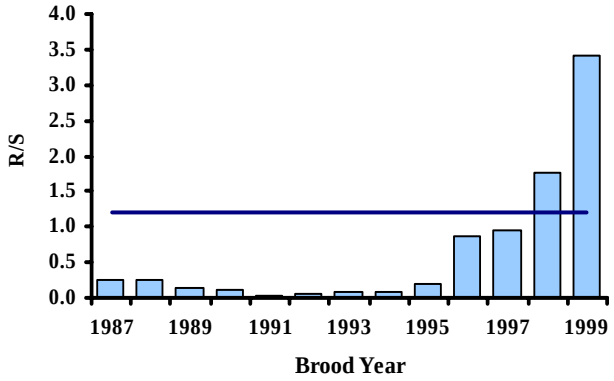
Clackamas – Lower Columbia Spring Chinook





The Clackamas spring Chinook population passed four of the interim criteria, but failed both productivity and reproductive independence. Abundance in the Clackamas is monitored as fish passage at North Fork Dam. The 2002 return year was the first year that all returning hatchery spring Chinook were adipose finclipped. Prior to 2002, not all hatchery fish could be distinguished at the dams, thus counts represent total passage of naturally-produced and hatchery fish. The graph above shows hatchery and naturally produced fish combined through 2001, and naturally-produced fish only in 2002-2004. The population failed the independence criterion. Using techniques described in the methods section, hatchery fractions were estimated to be between 60-95% from 1990-2001. Productivity was failed because in one of two years of low abundance, productivity was below 1.2. Hatchery ratios among spawners have been so great that it is unlikely productivity would be high enough to pass the criterion in other years of low abundance.

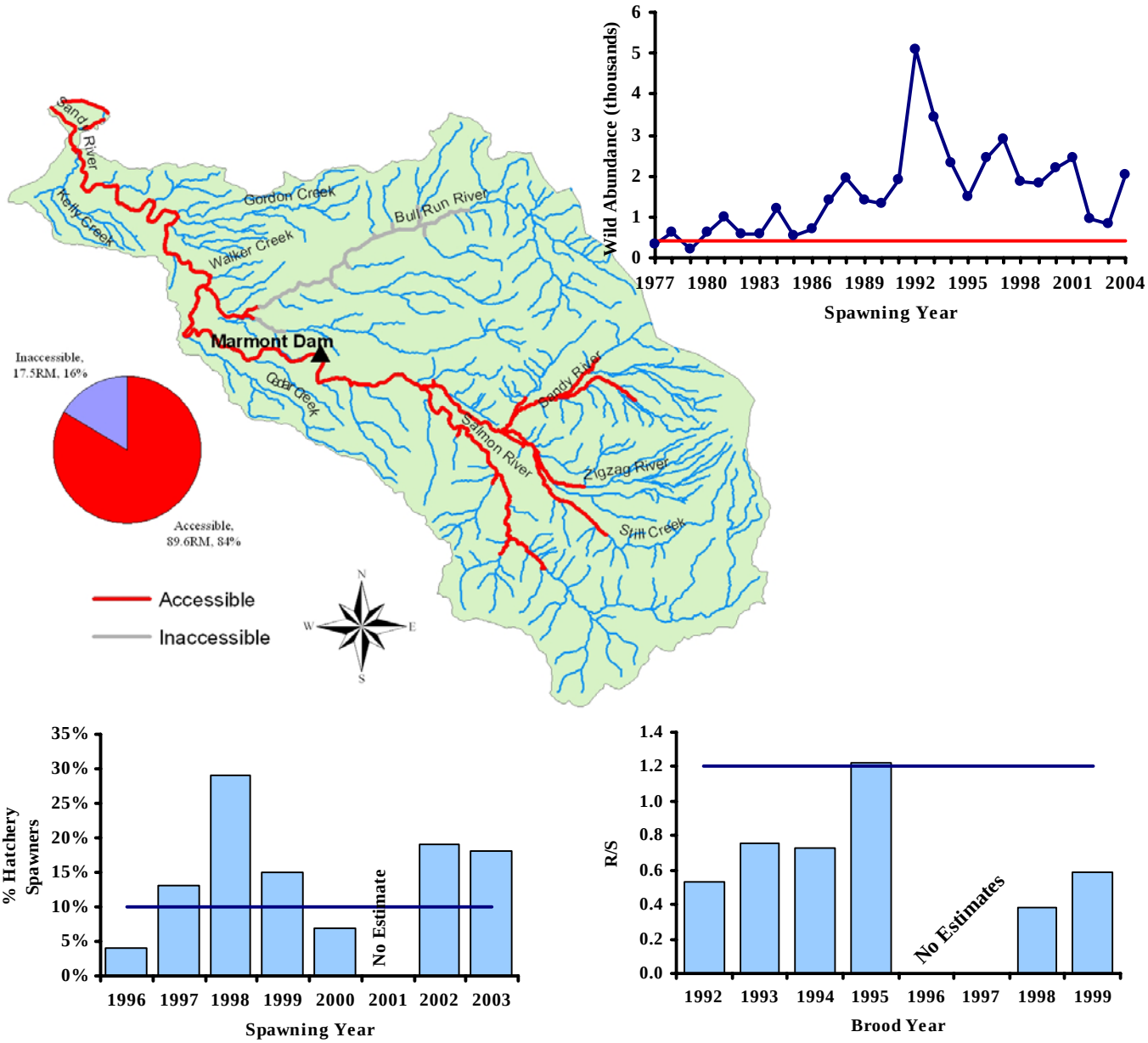




Assessment Outcome

Existence	Distribution	Abundance	Productivity	Independence	Hybridization
Pass	*Pass*	*Pass*	*Fail*	*Fail*	*Pass*

Sandy– Lower Columbia Spring Chinook

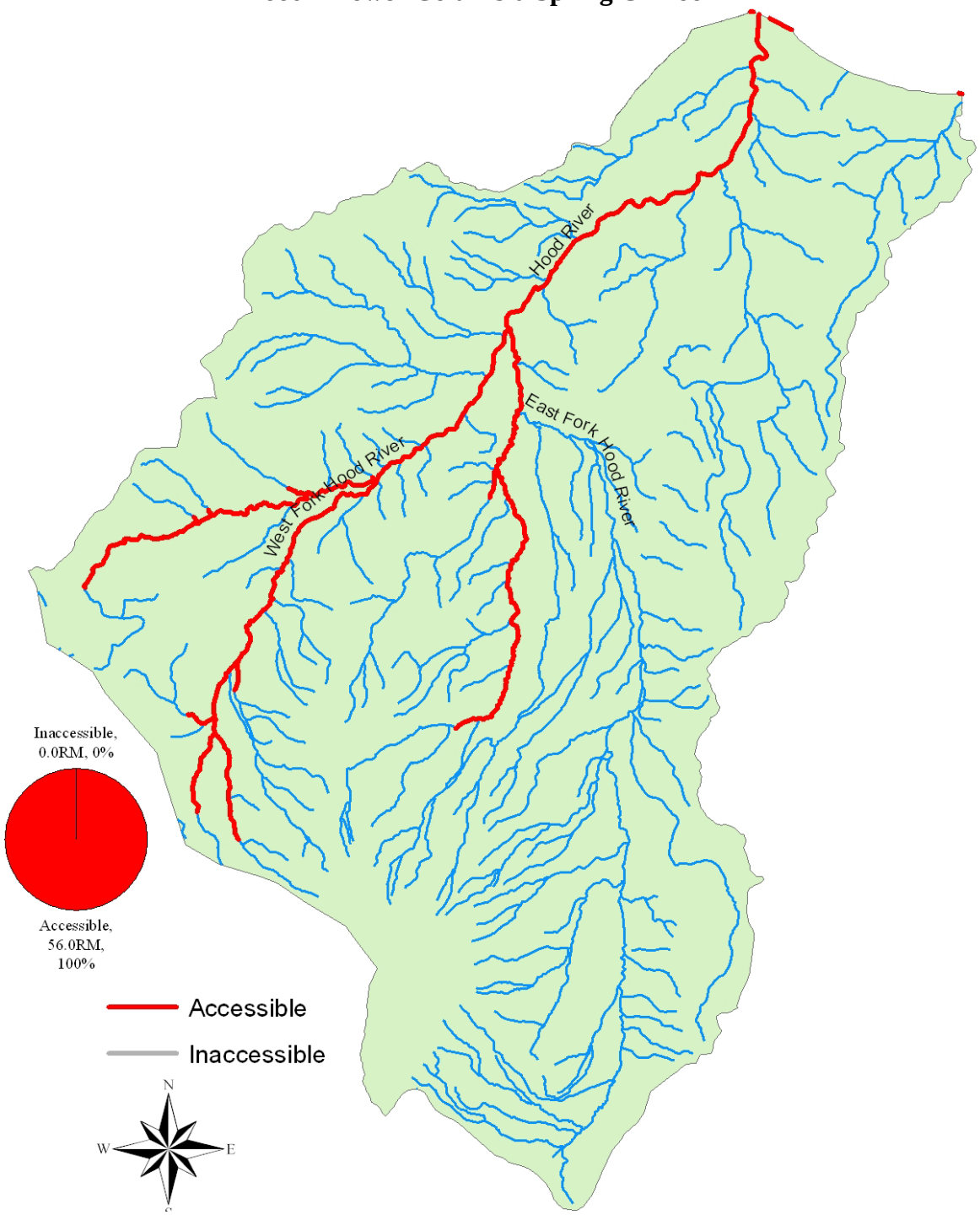


The Sandy spring Chinook population passed four of the interim criteria, but failed reproductive independence and productivity. Abundance in the Sandy is monitored by fish passage at Marmot Dam. The 2002 return year was the first year that all returning hatchery spring Chinook were adipose finclipped. Prior to 2002, naturally and hatchery-produced fish could not be distinguished at the dams. The origin of natural spawners has been estimated via CWT recoveries since 1996. Abundance estimates prior to then were not corrected for hatchery-to-naturally produced ratios. Evaluation of productivity estimates was inconclusive because all but one year did not qualify as "low abundance" years. Precautionary application of the interim criteria treats insufficient data as failure in assessment of risks to the SMU, so the productivity criteria was failed.

Assessment Outcome

Existence	Distribution	Abundance	Productivity	Independence	Hybridization
Pass	*Pass*	*Pass*	*Fail*	*Fail*	*Pass*

Hood – Lower Columbia Spring Chinook



The native spring Chinook population in the Hood Basin is considered extinct. Bonneville Power Administration is currently funding the Hood River Production Program which has used Deschutes stock spring Chinook to re-establish a population within the Hood. Though returns have been low, natural production is occurring.

Assessment Outcome

Existence	Distribution	Abundance	Productivity	Independence	Hybridization
Fail	--	--	--	--	--