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MULTIDISCIPLINARY
SCIENCE TEAM
(IMST)**



State of Oregon

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Kay Brown
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Dear Kay,

This letter is a revision of IMST's review of ODFW's proposed Lower Columbia River Coho Management Plan (LCRCMP) that was sent to Oregon Department of Fish & Wildlife on April 3, 2002. After we submitted the April 3rd letter, ODFW staff brought an error to our attention. This letter corrects that mistake and represents our advice to your agency and the State of Oregon. The error was related to our observation that 1) the mark rate in the fishery was the same as the mark rate in the hatchery and 2) the State should strive to obtain a higher mark rate in the fishery than in the hatchery. If the recovered marks are accurate representations of the marked populations and the survival rates of marked and unmarked fish and wild and hatchery fish are the same, the mark rate in the fishery cannot exceed the mark rate in the hatchery. Thank you for bringing this point to our attention. We have corrected that paragraph and clarified our recommendation about comparing the lower Columbia River coho model with the Nickelson-Lawson model. We hope that these comments will be helpful to the Department and the Oregon Fish and Wildlife Commission.

IMST strongly endorses the development of a specific management plan for the coho salmon stocks of the lower Columbia River. Our earlier report on Harvest Management (IMST 2000) concluded that "all wild coho salmon in Oregon---lower Columbia River, north coast, central coast, and south coast stocks---should be managed under the same principles and goals. There is no scientific basis for treating lower Columbia River coho salmon separately from coastal coho salmon." As noted in our recent comments to Ed Bowles on the Native Fish Conservation Program, we also endorse your emphasis on ODFW's role 1) to establish clear management standards, 2) to quantitatively assess the risks of extinction associated with management policies, 3) to err on the side of conservation in relation to scientific uncertainty, and 4) to monitor status and trends in lower Columbia River coho salmon populations. In particular, the IMST supports the development of a recovery plan for the lower Columbia River coho salmon and the development of criteria for recovery that are included in this new plan.

In general, we have three major concerns about the proposed management plan: 1) harvest rates include both marine and in-river harvest, thus subjecting these stocks to 50% greater impacts than coastal stocks even during periods of low abundance, 2) using separate population models for coastal stocks and lower Columbia River stocks, and 3) using strong populations as the indicator populations for the lower Columbia River coho.

The Harvest Matrix presented in the LCRCMP calls for higher impacts than the State uses in managing coastal coho salmon (Amendment 13; PFMC 1997). Greater impact rates are inherent with an upriver terminal fishery because the fish must pass through both coastal and in-river fishing. At very low levels and critically low levels, higher impact rates have the potential to create higher risks of extinction for the limited coho populations of the lower Columbia River. The development of the harvest matrix and its potential consequences for the risk of extinction are based on an analysis by Mark Chilcote. The IMST has not had an opportunity to review this process in detail, but the general approach appears to include components that may be technically sound.

The State of Oregon has developed two separate models of coho salmon (Nickelson and Lawson 1998, Chilcote 2001). The Nickelson-Lawson model that is used for coastal OCN coho is based primarily on habitat relationships and incorporates the full life history of coho salmon. The Chilcote model used for the lower Columbia River is based more on stock-recruitment curves. This approach was taken rather than using the coastal model because the necessary habitat data were not available. Both models are useful, and consistent performance of the two models would strengthen the conclusions about risks of extinction. If the two models differ in their predictions about performance of coho salmon populations, the models could be used to explore possible explanations for the differences in the outcomes (i.e., a form of “stereoscopic vision”). The IMST recommends that ODFW should evaluate lower Columbia River coho salmon quantitatively using both the Chilcote analysis and the Nickelson/Lawson models. We recognize that the Nickelson/Lawson model requires habitat information that is being gathered this summer in basin surveys of the lower Columbia River tributaries. Incorporating these results into the models and comparing the estimates of the risks of extinction from the two models should be a high priority for the State.

We also recommend ODFW to apply the 99-yr or 33-generation timeframe adopted by the PFMC in their analysis of the probability of extinction. The timeframe used in the LCRCMP is one-third that used in other analysis for OCN coho salmon. During periods of low survival, great caution should be used in managing these stocks because of the potential for greater impacts from the combined ocean fisheries, in-river net fisheries, and sport harvest. Decreased performance of the two healthy stocks in the Sandy and Clackamas raise additional concerns, especially in light of the probable extinctions that have occurred in the lower tributaries over the last 50 years (see analysis by Mark Chilcote, ODFW in Figures 1-9).

The double jeopardy of coho (ocean and in-river fishery) impacts may be too high at low populations, especially when many of the coho are caught in river during a period of the year when river temperatures are high and hook and release mortalities may be high. Has

this been incorporated into the impacts estimated in Table 2? Is ODFW assuming a 10% hook and release mortality for in-river fisheries and what is the scientific basis for this estimate? IMST has endorsed the development of the Very Low and Critical management levels in the harvest matrix (Tables 1 and 2). We encourage additional analysis of the models and the assumptions to be certain that harvest recommendations are prudent and err on the side of protecting these extremely small and potentially vulnerable stocks.

The observed mark (adipose-clip) rate observed in the 2001 commercial catches in the Columbia River was 89.2%. This is identical to the estimate of 89.2% for the 2000 Columbia River hatchery release of yearling coho salmon (ODFW 2002). This suggests that fisheries were not preferentially selective for unmarked fish. Impacts on wild coho in the mainstem Columbia River are reduced by gear, time, area and quota restrictions, especially for the late Clackamas run. IMST encourages the State to continue these and other efforts to attain high mark rates in the fishery, which would indicate less impact on unmarked coho.

Monitoring and evaluation will be necessary to assess harvest management policies and their success. The LCRCMP uses the Clackamas River and Sandy River populations as indicators of the population trends and stock status. These two populations are the only relatively abundant and “healthy” populations in the lower Columbia River. The other populations are either extremely weak or have become extinct and are made up of hatchery fish or strays. The future viability of these weak populations will not be indicated by the Clackamas and Sandy River populations (see analysis by Mark Chilcote, ODFW in Figures 1-9). The IMST recommends a two-tiered monitoring plan that tracks both the more abundant populations and the weaker populations. Each tier would provide ecologically important indicators about the status and trends of lower Columbia River coho salmon. The more abundant populations provide a numerically more robust trend that is less vulnerable to abrupt and local fluctuations and would be interpreted with greater certainty. The weaker populations would indicate the variations and consequences of fluctuations that are more likely to lead to extinctions in these low populations. The estuary may be more important habitat for the lower river stocks and could provide valuable information on the role of estuaries in coho salmon production. The small size of the lower basins also makes the lower Columbia River stocks an important “laboratory” for learning more about metapopulation structure and dynamics. This is a critical issue in assessing the risk of extinction for coastal stocks, which vary greatly in population size and watershed area.

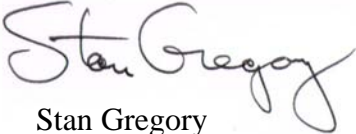
Little is included in the plan about habitat assessment and improvement of the quality and quantity of good spawning/rearing areas for wild coho. Are more surveys planned for the lower Columbia River? Also, estimates of smolt outmigration and adult returns are available from the North Fork Dam on the Clackamas, but only adults are counted at Marmot Dam on the Sandy. Life-history monitoring to include smolts on the Sandy River is needed to estimate trends in smolt production and smolts/spawner.

The IMST also finds ODFW’s decision to postpone the addition of hatchery fish into tributaries in the lower Columbia River until natural recolonization is evaluated to be

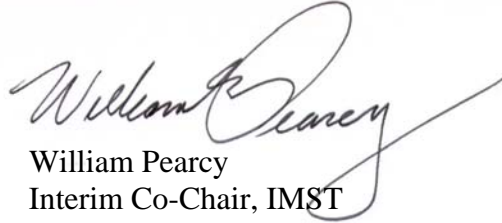
commendable. Combined with habitat surveys, this could provide an opportunity to learn how recolonization is related to habitat characteristics.

The IMST will continue to work with ODFW to review proposed management plans and monitoring efforts.

Sincerely,



Stan Gregory
Interim Co-Chair, IMST



William Percy
Interim Co-Chair, IMST

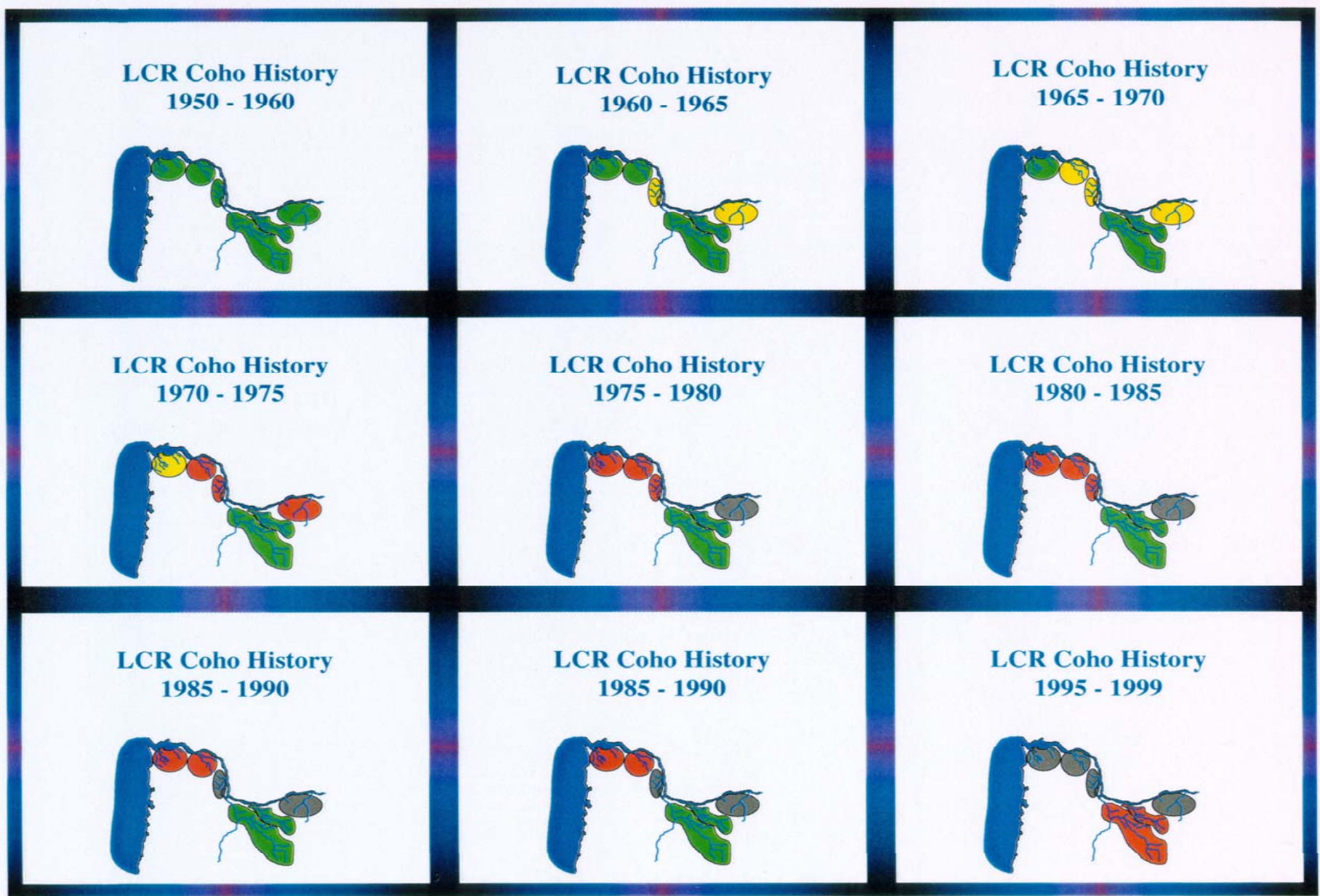
cc: OFWC
Ed Bowles
Lindsey Ball
Mark Chilcote
Sam Sharr
Louise Solliday
Neal Coenen
IMST

Nickelson, T.E., and P.W. Lawson. 1998. Population viability of coho salmon, *Oncorhynchus kisutch*, in Oregon coastal basins: application of a habitat-based life cycle model. *Canadian Journal of Fisheries and Aquatic Sciences* 55:2383-2392.

ODFW. 2002. Post-season fishery impact assessment for wild Columbia River coho, 2001. February 13, 2002, 12 pp.

Pacific Fishery Management Council (PFMC). 1997. Amendment 13 to the Pacific Coast Salmon Plan: Fishery management regime to ensure protection and rebuilding of Oregon coastal natural coho salmon. (Draft) Portland, OR.

ODFW. 2002. Integration of management in ocean and Columbia River Fisheries in 2002 to meet conservation requirements for Oregon Coastal Natural and lower Columbia River wild coho salmon. Provided by Sam Sharr, ODFW. 8 p.



Figures 1-9. Estimated status of wild Lower Columbia River Coho spawner abundance overtime. Green = moderate to high spawner densities, population is healthy, yellow = low densities, warning signal of declining population health, red = extremely low densities, population at risk of extinction, and gray = population believed extinct. Figures from Mark Chilcote, ODFW, March 26, 2002, presentation to the Joint Interim Task Force on Salmon Recovery, Salem, OR.

Table 1. Harvest management matrix for lower Columbia River wild coho salmon showing maximum allowable **OCEAN** fishery mortality rates (from ODFW 2002).

Parental Escapement		Marine Survival Index (based on return of jacks per hatchery smolt)			
		Critical (<0.0008)	Low (< 0.0015)	Medium (< 0.0040)	High (> 0.0040)
High	> 0.75 full seeding	< 8.0%	< 15.0%	< 30.0%	< 45.0%
Medium	0.75 to 0.50 full seeding	< 8.0%	< 15.0%	< 20.0%	< 38.0%
Low	0.50 to 0.20 full seeding	< 8.0%	< 15.0%	< 15.0%	< 25.0%
Very Low	0.20 to 0.10 of full seeding	< 8.0%	< 11.0%	< 11.0%	< 11.0%
Critical	< 0.10 of full seeding	0 – 8.0%	0 – 8.0%	0 – 8.0%	0 – 8.0%

Table 2. Harvest management matrix for lower Columbia River wild coho salmon showing maximum allowable mortality rates for **COLUMBIA RIVER** fisheries (from ODFW 2002).

Parental Escapement		Marine Survival Index (based on return of jacks per hatchery smolt)			
		Critical (<0.0008)	Low (< 0.0015)	Medium (< 0.0040)	High (> 0.0040)
High	> 0.75 full seeding	< 4.0%	< 7.5%	< 15.0%	< 22.5%
Medium	0.75 to 0.50 full seeding	< 4.0%	< 7.5%	< 11.5%	< 19.0%
Low	0.50 to 0.20 full seeding	< 4.0%	< 7.5%	< 9.0%	< 12.5%
Very Low	0.20 to 0.10 of full seeding	< 4.0%	< 6.0%	< 8.0%	< 10.0%
Critical	< 0.10 of full seeding	0.0 – 4.0%	0.0 – 4.0%	0.0 – 4.0%	0.0 – 4.0%

Table 3. Likely cumulative exploitation rates for lower Columbia River coho under the combined management protocols proposed for setting ocean and in-river fishery harvest rates.

Parental Escapement ^{1/}		Marine Survival Index (based on return of jacks per hatchery smolt)			
		Critical (<0.0008)	Low (< 0.0015)	Medium (< 0.0040)	High (> 0.0040)
High	> 0.75 full seeding	< 11.7%	< 21.4%	< 40.5 %	< 57.4%
Medium	0.75 to 0.50 full seeding	< 11.7%	< 21.4%	< 29.2%	< 49.8%
Low	0.50 to 0.20 full seeding	< 11.7%	< 21.4%	< 22.7%	< 34.4%
Very Low	0.20 to 0.10 of full seeding	< 11.7%	< 16.3%	< 18.1%	< 19.9%
Critical	< 0.10 of full seeding	0.0 – 11.7%	0.0 – 11.7%	0.0 – 11.7%	0.0 – 11.7%

^{1/} Full Seeding: Clackamas River = 3,800
Sandy River = 1,340

Table 4. Maximum allowable cumulative exploitation rates on lower Columbia River wild coho and how they relate to of maximum allowable harvest rates on lower Columbia River wild coho in Columbia River fisheries, harvest rates on lower Columbia River wild coho in ocean fisheries, and cumulative exploitation rates on OCN coho. Shaded cells depict in-river harvest rates or overall exploitation rates for lower Columbia River coho that exceed the maximum allowable in 2002 given the status of the parental spawners and the marine survival for the 1999 brood year production. (Table from ODFW 2002)

IMPACT RATES ON SURROGATE OCN COHO		FISHERY HARVEST RATES ON LOWER COLUMBIA RIVER COHO													
OVERALL	FRESHWATER	OCEAN	INRIVER												
			1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%	4.5%	5.0%	5.5%	6.0%		
		OVERALL EXPLOITATION RATES ON LOWER COLUMBIA COHO													
7.0%	1.13%	5.9%	6.8%	7.3%	7.8%	8.2%	8.7%	9.2%	9.6%	10.1%	10.6%	11.0%	11.5%		
7.5%	1.13%	6.4%	7.3%	7.8%	8.2%	8.7%	9.2%	9.6%	10.1%	10.6%	11.1%	11.5%	12.0%		
8.0%	1.13%	6.9%	7.8%	8.3%	8.7%	9.2%	9.7%	10.1%	10.6%	11.1%	11.5%	12.0%	12.5%		
8.5%	1.13%	7.4%	8.3%	8.8%	9.2%	9.7%	10.1%	10.6%	11.1%	11.5%	12.0%	12.5%	12.9%		
9.0%	1.13%	7.9%	8.8%	9.3%	9.7%	10.2%	10.6%	11.1%	11.6%	12.0%	12.5%	12.9%	13.4%		
9.5%	1.13%	8.4%	9.3%	9.7%	10.2%	10.7%	11.1%	11.6%	12.0%	12.5%	13.0%	13.4%	13.9%		
10.0%	1.13%	8.9%	9.8%	10.2%	10.7%	11.1%	11.6%	12.1%	12.5%	13.0%	13.4%	13.9%	14.3%		
10.5%	1.13%	9.4%	10.3%	10.7%	11.2%	11.6%	12.1%	12.5%	13.0%	13.4%	13.9%	14.4%	14.8%		
11.0%	1.13%	9.9%	10.8%	11.2%	11.7%	12.1%	12.6%	13.0%	13.5%	13.9%	14.4%	14.8%	15.3%		
11.5%	1.13%	10.4%	11.3%	11.7%	12.2%	12.6%	13.1%	13.5%	14.0%	14.4%	14.9%	15.3%	15.7%		
12.0%	1.13%	10.9%	11.8%	12.2%	12.7%	13.1%	13.5%	14.0%	14.4%	14.9%	15.3%	15.8%	16.2%		
12.5%	1.13%	11.4%	12.3%	12.7%	13.1%	13.6%	14.0%	14.5%	14.9%	15.4%	15.8%	16.2%	16.7%		
13.0%	1.13%	11.9%	12.8%	13.2%	13.6%	14.1%	14.5%	15.0%	15.4%	15.8%	16.3%	16.7%	17.2%		