

FINAL Meeting Notes
Lewis River License Implementation
Aquatic Coordination Committee (ACC) Meeting
Aquatic Fund Subgroup
January 7, 2016
Merwin Hydro Control Center
Ariel, WA

ACC Participants Present (10)

Frank Shrier, PacifiCorp
 Kim McCune, PacifiCorp
 Baker Holden, USDA Forest Service (Phone-in)
 Ruth Tracy, USDA Forest Service
 Peggy Miller, WDFW
 Pat Frazier, WDFW
 Aaron Roberts, WDFW
 Michelle Day, NMFS
 Shannon Wills, Cowlitz Indian Tribe (Phone-in)
 Steve Manlow, LCFRB (Phone-in)

Calendar:

March 2016 (Date -TBD)	Aquatic Fund Sub-Group Meeting	Location - TBD
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Assignments from January 7, 2016	Status
All Participants to review the Synthesis Matrix under suggested format from Ruth Tracy.	Complete – 5/16/16
All Participants to review the Synthesis Matrix and get familiar with the filtering and sorting.	Complete – 5/16/16
Shrier: Add a column in the Synthesis Matrix for restoration value.	Complete – 1/8/16
Shrier: Email revised Synthesis Matrix to the ACC Aquatic Fund Subgroup	Complete – 1/8/16
Manlow: Report back to Subgroup if the Consumer Reports (see Attachment B) can be placed on the LCFRB website so aquatic fund project proposers can access the information.	Complete – 1/8/16 – sent actual reports
Manlow: Define reach potential heading in accordance with LCFRB.	Complete

Opening, Review of Agenda and Meeting Notes

Frank Shrier (PacifiCorp) called the meeting to order at 12:30 p.m. and reviewed the November 19, 2015 meeting notes. The November 19, 2015 Meeting Note were approved without change at 12:45pm. Kim McCune (PacifiCorp) will post the final notes to the Lewis River website.

Shrier noted that he would like the subgroup to take a step back, review the input provided by Ruth Tracy (USDA FS) and determine what additional help is needed from the ACC to meet the needs for completion as PacifiCorp staff is unable to make all the needed changes without help.

Aquatic Fund Process Review

The ACC Aquatic Fund Subgroup (Subgroup) continued its review of the Synthesis Matrix and the LCFRB Interactive map (Map) (<http://www.lowercolumbiasalmonrecovery.org/mappage>). The following topics were discussed for consideration:

- Suggest priority areas to potential aquatic fund project proposers; provide list of areas, i.e. top 25 preferred areas with highest restoration potential for proposers to focus on.
- Add landowner acknowledgment reference in initial cover letter announcement so ACC knows at the beginning of the process that the proposer has landowner support.
- What information should be considered to determine the top 25?
 - Restoration vs protection?
 - What is priority class attributes?
 - What are primary limiting factors?
- Revamp the Synthesis Matrix; rather than the use of photos, link to the LCFRB (**Attachment B** – Columbia, Lower Watershed Reach Analysis – Spring Chinook) priority summary and consumer report.
- Perhaps provide the consumer report pages or link for the aquatic fund project proposers.

Michelle Day (NMFS) suggests the focus be spring Chinook; reintroduction efforts, healthy population in the Columbia; need successful reintroduction in Lewis and Cowlitz rivers to achieve recovery.

Pat Frazier (WDFW) too would like the focus on spring Chinook over the next five (5) years, natural prioritization but also review areas with multi species. Recovery plan goal is important.

The Subgroup reviewed **Attachment A** – Lower NF Lewis Winter Steelhead Protection and Restoration Strategic Priority Summary, May 2010 and **Attachment B** – Columbia, Lower Watershed Reach Analysis – Spring Chinook

The Subgroup will review reach potential and Synthesis Matrix ratings and will review how aquatic fund project proposers are and are not meeting certain reach criteria.

After the EDT upgrade, which will be complete the end of February 2016, PacifiCorp will rerun the Synthesis Matrix and LCFRB ratings. The Subgroup will determine a date to meet again in March 2016 once the EDT upgrade is finished.

< Meeting adjourned at 2:55 p.m. >

Agenda items for March, 2016

- January 7, 2016 Meeting Notes
- Discuss inclusion of review expectation in announcement cover letter
- Review landowner acknowledgment form

Next Scheduled Meeting:

March, 2016 (date TBD)
Merwin Hydro Control Center
Ariel, WA
9:00am – 12:00pm

Meeting Handouts & Attachments:

- Attachment A – Lower NF Lewis Winter Steelhead Protection and Restoration Strategic Priority Summary, May 2010
- Attachment B – Columbia, Lower Watershed Reach Analysis – Spring Chinook

**Lower NF Lewis Winter Steelhead
Protection and Restoration Strategic Priority Summary**

Geographic area priority	Attribute class priority for restoration															
Geographic area	Channel stability	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Cedar Cr 2 A	●		●				●				●	●	●	●		●
Cedar Cr 5	●		●		●		●				●	●	●	●		●
Cedar Cr 1 C	●		●		●		●				●	●	●	●		●
Cedar Cr 1 B	●		●		●		●				●	●	●	●		●
Lewis 4 B			●		●		●	●			●	●	●	●		●
Cedar Cr 4 B	●		●		●		●				●	●	●	●		●
Cedar Cr 2 E	●		●				●				●	●	●	●		●
Cedar Cr 4 A	●		●		●		●				●	●	●	●		●
Cedar Cr 3	●		●		●		●				●	●	●	●		●
Robinson Cr 1 A	●		●		●		●				●	●	●	●		●
Cedar Cr RB Trib 3					●		●									
Cedar Cr 1 A			●				●				●	●	●	●		●
Cedar Cr 8 A	●		●		●		●				●	●	●	●		●
Cedar Cr 2 C	●		●		●		●				●	●	●	●		●
Pup Cr 1 A	●		●		●		●				●	●	●	●		●
Johnson Cr 1 B	●		●		●		●				●	●	●	●		●
Chelatchie Cr 2 C	●		●		●	●	●					●	●	●		●
Cedar Cr 8 B	●				●		●				●	●	●	●		●
Chelatchie Cr 1	●		●		●		●				●	●	●	●		●
Cedar Cr 2 D	●		●		●		●				●	●	●	●		●
Cedar Cr 2 B	●		●				●				●	●	●	●		●
Cedar Cr 8 C	●				●		●				●	●	●	●		●
Lewis 7 B			●		●		●	●			●	●				●
Cedar Cr 8 D	●		●		●		●				●	●	●	●		●
Chelatchie Cr 2 E	●		●		●	●	●				●	●	●	●		●
Brush Cr	●		●		●		●				●	●	●	●		●
NF Chelatchie Cr 1	●		●		●		●				●	●	●	●		●
Bitter Cr 1 A			●		●		●					●	●	●		●

1/ "Channel stability" applies to freshwater areas only.

Key to strategic priority (corresponding Benefit Category letter also shown)





	A High		B Medium		C Low		D & E Indirect or General
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Figure K-12. Lower NF Lewis subbasin winter steelhead habitat factor analysis diagram. Diagram displays the relative impact of habitat factors in specific reaches. The reaches are ordered according to their restoration and preservation rank, which factors in their potential benefit to overall population abundance, productivity, and diversity. The reach with the greatest potential benefit is listed at the top. The dots represent the relative impact of habitat attributes on reach-level performance. See Appendix E Chapter 6 for more information on habitat factor analysis diagrams. Some low priority reaches may not be included for display purposes.

**NF Lewis (Lower) Fall Chinook
Protection and Restoration Strategic Priority Summary**

Geographic area priority		Attribute class priority for restoration														
Geographic area	Channel stability	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Lewis 7 A					●		●	●								●
Lewis 6					●		●	●								●
Lewis 4 C					●		●	●					●			●
Lewis 3	●				●		●	●				●	●			●
Lewis 4 B					●		●	●					●			●
Lewis 4 A					●		●	●					●			●
Lewis 2 tidal D	●				●		●	●				●	●			●
Lewis 5					●			●								●
Lewis 7 B					●		●	●								●
Lewis 2 tidal C	●						●					●				●
Lewis 2 tidal B	●						●					●				●
Lewis 2 tidal A	●				●		●					●				●
Lewis 1 tidal B	●				●		●					●	●			●
Lewis 1 tidal A	●				●		●					●	●			●

Key to strategic priority (corresponding Benefit Category letter also shown)

1/ "Channel stability" applies to freshwater areas only.

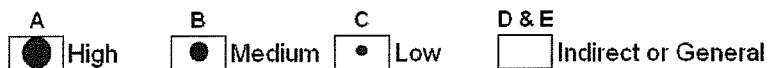


Figure K-13. Lower North Fork Lewis fall Chinook habitat factor analysis diagram. Diagram displays the relative impact of habitat factors in specific reaches. The reaches are ordered according to their restoration and preservation rank, which factors in their potential benefit to overall population abundance, productivity, and diversity. The reach with the greatest potential benefit is listed at the top. The dots represent the relative impact of habitat attributes on reach-level performance. See Appendix E Chapter 6 for more information on habitat factor analysis diagrams. Some low priority reaches may not be included for display purposes.

Lower NF Lewis Coho
Protection and Restoration Strategic Priority Summary

Geographic area priority	Attribute class priority for restoration															
	Channel stability	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Lewis 3	●		●		●		●					●	●			●
Lewis 4 C			●		●		●						●			●
Hayes Cr 1	●		●		●		●						●	●		●
Robinson Cr 1 A	●		●		●	●	●						●	●		●
Lewis 4 B			●		●		●						●			●
Cedar Cr 2 B	●		●		●		●						●	●		●
Lewis 4 A			●		●		●						●			●
Lewis 5			●		●		●				●		●			●
Cedar Cr 4 B	●		●		●		●						●	●		●
Staples Cr 1	●		●		●	●	●						●	●		●
Lewis LB Trib 3 LB Trib A	●		●		●		●						●	●		●
Lewis LB Trib 3 B	●		●		●		●						●	●		●
Cedar Cr 2 A	●		●		●		●						●	●		●
Cedar Cr 2 C	●		●		●		●						●	●		●
Lewis 6			●		●		●				●		●			●
Chelatchie Cr 2 E	●		●		●	●	●						●	●		●
Johnson Cr 1 A	●		●		●		●						●	●		●
Bitter Cr 3	●		●		●		●						●	●		●
Chelatchie Cr 1	●		●		●		●						●	●		●
Cedar Cr 2 E	●		●		●		●						●	●		●
Chelatchie Cr 2 C	●		●		●	●	●						●	●		●
Cedar Cr 3	●		●		●		●						●	●		●
Cedar Cr 4 A	●		●		●		●						●	●		●
Pup Cr LB Trib C	●		●		●		●						●	●		●
NF Chelatchie Cr 3	●		●		●		●						●	●		●
Pup Cr LB Trib A	●		●		●		●						●	●		●
Cedar Cr 1 A	●		●		●		●						●	●		●
Cedar Cr 2 D	●		●		●		●						●	●		●
Staples Cr 2	●		●		●		●						●	●		●
Ross Cr 1 B	●		●		●		●						●	●		●
Cedar Cr LB Trib 3 B	●		●		●		●						●	●		●
NF Chelatchie Cr RB Trib	●		●		●		●						●	●		●
Bitter Cr LB Trib 3 A	●		●		●		●						●	●		●
Lewis 7 A			●		●		●				●		●			●
NF Chelatchie Cr 1	●		●		●		●						●	●		●
Cedar Cr 6 A	●		●		●		●						●	●		●
Jenny Cr	●		●		●		●						●	●		●

Key to strategic priority (corresponding Benefit Category letter also shown)

1/ *Channel stability* applies to freshwater areas only.

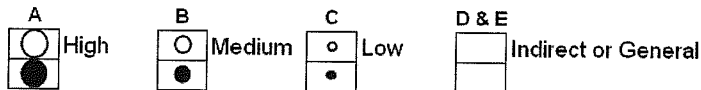


Figure K-14. North Fork Lewis coho habitat factor analysis diagram. Diagram displays the relative impact of habitat factors in specific reaches. The reaches are ordered according to their restoration and preservation rank, which factors in their potential benefit to overall population abundance, productivity, and diversity. The reach with the greatest potential benefit is listed at the top. The dots represent the relative impact of habitat attributes on reach-level performance. See Appendix E Chapter 6 for more information on habitat factor analysis diagrams. Some low priority reaches may not be included for display purposes.

Species/Component:	Spring Chinook
Restoration Potential:	Current Conditions versus Historic Potential
Restoration Emphasis:	Restoration or maintenance/improvement of historic life histories

Columbia, Lower Watershed Reach Analysis - Spring Chinook

Geographic Area:		Clear Creek Lower		Stream:	Clear Creek
Reach:		Broke reach into upper and lower		Reach Length (mi):	6.15
				Reach Code:	Clear Creek Lower
Restoration Benefit Category:1/	D	Productivity Rank:1/	14	Potential % change in productivity:2/	10.8%
Overall Restoration Potential Rank:1/	33	Average Abundance (Neq) Rank:1/	13	Potential % change in Neq:2/	5.4%
(lowest rank possible - with ties)1/	59	Life History Diversity Rank:1/	73	Potential % change in diversity:2/	0.0%
Preservation Benefit Category:1/	A	Productivity Rank:1/	9	% loss in productivity with degradation:2/	-6.0%
Overall Preservation Rank:1/	5	Average Abundance (Neq) Rank:1/	10	% loss in Neq with degradation:2/	-6.7%
(lowest rank possible - with ties)1/	58	Life History Diversity Rank:1/	5	% loss in diversity with degradation:2/	-5.8%

Life stage	Relevant months	% of life history trajectories affected	Productivity change (%)	Life Stage Rank	Change in attribute impact on survival															
					Channel stability	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Spawning	Sep	3.8%	-0.8%	6							●									●
Egg incubation	Sep-Apr	3.8%	-40.3%	1	●												●			●
Fry colonization	Mar-May	4.2%	-3.9%	2					●	●	●									●
0-age active rearing	Mar-Oct	4.6%	-2.1%	4			●		●	●	●			●						●
0-age migrant	Oct-Nov	2.0%	-1.0%	7							●						●			●
0-age inactive	Oct-Mar	2.0%	-5.6%	3	●				●	●	●									●
1-age active rearing	Mar-May	2.0%	-0.6%	8			●		●	●	●									●
1-age migrant	Mar-Jun	4.3%	-0.3%	9							●									●
1-age transient rearing																				
2+-age transient rearing																				
Prespawning migrant	Apr-Aug	7.6%	-0.1%	10					●		●									●
Prespawning holding	May-Sep	3.8%	-1.7%	5					●		●									●
All Stages Combined		7.6%																		

1/ Ranking based on effect over entire geographic area.

2/ Value shown is for overall population performance.

KEY

Notes: Changes in key habitat can be caused by either a change in percent key habitat or in stream width.

NA = Not applicable

Potential % changes in performance measures for reaches upstream of dams were computed with full passage allowed at dams (though reservoir effects still in place).

	Loss	Gain
None	○	○
Small	●	○
Moderate	●	○
High	●	○
Extreme	●	○

Species/Component:	Spring Chinook
Restoration Potential:	Current Conditions versus Historic Potential
Restoration Emphasis:	Restoration or maintenance/improvement of historic life histories

Columbia, Lower Watershed Reach Analysis - Spring Chinook

Geographic Area:	Clear Creek			Stream:	Clear Creek
Reach:	Description: mouth to RM 8.7; Confinement: confined; Fish Species present: WS, SS			Reach Length (m):	6.15
				Reach Code:	Clear Creek
Restoration Benefit Category:1/	D	Productivity Rank:1/	10	Potential % change in productivity:2/	18.2%
Overall Restoration Potential Rank:1/	16	Average Abundance (Neq) Rank:1/	20	Potential % change in Neq:2/	4.0%
(lowest rank possible - with ties)1/	59	Life History Diversity Rank:1/	32	Potential % change in diversity:2/	1.1%
Preservation Benefit Category:1/	A	Productivity Rank:1/	2	% loss in productivity with degradation:2/	-11.1%
Overall Preservation Rank:1/	2	Average Abundance (Neq) Rank:1/	6	% loss in Neq with degradation:2/	-9.3%
(lowest rank possible - with ties)1/	58	Life History Diversity Rank:1/	2	% loss in diversity with degradation:2/	-8.7%

Life stage	Relevant months	% of life history trajectories affected	Productivity change (%)	Life Stage Rank	Change in attribute impact on survival															
					Channel stability	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Spawning	Sep	3.8%	-1.1%	6																
Egg incubation	Sep-Apr	3.8%	-40.0%	1	●											●				
Fry colonization	Mar-May	3.8%	-7.5%	2					●	●	●									●
0-age active rearing	Mar-Oct	3.5%	-3.7%	4			●		●	●	●			●	●					●
0-age migrant	Oct-Nov	2.3%	-1.5%	7							●					●				●
0-age inactive	Oct-Mar	2.3%	-10.0%	3	●				●	●	●									●
1-age active rearing	Mar-May	2.3%	-1.1%	8			●		●	●	●									●
1-age migrant	Mar-Jun	2.3%	-0.4%	9							●									●
1-age transient rearing																				
2+-age transient rearing																				
Prespawning migrant	Apr-Aug	3.8%	-0.1%	10					●		●									●
Prespawning holding	May-Sep	3.8%	-2.6%	5					●		●									●
All Stages Combined		3.8%																		

1/ Ranking based on effect over entire geographic area.

2/ Value shown is for overall population performance.

Notes: Changes in key habitat can be caused by either a change in percent key habitat or in stream width.

Potential % changes in performance measures for reaches upstream of dams were computed with full passage allowed at dams (though reservoir effects still in place).

KEY
NA = Not applicable

	Loss	Gain
None	●	○
Small	●	○
Moderate	●	○
High	●	○
Extreme	●	○

Species/Component:	Spring Chinook
Restoration Potential:	Current Conditions versus Historic Potential
Restoration Emphasis:	Restoration or maintenance/improvement of historic life histories

Columbia, Lower Watershed Reach Analysis - Spring Chinook

Geographic Area:		Muddy R 1A		Stream:	Muddy River
Reach:		Description: Clear Creek to Clearwater Creek; Confinement: ; Fish Species present: chinook steelhead		Reach Length (mi):	4.40
				Reach Code:	Muddy R 1A
Restoration Benefit Category:1/	D	Productivity Rank:1/	25	Potential % change in productivity:2/	3.8%
Overall Restoration Potential Rank:1/	15	Average Abundance (Neg) Rank:1/	21	Potential % change in Neg:2/	3.5%
(lowest rank possible - with ties)1/	59	Life History Diversity Rank:1/	21	Potential % change in diversity:2/	2.9%
Preservation Benefit Category:1/	D	Productivity Rank:1/	37	% loss in productivity with degradation:2/	-0.7%
Overall Preservation Rank:1/	20	Average Abundance (Neg) Rank:1/	21	% loss in Neg with degradation:2/	-2.9%
(lowest rank possible - with ties)1/	58	Life History Diversity Rank:1/	11	% loss in diversity with degradation:2/	-3.3%

Life stage	Relevant months	% of life history trajectories affected	Productivity change (%)	Life Stage Rank	Change in attribute impact on survival														
					Channel stability	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals
Spawning	Sep	2.9%	-39.5%	2							●						●	●	
Egg incubation	Sep-Apr	2.9%	-66.9%	1	●												●	●	
Fry colonization	Mar-May	5.6%	-7.4%	5	●				●	●	●					●	●	●	○
0-age active rearing	Mar-Oct	12.6%	-7.7%	3	●		●		●	●	●				●	●	●	●	●
0-age migrant	Oct-Nov	4.3%	-3.0%	8							●				●	●	●	●	○
0-age inactive	Oct-Mar	2.1%	-13.9%	6	●				●	●	●					●	●	●	○
1-age active rearing	Mar-May	2.1%	-2.3%	10			●		●	●	●								○
1-age migrant	Mar-Jun	10.4%	-0.6%	9							●				●				○
1-age transient rearing																			
2+-age transient rearing																			
Prespawning migrant	Apr-Aug	22.9%	-1.1%	7					●		●						●	●	○
Prespawning holding	May-Sep	2.9%	-24.9%	4					●		●						●	●	○
All Stages Combined		22.9%																	

1/ Ranking based on effect over entire geographic area.

2/ Value shown is for overall population performance.

KEY

None		
Small	●	○
Moderate	●	○
High	●	○
Extreme	●	○

Notes: Changes in key habitat can be caused by either a change in percent key habitat or in stream width.

NA = Not applicable

Potential % changes in performance measures for reaches upstream of dams were computed with full passage allowed at dams (though reservoir effects still in place).

Species/Component:	Spring Chinook
Restoration Potential:	Current Conditions versus Historic Potential
Restoration Emphasis:	Restoration or maintenance/improvement of historic life histories

Columbia, Lower Watershed Reach Analysis - Spring Chinook

Geographic Area:		Muddy R 1		Stream:		Muddy River	
Reach:		Description: mouth to Clear Creek; Confinement: ; Fish Species present: chinook, steelhead		Reach Length (mi):		4.40	
				Reach Code:		Muddy R 1	
Restoration Benefit Category:1/	D	Productivity Rank:1/	32	Potential % change in productivity:2/	2.1%		
Overall Restoration Potential Rank:1/	20	Average Abundance (Neq) Rank:1/	14	Potential % change in Neq:2/	5.3%		
(lowest rank possible - with ties)1/	59	Life History Diversity Rank:1/	29	Potential % change in diversity:2/	1.5%		
Preservation Benefit Category:1/	C	Productivity Rank:1/	26	% loss in productivity with degradation:2/	-2.0%		
Overall Preservation Rank:1/	13	Average Abundance (Neq) Rank:1/	9	% loss in Neq with degradation:2/	-6.8%		
(lowest rank possible - with ties)1/	58	Life History Diversity Rank:1/	11	% loss in diversity with degradation:2/	-3.3%		

Life stage	Relevant months	% of life history trajectories affected	Productivity change (%)	Life Stage Rank	Change in attribute impact on survival																
					Channel stability	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity	
Spawning	Sep	2.9%	-36.2%	3							●	●						●	●		
Egg incubation	Sep-Apr	2.9%	-61.0%	1	●													●	●		○
Fry colonization	Mar-May	4.5%	-7.9%	5	●				○	●	●							●	●		○
0-age active rearing	Mar-Oct	15.5%	-7.0%	2	●		●			○	●	●				●		●	●		○
0-age migrant	Oct-Nov	6.0%	-2.0%	8							●							●	●		○
0-age inactive	Oct-Mar	2.5%	-11.2%	7	●					●	●							●	●		○
1-age active rearing	Mar-May	2.5%	-2.1%	10			●			●	●										○
1-age migrant	Mar-Jun	17.1%	-0.4%	9							●							●	●		○
1-age transient rearing																					
2+-age transient rearing																					
Prespawning migrant	Apr-Aug	33.3%	-0.9%	6					○		●							●	●		○
Prespawning holding	May-Sep	2.9%	-22.0%	4					●		●							●	●		○
All Stages Combined		33.3%																			

1/ Ranking based on effect over entire geographic area.

2/ Value shown is for overall population performance.

KEY

Notes: Changes in key habitat can be caused by either a change in percent key habitat or in stream width.

NA = Not applicable

Potential % changes in performance measures for reaches upstream of dams were computed with full passage allowed at dams (though reservoir effects still in place).

	Loss	Gain
None		
Small	●	○
Moderate	●	○
High	●	○
Extreme	●	○

Species/Component:	Spring Chinook
Restoration Potential:	Current Conditions versus Historic Potential
Restoration Emphasis:	Restoration or maintenance/improvement of historic life histories

Columbia, Lower Watershed Reach Analysis - Spring Chinook

Geographic Area:	Muddy R 2		Stream:	Muddy River	
Reach:	Description: Clearwater Creek to Smith Creek; Confinement: ; Fish Species present: chinook, steelhead		Reach Length (mi):	1.50	
			Reach Code:	Muddy R 2	
Restoration Benefit Category:1/	D	Productivity Rank:1/	51	Potential % change in productivity:2/	0.1%
Overall Restoration Potential Rank:1/	47	Average Abundance (Neq) Rank:1/	45	Potential % change in Neq:2/	0.4%
(lowest rank possible - with ties)1/	59	Life History Diversity Rank:1/	39	Potential % change in diversity:2/	0.4%
Preservation Benefit Category:1/	E	Productivity Rank:1/	48	% loss in productivity with degradation:2/	-0.1%
Overall Preservation Rank:1/	52	Average Abundance (Neq) Rank:1/	47	% loss in Neq with degradation:2/	-0.2%
(lowest rank possible - with ties)1/	58	Life History Diversity Rank:1/	49	% loss in diversity with degradation:2/	0.0%

Life stage	Relevant months	% of life history trajectories affected	Productivity change (%)	Life Stage Rank	Change in attribute impact on survival															
					Channel stability	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Spawning	Sep	1.0%	45.1%	2							●						●	●		
Egg incubation	Sep-Apr	1.0%	-67.2%	1	●												●	●		
Fry colonization	Mar-May	3.0%	-11.0%	3	●				●	●	●						●	●		○
0-age active rearing	Mar-Oct	7.7%	-3.2%	4	●		●		●	●	●				●		●	●		○
0-age migrant	Oct-Nov	1.2%	-1.6%	8							●						●	●		○
0-age inactive	Oct-Mar	0.1%	-37.5%	7	●				●	●	●									
1-age active rearing	Mar-May	0.1%	-6.2%	10							●									
1-age migrant	Mar-Jun	6.1%	-0.3%	9							●									○
1-age transient rearing																				
2+-age transient rearing																				
Prespawning migrant	Apr-Aug	16.2%	-0.4%	6							●						●	●		○
Prespawning holding	May-Sep	1.0%	-25.8%	5					●		●						●	●		
All Stages Combined		16.2%																		

1/ Ranking based on effect over entire geographic area.

2/ Value shown is for overall population performance.

KEY

None	●	○
Small	●	○
Moderate	●	○
High	●	○
Extreme	●	○

NA = Not applicable

Notes: Changes in key habitat can be caused by either a change in percent key habitat or in stream width.

Potential % changes in performance measures for reaches upstream of dams were computed with full passage allowed at dams (though reservoir effects still in place).

Species/Component:	Spring Chinook
Restoration Potential:	Current Conditions versus Historic Potential
Restoration Emphasis:	Restoration or maintenance/improvement of historic life histories

Columbia, Lower Watershed Reach Analysis - Spring Chinook

Geographic Area:	Muddy R 3	Stream:	Muddy River		
Reach:	Description: Smith Creek to RM 13.8 Confinement: ; Fish Species present: chinook, steelhead	Reach Length (mi):	3.50		
		Reach Code:	Muddy R 3		
Restoration Benefit Category:1/	D	Productivity Rank:1/	53	Potential % change in productivity:2/	0.0%
Overall Restoration Potential Rank:1/	38	Average Abundance (Neq) Rank:1/	51	Potential % change in Neq:2/	0.2%
(lowest rank possible - with ties)1/	59	Life History Diversity Rank:1/	17	Potential % change in diversity:2/	4.0%
Preservation Benefit Category:1/	D	Productivity Rank:1/	48	% loss in productivity with degradation:2/	-0.1%
Overall Preservation Rank:1/	48	Average Abundance (Neq) Rank:1/	45	% loss in Neq with degradation:2/	-0.3%
(lowest rank possible - with ties)1/	58	Life History Diversity Rank:1/	41	% loss in diversity with degradation:2/	-0.4%

Life stage	Relevant months	% of life history trajectories affected	Productivity change (%)	Life Stage Rank	Change in attribute impact on survival															
					Channel stability	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Spawning	Sep	2.9%	-51.5%	2							●						●	●		
Egg incubation	Sep-Apr	2.9%	-64.5%	1	●												●	●		●
Fry colonization	Mar-May	2.9%	-19.3%	5	●				●	●	●						●	●		○
0-age active rearing	Mar-Oct	2.0%	-8.2%	6	●		●		●	●	●				●		●	●		○
0-age migrant	Oct-Nov	1.1%	-5.5%	7							●						●	●		○
0-age inactive	Oct-Mar	1.1%	-58.5%	4	●				●	●	●						●	●		○
1-age active rearing	Mar-May	1.1%	-4.8%	8	■		●		●	●	●						●	●		○
1-age migrant	Mar-Jun	1.1%	-0.6%	10							●						■	■		○
1-age transient rearing																				
2+-age transient rearing																				
Prespawning migrant	Apr-Aug	2.9%	-0.5%	9							●						●	●		○
Prespawning holding	May-Sep	2.9%	-25.9%	3					●	●	●						●	●		○
All Stages Combined		2.9%																		

1/ Ranking based on effect over entire geographic area.

2/ Value shown is for overall population performance.

Notes: Changes in key habitat can be caused by either a change in percent key habitat or in stream width.

Potential % changes in performance measures for reaches upstream of dams were computed with full passage

allowed at dams (though reservoir effects still in place).

KEY
NA = Not applicable

	Loss	Gain
None	○	○
Small	●	○
Moderate	●	○
High	●	○
Extreme	●	○

Species/Component:	Spring Chinook
Restoration Potential:	Current Conditions versus Historic Potential
Restoration Emphasis:	Restoration or maintenance/improvement of historic life histories

Columbia, Lower Watershed Reach Analysis - Spring Chinook

Geographic Area: Pepper Creek				Stream:	Pepper Creek
Reach: Description: mouth to RM 0.4; Confinement: Confined				Reach Length (mi):	0.40
				Reach Code:	Pepper Creek
Restoration Benefit Category:1/	E	Productivity Rank:1/	53	Potential % change in productivity:2/	0.0%
Overall Restoration Potential Rank:1/	55	Average Abundance (Neq) Rank:1/	58	Potential % change in Neq:2/	0.0%
(lowest rank possible - with ties)1/	59	Life History Diversity Rank:1/	33	Potential % change in diversity:2/	0.7%
Preservation Benefit Category:1/	E	Productivity Rank:1/	56	% loss in productivity with degradation:2/	0.0%
Overall Preservation Rank:1/	52	Average Abundance (Neq) Rank:1/	55	% loss in Neq with degradation:2/	0.0%
(lowest rank possible - with ties)1/	58	Life History Diversity Rank:1/	33	% loss in diversity with degradation:2/	-0.7%

Life stage	Relevant months	% of life history trajectories affected	Productivity change (%)	Life Stage Rank	Change in attribute impact on survival														
					Channel stability	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals
Spawning	Sep	1.0%	-13.1%	3							●							●	●
Egg incubation	Sep-Apr	1.0%	-51.3%	1	●												●	●	●
Fry colonization	Mar-May	1.0%	-3.0%	6					●	●	●					●		●	●
0-age active rearing	Mar-Oct	0.6%	-11.7%	4			●		●	●	●				●		●	●	●
0-age migrant	Oct-Nov	0.6%	-1.4%	8							●				●				●
0-age inactive	Oct-Mar	0.6%	-34.2%	2	●				●	●	●								●
1-age active rearing	Mar-May	0.6%	-1.7%	7			●		●	●	●								●
1-age migrant	Mar-Jun	0.6%	-0.1%	9							●								●
1-age transient rearing																			
2+-age transient rearing																			
Prespawning migrant	Apr-Aug	1.0%	0.0%	10															
Prespawning holding	May-Sep	1.0%	-5.4%	5					●		●							●	●
All Stages Combined		1.0%																	

1/ Ranking based on effect over entire geographic area.

2/ Value shown is for overall population performance.

Notes: Changes in key habitat can be caused by either a change in percent key habitat or in stream width.

Potential % changes in performance measures for reaches upstream of dams were computed with full passage allowed at dams (though reservoir effects still in place).

KEY
NA = Not applicable

	Loss	Gain
None	○	○
Small	●	○
Moderate	●	○
High	●	○
Extreme	●	○

Species/Component:	Spring Chinook
Restoration Potential:	Current Conditions versus Historic Potential
Restoration Emphasis:	Restoration or maintenance/improvement of historic life histories

Columbia, Lower Watershed Reach Analysis - Spring Chinook

Geographic Area:		Clearwater Creek		Stream:	Clearwater Creek
Reach:	Description: mouth to RM 3.5; Confinement: confined; Fish Species present: WS, SS			Reach Length (mi):	5.20
				Reach Code:	Clearwater Creek
Restoration Benefit Category:1/	A	Productivity Rank:1/	3	Potential % change in productivity:2/	30.4%
Overall Restoration Potential Rank:1/	10	Average Abundance (Neq) Rank:1/	11	Potential % change in Neq:2/	9.6%
(lowest rank possible - with ties)1/	59	Life History Diversity Rank:1/	29	Potential % change in diversity:2/	1.5%
Preservation Benefit Category:1/	A	Productivity Rank:1/	5	% loss in productivity with degradation:2/	-9.1%
Overall Preservation Rank:1/	3	Average Abundance (Neq) Rank:1/	7	% loss in Neq with degradation:2/	-8.6%
(lowest rank possible - with ties)1/	58	Life History Diversity Rank:1/	3	% loss in diversity with degradation:2/	-6.9%

Life stage	Relevant months	% of life history trajectories affected	Productivity change (%)	Life Stage Rank	Change in attribute impact on survival														
					Channel stability	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals
Spawning	Sep	3.8%	-34.5%	2							●						●	●	
Egg incubation	Sep-Apr	3.8%	-47.6%	1	●												●	●	
Fry colonization	Mar-May	3.8%	-4.6%	5					●	●	●						●	●	●
0-age active rearing	Mar-Oct	3.1%	-9.5%	4			●		●	●	●					●	●	●	●
0-age migrant	Oct-Nov	2.1%	-1.8%	7							●					●	●	●	●
0-age inactive	Oct-Mar	2.1%	-6.1%	6	●				●	●	●								●
1-age active rearing	Mar-May	2.1%	-0.6%	9			●		●	●	●								●
1-age migrant	Mar-Jun	2.1%	-0.3%	10							●								●
1-age transient rearing																			
2+-age transient rearing																			
Prespawning migrant	Apr-Aug	3.8%	-0.4%	8					●	●	●						●	●	●
Prespawning holding	May-Sep	3.8%	-12.6%	3					●	●	●						●	●	●
All Stages Combined		3.8%																	

1/ Ranking based on effect over entire geographic area.

2/ Value shown is for overall population performance.

KEY

Notes: Changes in key habitat can be caused by either a change in percent key habitat or in stream width.

NA = Not applicable

Potential % changes in performance measures for reaches upstream of dams were computed with full passage allowed at dams (though reservoir effects still in place).

	Loss	Gain
None	○	○
Small	●	○
Moderate	●	○
High	●	○
Extreme	●	○