RECLAMATION

Managing Water in the West

Yakima River Basin *Study*

Habitat Subcommittee Meeting, October 15, 2010

Fishery Benefits Results

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Columbia-Cascades Area Office
Pacific Northwest Region

U.S. Department of the Interior
Bureau of Reclamation

Summary of Estimated Species Abundance

Species	Baseline	Restoration Only	Percent Change Restoration Only vs. Baseline	Restoration + Phase 1 Passage	Percent Change Restoration + Phase 1 Passage Vs. Baseline	Percent Change Restoration Only vs. Restoration + Phase 1 Passage
Spring Chinook	5395	15946	196%	17927	232%	12%
Summer Chinook	3219	11122	246%	11122	246%	0%
Fall Chinook	9659	15668	62%	15668	62%	0%
Coho	782	3637	365%	4073	421%	12%
Steelhead	3391	6807	101%	7707	127%	13%
All Species	22446	53180	137%	56497	152%	6%

Upper Yakima- Integrated Structural + Phase I Passage

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Yakima Summer Steelhead

Change in Performance Due to Scenario's Effect within Geographic Area

Geographic Area	Loss category		Gain category		Loss or Gain in Abundance		Change in Productivity with		Change in Diversity Index with	
	Category	rank	Category	rank	Loss	Gain	Loss	Gain	Loss	Gain
Ahtanum Cr.	B	3	E	16						
Big, Little, Tucker Creeks	A	1	E	15						
Lower Cle Elum	D	8	B	4						
Lower Kachess	D	8	E	18						
Lower Naches	D	8	E	14						
Lower Yakima River	D	8	E	9						
Manastash	D	8	C	5						
Marion Drain	D	8	E	18						
Swauk	D	8	C	6						
Taneum	D	8	A	2						
Teanaway	D	8	A	1						
Toppenish Cr. Below Simcoe	C	5	E	18						
Umtanum	C	5	E	17						
Upper Cle Elum	D	8	E	18						
Upper Kachess	C	5	E	18						
Upper Yakima	D	8	B	3						
Wenas Cr.	D	8	E	18						
Wide Hollow	D	8	E	18						
Wilson	D	8	D	7						
Yakima - Gap to Gap Floodplain	D	8	E	12						
Yakima - Selah Floodplain	A	2	E	11						
Yakima Canyon	B	3	E	12						
Yakima- Lower Wapato Floodplain	D	8	D	8						
Yakima- Upper Wapato Floodplain	D	8	E	10						

-65% 0% 65%
Percentage change

-65% 0% 65%
Percentage change

-65% 0% 65%
Percentage change

RECLAMATION

Yakima Summer Steelhead
Life Stage Summary of Scenario Effects Across All Geographic Areas

Life stage	Relevant months	Productivity change due to scenario (%)	Life Stage Rank	Change in attribute impact on survival due to scenario															
				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	Feb-May	15.3%	10							○						○	◯		○
Egg incubation	Mar-Jun	123.6%	2	○												○	◯		○
Fry colonization	Apr-Jul	117.3%	3	○				○	○	○		◯			○	○	○		◯
0-age active rearing	May-Oct	111.2%	4					○		○				○			○		◯
0,1-age inactive	Oct-Mar	47.3%	8					○		○									○
1-age migrant	Mar-Jun	69.0%	8							○		◯			○	○	○		◯
1-age active rearing	Mar-Oct	70.4%	6							○							○		○
2+-age active rearing	Mar-Oct	5.5%	12							○									○
2+-age migrant	Mar-Jun	12.7%	11		○							◯			○	○	○		◯
2+-age transient rearing	Jan-Dec	0.0%	15																
Prespawning migrant	Jun-Feb	96.1%	5									◯					○		◯
Prespawning holding	Sep-Apr	0.5%	13																◯

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

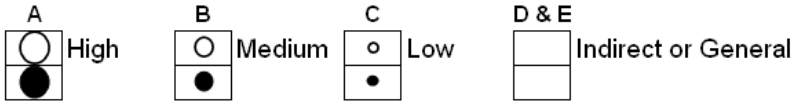
	Loss	Gain
None		
Small	•	○
Moderate	●	○
High	⬤	○
Extreme	⬤	◯

Yakima Summer Steelhead
Summary of Scenario Effects on Survival Factors and Overall Performance

Relative loss or gain by area			Change in attribute impact on survival due to scenario															
Geographic area	Relative loss	Relative gain	*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*
Ahtanum Cr.	●						○		∘							∘		◯
Big, Little, Tucker Creeks	●										◯							◯
Lower Cle Elum		○	∘				∘		∘		◯							◯
Lower Kachess																		
Lower Naches																		∘
Lower Yakima River														∘		∘		∘
Manastash		∘	∘								◯				∘	∘		◯
Marion Drain																		
Swauk		∘	◯				∘		◯						◯	◯		◯
Taneum		◯	∘				∘		∘		◯				◯			◯
Teanaway		◯	◯						∘				∘		◯	◯		◯
Toppenish Cr. Below Simcoe	●																	◯
Umtanum	●																	
Upper Cle Elum																		
Upper Kachess	●																	
Upper Yakima		○	∘				∘		∘						∘			∘
Wenas Cr.																		
Wide Hollow																		
Wilson			∘						∘		◯				∘	∘		∘
Yakima - Gap to Gap Floodplain																		◯
Yakima - Selah Floodplain	●		∘						∘					∘	∘	◯		∘
Yakima Canyon	●														∘	◯		
Yakima- Lower Wapato Floodplain									∘					∘	∘	∘		◯
Yakima- Upper Wapato Floodplain														∘	∘	∘		◯

1/ Greatest absolute value of factor change (whether gain or loss) is shown for area (reaches may differ in gain or loss).

Key to amount of change in factor (corresponding Loss/Gain Category letter also shown)



Yakima Coho

Change in Performance Due to Scenario's Effect within Geographic Area

Geographic Area	Loss category		Gain category		Loss or Gain in Abundance		Change in Productivity with		Change in Diversity Index with	
	Category	rank	Category	rank	Loss	Gain	Loss	Gain	Loss	Gain
Ahtanum Cr.	D	8	E	13						
Big, Little, Tucker Creeks	B	4	E	14						
Keechelus	D	8	E	18						
Lower Cle Elum	D	8	B	4						
Lower Kachess	D	8	E	18						
Lower Naches	B	3	E	15						
Lower Yakima River	D	8	E	11						
Manastash	D	8	D	8						
Marion Drain	D	8	E	18						
Swauk	D	8	C	6						
Taneum	D	8	B	3						
Teanaway	D	8	A	2						
Toppenish Cr. Below Simcoe	B	4	E	18						
Umtanum	C	6	E	17						
Upper Cle Elum	D	8	E	18						
Upper Kachess	C	6	E	18						
Upper Yakima	D	8	A	1						
Wenas Cr.	D	8	E	18						
Wide Hollow	D	8	E	18						
Wilson	D	8	C	5						
Yakima - Gap to Gap Floodplain	A	2	E	12						
Yakima - Selah Floodplain	A	1	E	10						
Yakima Canyon	D	8	E	16						
Yakima- Lower Wapato Floodplain	D	8	C	6						
Yakima- Upper Wapato Floodplain	D	8	E	9						

-60% 0% 60%
Percentage change

-60% 0% 60%
Percentage change

-60% 0% 60%
Percentage change

RECLAMATION

Yakima Coho
Life Stage Summary of Scenario Effects Across All Geographic Areas

Life stage	Relevant months	Productivity change due to scenario (%)	Life Stage Rank	Change in attribute impact on survival due to scenario															
				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	Oct-Jan	1.4%	10							○	◦								○
Egg incubation	Oct-May	14.2%	6	◦												○			○
Fry colonization	Mar-May	5.5%	7	◦				◦	◦	○									○
0-age active rearing	Mar-Oct	177.8%	1							◦		○					◦		○
0-age migrant	Oct-Nov	21.7%	4							◦		○							○
0-age inactive	Oct-Mar	49.0%	3					◦		○									○
1-age active rearing	Mar-May	3.5%	8							○									○
1-age migrant	Mar-Jun	16.7%	5		◦					○		○			◦	◦			○
1-age transient rearing	Jan-Dec	0.0%	11																
2+-age transient rearing	Jan-Dec	0.0%	11																
Prespawning migrant	Sep-Nov	120.9%	2									○							○
Prespawning holding	Oct-Dec	1.8%	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	⬤	○

Yakima Coho

Summary of Scenario Effects on Survival Factors and Overall Performance

Relative loss or gain by area			Change in attribute impact on survival due to scenario															
Geographic area	Relative loss	Relative gain	*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*
Ahtanum Cr.							○		○							○		◯
Big, Little, Tucker Creeks	●										◯							◯
Keechelus																		
Lower Cle Elum		○					○		○		◯							◯
Lower Kachess																		
Lower Naches	●								○									◯
Lower Yakima River														○				○
Manastash									○		◯				○			◯
Marion Drain																		
Swauk		○	○				○		○						○	○		◯
Taneum		○	○				○		◯		○				○			◯
Teanaway		◯	○				○		○						○	○		◯
Toppenish Cr. Below Simcoe	●						○		•									◯
Umtanum	•																	
Upper Cle Elum																		
Upper Kachess	•																	
Upper Yakima		◯							○						○			○
Wenas Cr.																		
Wide Hollow																		
Wilson		○							○		◯				○			○
Yakima - Gap to Gap Floodplain	●								○									◯
Yakima - Selah Floodplain	●								○									○
Yakima Canyon																○		
Yakima- Lower Wapato Floodplain		○												○	○			◯
Yakima- Upper Wapato Floodplain									○					○	○	○		◯

1/ Greatest absolute value of factor change (whether gain or loss) is shown for area (reaches may differ in gain or loss).

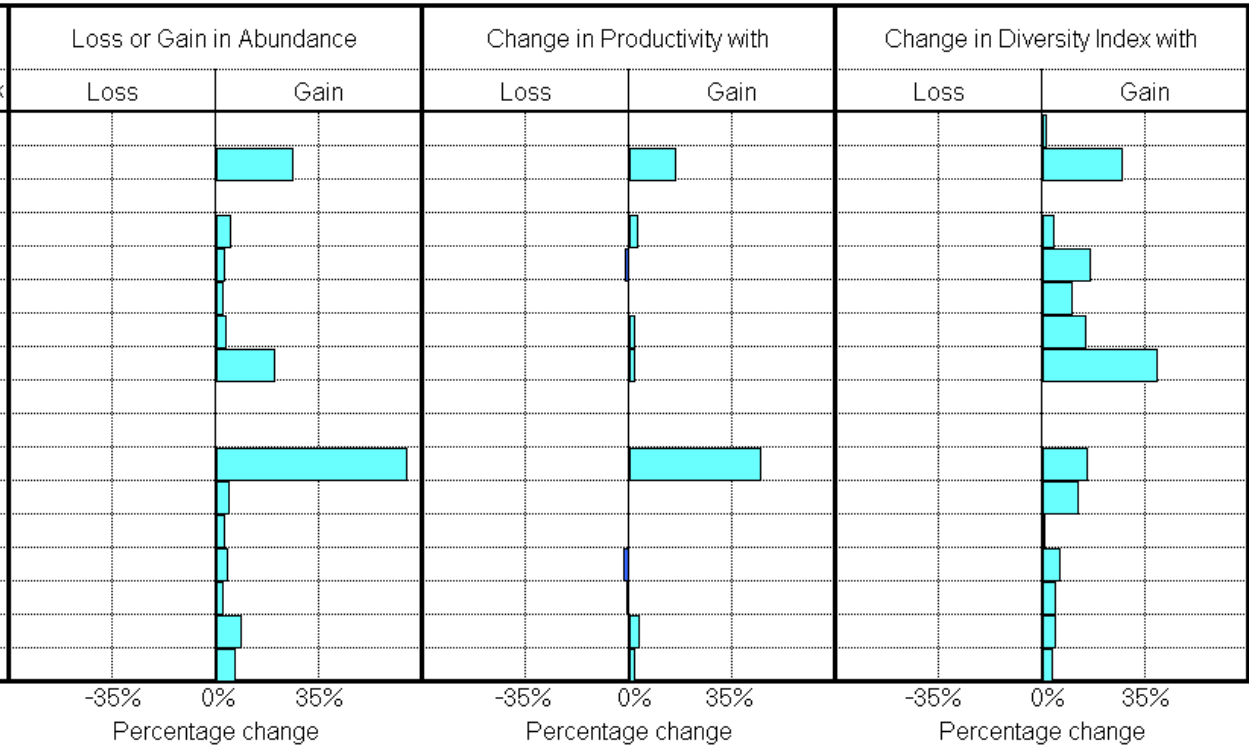
Key to amount of change in factor (corresponding Loss/Gain Category letter also shown)

A	B	C	D & E
◯ / ● High	○ / ● Medium	○ / • Low	Indirect or General

Yakima Spring Chinook

Change in Performance Due to Scenario's Effect within Geographic Area

Geographic Area	Loss category		Gain category	
	Category	rank	Category	rank
Big, Little, Tucker Creeks	C	6	E	14
Lower Cle Elum	D	8	A	1
Lower Kachess	D	8	E	16
Lower Yakima River	D	8	C	6
Manastash	A	2	D	8
Swauk	D	8	E	11
Taneum	D	8	C	5
Teanaway	D	8	B	3
Upper Cle Elum	D	8	E	16
Upper Kachess	D	7	E	15
Upper Yakima	D	8	A	1
Wilson	C	5	D	7
Yakima - Gap to Gap Floodplain	B	4	E	13
Yakima - Selah Floodplain	A	1	E	10
Yakima Canyon	B	3	E	12
Yakima- Lower Wapato Floodplain	D	8	B	4
Yakima- Upper Wapato Floodplain	D	8	E	9



RECLAMATION

Yakima Spring Chinook
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Life stage	Relevant months	Productivity change due to scenario (%)	Life Stage Rank	Change in attribute impact on survival due to scenario															
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Spawning	Sep	241.1%	1					○		○	○						◯		◯
Egg incubation	Sep-Apr	70.3%	4	○												○	○		○
Fry colonization	Mar-May	16.4%	6	○				○	○	○		◯							○
0-age active rearing	Mar-Oct	140.3%	3							○		◯					○		◯
0-age migrant	Oct-Nov	7.1%	8							○		◯							○
0-age inactive	Oct-Mar	6.1%	9					○	○	○									◯
1-age active rearing	Mar-May	0.8%	10																◯
1-age migrant	Mar-Jun	15.1%	7		○					○		◯			○	○			◯
1-age transient rearing	Jan-Dec	0.0%	11																
2+-age transient rearing	Jan-Dec	0.0%	11																
Prespawning migrant	Apr-Aug	64.0%	5									◯					○		◯
Prespawning holding	May-Sep	174.0%	2					○		◯						○	○		◯

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	Loss	Gain
None		
Small	•	○
Moderate	●	○
High	⬤	○
Extreme	⬤	◯

Yakima Spring Chinook
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Big, Little, Tucker Creeks	•																	◯
Lower Cle Elum		◯					○		○		◯							◯
Lower Kachess																		
Lower Yakima River		○														○		○
Manastash	●						○		◯		◯				◯	◯		◯
Swauk			◯				◯		◯						◯	◯		◯
Taneum		○	○				○		◯		◯				◯			◯
Teanaway		◯	○				○		◯						◯	◯		◯
Upper Cle Elum																		
Upper Kachess																		
Upper Yakima		◯							○						○			○
Wilson	•								◯		◯				○			○
Yakima - Gap to Gap Floodplain	●																	◯
Yakima - Selah Floodplain	●						○		○					○		◯		○
Yakima Canyon	●															◯		
Yakima- Lower Wapato Floodplain		◯													○	○		◯
Yakima- Upper Wapato Floodplain															○	○		◯

1/ Greatest absolute value of factor change (whether gain or loss) is shown for area (reaches may differ in gain or loss).

Key to amount of change in factor (corresponding Loss/Gain Category letter also shown)

A	B	C	D & E
◯ / ● High	○ / ● Medium	○ / • Low	Indirect or General