BAKER RIVER PROJECT RELICENSE

Fish Passage Technical Working Group

September 28, 2000

9:00 a.m. – 3:00 p.m.

West Coast Sea-Tac Hotel
18220 Pacific Hwy. S.
Seattle, WA 98188

AGENDA

Review Agenda
Action Items
Continue fleshing out brainstormed list of potential solutions (Start with additional options/combinations developed by teamlet)
Meeting evaluation
Set agenda for next meeting

		Baker Downstream Passage Brainstorm Options (Matrix Unrated)	Primary or secondary	Fish	Life stages	Operation	Economic	Other interests	Score	Ken's Comments	PSE's Comments
		Relative weight of evaluation parameters		1	1	1	1	1			
	1 Reservoir passage										
		Behavioral guidance	0								
1		Electric fields, bubble curtains, strobe light, chemicals, sonics, turbulent flow	S	2	2	4	4	5			No stand-alone possibilities, supports primary facilities
2		Reservoir management schedule for passage	P	5	5	3	1	3	17		Need to define for accurate rating
3		Reservoir bypass (capture at Upper Baker, take to Skagit River)	P	6	6	4	5	4	25		
4		River screen and trap (upstream)	P	5	4	2	2	3	16	Difficult screening, lessens rearing opportunity	Remote, need multiple sites, debris, sediment
5		Temperature manipulation	S								More applicable for release flows
6		Dam removal	P	6	6	0	0	2			
7		Purse Seine	P	3	2	2	4	4	15	Lots of handling; removes non-migrants	Extremely difficult
8		Traveling gulper	P	2	3	2	3	4	14	Probably fixed at different locations by season	
9		Fish vacuum	P	2	3	2	4	4	15	Same as travelling gulper?	
10		Multiple fixed base traps with guide nets	P	4	4	1	2	4	15	Remote facilities, lots of handling, holding, decreased rearing	Operations nightmare
11		Pied Piper (something that attracts fish to a location so they can be more effectively collected)	?							Don't know what this is. Moved from attraction/guidance.	Potential in artificial rearing situations only
12		Reservoir crowder (not only mechanical)	P	1	1	2	2	2	8	Moved from attract/guidance.	Not possible; removes resident species
	2 Attraction/Guidance										
13		Behavioral guidance	0								
14		Split intake with deep and a surface opening	P	5	3	4	3	5	20	Benefits later/larger fish that might be deeper. Splits attraction so less effective.	
15		A fixed 10 ft. V-Screen with 'x' reservoir elev. that would be met during peak of fish passage and a gulper that would operate at all other reservoir elevations	P	4	4	2	1	5	16	Variation of split intake. I assumed it could be any size rather than just a 10ft screen.	Need more information - rated '0' if duplicate/full flow screen
16		2-station intake - gives more control over attraction than surface collector; Lower Baker extension with penstock upstream	P	5	3	3	2	4	17	Essentially same as split intake. Splits attraction so less effective unless full flow through both collectors.	
17		Conventional screen (up to full flow)	P	6	6	4	1	5	22	High certainty	Full-flow alternative a killer
18		Electric fields, bubble curtains, strobe light, chemicals, sonics, turbulent flow	S	2	3	4	4	5			
19		Directional flow guidance	S			5	5	4		Low certainty	
20		Gulper	P	3	2	5	5	4	19	As is	Improved gulper with higher pump capacity, wedge-wire, etc.
21		Modified gulper plumbed into both pumps and penstock; replacing louvers with exclusionary screens, V-shaped and ramped, adjust for variable flow and velocity, uses guides	P	4	4	4	3	4	19		

		Baker Downstream Passage Brainstorm Options (Matrix Unrated)	Primary or secondary	Fish	Life stages	Operation	Economic	Other interests	Score	Ken's Comments	PSE's Comments
		Relative weight of evaluation parameters		1	1	1	1	1			
22		Reservoir management schedule for passage	0							reservoir passage	
23		Temperature manipulation	0							reservoir passage	
24		Surface collector/baffle combination (appropriate for Upper Baker)	P	5	5	4	4	5	23	Depends on flow	
25		Slotted spill ---notch spill gate	P	5	5	5	2	4	21		
26		Turbine passage (fish friendly)	P	0	0						
27		Multiple slots oriented vertically (could be attached to a gulper or conventional screens)	P	5	5	4	4	5	23	Depends on flow	
28		Spill for attraction flow	P	5	5	5	1	4	20		
29		Traveling gulper	P	3	3	2	3	4	15		
30		Fish vacuum	P	3	3	2	4	4	16	Same as traveling gulper?	
31		MIS/Gulper hybrid	P	6	6	4	4	4	24	Not sure what this is.	Similar to #20? Passage when units not operational?
32		Baffle system upstream for spill. Collect fish behind it.	P	5	5	2	2	3	17	Not sure what this is.	
33		Multiple fixed base traps with guide nets	P	3	3	1	2	3	12	Assume these are passive traps rather than gulpers.	
34		Barrier nets	P	3	3	4	5	3	18		
	3 Exclusion										
		Behavioral guidance	0								
35		A fixed 10 ft. V-Screen with 'x' reservoir elevation that would be met during peak of fish passage and a gulper that would operate at all other reservoir elevations	P	4	3	2	2	5	16	Assume this is a vertical high velocity screen with some flexibility of scale.	
36		MIS (Modular Incline Screen) is rectangular and can be anywhere fixed or variable elevation	P	5	3	4	4	5	21	Assume fixed MIS; next option is variable depth.	No passage when units not in operation; is this in new tower?; no fixed pool elev.
37		Vertically adjustable MIS	P	5	4	3	3	5	20		No passage when units not in operation
38		Eicher (designed elliptically for penstock)	P	2	2	4	3	4	15	Difficult bypass with variable forebay.	No passage when units not in operation
39		Electric fields, bubble curtains, strobe light, chemicals, sonics, turbulent flow	S			4	5	5			
40		Directional flow guidance	S								
41		Gulper	P	4	2	5	5	4	20	As is.	
42		Modified gulper plumbed into both pumps and penstock; replacing louvers with exclusionary screens, V-shaped and ramped, adjust for variable flow and velocity, uses guides	P	4	4	4	3	4	19		
43		Barrier nets - consider the net as a screen	P	2	1	4	6	4	17		Contoured with flow, smaller and stronger mesh than now used
44		River screen and trap (upstream)	P	5	5	1	3	3	17	Assumes conventional screen.	
45		Surface collector/baffle combination (appropriate for Upper Baker)				4	4	5		This is a collector, not exclusion.	

		Baker Downstream Passage Brainstorm Options (Matrix Unrated)	Primary or secondary	Fish	Life stages	Operation	Economic	Other interests	Score	Ken's Comments	PSE's Comments
		Relative weight of evaluation parameters		1	1	1	1	1			
46		Traveling screens (currently using on Columbia River) self-cleaning; a submerged traveling intake screen, in gate well slot	P	4	4	4	4	4	20	Low certainty	Need to define fish diversion/collection details
47		Higher approach velocity conventional screen	P	5	4	3	2	5	19	Depends on how high	
48		Traveling gulper	P	4	2	2	3	4	15	Same as modified gulper	
49		Fish vacuum				2	4	4		This is a collector, not exclusion.	
50		MIS/Gulper hybrid	P	5	4	4	4	4	21	Assumes combination rather than hybrid	
51		Multiple fixed base traps with guide nets	P	5	5	1	2	3	16	Fits few attraction concepts.	
	4 Transport										
52		Fish locks	P	5	4	4	3	4	20		
53		Pipeline passage that utilizes penstock	P	3	3	5	3	4	18		
54		Dam removal	P	6	6	0	0				
55		Turbine passage (fish friendly)	P	0	0	5	2	5			
56		Trap-and-haul	P	4	4	4	4	5	21		
57		Gravity pipe bypass	P	3	4	5	3	5	20		Recurrent problems with last pipe
	5 General										
58		Combination of behavioral guidance and conventional technology	?							To be defined	
		Ratings Key									
	0	fatal flaw									
	1	low - bad	Score function: (e.g., score for #1, electric fields, . . .)								
	2		=IF(OR(D5<>"P", E5=0, F5=0, G5=0, H5=0, I5=0),"",(E5*E2+F5*F2+G5*G2+H5*H2+I5*I2))								
	3										
	4										
	5										
	6	high - good									

		Baker Downstream Passage Brainstorm Options (Matrix Rated 50% Grouped)	Primary or secondary	Fish	Life stages	Operation	Economic	Other interests	Score	Ken's Comments	PSE's Comments
		Relative weight of evaluation parameters		**43**	**14**	**14**	**22**	**6**			
1	1	Electric fields, bubble curtains, strobe light, chemicals, sonics, turbulent flow	S	2	2	4	4	5			No stand-alone possibilities, supports primary facilities
5	1	Temperature manipulation	S								More applicable for release flows
6	1	Dam removal	P	6	6	0	0	2			
11	1	Pied Piper (something that attracts fish to a location so they can be more effectively collected)	?							Don't know what this is. Moved from attraction/guidance.	Potential in artificial rearing situations only
3	1	Reservoir bypass (capture at Upper Baker, take to Skagit River)	P	6	6	4	5	4	537		
2	1	Reservoir management schedule for passage	P	5	5	3	1	3	371		Need to define for accurate rating
4	1	River screen and trap (upstream)	P	5	4	2	2	3	365	Difficult screening, lessens rearing opportunity	Remote, need multiple sites, debris, sediment
10	1	Multiple fixed base traps with guide nets	P	4	4	1	2	4	313	Remote facilities, lots of handling, holding, decreased rearing	Operations nightmare
7	1	Purse Seine	P	3	2	2	4	4	300	Lots of handling; removes non-migrants	Extremely difficult
9	1	Fish vacuum	P	2	3	2	4	4	271	Same as travelling gulper?	
8	1	Traveling gulper	P	2	3	2	3	4	249	Probably fixed at different locations by season	
12	1	Reservoir crowder (not only mechanical)	P	1	1	2	2	2	143	Moved from attract/guidance.	Not possible; removes resident species
	2	*Attraction/Guidance*									
13	2	Behavioral guidance	0								
18	2	Electric fields, bubble curtains, strobe light, chemicals, sonics, turbulent flow	S	2	3	4	4	5			
19	2	Directional flow guidance	S			5	5	4		Low certainty	
22	2	Reservoir management schedule for passage	0							reservoir passage	
23	2	Temperature manipulation	0							reservoir passage	
26	2	Turbine passage (fish friendly)	P	0	0						
31	2	MIS/Gulper hybrid	P	6	6	4	4	4	515	Not sure what this is.	Similar to #20? Passage when units not operational?
24	2	Surface collector/baffle combination (appropriate for Upper Baker)	P	5	5	4	4	5	464	Depends on flow	
27	2	Multiple slots oriented vertically (could be attached to a gulper or conventional screens)	P	5	5	4	4	5	464	Depends on flow	
25	2	Slotted spill ---notch spill gate	P	5	5	5	2	4	428		
14	2	Split intake with deep and a surface opening	P	5	3	4	3	5	413	Benefits later/larger fish that might be deeper. Splits attraction so less effective.	
28	2	Spill for attraction flow	P	5	5	5	1	4	405		
32	2	Baffle system upstream for spill. Collect fish behind it.	P	5	5	2	2	3	379	Not sure what this is.	
21	2	Modified gulper plumbed into both pumps and penstock; replacing louvers with exclusionary screens, V-shaped and ramped, adjust for variable flow and velocity, uses guides	P	4	4	4	3	4	378		

		Baker Downstream Passage Brainstorm Options (Matrix Rated 50% Grouped)	Primary or secondary	Fish	Life stages	Operation	Economic	Other interests	Score	Ken's Comments	PSE's Comments
		Relative weight of evaluation parameters		**43**	**14**	**14**	**22**	**6**			
16	2	2-station intake - gives more control over attraction than surface collector; Lower Baker extension with penstock upstream	P	5	3	3	2	4	371	Essentially same as split intake. Splits attraction so less effective unless full flow through both collectors.	
20	2	Gulper	P	3	2	5	5	4	365	As is	Improved gulper with higher pump capacity, wedge-wire, etc.
34	2	Barrier nets	P	3	3	4	5	3	358		
30	2	Fish vacuum	P	3	3	2	4	4	314	Same as traveling gulper?	
15	2	A fixed 10 ft. V-Screen with 'x' reservoir elev. that would be met during peak of fish passage and a gulper that would operate at all other reservoir elevations	P	4	4	2	1	5	312	Variation of split intake. I assumed it could be any size rather than just a 10ft screen.	Need more information - rated '0' if duplicate/full flow screen
29	2	Traveling gulper	P	3	3	2	3	4	292		
33	2	Multiple fixed base traps with guide nets	P	3	3	1	2	3	250	Assume these are passive traps rather than gulpers.	
	3	*Exclusion*									
	3	Behavioral guidance	0								
39	3	Electric fields, bubble curtains, strobe light, chemicals, sonics, turbulent flow	S			4	5	5			
40	3	Directional flow guidance	S								
45	3	Surface collector/baffle combination (appropriate for Upper Baker)				4	4	5		This is a collector, not exclusion.	
49	3	Fish vacuum				2	4	4		This is a collector, not exclusion.	
17	3	Conventional screen (up to full flow)	P	6	6	4	1	5	455	High certainty	Full-flow alternative a killer
50	3	MIS/Gulper hybrid	P	5	4	4	4	4	443	Assumes combination rather than hybrid	
36	3	MIS (Modular Incline Screen) is rectangular and can be anywhere fixed or variable elevation	P	5	3	4	4	5	435	Assume fixed MIS; next option is variable depth.	No passage when units not in operation; is this in new tower?; no fixed pool elev.
37	3	Vertically adjustable MIS	P	5	4	3	3	5	413		No passage when units not in operation
41	3	Gulper	P	4	2	5	5	4	408	As is.	
46	3	Traveling screens (currently using on Columbia River) self-cleaning; a submerged traveling intake screen, in gate well slot	P	4	4	4	4	4	400	Low certainty	Need to define fish diversion/collection details
47	3	Higher approach velocity conventional screen	P	5	4	3	2	5	391	Depends on how high	
44	3	River screen and trap (upstream)	P	5	5	1	3	3	387	Assumes conventional screen.	
42	3	Modified gulper plumbed into both pumps and penstock; replacing louvers with exclusionary screens, V-shaped and ramped, adjust for variable flow and velocity, uses guides	P	4	4	4	3	4	378		
51	3	Multiple fixed base traps with guide nets	P	5	5	1	2	3	365	Fits few attraction concepts.	
48	3	Traveling gulper	P	4	2	2	3	4	321	Same as modified gulper	
35	3	A fixed 10 ft. V-Screen with 'x' reservoir elevation that would be met during peak of fish passage and a gulper that would operate at all other reservoir elevations	P	4	3	2	2	5	320	Assume this is a vertical high velocity screen with some flexibility of scale.	

		Baker Downstream Passage Brainstorm Options (Matrix Rated 50% Grouped)	Primary or secondary	Fish	Life stages	Operation	Economic	Other interests	Score	Ken's Comments	PSE's Comments
		Relative weight of evaluation parameters		**43**	**14**	**14**	**22**	**6**			
43	3	Barrier nets - consider the net as a screen	P	2	1	4	6	4	315		Contoured with flow, smaller and stronger mesh than now used
38	3	Eicher (designed elliptically for penstock)	P	2	2	4	3	4	263	Difficult bypass with variable forebay.	No passage when units not in operation
	4	*Transport*									
54	4	Dam removal	P	6	6	0	0				
55	4	Turbine passage (fish friendly)	P	0	0	5	2	5			
52	4	Fish locks	P	5	4	4	3	4	421		
56	4	Trap-and-haul	P	4	4	4	4	5	406		
57	4	Gravity pipe bypass	P	3	4	5	3	5	355		Recurrent problems with last pipe
53	4	Pipeline passage that utilizes penstock	P	3	3	5	3	4	335		
	5	*General*									
58	5	Combination of behavioral guidance and conventional technology	?							To be defined	
		Reservoir passage									
		Behavioral guidance	0								
		Ratings Key									
	0	fatal flaw									
	1	low - bad	Score function: (e.g., score for #1, electric fields, . . .)								
	2		=IF(OR(D5<>"P", E5=0, F5=0, G5=0, H5=0, I5=0),"",(E5*E2+F5*F2+G5*G2+H5*H2+I5*I2))								
	3										
	4										
	5										
	6	high - good									

		Baker Downstream Passage Brainstorm Options (Matrix Rated 50% Ungrouped)	Primary or secondary	Fish	Life stages	Operation	Economic	Other interests	Score	Pursue	More Info	Ken's Comments	PSE's Comments
		Relative weight of evaluation parameters		**43**	**14**	**14**	**22**	**6**					
1	1	Electric fields, bubble curtains, strobe light, chemicals, sonics, turbulent flow	S	2	2	4	4	5					No stand-alone possibilities, supports primary facilities
5	1	Temperature manipulation	S										More applicable for release flows
6	1	Dam removal	P	6	6	0	0	2					
11	1	Pied Piper (something that attracts fish to a location so they can be more effectively collected)	?									Don't know what this is. Moved from attraction/guidance.	Potential in artificial rearing situations only
	2	*Attraction/Guidance*											
13	2	Behavioral guidance	0										
18	2	Electric fields, bubble curtains, strobe light, chemicals, sonics, turbulent flow	S	2	3	4	4	5					
19	2	Directional flow guidance	S			5	5	4				Low certainty	
22	2	Reservoir management schedule for passage	0									reservoir passage	
23	2	Temperature manipulation	0									reservoir passage	
26	2	Turbine passage (fish friendly)	P	0	0								
	3	*Exclusion*											
	3	Behavioral guidance	0										
39	3	Electric fields, bubble curtains, strobe light, chemicals, sonics, turbulent flow	S			4	5	5					
40	3	Directional flow guidance	S										
45	3	Surface collector/baffle combination (appropriate for Upper Baker)				4	4	5				This is a collector, not exclusion.	
49	3	Fish vacuum				2	4	4				This is a collector, not exclusion.	
	4	*Transport*											
54	4	Dam removal	P	6	6	0	0						
55	4	Turbine passage (fish friendly)	P	0	0	5	2	5					
	5	*General*											
58	5	Combination of behavioral guidance and conventional technology	?									To be defined	
3	1	Reservoir bypass (capture at Upper Baker, take to Skagit River)	P	6	6	4	5	4	537	G	Y		
31	2	MIS/Gulper hybrid	P	6	6	4	4	4	515	G	Y	Not sure what this is.	Similar to #20? Passage when units not operational?
24	2	Surface collector/baffle combination (appropriate for Upper Baker)	P	5	5	4	4	5	464	G	Y	Depends on flow	
27	2	Multiple slots oriented vertically (could be attached to a gulper or conventional screens)	P	5	5	4	4	5	464	G	Y	Depends on flow	
17	3	Conventional screen (up to full flow)	P	6	6	4	1	5	455	G	Y	High certainty	Full-flow alternative a killer
50	3	MIS/Gulper hybrid	P	5	4	4	4	4	443	G	Y	Assumes combination rather than hybrid	
36	3	MIS (Modular Incline Screen) is rectangular and can be anywhere fixed or variable elevation	P	5	3	4	4	5	435	G	Y	Assume fixed MIS; next option is variable depth.	No passage when units not in operation; is this in new tower?; no fixed pool elev.
25	2	Slotted spill ---notch spill gate	P	5	5	5	2	4	428	Y	Y		
52	4	Fish locks	P	5	4	4	3	4	421	G	Y		
14	2	Split intake with deep and a surface opening	P	5	3	4	3	5	413	G	Y	Benefits later/larger fish that might be deeper. Splits attraction so less effective.	

		Baker Downstream Passage Brainstorm Options (Matrix Rated 50% Ungrouped)	Primary or secondary	Fish	Life stages	Operation	Economic	Other interests	Score	Pursue	More Info	Ken's Comments	PSE's Comments
		Relative weight of evaluation parameters		**43**	**14**	**14**	**22**	**6**					
37	3	Vertically adjustable MIS	P	5	4	3	3	5	413	G	Y		No passage when units not in operation
41	3	Gulper	P	4	2	5	5	4	408	G	Y	As is.	
56	4	Trap-and-haul	P	4	4	4	4	5	406	G	Y		
28	2	Spill for attraction flow	P	5	5	5	1	4	405	Y	Y		
46	3	Traveling screens (currently using on Columbia River) self-cleaning; a submerged traveling intake screen, in gate well slot	P	4	4	4	4	4	400	Y	Y	Low certainty	Need to define fish diversion/collection details
47	3	Higher approach velocity conventional screen	P	5	4	3	2	5	391	G	Y	Depends on how high	
44	3	River screen and trap (upstream)	P	5	5	1	3	3	387	Y	Y	Assumes conventional screen.	
32	2	Baffle system upstream for spill. Collect fish behind it.	P	5	5	2	2	3	379	R	N	Not sure what this is.	
21	2	Modified gulper plumbed into both pumps and penstock; replacing louvers with exclusionary screens, V-shaped and ramped, adjust for variable flow and velocity, uses guides	P	4	4	4	3	4	378	Y	Y		
42	3	Modified gulper plumbed into both pumps and penstock; replacing louvers with exclusionary screens, V-shaped and ramped, adjust for variable flow and velocity, uses guides	P	4	4	4	3	4	378	Y	Y		
16	2	2-station intake - gives more control over attraction than surface collector; Lower Baker extension with penstock upstream	P	5	3	3	2	4	371	Y	Y	Essentially same as split intake. Splits attraction so less effective unless full flow through both collectors.	
2	1	Reservoir management schedule for passage	P	5	5	3	1	3	371	G	Y		Need to define for accurate rating
20	2	Gulper	P	3	2	5	5	4	365	G	Y	As is	Improved gulper with higher pump capacity, wedge-wire, etc.
4	1	River screen and trap (upstream)	P	5	4	2	2	3	365	Y	Y	Difficult screening, lessens rearing opportunity	Remote, need multiple sites, debris, sediment
51	3	Multiple fixed base traps with guide nets	P	5	5	1	2	3	365	Y	Y	Fits few attraction concepts.	
34	2	Barrier nets	P	3	3	4	5	3	358	G	Y		
57	4	Gravity pipe bypass	P	3	4	5	3	5	355	G	Y		Recurrent problems with last pipe
53	4	Pipeline passage that utilizes penstock	P	3	3	5	3	4	335	Y	Y		
48	3	Traveling gulper	P	4	2	2	3	4	321	R	N	Same as modified gulper	
35	3	A fixed 10 ft. V-Screen with 'x' reservoir elevation that would be met during peak of fish passage and a gulper that would operate at all other reservoir elevations	P	4	3	2	2	5	320	Y	Y	Assume this is a vertical high velocity screen with some flexibility of scale.	
43	3	Barrier nets - consider the net as a screen	P	2	1	4	6	4	315	G	Y		Contoured with flow, smaller and stronger mesh than now used
30	2	Fish vacuum	P	3	3	2	4	4	314	R	N	Same as traveling gulper?	
10	1	Multiple fixed base traps with guide nets	P	4	4	1	2	4	313	Y	Y	Remote facilities, lots of handling, holding, decreased rearing	Operations nightmare
15	2	A fixed 10 ft. V-Screen with 'x' reservoir elev. that would be met during peak of fish passage and a gulper that would operate at all other reservoir elevations	P	4	4	2	1	5	312	Y	Y	Variation of split intake. I assumed it could be any size rather than just a 10ft screen.	Need more information - rated '0' if duplicate/full flow screen
7	1	Purse Seine	P	3	2	2	4	4	300	R	N	Lots of handling; removes non-migrants	Extremely difficult
29	2	Traveling gulper	P	3	3	2	3	4	292	R	N		
9	1	Fish vacuum	P	2	3	2	4	4	271	R	N	Same as travelling gulper?	
38	3	Eicher (designed elliptically for penstock)	P	2	2	4	3	4	263	Y	Y	Difficult bypass with variable forebay.	No passage when units not in operation

		Baker Downstream Passage Brainstorm Options (Matrix Rated 50% Ungrouped)	Primary or secondary	Fish	Life stages	Operation	Economic	Other interests	Score	Pursue	More Info	Ken's Comments	PSE's Comments
		Relative weight of evaluation parameters		**43**	**14**	**14**	**22**	**6**					
33	2	Multiple fixed base traps with guide nets	P	3	3	1	2	3	250	Y	N	Assume these are passive traps rather than gulpers.	
8	1	Traveling gulper	P	2	3	2	3	4	249	R	N	Probably fixed at different locations by season	
12	1	Reservoir crowder (not only mechanical)	P	1	1	2	2	2	143	R	N	Moved from attract/guidance.	Not possible; removes resident species
	1	*Reservoir passage*											
		Behavioral guidance	0										
		Ratings Key											
	0	fatal flaw											
	1	low - bad	Score function: (e.g., score for #1, electric fields, . . .)										
	2		=IF(OR(D5<>"P", E5=0, F5=0, G5=0, H5=0, I5=0),"",(E5*E2+F5*F2+G5*G2+H5*H2+I5*I2))										
	3												
	4												
	5												
	6	high - good											

Passage Concepts Matrix Weighting Calculations (Ratings Averaged)

	Fish	Mtg Avg Stages	Ops	Econ	Other	Total
Wayne	35	5	20	35	5	100
Kevin	30	10	10	40	10	100
Arnie	30	15	20	30	5	100
Nick	35	15	10	35	5	100
Cary	40	5	10	35	10	100
Mort	35	10	20	30	5	100
Steve						0
Ed	35	25	20	15	5	100
Stan	70	10	10	5	5	100
Gary						0
Ken						0
Fred	50	20	15	10	5	100
Doug	40	10	20	20	10	100
						0
						0
Mean	**40**	**13**	**16**	**26**	**7**	**100**

PSE Only

	Fish	Stages	Ops	Econ	Other	Total
Wayne	35	5	20	35	5	100
Kevin	30	10	10	40	10	100
Arnie	30	15	20	30	5	100
Nick	35	15	10	35	5	100
Cary	40	5	10	35	10	100
Mort						0
Steve						0
Ed						0
Stan						0
Gary						0
Ken						0
Fred						0
Doug	40	10	20	20	10	100
						0
						0
Mean	**35**	**10**	**15**	**33**	**8**	**100**

Agencies Only

	Fish	Stages	Ops	Econ	Other	Total
Wayne						0
Kevin						0
Arnie						0
Nick						0
Cary						0
Mort						0
Steve						0
Ed	35	25	20	15	5	100
Stan	70	10	10	5	5	100
Gary						0
Ken						0
Fred	50	20	10	15	5	100
Doug						0
						0
						0
Mean	**52**	**18**	**13**	**12**	**5**	**100**

	Fish	Stages	Ops	Econ	Other	Total
Agencies/PSE Rated 50%	**43**	**14**	**14**	**22**	**6**	**100**
PSE Only	**35**	**10**	**15**	**33**	**8**	**100**
Agencies Only	**52**	**18**	**13**	**12**	**5**	**100**
Mtg Avg	**40**	**13**	**16**	**26**	**7**	**100**
Discussion-based						

BAKER RIVER PROJECT RELICENSE

Fish Passage Technical Working Group

September 28, 2000

9:00 a.m. – 3:00 p.m.

West Coast Sea-Tac Hotel
18220 Pacific Hwy. S.
Seattle, WA 98188

MEETING NOTES

Mission Statement: *To develop an efficient fish passage design for the Baker River Project.*

Attendees:

Arnie Aspelund, PSE	Ed Meyer, NMFS
Kevin Brink, PSE	Wayne Porter, PSE
Doug Bruland, PSE	Fred Seavey, USFWS
Cary Feldmann, PSE	Nick Verretto, PSE
Steve Fransen, NMFS	Stan Walsh, SSC
Mort McMillen, M-W	Lyn Wiltse, PDSA Consulting

Purpose: The purpose of the meeting was to continue the conceptual design process for replacement of juvenile fish passage facilities at the Baker Project.

Note: Future meeting dates are: 19 October and 16 November, 2000, 9:00 to 3:00 at the West Coast Sea-Tac Hotel.

Agenda:

1. Review notes/agenda
2. Action items/parking lot review
3. Continue brainstorming downstream passage solutions and review results of teamlet
4. Meeting evaluation
5. Set agenda for next meeting

Review notes/agenda:

No changes to the agenda or meeting notes were recommended.

New Action Items:

- Review brainstorming passage ideas matrix for continued development at next meeting.
- Bring questions regarding additional information needs and studies development.
- Nick will produce additional bar chart of gulper pump cycle test data.

"Old" Action Items:

- Fred will bring Skagit Chinook length-frequency data.
- Fred will look at statistical variation from year to year in the gulper mark and recovery data (by September).

- Kevin Brink will analyze how fluctuation limits affect spill (# events, amounts, seasons, duration, flow-days by month), to facilitate discussions regarding limits to drawdown range and effects on screening designs. Kevin will report at the October 19th meeting.
    - Fred will look at statistical variation year-to-year in the gulper mark and recovery data (by October).

Report on Completed Action Items:

- Nick distributed data on gulper pump cycle (every 24 hours) test. The x-axis appears to be incorrect, but the y-axis is correct and it yields the important data. The numbers appear to be too small to be statistically significant. He has copies of the data available on disk for anyone who wants to play with it. Nick will produce bar charts for the next meeting, and correct x-axis errors (overlapping dates) present in the line plots.
- Nick reported that he was unable to get the Hydrolab working, but that temperature data collection had been initiated using a combination of a portable meter and data loggers located at the gulper. PSE began in September taking weekly Lower Baker vertical column temperature data at 10-ft. increments from 100' to the surface. Additional depth measurements have been initiated with data loggers at depths of 150' and 200 feet. Similar data is being collected from the Upper Baker gulper, with two data loggers deployed at 190' and 225' (depth from the surface).

Parking Lot:

- Hydroacoustic data - Arnie
- Fish species run timing, emergence timing, length-frequency data – Doug, Nick
- Design strategy process
- Conceptual designs as they relate to costs
- Sediment studies

Continue Brainstorming Downstream Passage Solutions and Review Results of Teamlet:

The teamlet (consisting of Ken Bates, Wayne Porter, Kevin Brink, Nick Verretto, Cary Feldmann, Dennis Dorratcague and Mort McMillen) put together a potential solution matrix (with much thanks to Ken) with some rating criteria. Nick distributed hard copies of the matrix, consisting of the list of brainstormed options developed in the last meeting (listed below), which were then rated in a systematic way by the meeting participants. Team members provided review, asking clarifying questions and revising the ratings

in the process. They reiterated that the matrix is just a tool to help the team accomplish its mission, and that no one will be held accountable for particular ratings down the road.

Each option was listed as either primary or secondary – primary options consisting of those which would function as stand-alone facilities, and secondary options being support or ancillary facilities. Options were then rated on a scale of 0-6 regarding effectiveness in addressing the five areas of concern identified in the last meeting (i.e., "works well for fish", ". . .all life stages", ". . .operations", ". . .economics", ". . .other interests"). A score of 0 was considered a fatal flaw which would remove the option from further consideration, and a score of 6 indicated the highest effectiveness at addressing the concern.

Each of the five areas of concern was given a relative weight, the sum of which was 100% (this was done by each individual, then the mean calculated based on relative participation of PSE and agency representatives). Final scores were given each option, representing relative effectiveness, and the list reorganized by score for further discussion.

The original & organized matrices and the linked scoring sheets were copied onto disk and distributed at the end of the meeting, and are an attachment to these minutes. Participants are to review the list prior to the next meeting and be prepared to continue discussions leading to the identification of several options for conceptual design development. All options should be considered in the context of what additional information, if any, is needed to provide confidence in acceptance of the option for further development. This will fuel discussion at the next meeting regarding future study needs. The revised matrix will be available on the web site.

1. Reservoir Passage

Behavioral guidance
Electric fields, bubble curtains, strobe lights, chemicals, sonics, turbulent flow
Reservoir management schedule for passage
Reservoir bypass (capture at Upper Baker, take to Lower Baker)
River screen and trap (upstream)
Temperature manipulation
Dam removal
Purse seine
Traveling gulper
Fremont Duck Thing
Fish vacuum
Multiple fixed-base traps with guide nets

2. Attraction/Guidance

Behavioral guidance
Split intake with deep a surface openings
A 10 ft. v-screen with a fixed reservoir elevation that would be used during the peak of fish passage and a gulper that would operate at all other reservoir elevations
Two-station intake gives more control over attraction than surface collector (e.g., Lower Baker penstock/intake extension upstream

Conventional screen (up to full flow)
Electric fields, bubble curtains, strobe lights, chemicals, sonics, turbulent flow
Directional flow guidance
Gulper
Modified gulper plumbed into both pumps and penstock; replacing louvers with exclusionary screens, v-shaped and ramped, adjustable for variable flow and velocity, uses guides
Reservoir management schedule for passage
Temperature manipulation
Surface collector/baffle combination (appropriate for Upper Baker)
Slotted spill -- notched spill gate
Turbine passage (fish-friendly)
Multiple slots oriented vertically (could be attached to a gulper conventional screen or gulper)
Spill for attraction flow
Pied Piper (something that attracts fish to a location so they can be more effectively collected)
Reservoir crowder (not only mechanical)
Traveling gulper
Fremont Duck Thing
Fish vacuum
MIS/Gulper hybrid
Baffle system upstream for spill; Collect fish behind it
Multiple fixed-base traps with guide nets

3. Exclusion

Behavioral guidance
A 10 ft. v-screen with a fixed reservoir elevation that would be used during the peak of fish passage and a gulper that would operate at all other reservoir elevations
MIS (Modular Incline Screen) is rectangular and can be anywhere fixed or variable elevation
Vertically adjustable MIS
Eicher (designed elliptically for penstock)
Electric fields, bubble curtains, strobe lights, chemicals, sonics, turbulent flow
Directional flow guidance
Gulper
Modified gulper plumbed into both pumps and penstock; replacing louvers with exclusionary screens, v-shaped and ramped, adjust for variable flow and velocity, uses guides
Barrier nets
River screen and trap (upstream)
Surface collector/baffle combination (appropriate for Upper Baker)
Traveling screens (currently used on Columbia River) self-cleaning; a submerged traveling intake screen, in gate well slot
Higher approach velocity than conventional
Traveling gulper
Fremont Duck Thing
Fish vacuum
MIS/Gulper hybrid
Multiple fixed base traps with guide nets

4. Transport
Fish locks
Pipeline passage that utilizes penstock
Dam removal
Turbine passage (fish-friendly)
Trap-and-haul
Fremont Duck Thing

5. General
Combination of behavioral guidance and conventional technology

Meeting Evaluation
Well-Dones:
- Matrix information
- Good level of energy
- Working lunches

Opportunities to Improve:
- Number minutes pages
- Encourage full participation

Tentative Agenda for next meeting – 19 October, 2000

9 a.m. - 3 p.m., West Coast Sea-Tac Hotel
1. Review notes/agenda
2. Action items/parking lot review
3. Continue brainstorming matrix development
4. Studies identification discussion
5. Meeting evaluation
6. Set agenda for next meeting