Channel Stability

Level 3 Attribute: Channel Stability

Species: Chinook Life Stage: Spawning

Definition: The effect of stream channel stability (within a reach) on the relative survival or performance of the focus species; the extent of channel stability is with respect to its streambed, banks, and its channel shape and location.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			No effects are assumed. Adult salmon prepared to spawn are assumed to be capable of delaying spawning long enough to minimize effects of channel disturbance events.	4

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Channel Stability

Species: Chinook Life Stage: Egg incubation

Definition: The effect of stream channel stability (within a reach) on the relative survival or performance of the focus species; the extent of channel stability is with respect to its streambed, banks, and its channel shape and location.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Bed scour	BdScour	Primary	Streambed scour during high flow events can dislodge some or all incubating eggs or alevins at spawning sites resulting in mortality. Major bed scouring events can result in very high loss.	1
Icing	Icing	Modifying	Icing events, particularly severe ones in areas with little wood and impaired riparian function, can alter stream features, such as side channels, creating less suitable sites for egg incubation.	2
Riparian function	RipFunc	Modifying	Loss of riparian function can result in loss of side channels (somewhat protected from high flows), often heavily used by spawning chinook, increasing susceptibility of eggs to scour events.	1
Wood	WdDeb	Modifying	Loss of wood, particularly large wood lodged along a stream, can cause a loss in relatively protected sites for egg deposition, increasing overall susceptibility in a reach to bed scour events.	1

Primary Level 2 Attribute	
BdScour	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**1E-02**
3	*1.4E-01*
4	**9E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Icing	*RipFunc*	*WdDeb*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*4.4E-05*	*4.4E-05*	*4.4E-05*					
2	**6E-04**	**6E-04**	**6E-04**					
3	*2.9E-03*	*2.9E-03*	*2.9E-03*					
4	**9E-03**	**9E-03**	**9E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
BdScour	0	1	1	1	2	3	4
Icing	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
WdDeb	0	0	0	0	1	1	2
Sensitivity (S)	0	.0001	.0005	.0012	.0256	.3046	1
Relative Prod. (P=1-S)	1.0000	0.9999	0.9995	0.9988	0.9744	0.6954	-0.9305

Level 3 Attribute: Channel Stability

Species: Chinook Life Stage: Fry colonization

Definition: The effect of stream channel stability (within a reach) on the relative survival or performance of the focus species; the extent of channel stability is with respect to its streambed, banks, and its channel shape and location.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Bed scour	BdScour	Primary	Streambed scour during high flow events is likely to disrupt newly emerged fry resting in or on the substrate resulting in displacement and mortality.	4
Icing	Icing	Modifying	Icing events, particularly severe ones in areas with little wood and impaired riparian function, can alter stream features, such as low velocity areas, creating less suitable sites for colonization.	4
Riparian function	RipFunc	Modifying	Loss of riparian function can result in loss of side channels and quiet water areas, used by emergent fry, forcing fry into areas more exposed to channel instability during high flows.	4
Wood	WdDeb	Modifying	Loss of wood can cause a loss in relatively stable areas for newly emerged fry, increasing overall susceptibility of fry in a reach to channel instability events.	4

Primary Level 2 Attribute	
BdScour	
Rating	**Sensitivity***
0	**0E+00**
1	*7.3E-05*
2	**1E-03**
3	*4.7E-03*
4	**1E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Icing	*RipFunc*	*WdDeb*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*5.7E-05*	*5.7E-05*	*5.7E-05*					
2	**5E-04**	**5E-04**	**5E-04**					
3	*2.1E-03*	*2.1E-03*	*2.1E-03*					
4	**5E-03**	**5E-03**	**5E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
BdScour	0	1	1	1	2	3	4
Icing	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
WdDeb	0	0	0	0	1	1	2
Sensitivity (S)	0	.0001	.0004	.0012	.0071	.0357	.1342
Relative Prod. (P=1-S)	1.0000	0.9999	0.9996	0.9988	0.9929	0.9643	0.8658

Level 3 Attribute: Channel Stability

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of stream channel stability (within a reach) on the relative survival or performance of the focus species; the extent of channel stability is with respect to its streambed, banks, and its channel shape and location.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Bed scour	BdScour	Primary	Streambed scour during high flow events is likely to disrupt rearing juveniles resulting in displacement and mortality.	4
Icing	Icing	Modifying	Icing events, particularly severe ones in areas with little wood and impaired riparian function, can alter stream features, such as low velocity areas, creating less suitable sites for rearing.	4
Riparian function	RipFunc	Modifying	Loss of riparian function can result in loss of side channels and quiet water areas, used by rearing juveniles, forcing fish into areas more exposed to channel instability during high flows.	4
Wood	WdDeb	Modifying	Loss of wood can cause a loss in relatively stable areas for rearing juveniles, increasing overall susceptibility of fish in a reach to channel instability events.	4
			Note: Effects of these attributes on rearing juveniles are assumed to be less than on newly emerged fry because older, larger fish should be able to better cope with such events.	

Primary Level 2 Attribute

BdScour	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**1E-03**
3	*4.0E-03*
4	**1E-02**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	Icing	*RipFunc*	*WdDeb*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*5.7E-05*	*5.7E-05*	*5.7E-05*					
2	**5E-04**	**5E-04**	**5E-04**					
3	*1.5E-03*	*1.5E-03*	*1.5E-03*					
4	**4E-03**	**4E-03**	**4E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
BdScour	0	1	1	1	2	3	4
Icing	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
WdDeb	0	0	0	0	1	1	2
Sensitivity (S)	0	.0001	.0005	.0014	.0072	.0303	.0995
Relative Prod. (P=1-S)	1.0000	0.9999	0.9995	0.9986	0.9928	0.9697	0.9005

Level 3 Attribute: Channel Stability

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of stream channel stability (within a reach) on the relative survival or performance of the focus species; the extent of channel stability is with respect to its streambed, banks, and its channel shape and location.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Bed scour	BdScour	Primary	Streambed scour during high flow events is likely to disrupt rearing juveniles resulting in displacement and mortality.	4
Icing	Icing	Modifying	Icing events, particularly severe ones in areas with little wood and impaired riparian function, can alter stream features, such as low velocity areas, creating less suitable sites for rearing.	4
Riparian function	RipFunc	Modifying	Loss of riparian function can result in loss of side channels and quiet water areas, used by rearing juveniles, forcing fish into areas more exposed to channel instability during high flows.	4
Wood	WdDeb	Modifying	Loss of wood can cause a loss in relatively stable areas for rearing juveniles, increasing overall susceptibility of fish in a reach to channel instability events.	4
			Note: Effects of these attributes on rearing juveniles are assumed to be less than on newly emerged fry because older, larger fish should be able to better cope with such events.	

Primary Level 2 Attribute

BdScour	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**1E-03**
3	*4.0E-03*
4	**1E-02**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	Icing	*RipFunc*	*WdDeb*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*5.7E-05*	*5.7E-05*	*5.7E-05*					
2	**5E-04**	**5E-04**	**5E-04**					
3	*1.5E-03*	*1.5E-03*	*1.5E-03*					
4	**4E-03**	**4E-03**	**4E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
BdScour	0	1	1	1	2	3	4
Icing	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
WdDeb	0	0	0	0	1	1	2
Sensitivity (S)	0	.0001	.0005	.0014	.0072	.0303	.0995
Relative Prod. (P=1-S)	1.0000	0.9999	0.9995	0.9986	0.9928	0.9697	0.9005

Level 3 Attribute: Channel Stability

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of stream channel stability (within a reach) on the relative survival or performance of the focus species; the extent of channel stability is with respect to its streambed, banks, and its channel shape and location.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			No effects are assumed. Migrant fingerlings are assumed to be capable of coping with channel disturbance events.	4

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Channel Stability

Species: Chinook Life Stage: Inactive

Definition: The effect of stream channel stability (within a reach) on the relative survival or performance of the focus species; the extent of channel stability is with respect to its streambed, banks, and its channel shape and location.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Bed scour	BdScour	Primary	Streambed scour during high flow events is likely to disrupt inactive (overwintering) juveniles resulting in displacement and mortality. Inactive chinook utilize interstitial spaces within substrate.	3
Icing	Icing	Modifying	Icing events, particularly severe ones in areas with little wood and impaired riparian function, can alter stream features, such as low velocity areas, creating less suitable sites for rearing.	4
Riparian function	RipFunc	Modifying	Loss of riparian function can result in loss of side channels and quiet water areas, used by rearing juveniles, forcing fish into areas more exposed to channel instability during high flows.	4
Wood	WdDeb	Modifying	Loss of wood can cause a loss in relatively stable areas for rearing juveniles, increasing overall susceptibility of fish in a reach to channel instability events.	4

Primary Level 2 Attribute	
BdScour	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**2E-03**
3	*1.3E-02*
4	**5E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Icing	*RipFunc*	*WdDeb*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*5.7E-05*	*5.7E-05*	*5.7E-05*					
2	**5E-04**	**5E-04**	**5E-04**					
3	*2.1E-03*	*2.1E-03*	*2.1E-03*					
4	**5E-03**	**5E-03**	**5E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
BdScour	0	1	1	1	2	3	4
Icing	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
WdDeb	0	0	0	0	1	1	2
Sensitivity (S)	0	.0001	.0005	.0014	.0107	.0607	.2387
Relative Prod. (P=1-S)	1.0000	0.9999	0.9995	0.9986	0.9893	0.9393	0.7613

Level 3 Attribute: Channel Stability

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of stream channel stability (within a reach) on the relative survival or performance of the focus species; the extent of channel stability is with respect to its streambed, banks, and its channel shape and location.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Bed scour	BdScour	Primary	Streambed scour during high flow events is likely to disrupt rearing juveniles resulting in displacement and mortality.	4
Icing	Icing	Modifying	Icing events, particularly severe ones in areas with little wood and impaired riparian function, can alter stream features, such as low velocity areas, creating less suitable sites for rearing.	4
Riparian function	RipFunc	Modifying	Loss of riparian function can result in loss of side channels and quiet water areas, used by rearing juveniles, forcing fish into areas more exposed to channel instability during high flows.	4
Wood	WdDeb	Modifying	Loss of wood can cause a loss in relatively stable areas for rearing juveniles, increasing overall susceptibility of fish in a reach to channel instability events.	4
			Note: Effects of these attributes on rearing juveniles are assumed to be less than on newly emerged fry because older, larger fish should be able to better cope with such events.	

Primary Level 2 Attribute

BdScour	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**1E-03**
3	*4.0E-03*
4	**1E-02**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	Icing	*RipFunc*	*WdDeb*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*5.7E-05*	*5.7E-05*	*5.7E-05*					
2	**5E-04**	**5E-04**	**5E-04**					
3	*1.5E-03*	*1.5E-03*	*1.5E-03*					
4	**4E-03**	**4E-03**	**4E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
BdScour	0	1	1	1	2	3	4
Icing	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
WdDeb	0	0	0	0	1	1	2
Sensitivity (S)	0	.0001	.0005	.0014	.0072	.0303	.0995
Relative Prod. (P=1-S)	1.0000	0.9999	0.9995	0.9986	0.9928	0.9697	0.9005

Level 3 Attribute: Channel Stability

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of stream channel stability (within a reach) on the relative survival or performance of the focus species; the extent of channel stability is with respect to its streambed, banks, and its channel shape and location.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			No effects are assumed. Migrant yearling fish are assumed to be capable of coping with channel disturbance events.	4

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Channel Stability

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of stream channel stability (within a reach) on the relative survival or performance of the focus species; the extent of channel stability is with respect to its streambed, banks, and its channel shape and location.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			No effects are assumed. Adult salmon assumed to be capable of coping with channel disturbance events.	4

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Channel Stability

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of stream channel stability (within a reach) on the relative survival or performance of the focus species; the extent of channel stability is with respect to its streambed, banks, and its channel shape and location.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			No effects are assumed. Adult salmon assumed to be capable of coping with channel disturbance events.	4

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Chemicals

Level 3 Attribute: Chemicals

Species: Chinook Life Stage: Spawning

Definition: The effect of toxic substances or toxic conditions on the relative survival or performance of the focus species. Substances include chemicals and heavy metals. Toxic conditions include low pH.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Miscellaneous toxic pollutants - water	MscToxWat	Primary	Pollutants discharged into streams can cause significant stress and mortality to fish. Effects of many substances are documented in lab studies, though field verification less certain.	1
Metals/Pollutants - in sediments/soils	MetWatCol	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Metals - in water column	MetSedSls	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Nutrient enrichment	NutEnrch	Modifying	High nutrient loading was assumed to increase effects of other toxic substances.	4
			Note: Effects of substances noted here are known to vary with temperature, oxygen, and other stressors. Consideration may need to be given to including some interactions.	

Primary Level 2 Attribute	
MscToxWat	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	MetWatCol	*MetSedSls*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*1.1E-04*	*4.4E-05*	*4.4E-05*					
2	**7E-03**	**4E-04**	**4E-04**					
3	*7.9E-02*	*1.6E-03*	*1.6E-03*					
4	**4E-01**	**4E-03**	**4E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
MscToxWat	0	1	1	1	2	3	4
MetWatCol	0	0	1	1	1	2	3
MetSedSls	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	.0002	.001	.0021	.0333	.4311	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9990	0.9979	0.9667	0.5689	-1.8336

Level 3 Attribute: Chemicals

Species: Chinook Life Stage: Egg incubation

Definition: The effect of toxic substances or toxic conditions on the relative survival or performance of the focus species. Substances include chemicals and heavy metals. Toxic conditions include low pH.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Miscellaneous toxic pollutants - water	MscToxWat	Primary	Pollutants discharged into streams can cause significant stress and mortality to fish. Effects of many substances are documented in lab studies, though field verification less certain.	1
Metals - in water column	MetSedSls	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Metals/Pollutants - in sediments/soils	MetWatCol	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Nutrient enrichment	NutEnrch	Modifying	High nutrient loading was assumed to increase effects of other toxic substances.	4
			Note: Effects of substances noted here are known to vary with temperature, oxygen, and other stressors. Consideration may need to be given to including some interactions.	

Primary Level 2 Attribute

MscToxWat	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	MetSedSls	*MetWatCol*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*1.1E-04*	*1.1E-04*	*4.4E-05*					
2	**7E-03**	**7E-03**	**4E-04**					
3	*7.9E-02*	*7.9E-02*	*1.6E-03*					
4	**4E-01**	**4E-01**	**4E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
MscToxWat	0	1	1	1	2	3	4
MetSedSls	0	0	1	1	1	2	3
MetWatCol	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	.0002	.001	.0027	.0366	.6168	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9990	0.9973	0.9634	0.3832	-3.6916

Level 3 Attribute: Chemicals

Species: Chinook Life Stage: Fry colonization

Definition: The effect of toxic substances or toxic conditions on the relative survival or performance of the focus species. Substances include chemicals and heavy metals. Toxic conditions include low pH.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Miscellaneous toxic pollutants - water	MscToxWat	Primary	Pollutants discharged into streams can cause significant stress and mortality to fish. Effects of many substances are documented in lab studies, though field verification less certain.	1
Metals/Pollutants - in sediments/soils	MetWatCol	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Metals - in water column	MetSedSls	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Nutrient enrichment	NutEnrch	Modifying	High nutrient loading was assumed to increase effects of other toxic substances.	4
			Note: Effects of substances noted here are known to vary with temperature, oxygen, and other stressors. Consideration may need to be given to including some interactions.	

Primary Level 2 Attribute	
MscToxWat	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	MetWatCol	*MetSedSls*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*1.1E-04*	*4.4E-05*	*4.4E-05*					
2	**7E-03**	**4E-04**	**4E-04**					
3	*7.9E-02*	*1.6E-03*	*1.6E-03*					
4	**4E-01**	**4E-03**	**4E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
MscToxWat	0	1	1	1	2	3	4
MetWatCol	0	0	1	1	1	2	3
MetSedSls	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	.0002	.001	.0021	.0333	.4311	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9990	0.9979	0.9667	0.5689	-1.8336

Level 3 Attribute: Chemicals

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of toxic substances or toxic conditions on the relative survival or performance of the focus species. Substances include chemicals and heavy metals. Toxic conditions include low pH.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Miscellaneous toxic pollutants - water	MscToxWat	Primary	Pollutants discharged into streams can cause significant stress and mortality to fish. Effects of many substances are documented in lab studies, though field verification less certain.	1
Metals/Pollutants - in sediments/soils	MetWatCol	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Metals - in water column	MetSedSls	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Nutrient enrichment	NutEnrch	Modifying	High nutrient loading was assumed to increase effects of other toxic substances.	4
			Note: Effects of substances noted here are known to vary with temperature, oxygen, and other stressors. Consideration may need to be given to including some interactions.	

Primary Level 2 Attribute	
MscToxWat	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	MetWatCol	*MetSedSls*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*1.1E-04*	*4.4E-05*	*4.4E-05*					
2	**7E-03**	**4E-04**	**4E-04**					
3	*7.9E-02*	*1.6E-03*	*1.6E-03*					
4	**4E-01**	**4E-03**	**4E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
MscToxWat	0	1	1	1	2	3	4
MetWatCol	0	0	1	1	1	2	3
MetSedSls	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	.0002	.001	.0021	.0333	.4311	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9990	0.9979	0.9667	0.5689	-1.8336

Level 3 Attribute: Chemicals

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of toxic substances or toxic conditions on the relative survival or performance of the focus species. Substances include chemicals and heavy metals. Toxic conditions include low pH.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Miscellaneous toxic pollutants - water	MscToxWat	Primary	Pollutants discharged into streams can cause significant stress and mortality to fish. Effects of many substances are documented in lab studies, though field verification less certain.	1
Metals/Pollutants - in sediments/soils	MetWatCol	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Metals - in water column	MetSedSls	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Nutrient enrichment	NutEnrch	Modifying	High nutrient loading was assumed to increase effects of other toxic substances.	4
			Note: Effects of substances noted here are known to vary with temperature, oxygen, and other stressors. Consideration may need to be given to including some interactions.	

Primary Level 2 Attribute	
MscToxWat	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	MetWatCol	*MetSedSls*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*1.1E-04*	*4.4E-05*	*4.4E-05*					
2	**7E-03**	**4E-04**	**4E-04**					
3	*7.9E-02*	*1.6E-03*	*1.6E-03*					
4	**4E-01**	**4E-03**	**4E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
MscToxWat	0	1	1	1	2	3	4
MetWatCol	0	0	1	1	1	2	3
MetSedSls	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	.0002	.001	.0021	.0333	.4311	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9990	0.9979	0.9667	0.5689	-1.8336

Level 3 Attribute: Chemicals

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of toxic substances or toxic conditions on the relative survival or performance of the focus species. Substances include chemicals and heavy metals. Toxic conditions include low pH.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Miscellaneous toxic pollutants - water	MscToxWat	Primary	Pollutants discharged into streams can cause significant stress and mortality to fish. Effects of many substances are documented in lab studies, though field verification less certain.	1
Metals/Pollutants - in sediments/soils	MetWatCol	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Metals - in water column	MetSedSls	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Nutrient enrichment	NutEnrch	Modifying	High nutrient loading was assumed to increase effects of other toxic substances.	4
			Note: Effects of substances noted here are known to vary with temperature, oxygen, and other stressors. Consideration may need to be given to including some interactions.	

Primary Level 2 Attribute	
MscToxWat	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	MetWatCol	*MetSedSls*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*1.1E-04*	*4.4E-05*	*4.4E-05*					
2	**7E-03**	**4E-04**	**4E-04**					
3	*7.9E-02*	*1.6E-03*	*1.6E-03*					
4	**4E-01**	**4E-03**	**4E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
MscToxWat	0	1	1	1	2	3	4
MetWatCol	0	0	1	1	1	2	3
MetSedSls	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	.0002	.001	.0021	.0333	.4311	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9990	0.9979	0.9667	0.5689	-1.8336

Level 3 Attribute: Chemicals

Species: Chinook Life Stage: Inactive

Definition: The effect of toxic substances or toxic conditions on the relative survival or performance of the focus species. Substances include chemicals and heavy metals. Toxic conditions include low pH.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Miscellaneous toxic pollutants - water	MscToxWat	Primary	Pollutants discharged into streams can cause significant stress and mortality to fish. Effects of many substances are documented in lab studies, though field verification less certain.	1
Metals/Pollutants - in sediments/soils	MetWatCol	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Metals - in water column	MetSedSls	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Nutrient enrichment	NutEnrch	Modifying	High nutrient loading was assumed to increase effects of other toxic substances.	4
			Note: Effects of substances noted here are known to vary with temperature, oxygen, and other stressors. Consideration may need to be given to including some interactions.	

Primary Level 2 Attribute	
MscToxWat	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	MetWatCol	*MetSedSls*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*1.1E-04*	*4.4E-05*	*4.4E-05*					
2	**7E-03**	**4E-04**	**4E-04**					
3	*7.9E-02*	*1.6E-03*	*1.6E-03*					
4	**4E-01**	**4E-03**	**4E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
MscToxWat	0	1	1	1	2	3	4
MetWatCol	0	0	1	1	1	2	3
MetSedSls	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	.0002	.001	.0021	.0333	.4311	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9990	0.9979	0.9667	0.5689	-1.8336

Level 3 Attribute: Chemicals

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of toxic substances or toxic conditions on the relative survival or performance of the focus species. Substances include chemicals and heavy metals. Toxic conditions include low pH.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Miscellaneous toxic pollutants - water	MscToxWat	Primary	Pollutants discharged into streams can cause significant stress and mortality to fish. Effects of many substances are documented in lab studies, though field verification less certain.	1
Metals/Pollutants - in sediments/soils	MetWatCol	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Metals - in water column	MetSedSls	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Nutrient enrichment	NutEnrch	Modifying	High nutrient loading was assumed to increase effects of other toxic substances.	4
			Note: Effects of substances noted here are known to vary with temperature, oxygen, and other stressors. Consideration may need to be given to including some interactions.	

Primary Level 2 Attribute	
MscToxWat	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	MetWatCol	*MetSedSls*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*1.1E-04*	*4.4E-05*	*4.4E-05*					
2	**7E-03**	**4E-04**	**4E-04**					
3	*7.9E-02*	*1.6E-03*	*1.6E-03*					
4	**4E-01**	**4E-03**	**4E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
MscToxWat	0	1	1	1	2	3	4
MetWatCol	0	0	1	1	1	2	3
MetSedSls	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	.0002	.001	.0021	.0333	.4311	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9990	0.9979	0.9667	0.5689	-1.8336

Level 3 Attribute: Chemicals

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of toxic substances or toxic conditions on the relative survival or performance of the focus species. Substances include chemicals and heavy metals. Toxic conditions include low pH.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Miscellaneous toxic pollutants - water	MscToxWat	Primary	Pollutants discharged into streams can cause significant stress and mortality to fish. Effects of many substances are documented in lab studies, though field verification less certain.	1
Metals/Pollutants - in sediments/soils	MetWatCol	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Metals - in water column	MetSedSls	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Nutrient enrichment	NutEnrch	Modifying	High nutrient loading was assumed to increase effects of other toxic substances.	4
			Note: Effects of substances noted here are known to vary with temperature, oxygen, and other stressors. Consideration may need to be given to including some interactions.	

Primary Level 2 Attribute

MscToxWat	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	MetWatCol	*MetSedSls*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*1.1E-04*	*4.4E-05*	*4.4E-05*					
2	**7E-03**	**4E-04**	**4E-04**					
3	*7.9E-02*	*1.6E-03*	*1.6E-03*					
4	**4E-01**	**4E-03**	**4E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
MscToxWat	0	1	1	1	2	3	4
MetWatCol	0	0	1	1	1	2	3
MetSedSls	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	.0002	.001	.0021	.0333	.4311	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9990	0.9979	0.9667	0.5689	-1.8336

Level 3 Attribute: Chemicals

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of toxic substances or toxic conditions on the relative survival or performance of the focus species. Substances include chemicals and heavy metals. Toxic conditions include low pH.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Miscellaneous toxic pollutants - water	MscToxWat	Primary	Pollutants discharged into streams can cause significant stress and mortality to fish. Effects of many substances are documented in lab studies, though field verification less certain.	1
Metals/Pollutants - in sediments/soils	MetWatCol	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Metals - in water column	MetSedSls	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Nutrient enrichment	NutEnrch	Modifying	High nutrient loading was assumed to increase effects of other toxic substances.	4
			Note: Effects of substances noted here are known to vary with temperature, oxygen, and other stressors. Consideration may need to be given to including some interactions.	

Primary Level 2 Attribute	
MscToxWat	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	MetWatCol	*MetSedSls*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*1.1E-04*	*4.4E-05*	*4.4E-05*					
2	**7E-03**	**4E-04**	**4E-04**					
3	*7.9E-02*	*1.6E-03*	*1.6E-03*					
4	**4E-01**	**4E-03**	**4E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
MscToxWat	0	1	1	1	2	3	4
MetWatCol	0	0	1	1	1	2	3
MetSedSls	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	.0002	.001	.0021	.0333	.4311	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9990	0.9979	0.9667	0.5689	-1.8336

Level 3 Attribute: Chemicals

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of toxic substances or toxic conditions on the relative survival or performance of the focus species. Substances include chemicals and heavy metals. Toxic conditions include low pH.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Miscellaneous toxic pollutants - water	MscToxWat	Primary	Pollutants discharged into streams can cause significant stress and mortality to fish. Effects of many substances are documented in lab studies, though field verification less certain.	1
Metals/Pollutants - in sediments/soils	MetWatCol	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Metals - in water column	MetSedSls	Modifying	Persistent exposure to heavy metals causes stress and mortality. Fish can sometimes detect metals and move from high concentration but behavioral disruption assumed to reduce performance.	3
Nutrient enrichment	NutEnrch	Modifying	High nutrient loading was assumed to increase effects of other toxic substances.	4
			Note: Effects of substances noted here are known to vary with temperature, oxygen, and other stressors. Consideration may need to be given to including some interactions.	

Primary Level 2 Attribute

MscToxWat	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	MetWatCol	*MetSedSls*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*1.1E-04*	*4.4E-05*	*4.4E-05*					
2	**7E-03**	**4E-04**	**4E-04**					
3	*7.9E-02*	*1.6E-03*	*1.6E-03*					
4	**4E-01**	**4E-03**	**4E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
MscToxWat	0	1	1	1	2	3	4
MetWatCol	0	0	1	1	1	2	3
MetSedSls	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	.0002	.001	.0021	.0333	.4311	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9990	0.9979	0.9667	0.5689	-1.8336

Competition (with hatchery fish)

Level 3 Attribute: Competition (with hatchery fish)

Species: Chinook Life Stage: Spawning

Definition: The effect of competition with hatchery produced animals on the relative survival or performance of the focus species; competition might be for food or space within the stream reach.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Competition with hatchery for space is not considered to be a factor affecting spawning success of chinook, given the resolution of the Level Hatchery Fish Outplant attribute input.	3

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Competition (with hatchery fish)

Species: Chinook Life Stage: Egg incubation

Definition: The effect of competition with hatchery produced animals on the relative survival or performance of the focus species; competition might be for food or space within the stream reach.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Superimposition by hatchery fish is not considered to be a factor affecting incubation success, given the resolution of the Level Hatchery Fish Outplant attribute input.	3

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Competition (with hatchery fish)

Species: Chinook Life Stage: Fry colonization

Definition: The effect of competition with hatchery produced animals on the relative survival or performance of the focus species; competition might be for food or space within the stream reach.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Competition with hatchery fish at this life stage is not considered to be a factor affecting survival given the resolution of the Level Hatchery Fish Outplant attribute input.	3

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Competition (with hatchery fish)

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of competition with hatchery produced animals on the relative survival or performance of the focus species; competition might be for food or space within the stream reach.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Hatchery fish outplants	HatFOutp	Primary	Hatchery fish outplants are assumed to interact with naturally rearing juveniles, affecting growth and survival.	3
Alkalinity	Alka	Modifying	Waters high in natural alkalinity generally have greater benthos production than those with low alkalinity. Thus waters with lower alkalinity are assumed to have greater potential for competion.	4
Benthos diversity	BenComRc	Modifying	Loss of diversity of benthos, indicated by EPT index, would presumably increase effect of interspecific competition associated with overall fish community richness.	4
Riparian function	RipFunc	Modifying	Areas with impaired riparian function will contribute less terrestrial food sources to rearing fishes. This is assumed to add to competition effect.	4
Salmon Carcasses	SalmCarcas	Modifying	Salmon carcasses serve as a direct source of food to juveniles and also promote higher productivity of benthos. Reaches with low carcass abundance is assumed to add to competition effect.	2

Primary Level 2 Attribute	
HatFOutp	
Rating	**Sensitivity***
0	**0E+00**
1	*3.7E-06*
2	**2E-04**
3	*1.9E-03*
4	**1E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Alka	*BenComRc*	*RipFunc*	*SalmCarca*				
0	**7E-04**	**0E+00**	**0E+00**	**0E+00**				
1	*2.9E-04*	*1.1E-05*	*1.1E-05*	*1.1E-05*				
2	**9E-05**	**9E-05**	**9E-05**	**9E-05**				
3	*1.1E-05*	*2.9E-04*	*2.9E-04*	*2.9E-04*				
4	**0E+00**	**7E-04**	**7E-04**	**7E-04**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
HatFOutp	0	1	1	1	2	3	4
Alka	0	0	1	1	1	2	3
BenComRch	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
SalmCarcass	0	0	0	0	0	1	2
Sensitivity (S)	0	0	.0005	.0009	.0034	.0117	.0427
Relative Prod. (P=1-S)	1.0000	1.0000	0.9995	0.9991	0.9966	0.9883	0.9573

Level 3 Attribute: Competition (with hatchery fish)

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of competition with hatchery produced animals on the relative survival or performance of the focus species; competition might be for food or space within the stream reach.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Hatchery fish outplants	HatFOutp	Primary	Hatchery fish outplants are assumed to interact with naturally rearing juveniles, affecting growth and survival.	3
Alkalinity	Alka	Modifying	Waters high in natural alkalinity generally have greater benthos production than those with low alkalinity. Thus waters with lower alkalinity are assumed to have greater potential for competion.	4
Benthos diversity	BenComRc	Modifying	Loss of diversity of benthos, indicated by EPT index, would presumably increase effect of interspecific competition associated with overall fish community richness.	4
Riparian function	RipFunc	Modifying	Areas with impaired riparian function will contribute less terrestrial food sources to rearing fishes. This is assumed to add to competition effect.	4
Salmon Carcasses	SalmCarcas	Modifying	Salmon carcasses serve as a direct source of food to juveniles and also promote higher productivity of benthos. Reaches with low carcass abundance is assumed to add to competition effect.	2

Primary Level 2 Attribute	
HatFOutp	
Rating	**Sensitivity***
0	**0E+00**
1	*3.7E-06*
2	**2E-04**
3	*1.9E-03*
4	**1E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Alka	*BenComRc*	*RipFunc*	*SalmCarca*				
0	**7E-04**	**0E+00**	**0E+00**	**0E+00**				
1	*2.9E-04*	*1.1E-05*	*1.1E-05*	*1.1E-05*				
2	**9E-05**	**9E-05**	**9E-05**	**9E-05**				
3	*1.1E-05*	*2.9E-04*	*2.9E-04*	*2.9E-04*				
4	**0E+00**	**7E-04**	**7E-04**	**7E-04**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
HatFOutp	0	1	1	1	2	3	4
Alka	0	0	1	1	1	2	3
BenComRch	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
SalmCarcass	0	0	0	0	0	1	2
Sensitivity (S)	0	0	.0005	.0009	.0034	.0117	.0427
Relative Prod. (P=1-S)	1.0000	1.0000	0.9995	0.9991	0.9966	0.9883	0.9573

Level 3 Attribute: Competition (with hatchery fish)

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of competition with hatchery produced animals on the relative survival or performance of the focus species; competition might be for food or space within the stream reach.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Potential for competition with hatchery fish during this short life stage is assumed minimal. Fish in this life stage are migrating quickly and may not be actively foraging.	4

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Competition (with hatchery fish)

Species: Chinook Life Stage: Inactive

Definition: The effect of competition with hatchery produced animals on the relative survival or performance of the focus species; competition might be for food or space within the stream reach.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Competition with hatchery fish while overwintering is assumed minimal.	4

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Competition (with hatchery fish)

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of competition with hatchery produced animals on the relative survival or performance of the focus species; competition might be for food or space within the stream reach.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Hatchery fish outplants	HatFOutp	Primary	Hatchery fish outplants are assumed to interact with naturally rearing juveniles, affecting growth and survival.	3
Alkalinity	Alka	Modifying	Waters high in natural alkalinity generally have greater benthos production than those with low alkalinity. Thus waters with lower alkalinity are assumed to have greater potential for competion.	4
Benthos diversity	BenComRc	Modifying	Loss of diversity of benthos, indicated by EPT index, would presumably increase effect of interspecific competition associated with overall fish community richness.	4
Riparian function	RipFunc	Modifying	Areas with impaired riparian function will contribute less terrestrial food sources to rearing fishes. This is assumed to add to competition effect.	4
Salmon Carcasses	SalmCarcas	Modifying	Salmon carcasses serve as a direct source of food to juveniles and also promote higher productivity of benthos. Reaches with low carcass abundance is assumed to add to competition effect.	2

Primary Level 2 Attribute	
HatFOutp	
Rating	**Sensitivity***
0	**0E+00**
1	*3.7E-06*
2	**2E-04**
3	*1.9E-03*
4	**1E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Alka	*BenComRc*	*RipFunc*	*SalmCarca*				
0	**7E-04**	**0E+00**	**0E+00**	**0E+00**				
1	*2.9E-04*	*1.1E-05*	*1.1E-05*	*1.1E-05*				
2	**9E-05**	**9E-05**	**9E-05**	**9E-05**				
3	*1.1E-05*	*2.9E-04*	*2.9E-04*	*2.9E-04*				
4	**0E+00**	**7E-04**	**7E-04**	**7E-04**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
HatFOutp	0	1	1	1	2	3	4
Alka	0	0	1	1	1	2	3
BenComRch	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
SalmCarcass	0	0	0	0	0	1	2
Sensitivity (S)	0	0	.0005	.0009	.0034	.0117	.0427
Relative Prod. (P=1-S)	1.0000	1.0000	0.9995	0.9991	0.9966	0.9883	0.9573

Level 3 Attribute: Competition (with hatchery fish)

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of competition with hatchery produced animals on the relative survival or performance of the focus species; competition might be for food or space within the stream reach.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Potential for competition with hatchery fish during this short life stage is assumed minimal. Fish in this life stage are migrating quickly and may not be actively foraging.	4

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Competition (with hatchery fish)

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of competition with hatchery produced animals on the relative survival or performance of the focus species; competition might be for food or space within the stream reach.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Competition with hatchery fish for space is not considered to be a factor affecting performance in this life stage.	4

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Competition (with hatchery fish)

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of competition with hatchery produced animals on the relative survival or performance of the focus species; competition might be for food or space within the stream reach.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Competition with hatchery fish for space is not considered to be a factor affecting performance in this life stage.	4

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Competition (with other species)

Level 3 Attribute: Competition (with other species)

Species: Chinook Life Stage: Spawning

Definition: The effect of competition with other species on the relative survival or performance of the focus species; competition might be for food or space.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Competition with other species for space is not considered to be a factor affecting spawning success of chinook.	3

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Competition (with other species)

Species: Chinook Life Stage: Egg incubation

Definition: The effect of competition with other species on the relative survival or performance of the focus species; competition might be for food or space.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Competition with other species is not considered to be a factor affecting incubation survival of chinook.	3

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Competition (with other species)

Species: Chinook Life Stage: Fry colonization

Definition: The effect of competition with other species on the relative survival or performance of the focus species; competition might be for food or space.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish community richness	shComRch	Primary	Number of fish species present is assumed to be an indicator of interspecific competition affecting this life stage. Greater diversity of species would likely create some overlap in food utilized.	4
Alkalinity	Alka	Modifying	Waters high in natural alkalinity generally have greater benthos production than those with low alkalinity. Thus waters with lower alkalinity are assumed to have greater potential for competion.	4
Benthos diversity	enComRch	Modifying	Loss of diversity of benthos, indicated by EPT index, would presumably increase effect of interspecific competition associated with overall fish community richness.	4
Riparian function	RipFunc	Modifying	Areas with impaired riparian function will contribute less terrestrial food sources to rearing fishes. This is assumed to add to competition effect.	4
Salmon Carcasses	almCarcas	Modifying	Salmon carcasses serve as a direct source of food to juveniles and also promote higher productivity of benthos. Reaches with low carcass abundance is assumed to add to competition effect.	2

Primary Level 2 Attribute

FshComRch	
Rating	**Sensitivity***
0	**0E+00**
1	*3.7E-06*
2	**7E-05**
3	*4.4E-04*
4	**2E-03**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	Alka	*enComRch*	*RipFunc*	*SalmCarca*				
0	**2E-04**	**0E+00**	**0E+00**	**0E+00**				
1	*8.4E-05*	*3.7E-06*	*3.7E-06*	*3.7E-06*				
2	**3E-05**	**3E-05**	**3E-05**	**3E-05**				
3	*3.7E-06*	*8.4E-05*	*8.4E-05*	*8.4E-05*				
4	**0E+00**	**2E-04**	**2E-04**	**2E-04**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshComRch	0	1	1	1	2	3	4
Alka	0	0	1	1	1	2	3
BenComRch	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
SalmCarcass	0	0	0	0	0	1	2
Sensitivity (S)	0	0	.0002	.0003	.0011	.0031	.0088
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9997	0.9989	0.9969	0.9912

Level 3 Attribute: Competition (with other species)

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of competition with other species on the relative survival or performance of the focus species; competition might be for food or space.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish community richness	shComRch	Primary	Number of fish species present is assumed to be an indicator of interspecific competition affecting this life stage. Greater diversity of species would likely create some overlap in food utilized.	4
Alkalinity	Alka	Modifying	Waters high in natural alkalinity generally have greater benthos production than those with low alkalinity. Thus waters with lower alkalinity are assumed to have greater potential for competion.	4
Benthos diversity	enComRch	Modifying	Loss of diversity of benthos, indicated by EPT index, would presumably increase effect of interspecific competition associated with overall fish community richness.	4
Riparian function	RipFunc	Modifying	Areas with impaired riparian function will contribute less terrestrial food sources to rearing fishes. This is assumed to add to competition effect.	4
Salmon Carcasses	almCarcas	Modifying	Salmon carcasses serve as a direct source of food to juveniles and also promote higher productivity of benthos. Reaches with low carcass abundance is assumed to add to competition effect.	2

Primary Level 2 Attribute	
FshComRch	
Rating	**Sensitivity***
0	**0E+00**
1	*3.7E-06*
2	**7E-05**
3	*4.4E-04*
4	**2E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Alka	*enComRch*	*RipFunc*	*SalmCarca*				
0	**2E-04**	**0E+00**	**0E+00**	**0E+00**				
1	*8.4E-05*	*3.7E-06*	*3.7E-06*	*3.7E-06*				
2	**3E-05**	**3E-05**	**3E-05**	**3E-05**				
3	*3.7E-06*	*8.4E-05*	*8.4E-05*	*8.4E-05*				
4	**0E+00**	**2E-04**	**2E-04**	**2E-04**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshComRch	0	1	1	1	2	3	4
Alka	0	0	1	1	1	2	3
BenComRch	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
SalmCarcass	0	0	0	0	0	1	2
Sensitivity (S)	0	0	.0002	.0003	.0011	.0031	.0088
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9997	0.9989	0.9969	0.9912

Level 3 Attribute: Competition (with other species)

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of competition with other species on the relative survival or performance of the focus species; competition might be for food or space.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish community richness	shComRch	Primary	Number of fish species present is assumed to be an indicator of interspecific competition affecting this life stage. Greater diversity of species would likely create some overlap in food utilized.	4
Alkalinity	Alka	Modifying	Waters high in natural alkalinity generally have greater benthos production than those with low alkalinity. Thus waters with lower alkalinity are assumed to have greater potential for competion.	4
Benthos diversity	enComRch	Modifying	Loss of diversity of benthos, indicated by EPT index, would presumably increase effect of interspecific competition associated with overall fish community richness.	4
Riparian function	RipFunc	Modifying	Areas with impaired riparian function will contribute less terrestrial food sources to rearing fishes. This is assumed to add to competition effect.	4
Salmon Carcasses	almCarcas	Modifying	Salmon carcasses serve as a direct source of food to juveniles and also promote higher productivity of benthos. Reaches with low carcass abundance is assumed to add to competition effect.	2

Primary Level 2 Attribute	
FshComRch	
Rating	**Sensitivity***
0	**0E+00**
1	*3.7E-06*
2	**7E-05**
3	*4.4E-04*
4	**2E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Alka	*enComRch*	*RipFunc*	*SalmCarca*				
0	**2E-04**	**0E+00**	**0E+00**	**0E+00**				
1	*8.4E-05*	*3.7E-06*	*3.7E-06*	*3.7E-06*				
2	**3E-05**	**3E-05**	**3E-05**	**3E-05**				
3	*3.7E-06*	*8.4E-05*	*8.4E-05*	*8.4E-05*				
4	**0E+00**	**2E-04**	**2E-04**	**2E-04**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshComRch	0	1	1	1	2	3	4
Alka	0	0	1	1	1	2	3
BenComRch	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
SalmCarcass	0	0	0	0	0	1	2
Sensitivity (S)	0	0	.0002	.0003	.0011	.0031	.0088
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9997	0.9989	0.9969	0.9912

Level 3 Attribute: Competition (with other species)

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of competition with other species on the relative survival or performance of the focus species; competition might be for food or space.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Competition with other species during this short life stage is assumed minimal. Fish in this life stage are migrating quickly and may not be actively foraging.	4

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Competition (with other species)

Species: Chinook Life Stage: Inactive

Definition: The effect of competition with other species on the relative survival or performance of the focus species; competition might be for food or space.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Competition with other species while overwintering is assumed minimal.	4

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Competition (with other species)

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of competition with other species on the relative survival or performance of the focus species; competition might be for food or space.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish community richness	shComRch	Primary	Number of fish species present is assumed to be an indicator of interspecific competition affecting this life stage. Greater diversity of species would likely create some overlap in food utilized.	4
Alkalinity	Alka	Modifying	Waters high in natural alkalinity generally have greater benthos production than those with low alkalinity. Thus waters with lower alkalinity are assumed to have greater potential for competion.	4
Benthos diversity	enComRch	Modifying	Loss of diversity of benthos, indicated by EPT index, would presumably increase effect of interspecific competition associated with overall fish community richness.	4
Riparian function	RipFunc	Modifying	Areas with impaired riparian function will contribute less terrestrial food sources to rearing fishes. This is assumed to add to competition effect.	4
Salmon Carcasses	almCarcas	Modifying	Salmon carcasses serve as a direct source of food to juveniles and also promote higher productivity of benthos. Reaches with low carcass abundance is assumed to add to competition effect.	2

Primary Level 2 Attribute	
FshComRch	
Rating	**Sensitivity***
0	**0E+00**
1	*3.7E-06*
2	**7E-05**
3	*4.4E-04*
4	**2E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Alka	*BenComRch*	*RipFunc*	*SalmCarcass*				
0	**2E-04**	**0E+00**	**0E+00**	**0E+00**				
1	*8.4E-05*	*3.7E-06*	*3.7E-06*	*3.7E-06*				
2	**3E-05**	**3E-05**	**3E-05**	**3E-05**				
3	*3.7E-06*	*8.4E-05*	*8.4E-05*	*8.4E-05*				
4	**0E+00**	**2E-04**	**2E-04**	**2E-04**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshComRch	0	1	1	1	2	3	4
Alka	0	0	1	1	1	2	3
BenComRch	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
SalmCarcass	0	0	0	0	0	1	2
Sensitivity (S)	0	0	.0002	.0003	.0011	.0031	.0088
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9997	0.9989	0.9969	0.9912

Level 3 Attribute: Competition (with other species)

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of competition with other species on the relative survival or performance of the focus species; competition might be for food or space.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Competition with other species during this short life stage is assumed minimal. Fish in this life stage are migrating quickly and may not be actively foraging.	4

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Competition (with other species)

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of competition with other species on the relative survival or performance of the focus species; competition might be for food or space.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Competition with other species for space is not considered to be a factor affecting performance in this life stage.	4

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Competition (with other species)

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of competition with other species on the relative survival or performance of the focus species; competition might be for food or space.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Competition with other species for space is not considered to be a factor affecting performance in this life stage.	4

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Flow

Level 3 Attribute: Flow

Species: Chinook Life Stage: Spawning

Definition: The effect of the amount of stream flow, or the the pattern and extent of flow fluctuations, on the relative survival or performance of the focus species. Includes the effects of flow reductions or dewatering due to water withdrawals.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Confinement - natural	FlwDielVar	Primary	Fluctuating flow levels during the course of a day is assumed to be the only significant contributor to the effect of flow on spawning success.	3

Primary Level 2 Attribute	
FlwDielVar	
Rating	**Sensitivity***
0	**0E+00**
1	*1.6E-04*
2	**7E-03**
3	*6.2E-02*
4	**3E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft) and Hydrologic Regime Natural class 2 (rain-on-snow transitional); effect more severe in smaller channels, less severe in larger and generally less severe in Hydrologic Regime classes 0, 1, and 4.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FlwDielVar	0	1	1	1	2	3	4
Sensitivity (S)	0	.0002	.0002	.0002	.0069	.0622	.2973
Relative Prod. (P=1-S)	1.0000	0.9998	0.9998	0.9998	0.9931	0.9378	0.7027

Level 3 Attribute: Flow

Species: Chinook Life Stage: Egg incubation

Definition: The effect of the amount of stream flow, or the the pattern and extent of flow fluctuations, on the relative survival or performance of the focus species. Includes the effects of flow reductions or dewatering due to water withdrawals.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Confinement - natural	FlwDielVar	Primary	Fluctuating flows during the course of a day is assumed to be the only significant contributor to the direct effect of flow on incubation success. Hydroregulation would cause such fluctuation.	3

Primary Level 2 Attribute	
FlwDielVar	
Rating	**Sensitivity***
0	**0E+00**
1	*1.6E-04*
2	**7E-03**
3	*6.2E-02*
4	**3E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft) and Hydrologic Regime Natural class 2 (rain-on-snow transitional); effect more severe in smaller channels, less severe in larger and generally less severe in Hydrologic Regime classes 0 and 1.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FlwDielVar	0	1	1	1	2	3	4
Sensitivity (S)	0	.0002	.0002	.0002	.0069	.0622	.2973
Relative Prod. (P=1-S)	1.0000	0.9998	0.9998	0.9998	0.9931	0.9378	0.7027

Level 3 Attribute: Flow

Species: Chinook Life Stage: Fry colonization

Definition: The effect of the amount of stream flow, or the the pattern and extent of flow fluctuations, on the relative survival or performance of the focus species. Includes the effects of flow reductions or dewatering due to water withdrawals.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Flow - change in interannual	FlwHIgh	Primary	Emergent chinook fry need slow velocities for colonization. High velocities can displace fry, moving them prematurely, affecting growth. Increased high flows is assumed to effect survival.	3
Confinement - natural	Confine	Modifying	Confined reaches have higher velocities than unconfined reaches for a given discharge. Thus suitability of a reach for colonization should be related to confinement class (adds effect).	2
Confinement - Hydromodifications	onfineHydr	Modifying	Man-caused modifications to a stream channel that result in greater channel confinement will increase water velocities over the undisturbed state. Such action will add effect to High Flow.	2
Gradient	Grad	Modifying	Average water velocity within a reach is related to channel gradient. High gradient reaches, therefore, will tend to have flows unsuited for colonization. This attribute adds to effect of High Flow.	3
Flow - intra-annual flow pattern	FlwintraAnn	Modifying	Reaches with "flashy" flows (I.e., within a month) will tend to provide less suitable habitat for emergent fry, increasing the effect of High Flow.	4
Riparian function	RipFunc	Modifying	Impaired riparian function can often result in loss of backwater pools and side channels, areas that provide good fry colonization habitat. Loss of such areas will add effect to High Flow.	2
Wood	WdDeb	Modifying	Reduced wood structure can often result in loss of backwater pools and side channels, areas that provide good fry colonization habitat. Loss of such areas will add effect to High Flow.	2

Primary Level 2 Attribute

FlwHIgh	
Rating	**Sensitivity***
0	**0E+00**
1	*0.0E+00*
2	**7E-05**
3	*7.0E-04*
4	**7E-03**

Modifying Level 2 Attributes

Rating	Added Sensitivity*							
	Confine	*onfineHydr*	*Grad*	*FlwintraAnn*	*RipFunc*	*WdDeb*		
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**		
1	*5.7E-05*	*5.7E-05*	*5.7E-05*	*4.4E-05*	*4.4E-05*	*4.4E-05*		
2	**5E-04**	**5E-04**	**5E-04**	**3E-04**	**3E-04**	**3E-04**		
3	*1.5E-03*	*1.5E-03*	*1.5E-03*	*8.8E-04*	*8.8E-04*	*8.8E-04*		
4	**4E-03**	**4E-03**	**4E-03**	**2E-03**	**2E-03**	**2E-03**		

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft) and Hydrologic Regime Natural class 2 (rain-on-snow transitional); effect more severe in smaller channels, less severe in larger and generally less severe in Hydrologic Regime classes 0 and 1.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FlwHIgh	0	1	1	1	2	3	4
Confine	0	0	1	1	1	2	3
ConfineHydro	0	0	0	1	1	2	3
Grad	0	0	0	0	1	1	2
FlwintraAnn	0	0	0	0	0	1	2
RipFunc	0	0	0	0	0	1	1
WdDeb	0	0	0	0	0	1	1
Sensitivity (S)	0	0	.0001	.0004	.0026	.0343	.1532
Relative Prod. (P=1-S)	1.0000	1.0000	0.9999	0.9996	0.9974	0.9657	0.8468

Level 3 Attribute: Flow

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of the amount of stream flow, or the the pattern and extent of flow fluctuations, on the relative survival or performance of the focus species. Includes the effects of flow reductions or dewatering due to water withdrawals.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Flow - change in interannual	FlwLow	Primary	Low flows in late summer can strand juveniles, resulting in poorer growth or death. This attribute specifies whether low flow levels have been altered from pristine condition.	1
Embeddedness	Emb	Modifying	Increased embeddedness would be associated with shallower pools, decreasing effectiveness of pools to offset Low Flow effect.	3
Habitat type - backwater pools	HbBckPls	Modifying	Presence of backwater pools (indicated by % area in reach) should reduce potential for stranding due to low flows. This attribute serves to offset effect of Low Flow.	2
Habitat type - beaver ponds	HbBvrPnds	Modifying	Presence of beaver ponds (indicated by % area in reach) should reduce potential for stranding due to low flows. This attribute serves to offset effect of Low Flow.	2
Habitat type - primary pools	HbPls	Modifying	Abundance of pools (indicated by % area in reach) should reduce potential for stranding due to low flows. This attribute serves to offset effect of Low Flow.	2
Riparian function	RipFunc	Modifying	Loss of riparian function would degrade suitability of backwater pools and reduce effectiveness of those sites to offset Low Flow effect. Main channel would widen worsening Low Flow effect.	2
Wood	WdDeb	Modifying	Loss of wood structure would degrade pool quality, resulting in shallower pools, decreasing effectiveness of those sites to offset Low Flow effect.	2
Confinement - natural	Confine	Modifying	Natural features that confine channel could serve to maintain flow in deepest part of channel, thus serving to offset some part of the Low Flow effect.	3
Confinement - Hydromodifications	onfineHydr	Modifying	Confinement of channel due to diking could serve to maintain flow in deepest part of channel, thus serving to offset some part of the Low Flow effect.	3

Primary Level 2 Attribute

FlwLow	
Rating	**Sensitivity***
0	**0E+00**
1	*3.5E-03*
2	**2E-02**
3	*7.0E-02*
4	**2E-01**

Modifying Level 2 Attributes

Rating	Added Sensitivity*							
	Emb	*HbBckPls*	*HbBvrPnds*	*HbPls*	*RipFunc*	*WdDeb*	*Confine*	*ConfineHyd*
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**
1	*5.7E-05*	*-7.3E-05*	*-7.3E-05*	*-7.3E-05*	*5.7E-05*	*5.7E-05*	*-6.7E-06*	*-6.7E-06*
2	**4E-04**	**-5E-04**	**-5E-04**	**-5E-04**	**4E-04**	**4E-04**	**-4E-05**	**-4E-05**
3	*1.1E-03*	*-1.4E-03*	*-1.4E-03*	*-1.4E-03*	*1.1E-03*	*1.1E-03*	*-1.3E-04*	*-1.3E-04*
4	**2E-03**	**-3E-03**	**-3E-03**	**-3E-03**	**2E-03**	**2E-03**	**-3E-04**	**-3E-04**

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft) and Hydrologic Regime Natural class 2 (rain-on-snow transitional); effect more severe in smaller channels, less severe in larger and generally less severe in Hydrologic Regime classes 0, 1, and 4.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FlwLow	0	1	1	1	2	3	4
Emb	0	0	1	1	1	2	3
HbBckPls	0	0	0	1	1	2	3
HbBvrPnds	0	0	0	0	1	1	2
HbPls	0	0	0	0	0	1	2
RipFunc	0	0	0	0	0	1	1
WdDeb	0	0	0	0	0	1	1
Confine	0	0	0	0	0	1	1
ConfineHydro	0	0	0	0	0	1	1
Sensitivity (S)	0	.0035	.006	.0033	.0158	.0533	.0843
Relative Prod. (P=1-S)	1.0000	0.9965	0.9940	0.9967	0.9842	0.9467	0.9157

Level 3 Attribute: Flow

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of the amount of stream flow, or the the pattern and extent of flow fluctuations, on the relative survival or performance of the focus species. Includes the effects of flow reductions or dewatering due to water withdrawals.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Flow - change in interannual	FlwLow	Primary	Low flows in late summer can strand juveniles, resulting in poorer growth or death. This attribute specifies whether low flow levels have been altered from pristine condition.	1
Embeddedness	Emb	Modifying	Increased embeddedness would be associated with shallower pools, decreasing effectiveness of pools to offset Low Flow effect.	3
Habitat type - backwater pools	HbBckPls	Modifying	Presence of backwater pools (indicated by % area in reach) should reduce potential for stranding due to low flows. This attribute serves to offset effect of Low Flow.	2
Habitat type - beaver ponds	HbBvrPnds	Modifying	Presence of beaver ponds (indicated by % area in reach) should reduce potential for stranding due to low flows. This attribute serves to offset effect of Low Flow.	2
Habitat type - primary pools	HbPls	Modifying	Abundance of pools (indicated by % area in reach) should reduce potential for stranding due to low flows. This attribute serves to offset effect of Low Flow.	2
Riparian function	RipFunc	Modifying	Loss of riparian function would degrade suitability of backwater pools and reduce effectiveness of those sites to offset Low Flow effect. Main channel would widen worsening Low Flow effect.	2
Wood	WdDeb	Modifying	Loss of wood structure would degrade pool quality, resulting in shallower pools, decreasing effectiveness of those sites to offset Low Flow effect.	2
Confinement - natural	Confine	Modifying	Natural features that confine channel could serve to maintain flow in deepest part of channel, thus serving to offset some part of the Low Flow effect.	3
Confinement - Hydromodifications	onfineHydr	Modifying	Confinement of channel due to diking could serve to maintain flow in deepest part of channel, thus serving to offset some part of the Low Flow effect.	3

Primary Level 2 Attribute

FlwLow	
Rating	**Sensitivity***
0	**0E+00**
1	*3.5E-03*
2	**2E-02**
3	*7.0E-02*
4	**2E-01**

Modifying Level 2 Attributes

Rating	Added Sensitivity*							
	Emb	*HbBckPls*	*HbBvrPnds*	*HbPls*	*RipFunc*	*WdDeb*	*Confine*	*ConfineHyc*
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**
1	*5.7E-05*	*-7.3E-05*	*-7.3E-05*	*-7.3E-05*	*5.7E-05*	*5.7E-05*	*-6.7E-06*	*-6.7E-06*
2	**4E-04**	**-5E-04**	**-5E-04**	**-5E-04**	**4E-04**	**4E-04**	**-4E-05**	**-4E-05**
3	*1.1E-03*	*-1.4E-03*	*-1.4E-03*	*-1.4E-03*	*1.1E-03*	*1.1E-03*	*-1.3E-04*	*-1.3E-04*
4	**2E-03**	**-3E-03**	**-3E-03**	**-3E-03**	**2E-03**	**2E-03**	**-3E-04**	**-3E-04**

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft) and Hydrologic Regime Natural class 2 (rain-on-snow transitional); effect more severe in smaller channels, less severe in larger and generally less severe in Hydrologic Regime classes 0, 1, and 4.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FlwLow	0	1	1	1	2	3	4
Emb	0	0	1	1	1	2	3
HbBckPls	0	0	0	1	1	2	3
HbBvrPnds	0	0	0	0	1	1	2
HbPls	0	0	0	0	0	1	2
RipFunc	0	0	0	0	0	1	1
WdDeb	0	0	0	0	0	1	1
Confine	0	0	0	0	0	1	1
ConfineHydro	0	0	0	0	0	1	1
Sensitivity (S)	0	.0035	.006	.0033	.0158	.0533	.0843
Relative Prod. (P=1-S)	1.0000	0.9965	0.9940	0.9967	0.9842	0.9467	0.9157

Level 3 Attribute: Flow

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of the amount of stream flow, or the the pattern and extent of flow fluctuations, on the relative survival or performance of the focus species. Includes the effects of flow reductions or dewatering due to water withdrawals.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Flow

Species: Chinook Life Stage: Inactive

Definition: The effect of the amount of stream flow, or the the pattern and extent of flow fluctuations, on the relative survival or performance of the focus species. Includes the effects of flow reductions or dewatering due to water withdrawals.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Flow - change in interannual	FlwHIgh	Primary	Inactive (overwintering) juveniles require slow velocities. High velocities can displace them, causing stress or death. Increased high flows, therefore, is assumed to effect survival.	4
Confinement - natural	Confine	Modifying	Confined reaches have higher velocities than unconfined reaches for a given discharge. Thus suitability of a reach for overwintering should be related to confinement class (adds effect).	2
Confinement - Hydromodifications	onfineHydr	Modifying	Man-caused modifications to a stream channel that result in greater channel confinement will increase water velocities over the undisturbed state. Such action will add effect to High Flow.	2
Gradient	Grad	Modifying	Average water velocity within a reach is related to channel gradient. High gradient reaches, therefore, will tend to have flows unsuited for overwintering. This attribute adds to effect of High Flow.	3
Flow - intra-annual flow pattern	FlwintraAnn	Modifying	Reaches with "flashy" flows (I.e., within a month) will tend to provide less suitable habitat for overwintering, increasing the effect of High Flow.	4
Riparian function	RipFunc	Modifying	Impaired riparian function can often result in loss of backwater pools and side channels, areas that provide overwintering habitat. Loss of such areas will add effect to High Flow.	2
Wood	WdDeb	Modifying	Reduced wood structure can often result in loss of backwater pools and side channels, areas that provide overwintering habitat. Loss of such areas will add effect to High Flow.	2

Primary Level 2 Attribute

FlwHIgh	
Rating	**Sensitivity***
0	**0E+00**
1	*0.0E+00*
2	**7E-05**
3	*1.0E-03*
4	**1E-02**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	Confine	*onfineHydr*	*Grad*	*FlwintraAnn*	*RipFunc*	*WdDeb*		
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**		
1	*5.7E-05*	*5.7E-05*	*5.7E-05*	*4.4E-05*	*4.4E-05*	*4.4E-05*		
2	**5E-04**	**5E-04**	**5E-04**	**3E-04**	**3E-04**	**3E-04**		
3	*2.1E-03*	*2.1E-03*	*2.1E-03*	*8.8E-04*	*8.8E-04*	*8.8E-04*		
4	**5E-03**	**5E-03**	**5E-03**	**2E-03**	**2E-03**	**2E-03**		

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft) and Hydrologic Regime Natural class 2 (rain-on-snow transitional); effect more severe in smaller channels, less severe in larger and generally less severe in Hydrologic Regime classes 0 and 1.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FlwHIgh	0	1	1	1	2	3	4
Confine	0	0	1	1	1	2	3
ConfineHydro	0	0	0	1	1	2	3
Grad	0	0	0	0	1	1	2
FlwintraAnn	0	0	0	0	0	1	2
RipFunc	0	0	0	0	0	1	1
WdDeb	0	0	0	0	0	1	1
Sensitivity (S)	0	0	.0001	.0004	.0026	.0407	.225
Relative Prod. (P=1-S)	1.0000	1.0000	0.9999	0.9996	0.9974	0.9593	0.7750

Level 3 Attribute: Flow

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of the amount of stream flow, or the the pattern and extent of flow fluctuations, on the relative survival or performance of the focus species. Includes the effects of flow reductions or dewatering due to water withdrawals.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Flow - change in interannual	FlwHIgh	Primary	Spring rearing can encounter high flows. High velocities can displace them, causing stress or death. Increased high flows, therefore, is assumed to effect survival.	4
Confinement - natural	Confine	Modifying	Confined reaches have higher velocities than unconfined reaches for a given discharge. Thus suitability of a reach for spring rearing should be related to confinement class (adds effect).	2
Confinement - Hydromodifications	onfineHydr	Modifying	Man-caused modifications to a stream channel that result in greater channel confinement will increase water velocities over the undisturbed state. Such action will add effect to High Flow.	2
Gradient	Grad	Modifying	Average water velocity within a reach is related to channel gradient. High gradient reaches, therefore, will tend to have flows unsuited for spring rearing. This attribute adds to effect of High Flow.	3
Flow - intra-annual flow pattern	FlwintraAnn	Modifying	Reaches with "flashy" flows (I.e., within a month) will tend to provide less suitable habitat for spring rearing, increasing the effect of High Flow.	4
Riparian function	RipFunc	Modifying	Impaired riparian function can often result in loss of backwater pools and side channels, areas that provide suitable habitat. Loss of such areas will add effect to High Flow.	2
Wood	WdDeb	Modifying	Reduced wood structure can often result in loss of backwater pools and side channels, areas that provide spring rearing habitat. Loss of such areas will add effect to High Flow.	2

Primary Level 2 Attribute

FlwHIgh	
Rating	**Sensitivity***
0	**0E+00**
1	*7.3E-05*
2	**1E-03**
3	*4.7E-03*
4	**1E-02**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	Confine	*onfineHydr*	*Grad*	*FlwintraAnn*	*RipFunc*	*WdDeb*		
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**		
1	*5.7E-05*	*5.7E-05*	*5.7E-05*	*4.4E-05*	*4.4E-05*	*4.4E-05*		
2	**5E-04**	**5E-04**	**5E-04**	**3E-04**	**3E-04**	**3E-04**		
3	*2.1E-03*	*2.1E-03*	*2.1E-03*	*8.8E-04*	*8.8E-04*	*8.8E-04*		
4	**5E-03**	**5E-03**	**5E-03**	**2E-03**	**2E-03**	**2E-03**		

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft) and Hydrologic Regime Natural class 2 (rain-on-snow transitional); effect more severe in smaller channels, less severe in larger and generally less severe in Hydrologic Regime classes 0 and 1.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FlwHIgh	0	1	1	1	2	3	4
Confine	0	0	1	1	1	2	3
ConfineHydro	0	0	0	1	1	2	3
Grad	0	0	0	0	1	1	2
FlwintraAnn	0	0	0	0	0	1	2
RipFunc	0	0	0	0	0	1	1
WdDeb	0	0	0	0	0	1	1
Sensitivity (S)	0	.0001	.0004	.0012	.0071	.0663	.225
Relative Prod. (P=1-S)	1.0000	0.9999	0.9996	0.9988	0.9929	0.9337	0.7750

Level 3 Attribute: Flow

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of the amount of stream flow, or the the pattern and extent of flow fluctuations, on the relative survival or performance of the focus species. Includes the effects of flow reductions or dewatering due to water withdrawals.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft) and Hydrologic Regime Natural class 2 (rain-on-snow transitional); effect more severe in smaller channels, less severe in larger and generally less severe in Hydrologic Regime classes 0 and 1.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Flow

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of the amount of stream flow, or the the pattern and extent of flow fluctuations, on the relative survival or performance of the focus species. Includes the effects of flow reductions or dewatering due to water withdrawals.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Flow - change in interannual	FlwLow	Primary	Periods of low flow in summer/fall can impede adult migration, causing stress or death. This attribute specifies whether low flow levels have been altered from pristine condition.	3

Primary Level 2 Attribute	
FlwLow	
Rating	**Sensitivity***
0	**2E-03**
1	*2E-02*
2	**8E-02**
3	*2E-01*
4	**4E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft) and Hydrologic Regime Natural class 2 (rain-on-snow transitional); effect more severe in smaller channels, less severe in larger and generally less severe in Hydrologic Regime classes 0 and 1.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FlwLow	0	1	1	1	2	3	4
Sensitivity (S)	0	.0231	.0231	.0231	.0828	.1969	.3793
Relative Prod. (P=1-S)	1.0000	0.9769	0.9769	0.9769	0.9172	0.8031	0.6207

Level 3 Attribute: Flow

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of the amount of stream flow, or the the pattern and extent of flow fluctuations, on the relative survival or performance of the focus species. Includes the effects of flow reductions or dewatering due to water withdrawals.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Flow - change in interannual	FlwLow	Primary	Low flows in late summer can make holding adults more vulnerable to predation. This attribute specifies whether low flow levels have been altered from pristine condition.	3
Embeddedness	Emb	Modifying	Increased embeddedness would be associated with shallower pools, decreasing effectiveness of pools to offset Low Flow effect.	3
Habitat type - backwater pools	HbBckPls	Modifying	Presence of backwater pools (indicated by % area in reach) should reduce potential for exposure due to low flows. This attribute serves to offset effect of Low Flow.	4
Habitat type - beaver ponds	HbBvrPnds	Modifying	Presence of beaver ponds (indicated by % area in reach) should reduce potential for exposure due to low flows.. This attribute serves to offset effect of Low Flow.	4
Habitat type - primary pools	HbPls	Modifying	Abundance of pools (indicated by % area in reach) should reduce potential for increased exposure due to low flows. This attribute serves to offset effect of Low Flow.	4
Riparian function	RipFunc	Modifying	Loss of riparian function would degrade suitability of backwater pools and reduce effectiveness of those sites to offset Low Flow effect. Main channel would widen worsening Low Flow effect.	2
Wood	WdDeb	Modifying	Loss of wood structure would degrade pool quality, resulting in shallower pools, decreasing effectiveness of those sites to offset Low Flow effect.	2
Confinement - natural	Confine	Modifying	Natural features that confine channel could serve to maintain flow in deepest part of channel, thus serving to offset some part of the Low Flow effect.	3
Confinement - Hydromodifications	onfineHydr	Modifying	Confinement of channel due to diking could serve to maintain flow in deepest part of channel, thus serving to offset some part of the Low Flow effect.	3

Primary Level 2 Attribute

FlwLow	
Rating	**Sensitivity***
0	**0E+00**
1	*3.5E-03*
2	**2E-02**
3	*7.0E-02*
4	**2E-01**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	Emb	*HbBckPls*	*HbBvrPnds*	*HbPls*	*RipFunc*	*WdDeb*	*Confine*	*ConfineHyc*
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**
1	*5.7E-05*	*-7.3E-05*	*-7.3E-05*	*-7.3E-05*	*5.7E-05*	*5.7E-05*	*-6.7E-06*	*-6.7E-06*
2	**4E-04**	**-5E-04**	**-5E-04**	**-5E-04**	**4E-04**	**4E-04**	**-4E-05**	**-4E-05**
3	*1.1E-03*	*-1.4E-03*	*-1.4E-03*	*-1.4E-03*	*1.1E-03*	*1.1E-03*	*-1.3E-04*	*-1.3E-04*
4	**2E-03**	**-3E-03**	**-3E-03**	**-3E-03**	**2E-03**	**2E-03**	**-3E-04**	**-3E-04**

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft) and Hydrologic Regime Natural class 2 (rain-on-snow transitional); effect more severe in smaller channels, less severe in larger and generally less severe in Hydrologic Regime classes 0, 1, and 4.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FlwLow	0	1	1	1	2	3	4
Emb	0	0	1	1	1	2	3
HbBckPls	0	0	0	1	1	2	3
HbBvrPnds	0	0	0	0	1	1	2
HbPls	0	0	0	0	0	1	2
RipFunc	0	0	0	0	0	1	1
WdDeb	0	0	0	0	0	1	1
Confine	0	0	0	0	0	1	1
ConfineHydro	0	0	0	0	0	1	1
Sensitivity (S)	0	.0035	.006	.0033	.0158	.0533	.0843
Relative Prod. (P=1-S)	1.0000	0.9965	0.9940	0.9967	0.9842	0.9467	0.9157

Food

Level 3 Attribute: Food

Species: Chinook Life Stage: Spawning

Definition: The effect of the amount, diversity, and availability of food that can support the focus species on the its relative survival or performance.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Availability of food does not affect performance in this life stage.	1

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Food

Species: Chinook Life Stage: Egg incubation

Definition: The effect of the amount, diversity, and availability of food that can support the focus species on the its relative survival or performance.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Availability of food does not affect performance in this life stage.	1

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Food

Species: Chinook Life Stage: Fry colonization

Definition: The effect of the amount, diversity, and availability of food that can support the focus species on the its relative survival or performance.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Benthos diversity	enComRc	Primary	The diversity and abundance of benthic organisms is assumed to be an indicator of the overall supply of food available for this life stage.	3
Alkalinity	Alka	Modifying	The production of invertebrates in streams is generally correlated with alkalinity, as is the maximum density of juveniles during rearing (in streams where land use effects are minimal).	3
Riparian function	RipFunc	Modifying	The riparian zone is a principal source of terrestrial insects to the food supply of juvenile salmon. Impaired riparian function generally results in a reduction in the terrestrial input.	3
Salmon Carcasses	almCarcas	Modifying	Salmon carcasses can be an important nutrient source to a stream-riparian system. Benthos abundance can be related to carcass supply. Juveniles will also feed directly on carcasses.	1

Primary Level 2 Attribute	
BenComRch	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.2E-03*
4	**3E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Alka	*RipFunc*	*almCarcas*					
0	**2E-01**	**0E+00**	**0E+00**					
1	*5.2E-02*	*4.4E-05*	*7.3E-05*					
2	**6E-03**	**4E-04**	**1E-03**					
3	*1.3E-04*	*1.2E-03*	*8.6E-03*					
4	**0E+00**	**3E-03**	**3E-02**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

The effect of sensitivity to food abundance is incorporated into life stage productivity for the fry colonization, rearing (0 and 1 age), and inactive stages. Sensitivity shown on this page is allocated evenly between these stages.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
BenComRch	0	1	1	1	2	3	4
Alka	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
SalmCarcass	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.013	.0157	.0234	.009	.0098
Relative Prod. (P=1-S)	1.0000	1.0000	0.9870	0.9843	0.9766	0.9910	0.9902

Level 3 Attribute: Food

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of the amount, diversity, and availability of food that can support the focus species on the its relative survival or performance.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Benthos diversity	enComRc	Primary	The diversity and abundance of benthic organisms is assumed to be an indicator of the overall supply of food available for this life stage.	3
Alkalinity	Alka	Modifying	The production of invertebrates in streams is generally correlated with alkalinity, as is the maximum density of juveniles during rearing (in streams where land use effects are minimal).	3
Riparian function	RipFunc	Modifying	The riparian zone is a principal source of terrestrial insects to the food supply of juvenile salmon. Impaired riparian function generally results in a reduction in the terrestrial input.	3
Salmon Carcasses	almCarcas	Modifying	Salmon carcasses can be an important nutrient source to a stream-riparian system. Benthos abundance can be related to carcass supply. Juveniles will also feed directly on carcasses.	1

Primary Level 2 Attribute

BenComRch	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.2E-03*
4	**3E-03**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	Alka	*RipFunc*	*almCarcas*					
0	**2E-01**	**0E+00**	**0E+00**					
1	*5.2E-02*	*4.4E-05*	*7.3E-05*					
2	**6E-03**	**4E-04**	**1E-03**					
3	*1.3E-04*	*1.2E-03*	*8.6E-03*					
4	**0E+00**	**3E-03**	**3E-02**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

The effect of sensitivity to food abundance is incorporated into life stage productivity for the fry colonization, rearing (0 and 1 age), and inactive stages. Sensitivity shown on this page is allocated evenly between these stages.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
BenComRch	0	1	1	1	2	3	4
Alka	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
SalmCarcass	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.013	.0157	.0234	.009	.0098
Relative Prod. (P=1-S)	1.0000	1.0000	0.9870	0.9843	0.9766	0.9910	0.9902

Level 3 Attribute: Food

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of the amount, diversity, and availability of food that can support the focus species on the its relative survival or performance.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Benthos diversity	enComRc	Primary	The diversity and abundance of benthic organisms is assumed to be an indicator of the overall supply of food available for this life stage.	3
Alkalinity	Alka	Modifying	The production of invertebrates in streams is generally correlated with alkalinity, as is the maximum density of juveniles during rearing (in streams where land use effects are minimal).	3
Riparian function	RipFunc	Modifying	The riparian zone is a principal source of terrestrial insects to the food supply of juvenile salmon. Impaired riparian function generally results in a reduction in the terrestrial input.	3
Salmon Carcasses	almCarcas	Modifying	Salmon carcasses can be an important nutrient source to a stream-riparian system. Benthos abundance can be related to carcass supply. Juveniles will also feed directly on carcasses.	1

Primary Level 2 Attribute

BenComRch	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.2E-03*
4	**3E-03**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	Alka	*RipFunc*	*almCarcas*					
0	**2E-01**	**0E+00**	**0E+00**					
1	*5.2E-02*	*4.4E-05*	*7.3E-05*					
2	**6E-03**	**4E-04**	**1E-03**					
3	*1.3E-04*	*1.2E-03*	*8.6E-03*					
4	**0E+00**	**3E-03**	**3E-02**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

The effect of sensitivity to food abundance is incorporated into life stage productivity for the fry colonization, rearing (0 and 1 age), and inactive stages. Sensitivity shown on this page is allocated evenly between these stages.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
BenComRch	0	1	1	1	2	3	4
Alka	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
SalmCarcass	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.013	.0157	.0234	.009	.0098
Relative Prod. (P=1-S)	1.0000	1.0000	0.9870	0.9843	0.9766	0.9910	0.9902

Level 3 Attribute: Food

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of the amount, diversity, and availability of food that can support the focus species on the its relative survival or performance.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Benthos diversity	enComRc	Primary	The diversity and abundance of benthic organisms is assumed to be an indicator of the overall supply of food available for this life stage.	3
Alkalinity	Alka	Modifying	The production of invertebrates in streams is generally correlated with alkalinity, as is the maximum density of juveniles during rearing (in streams where land use effects are minimal).	3
Riparian function	RipFunc	Modifying	The riparian zone is a principal source of terrestrial insects to the food supply of juvenile salmon. Impaired riparian function generally results in a reduction in the terrestrial input.	3
Salmon Carcasses	almCarcas	Modifying	Salmon carcasses can be an important nutrient source to a stream-riparian system. Benthos abundance can be related to carcass supply. Juveniles will also feed directly on carcasses.	1
			Availability of food does not affect performance in this life stage.	1

Primary Level 2 Attribute	
BenComRch	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.2E-03*
4	**3E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Alka	*RipFunc*	*almCarcas*					
0	**2E-01**	**0E+00**	**0E+00**					
1	*5.2E-02*	*4.4E-05*	*7.3E-05*					
2	**6E-03**	**4E-04**	**1E-03**					
3	*1.3E-04*	*1.2E-03*	*8.6E-03*					
4	**0E+00**	**3E-03**	**3E-02**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
BenComRch	0	1	1	1	2	3	4
Alka	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
SalmCarcass	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.013	.0157	.0234	.009	.0098
Relative Prod. (P=1-S)	1.0000	1.0000	0.9870	0.9843	0.9766	0.9910	0.9902

Level 3 Attribute: Food

Species: Chinook Life Stage: Inactive

Definition: The effect of the amount, diversity, and availability of food that can support the focus species on the its relative survival or performance.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Benthos diversity	enComRc	Primary	The diversity and abundance of benthic organisms is assumed to be an indicator of the overall supply of food available for this life stage.	3
Alkalinity	Alka	Modifying	The production of invertebrates in streams is generally correlated with alkalinity, as is the maximum density of juveniles during rearing (in streams where land use effects are minimal).	3
Riparian function	RipFunc	Modifying	The riparian zone is a principal source of terrestrial insects to the food supply of juvenile salmon. Impaired riparian function generally results in a reduction in the terrestrial input.	3
Salmon Carcasses	almCarcas	Modifying	Salmon carcasses can be an important nutrient source to a stream-riparian system. Benthos abundance can be related to carcass supply. Juveniles will also feed directly on carcasses.	1

Primary Level 2 Attribute

BenComRch	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.2E-03*
4	**3E-03**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	Alka	*RipFunc*	*almCarcas*					
0	**2E-01**	**0E+00**	**0E+00**					
1	*5.2E-02*	*4.4E-05*	*7.3E-05*					
2	**6E-03**	**4E-04**	**1E-03**					
3	*1.3E-04*	*1.2E-03*	*8.6E-03*					
4	**0E+00**	**3E-03**	**3E-02**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

The effect of sensitivity to food abundance is incorporated into life stage productivity for the fry colonization, rearing (0 and 1 age), and inactive stages. Sensitivity shown on this page is allocated evenly between these stages.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
BenComRch	0	1	1	1	2	3	4
Alka	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
SalmCarcass	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.013	.0157	.0234	.009	.0098
Relative Prod. (P=1-S)	1.0000	1.0000	0.9870	0.9843	0.9766	0.9910	0.9902

Level 3 Attribute: Food

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of the amount, diversity, and availability of food that can support the focus species on the its relative survival or performance.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Benthos diversity	enComRc	Primary	The diversity and abundance of benthic organisms is assumed to be an indicator of the overall supply of food available for this life stage.	3
Alkalinity	Alka	Modifying	The production of invertebrates in streams is generally correlated with alkalinity, as is the maximum density of juveniles during rearing (in streams where land use effects are minimal).	3
Riparian function	RipFunc	Modifying	The riparian zone is a principal source of terrestrial insects to the food supply of juvenile salmon. Impaired riparian function generally results in a reduction in the terrestrial input.	3
Salmon Carcasses	almCarcas	Modifying	Salmon carcasses can be an important nutrient source to a stream-riparian system. Benthos abundance can be related to carcass supply. Juveniles will also feed directly on carcasses.	1

Primary Level 2 Attribute	
BenComRch	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.2E-03*
4	**3E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Alka	*RipFunc*	*almCarcas*					
0	**2E-01**	**0E+00**	**0E+00**					
1	*5.2E-02*	*4.4E-05*	*7.3E-05*					
2	**6E-03**	**4E-04**	**1E-03**					
3	*1.3E-04*	*1.2E-03*	*8.6E-03*					
4	**0E+00**	**3E-03**	**3E-02**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

The effect of sensitivity to food abundance is incorporated into life stage productivity for the fry colonization, rearing (0 and 1 age), and inactive stages. Sensitivity shown on this page is allocated evenly between these stages.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
BenComRch	0	1	1	1	2	3	4
Alka	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
SalmCarcass	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.013	.0157	.0234	.009	.0098
Relative Prod. (P=1-S)	1.0000	1.0000	0.9870	0.9843	0.9766	0.9910	0.9902

Level 3 Attribute: Food

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of the amount, diversity, and availability of food that can support the focus species on the its relative survival or performance.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Benthos diversity	enComRc	Primary	The diversity and abundance of benthic organisms is assumed to be an indicator of the overall supply of food available for this life stage.	3
Alkalinity	Alka	Modifying	The production of invertebrates in streams is generally correlated with alkalinity, as is the maximum density of juveniles during rearing (in streams where land use effects are minimal).	3
Riparian function	RipFunc	Modifying	The riparian zone is a principal source of terrestrial insects to the food supply of juvenile salmon. Impaired riparian function generally results in a reduction in the terrestrial input.	3
Salmon Carcasses	almCarcas	Modifying	Salmon carcasses can be an important nutrient source to a stream-riparian system. Benthos abundance can be related to carcass supply. Juveniles will also feed directly on carcasses.	1
			Availability of food does not affect performance in this life stage.	1

Primary Level 2 Attribute	
BenComRch	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.2E-03*
4	**3E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Alka	*RipFunc*	*almCarcas*					
0	**2E-01**	**0E+00**	**0E+00**					
1	*5.2E-02*	*4.4E-05*	*7.3E-05*					
2	**6E-03**	**4E-04**	**1E-03**					
3	*1.3E-04*	*1.2E-03*	*8.6E-03*					
4	**0E+00**	**3E-03**	**3E-02**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
BenComRch	0	1	1	1	2	3	4
Alka	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
SalmCarcass	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.013	.0157	.0234	.009	.0098
Relative Prod. (P=1-S)	1.0000	1.0000	0.9870	0.9843	0.9766	0.9910	0.9902

Level 3 Attribute: Food

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of the amount, diversity, and availability of food that can support the focus species on the its relative survival or performance.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Availability of food does not affect performance in this life stage.	1

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Food

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of the amount, diversity, and availability of food that can support the focus species on the its relative survival or performance.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Availability of food does not affect performance in this life stage.	1

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Habitat Diversity

Level 3 Attribute: Habitat diversity

Species: Chinook Life Stage: Spawning

Definition: The effect of the extent of habitat complexity within a stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Gradient	Grad	Primary	Habitat type diversity, and other aspects of complexity (e.g. stable wood) generally decreases with increasing channel gradient, reducing opportunities for refuge for spawners.	2
Confinement - natural	Confine	Modifying	Habitat diversity generally decreases with extent of the natural channel confinement, reducing opportunities for refuge and cover for spawners.	2
Confinement - Hydromodifications	onfineHydr	Modifying	Channels confined by human action (e.g., construction of levees, bank protection measures, closing of off-channel sites) reduce the level of habitat diversity provided by the natural condition.	1
Riparian function	RipFunc	Modifying	Loss of riparian function (e.g., by removal of riparian vegetation, channel straightening) results in a loss of refuge habitat for spawners.	1
Wood	WdDeb	Modifying	Removal of wood from channels removes an important source of habitat structure and cover for adult salmon, increasing exposure to predators.	1

Primary Level 2 Attribute	
Grad	
Rating	**Sensitivity***
0	**0E+00**
1	*3.3E-05*
2	**2E-04**
3	*6.6E-04*
4	**1E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Confine	*onfineHydr*	*RipFunc*	*WdDeb*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*3.3E-05*	*3.3E-05*	*3.3E-05*	*3.3E-05*				
2	**3E-04**	**3E-04**	**3E-04**	**3E-04**				
3	*1.2E-03*	*1.2E-03*	*1.2E-03*	*1.2E-03*				
4	**3E-03**	**3E-03**	**3E-03**	**3E-03**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Grad	0	1	1	1	2	3	4
Confine	0	0	1	1	1	2	3
ConfineHydro	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
WdDeb	0	0	0	0	0	1	2
Sensitivity (S)	0	0	.0002	.0007	.0026	.0155	.063
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9993	0.9974	0.9845	0.9370

Level 3 Attribute: Habitat diversity

Species: Chinook Life Stage: Egg incubation

Definition: The effect of the extent of habitat complexity within a stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Habitat diversity is not an issue for incubating eggs and alevins within natural redds.	2

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Habitat diversity

Species: Chinook Life Stage: Fry colonization

Definition: The effect of the extent of habitat complexity within a stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Gradient	Grad	Primary	Habitat type diversity, and other aspects of complexity (e.g. stable wood) generally decreases with increasing channel gradient, reducing opportunities for cover for juveniles.	2
Confinement - natural	Confine	Modifying	Habitat diversity generally decreases with extent of the natural channel confinement, reducing opportunities for refuge and cover for juveniles.	2
Confinement - Hydromodifications	onfineHydr	Modifying	Channels confined by human action (e.g., construction of levees, bank protection measures, closing of off-channel sites) reduce the level of habitat diversity provided by the natural condition.	1
Riparian function	RipFunc	Modifying	Loss of riparian function (e.g., by removal of riparian vegetation and channel straightening) results in a loss of cover habitat for juveniles, increasing exposure to predators and high flows.	1
Wood	WdDeb	Modifying	Removal of wood from channels removes an important source of habitat structure and associated features for juveniles, increasing exposure to predators and high flows.	1
Icing	Icing	Modifying	Icing events, especially in areas of impaired riparian function, can simplify habitat features, reducing opportunities for fish to find suitable hiding cover.	2

Primary Level 2 Attribute	
Grad	
Rating	**Sensitivity***
0	**0E+00**
1	*2.9E-04*
2	**5E-03**
3	*2.6E-02*
4	**8E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Confine	*onfineHydr*	*RipFunc*	*WdDeb*	*Icing*			
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**			
1	*5.7E-05*	*5.7E-05*	*5.7E-05*	*5.7E-05*	*5.7E-05*			
2	**8E-04**	**8E-04**	**8E-04**	**8E-04**	**8E-04**			
3	*3.7E-03*	*3.7E-03*	*3.7E-03*	*3.7E-03*	*3.7E-03*			
4	**1E-02**	**1E-02**	**1E-02**	**1E-02**	**1E-02**			

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Grad	0	1	1	1	2	3	4
Confine	0	0	1	1	1	2	3
ConfineHydro	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
WdDeb	0	0	0	0	0	1	2
Icing	0	0	0	0	0	1	1
Sensitivity (S)	0	.0003	.001	.0022	.0171	.1418	.6
Relative Prod. (P=1-S)	1.0000	0.9997	0.9990	0.9978	0.9829	0.8582	0.4000

Level 3 Attribute: Habitat diversity

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of the extent of habitat complexity within a stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Gradient	Grad	Primary	Habitat type diversity, and other aspects of complexity (e.g. stable wood) generally decreases with increasing channel gradient, reducing opportunities for cover for juveniles.	2
Confinement - natural	Confine	Modifying	Habitat diversity generally decreases with extent of the natural channel confinement, reducing opportunities for refuge and cover for juveniles.	2
Confinement - Hydromodifications	onfineHydr	Modifying	Channels confined by human action (e.g., construction of levees, bank protection measures, closing of off-channel sites) reduce the level of habitat diversity provided by the natural condition.	1
Riparian function	RipFunc	Modifying	Loss of riparian function (e.g., by removal of riparian vegetation and channel straightening) results in a loss of cover habitat for juveniles, increasing exposure to predators and high flows.	1
Wood	WdDeb	Modifying	Removal of wood from channels removes an important source of habitat structure and associated features for juveniles, increasing exposure to predators and high flows.	1

Primary Level 2 Attribute	
Grad	
Rating	**Sensitivity***
0	**0E+00**
1	*9.0E-05*
2	**2E-03**
3	*7.9E-03*
4	**3E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Confine	*onfineHydr*	*RipFunc*	*WdDeb*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*9.0E-05*	*5.7E-05*	*5.7E-05*	*7.3E-05*				
2	**2E-03**	**7E-04**	**7E-04**	**1E-03**				
3	*7.9E-03*	*2.8E-03*	*2.8E-03*	*6.4E-03*				
4	**3E-02**	**8E-03**	**8E-03**	**2E-02**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Grad	0	1	1	1	2	3	4
Confine	0	0	1	1	1	2	3
ConfineHydro	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
WdDeb	0	0	0	0	0	1	2
Sensitivity (S)	0	.0001	.0006	.0015	.0094	.0752	.3736
Relative Prod. (P=1-S)	1.0000	0.9999	0.9994	0.9985	0.9906	0.9248	0.6264

Level 3 Attribute: Habitat diversity

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of the extent of habitat complexity within a stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Gradient	Grad	Primary	Habitat type diversity, and other aspects of complexity (e.g. stable wood) generally decreases with increasing channel gradient, reducing opportunities for cover for juveniles.	2
Confinement - natural	Confine	Modifying	Habitat diversity generally decreases with extent of the natural channel confinement, reducing opportunities for refuge and cover for juveniles.	2
Confinement - Hydromodifications	onfineHydr	Modifying	Channels confined by human action (e.g., construction of levees, bank protection measures, closing of off-channel sites) reduce the level of habitat diversity provided by the natural condition.	1
Riparian function	RipFunc	Modifying	Loss of riparian function (e.g., by removal of riparian vegetation and channel straightening) results in a loss of cover habitat for juveniles, increasing exposure to predators and high flows.	1
Wood	WdDeb	Modifying	Removal of wood from channels removes an important source of habitat structure and associated features for juveniles, increasing exposure to predators and high flows.	1

Primary Level 2 Attribute	
Grad	
Rating	**Sensitivity***
0	**0E+00**
1	*9.0E-05*
2	**2E-03**
3	*7.9E-03*
4	**3E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Confine	*onfineHydr*	*RipFunc*	*WdDeb*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*9.0E-05*	*5.7E-05*	*5.7E-05*	*7.3E-05*				
2	**2E-03**	**7E-04**	**7E-04**	**1E-03**				
3	*7.9E-03*	*2.8E-03*	*2.8E-03*	*6.4E-03*				
4	**3E-02**	**8E-03**	**8E-03**	**2E-02**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Grad	0	1	1	1	2	3	4
Confine	0	0	1	1	1	2	3
ConfineHydro	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
WdDeb	0	0	0	0	0	1	2
Sensitivity (S)	0	.0001	.0006	.0015	.0094	.0752	.3736
Relative Prod. (P=1-S)	1.0000	0.9999	0.9994	0.9985	0.9906	0.9248	0.6264

Level 3 Attribute: Habitat diversity

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of the extent of habitat complexity within a stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Gradient	Grad	Primary	Habitat type diversity, and other aspects of complexity (e.g. stable wood) generally decreases with increasing channel gradient, reducing opportunities for cover for juvenile migrants.	2
Confinement - natural	Confine	Modifying	Habitat diversity generally decreases with extent of the natural channel confinement, reducing opportunities for refuge and cover for juvenile migrants.	2
Confinement - Hydromodifications	onfineHydr	Modifying	Channels confined by human action (e.g., construction of levees and bank protection measures) reduce the level of habitat diversity provided by the natural condition.	1
Riparian function	RipFunc	Modifying	Loss of riparian function (e.g., by removal of riparian vegetation, channel straightening) results in a loss of cover habitat for juvenile migrants.	1
Wood	WdDeb	Modifying	Removal of wood from channels removes an important source of habitat structure and cover for juvenile migrants, increasing exposure to predators.	1

Primary Level 2 Attribute	
Grad	
Rating	**Sensitivity***
0	**0E+00**
1	*3.3E-05*
2	**3E-04**
3	*1.2E-03*
4	**3E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Confine	*onfineHydr*	*RipFunc*	*WdDeb*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*3.3E-05*	*3.3E-05*	*3.3E-05*	*3.3E-05*				
2	**3E-04**	**3E-04**	**3E-04**	**3E-04**				
3	*1.2E-03*	*1.2E-03*	*1.2E-03*	*1.2E-03*				
4	**3E-03**	**3E-03**	**3E-03**	**3E-03**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Grad	0	1	1	1	2	3	4
Confine	0	0	1	1	1	2	3
ConfineHydro	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
WdDeb	0	0	0	0	0	1	2
Sensitivity (S)	0	0	.0002	.0007	.0031	.0189	.0775
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9993	0.9969	0.9811	0.9225

Level 3 Attribute: Habitat diversity

Species: Chinook Life Stage: Inactive

Definition: The effect of the extent of habitat complexity within a stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Gradient	Grad	Primary	Habitat type diversity, and other aspects of complexity (e.g. stable wood) generally decreases with increasing channel gradient, reducing opportunities for cover for juveniles.	2
Confinement - natural	Confine	Modifying	Habitat diversity generally decreases with extent of the natural channel confinement, reducing opportunities for refuge and cover for juveniles.	2
Confinement - Hydromodifications	onfineHydr	Modifying	Channels confined by human action (e.g., construction of levees, bank protection measures, closing of off-channel sites) reduce the level of habitat diversity provided by the natural condition.	1
Riparian function	RipFunc	Modifying	Loss of riparian function (e.g., by removal of riparian vegetation and channel straightening) results in a loss of cover habitat for juveniles, increasing exposure to predators and high flows.	1
Wood	WdDeb	Modifying	Removal of wood from channels removes an important source of habitat structure and associated features for juveniles, increasing exposure to predators and high flows.	1
Wood	WdDeb	Modifying	Removal of wood from channels removes an important source of habitat structure and associated features for juveniles, increasing exposure to predators and high flows.	1

Primary Level 2 Attribute

Grad	
Rating	**Sensitivity***
0	**0E+00**
1	*2.9E-04*
2	**6E-03**
3	*3.5E-02*
4	**1E-01**

Modifying Level 2 Attributes

Rating	Added Sensitivity*							
	Confine	*onfineHydr*	*RipFunc*	*WdDeb*	*WdDeb*			
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**			
1	*2.9E-04*	*4.4E-05*	*4.4E-05*	*4.4E-05*	*4.4E-05*			
2	**5E-03**	**6E-04**	**6E-04**	**6E-04**	**6E-04**			
3	*2.6E-02*	*2.9E-03*	*2.9E-03*	*2.9E-03*	*2.9E-03*			
4	**8E-02**	**9E-03**	**9E-03**	**9E-03**	**9E-03**			

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Grad	0	1	1	1	2	3	4
Confine	0	0	1	1	1	2	3
ConfineHydro	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
WdDeb	0	0	0	0	0	1	2
WdDeb	0	0	0	0	0	1	1
Sensitivity (S)	0	.0003	.0019	.0035	.0235	.2194	.9801
Relative Prod. (P=1-S)	1.0000	0.9997	0.9981	0.9965	0.9765	0.7806	0.0199

Level 3 Attribute: Habitat diversity

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of the extent of habitat complexity within a stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Gradient	Grad	Primary	Habitat type diversity, and other aspects of complexity (e.g. stable wood) generally decreases with increasing channel gradient, reducing opportunities for cover for juveniles.	2
Confinement - natural	Confine	Modifying	Habitat diversity generally decreases with extent of the natural channel confinement, reducing opportunities for refuge and cover for juveniles.	2
Confinement - Hydromodifications	onfineHydr	Modifying	Channels confined by human action (e.g., construction of levees, bank protection measures, closing of off-channel sites) reduce the level of habitat diversity provided by the natural condition.	1
Riparian function	RipFunc	Modifying	Loss of riparian function (e.g., by removal of riparian vegetation and channel straightening) results in a loss of cover habitat for juveniles, increasing exposure to predators and high flows.	1
Wood	WdDeb	Modifying	Removal of wood from channels removes an important source of habitat structure and associated features for juveniles, increasing exposure to predators and high flows.	1

Primary Level 2 Attribute	
Grad	
Rating	**Sensitivity***
0	**0E+00**
1	*9.0E-05*
2	**2E-03**
3	*7.9E-03*
4	**3E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Confine	*onfineHydr*	*RipFunc*	*WdDeb*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*9.0E-05*	*5.7E-05*	*5.7E-05*	*7.3E-05*				
2	**2E-03**	**7E-04**	**7E-04**	**1E-03**				
3	*7.9E-03*	*2.8E-03*	*2.8E-03*	*6.4E-03*				
4	**3E-02**	**8E-03**	**8E-03**	**2E-02**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Grad	0	1	1	1	2	3	4
Confine	0	0	1	1	1	2	3
ConfineHydro	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
WdDeb	0	0	0	0	0	1	2
Sensitivity (S)	0	.0001	.0006	.0015	.0094	.0752	.3736
Relative Prod. (P=1-S)	1.0000	0.9999	0.9994	0.9985	0.9906	0.9248	0.6264

Level 3 Attribute: Habitat diversity

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of the extent of habitat complexity within a stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Gradient	Grad	Primary	Habitat type diversity, and other aspects of complexity (e.g. stable wood) generally decreases with increasing channel gradient, reducing opportunities for cover for juvenile migrants.	2
Confinement - natural	Confine	Modifying	Habitat diversity generally decreases with extent of the natural channel confinement, reducing opportunities for refuge and cover for juvenile migrants.	2
Confinement - Hydromodifications	onfineHydr	Modifying	Channels confined by human action (e.g., construction of levees and bank protection measures) reduce the level of habitat diversity provided by the natural condition.	1
Riparian function	RipFunc	Modifying	Loss of riparian function (e.g., by removal of riparian vegetation, channel straightening) results in a loss of cover habitat for juvenile migrants.	1
Wood	WdDeb	Modifying	Removal of wood from channels removes an important source of habitat structure and cover for juvenile migrants, increasing exposure to predators.	1

Primary Level 2 Attribute	
Grad	
Rating	**Sensitivity***
0	**0E+00**
1	*3.3E-05*
2	**3E-04**
3	*1.2E-03*
4	**3E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Confine	*onfineHydr*	*RipFunc*	*WdDeb*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*3.3E-05*	*3.3E-05*	*3.3E-05*	*3.3E-05*				
2	**3E-04**	**3E-04**	**3E-04**	**3E-04**				
3	*1.2E-03*	*1.2E-03*	*1.2E-03*	*1.2E-03*				
4	**3E-03**	**3E-03**	**3E-03**	**3E-03**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Grad	0	1	1	1	2	3	4
Confine	0	0	1	1	1	2	3
ConfineHydro	0	0	0	1	1	2	3
RipFunc	0	0	0	0	1	1	2
WdDeb	0	0	0	0	0	1	2
Sensitivity (S)	0	0	.0002	.0007	.0031	.0189	.0775
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9993	0.9969	0.9811	0.9225

Level 3 Attribute: Habitat diversity

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of the extent of habitat complexity within a stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Gradient	Grad	Primary	Habitat type diversity, and other aspects of complexity (e.g. stable wood) generally decreases with increasing channel gradient, reducing opportunities for refuge for adult salmon.	2
Confinement - Hydromodifications	onfineHydr	Modifying	Channels confined by human action (e.g., construction of levees, bank protection measures, closing of off-channel sites) reduce the level of habitat diversity provided by the natural condition.	1
Riparian function	RipFunc	Modifying	Loss of riparian function (e.g., by removal of riparian vegetation, channel straightening) results in a loss of refuge habitat for adult salmon.	1
Wood	WdDeb	Modifying	Removal of wood from channels removes an important source of habitat structure and cover for adult salmon, increasing exposure to predators.	1

Primary Level 2 Attribute	
Grad	
Rating	**Sensitivity***
0	**0E+00**
1	*5.7E-05*
2	**1E-03**
3	*5.0E-03*
4	**2E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	onfineHydr	*RipFunc*	*WdDeb*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*5.7E-05*	*5.7E-05*	*5.7E-05*					
2	**8E-04**	**5E-04**	**5E-04**					
3	*3.7E-03*	*2.1E-03*	*2.1E-03*					
4	**1E-02**	**5E-03**	**5E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Grad	0	1	1	1	2	3	4
ConfineHydro	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
WdDeb	0	0	0	0	1	1	2
Sensitivity (S)	0	.0001	.0004	.0011	.0069	.0401	.1638
Relative Prod. (P=1-S)	1.0000	0.9999	0.9996	0.9989	0.9931	0.9599	0.8362

Level 3 Attribute: Habitat diversity

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of the extent of habitat complexity within a stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Gradient	Grad	Primary	Habitat type diversity, and other aspects of complexity (e.g. stable wood) generally decreases with increasing channel gradient, reducing opportunities for refuge for adult salmon.	2
Confinement - Hydromodifications	onfineHydr	Modifying	Channels confined by human action (e.g., construction of levees, bank protection measures, closing of off-channel sites) reduce the level of habitat diversity provided by the natural condition.	1
Riparian function	RipFunc	Modifying	Loss of riparian function (e.g., by removal of riparian vegetation, channel straightening) results in a loss of refuge habitat for adult salmon.	1
Wood	WdDeb	Modifying	Removal of wood from channels removes an important source of habitat structure and cover for adult salmon, increasing exposure to predators.	1
			Note: Natural confinement was not included for this life stage, as it was for others, because natural tightly confined channel (canyon reaches) provide sufficient habitat diversity for holding adult salmon.	3

Primary Level 2 Attribute	
Grad	
Rating	**Sensitivity***
0	**0E+00**
1	*3.3E-05*
2	**3E-04**
3	*8.9E-04*
4	**2E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	onfineHydr	*RipFunc*	*WdDeb*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*2.9E-04*	*7.3E-05*	*7.3E-05*					
2	**6E-03**	**1E-03**	**1E-03**					
3	*3.5E-02*	*6.4E-03*	*6.4E-03*					
4	**1E-01**	**2E-02**	**2E-02**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Grad	0	1	1	1	2	3	4
ConfineHydro	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
WdDeb	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.0008	.002	.0067	.054	.2899
Relative Prod. (P=1-S)	1.0000	1.0000	0.9992	0.9980	0.9933	0.9460	0.7101

Harassment

Level 3 Attribute: Harassment

Species: Chinook Life Stage: Spawning

Definition: The effect of harassment, poaching, or non-directed harvest (i.e., as can occur through hook and release) on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Harassment	Harass	Primary	The Level Two Harassment attribute assumes that proximity to human communities and road systems is an indicator of the extent that spawners will be disturbed, thereby affecting spawning	3
Habitat type - primary pools	HbPls	Modifying	Presence of pools is assumed to offset potential for harassment by providing refuge.	4
Riparian function	RipFunc	Modifying	Impairment of riparian function is assumed to increase the overall effect of harassment on spawners.	3
Turbidity	Turb	Modifying	Increased turbidiy is assumed to offset the potential for harassment by decreasing chance of visual contact or other means of disturbance.	4
Wood	WdDeb	Modifying	Loss of wood structure is assumed to increase the overall effect of harassment on spawners.	3

Primary Level 2 Attribute	
Harass	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**1E-03**
3	*5.4E-03*
4	**1E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	HbPls	*RipFunc*	*Turb*	*WdDeb*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*-4.4E-05*	*4.4E-05*	*-4.4E-05*	*4.4E-05*				
2	**-4E-04**	**4E-04**	**-4E-04**	**4E-04**				
3	*-1.2E-03*	*1.2E-03*	*-1.2E-03*	*1.2E-03*				
4	**-3E-03**	**3E-03**	**-3E-03**	**3E-03**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Harass	0	1	1	1	2	3	4
HbPls	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
Turb	0	0	0	0	1	1	2
WdDeb	0	0	0	0	0	1	2
Sensitivity (S)	0	.0001	0	.0001	.0005	.0054	.0148
Relative Prod. (P=1-S)	1.0000	0.9999	1.0000	0.9999	0.9995	0.9946	0.9852

Level 3 Attribute: Harassment

Species: Chinook Life Stage: Egg incubation

Definition: The effect of harassment, poaching, or non-directed harvest (i.e., as can occur through hook and release) on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Harassment	Harass	Primary	This attribute assumes that proximity to human communities and road systems is an indicator of the extent disturbance can occur. "Harassment" here constitutes redd disturbance.	4

Primary Level 2 Attribute	
Harass	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**1E-03**
3	*4.0E-03*
4	**1E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Harass	0	1	1	1	2	3	4
Sensitivity (S)	0	.0001	.0001	.0001	.0011	.004	.0101
Relative Prod. (P=1-S)	1.0000	0.9999	0.9999	0.9999	0.9989	0.9960	0.9899

Level 3 Attribute: Harassment

Species: Chinook Life Stage: Fry colonization

Definition: The effect of harassment, poaching, or non-directed harvest (i.e., as can occur through hook and release) on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Harrassment is not an issue for this life stage.	

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Harassment

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of harassment, poaching, or non-directed harvest (i.e., as can occur through hook and release) on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Harassment	Harass	Primary	The Level Two Harassment attribute assumes that proximity to human communities and road systems is an indicator of the extent that juveniles can be stressed or killed by human contact.	4
Habitat type - primary pools	HbPls	Modifying	Presence of pools is assumed to offset potential for harassment by providing refuge.	4
Riparian function	RipFunc	Modifying	Impairment of riparian function is assumed to increase the overall effect of harassment of juveniles.	4
Turbidity	Turb	Modifying	Increased turbidiy is assumed to offset the potential for harassment by decreasing chance of visual contact or other means of disturbance.	4
Wood	WdDeb	Modifying	Loss of wood structure is assumed to increase the overall effect of harassment of juveniles.	4
			Note: the maximum effect on this life stage is extremely small.	

Primary Level 2 Attribute	
Harass	
Rating	**Sensitivity***
0	**0E+00**
1	*3.3E-05*
2	**2E-04**
3	*7.6E-04*
4	**2E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	HbPls	*RipFunc*	*Turb*	*WdDeb*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*-3.7E-06*	*3.7E-06*	*-3.7E-06*	*3.7E-06*				
2	**-3E-05**	**3E-05**	**-3E-05**	**3E-05**				
3	*-8.4E-05*	*8.4E-05*	*-8.4E-05*	*8.4E-05*				
4	**-2E-04**	**2E-04**	**-2E-04**	**2E-04**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Harass	0	1	1	1	2	3	4
HbPls	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
Turb	0	0	0	0	1	1	2
WdDeb	0	0	0	0	0	1	2
Sensitivity (S)	0	0	0	0	.0001	.0008	.0017
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	0.9999	0.9992	0.9983

Level 3 Attribute: Harassment

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of harassment, poaching, or non-directed harvest (i.e., as can occur through hook and release) on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Harassment	Harass	Primary	The Level Two Harassment attribute assumes that proximity to human communities and road systems is an indicator of the extent that juveniles can be stressed or killed by human contact.	4
Habitat type - primary pools	HbPls	Modifying	Presence of pools is assumed to offset potential for harassment by providing refuge.	4
Riparian function	RipFunc	Modifying	Impairment of riparian function is assumed to increase the overall effect of harassment of juveniles.	4
Turbidity	Turb	Modifying	Increased turbidiy is assumed to offset the potential for harassment by decreasing chance of visual contact or other means of disturbance.	4
Wood	WdDeb	Modifying	Loss of wood structure is assumed to increase the overall effect of harassment of juveniles.	4
			Note: the maximum effect on this life stage is extremely small.	

Primary Level 2 Attribute	
Harass	
Rating	**Sensitivity***
0	**0E+00**
1	*3.3E-05*
2	**2E-04**
3	*7.6E-04*
4	**2E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	HbPls	*RipFunc*	*Turb*	*WdDeb*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*-3.7E-06*	*3.7E-06*	*-3.7E-06*	*3.7E-06*				
2	**-3E-05**	**3E-05**	**-3E-05**	**3E-05**				
3	*-8.4E-05*	*8.4E-05*	*-8.4E-05*	*8.4E-05*				
4	**-2E-04**	**2E-04**	**-2E-04**	**2E-04**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Harass	0	1	1	1	2	3	4
HbPls	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
Turb	0	0	0	0	1	1	2
WdDeb	0	0	0	0	0	1	2
Sensitivity (S)	0	0	0	0	.0001	.0008	.0017
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	0.9999	0.9992	0.9983

Level 3 Attribute: Harassment

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of harassment, poaching, or non-directed harvest (i.e., as can occur through hook and release) on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Harassment of actively migrating juveniles is assumed to not be an issue.	

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Harassment

Species: Chinook Life Stage: Inactive

Definition: The effect of harassment, poaching, or non-directed harvest (i.e., as can occur through hook and release) on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Harassment of juveniles during winter is assumed to not be an issue.	

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Harassment

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of harassment, poaching, or non-directed harvest (i.e., as can occur through hook and release) on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Harassment	Harass	Primary	The Level Two Harassment attribute assumes that proximity to human communities and road systems is an indicator of the extent that juveniles can be stressed or killed by human contact.	4
Habitat type - primary pools	HbPls	Modifying	Presence of pools is assumed to offset potential for harassment by providing refuge.	4
Riparian function	RipFunc	Modifying	Impairment of riparian function is assumed to increase the overall effect of harassment of juveniles.	4
Turbidity	Turb	Modifying	Increased turbidiy is assumed to offset the potential for harassment by decreasing chance of visual contact or other means of disturbance.	4
Wood	WdDeb	Modifying	Loss of wood structure is assumed to increase the overall effect of harassment of juveniles.	4
			Note: the maximum effect on this life stage is extremely small.	

Primary Level 2 Attribute	
Harass	
Rating	**Sensitivity***
0	**0E+00**
1	*3.3E-05*
2	**2E-04**
3	*7.6E-04*
4	**2E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	HbPls	*RipFunc*	*Turb*	*WdDeb*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*-3.7E-06*	*3.7E-06*	*-3.7E-06*	*3.7E-06*				
2	**-3E-05**	**3E-05**	**-3E-05**	**3E-05**				
3	*-8.4E-05*	*8.4E-05*	*-8.4E-05*	*8.4E-05*				
4	**-2E-04**	**2E-04**	**-2E-04**	**2E-04**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Harass	0	1	1	1	2	3	4
HbPls	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
Turb	0	0	0	0	1	1	2
WdDeb	0	0	0	0	0	1	2
Sensitivity (S)	0	0	0	0	.0001	.0008	.0017
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	0.9999	0.9992	0.9983

Level 3 Attribute: Harassment

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of harassment, poaching, or non-directed harvest (i.e., as can occur through hook and release) on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Harassment of actively migrating juveniles is assumed to not be an issue.	

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Harassment

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of harassment, poaching, or non-directed harvest (i.e., as can occur through hook and release) on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Harassment	Harass	Primary	The Level Two Harassment attribute assumes that proximity to human communities and road systems is an indicator of the extent that adult salmon will be disturbed, causing stress or mortality.	3
Habitat type - primary pools	HbPls	Modifying	Presence of pools is assumed to offset potential for harassment by providing refuge.	4
Riparian function	RipFunc	Modifying	Impairment of riparian function is assumed to increase the overall effect of harassment on adult salmon.	3
Turbidity	Turb	Modifying	Increased turbidiy is assumed to offset the potential for harassment by decreasing chance of visual contact or other means of disturbance.	4
Wood	WdDeb	Modifying	Loss of wood structure is assumed to increase the overall effect of harassment on adult salmon.	3

Primary Level 2 Attribute	
Harass	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**1E-03**
3	*5.4E-03*
4	**1E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	HbPls	*RipFunc*	*Turb*	*WdDeb*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*-4.4E-05*	*4.4E-05*	*-4.4E-05*	*4.4E-05*				
2	**-4E-04**	**4E-04**	**-4E-04**	**4E-04**				
3	*-1.2E-03*	*1.2E-03*	*-1.2E-03*	*1.2E-03*				
4	**-3E-03**	**3E-03**	**-3E-03**	**3E-03**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Harass	0	1	1	1	2	3	4
HbPls	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
Turb	0	0	0	0	1	1	2
WdDeb	0	0	0	0	0	1	2
Sensitivity (S)	0	.0001	0	.0001	.0005	.0054	.0148
Relative Prod. (P=1-S)	1.0000	0.9999	1.0000	0.9999	0.9995	0.9946	0.9852

Level 3 Attribute: Harassment

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of harassment, poaching, or non-directed harvest (i.e., as can occur through hook and release) on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Harassment	Harass	Primary	The Level Two Harassment attribute assumes that proximity to human communities and road systems is an indicator of the extent that adult salmon will be disturbed, causing stress or mortality.	3
Habitat type - primary pools	HbPls	Modifying	Presence of pools is assumed to offset potential for harassment by providing refuge.	4
Riparian function	RipFunc	Modifying	Impairment of riparian function is assumed to increase the overall effect of harassment on adult salmon.	3
Turbidity	Turb	Modifying	Increased turbidiy is assumed to offset the potential for harassment by decreasing chance of visual contact or other means of disturbance.	4
Wood	WdDeb	Modifying	Loss of wood structure is assumed to increase the overall effect of harassment on adult salmon.	3

Primary Level 2 Attribute	
Harass	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**1E-03**
3	*5.4E-03*
4	**1E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	HbPls	*RipFunc*	*Turb*	*WdDeb*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*-4.4E-05*	*4.4E-05*	*-4.4E-05*	*4.4E-05*				
2	**-4E-04**	**4E-04**	**-4E-04**	**4E-04**				
3	*-1.2E-03*	*1.2E-03*	*-1.2E-03*	*1.2E-03*				
4	**-3E-03**	**3E-03**	**-3E-03**	**3E-03**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Harass	0	1	1	1	2	3	4
HbPls	0	0	1	1	1	2	3
RipFunc	0	0	0	1	1	2	3
Turb	0	0	0	0	1	1	2
WdDeb	0	0	0	0	0	1	2
Sensitivity (S)	0	.0001	0	.0001	.0005	.0054	.0148
Relative Prod. (P=1-S)	1.0000	0.9999	1.0000	0.9999	0.9995	0.9946	0.9852

Key Habitat

Level 3 Attribute: Key Habitat

Species: Chinook Life Stage: Spawning

Definition: The relative quantity of the primary habitat type(s) utilized by the focus species during a life stage; quantity is expressed as percent of wetted surface area of the stream channel. Environmental quality attributes characterize the quality of this habit for the focus species.

Rule: The quantity of Key Habitat in a stream reach is computed from reach channel length, channel width, and percent of Key Habitat within the reach. Percent Key Habitat is estimated from habitat type composition based on a weighted sum of six Level 2 Ecological Attributes (see table below) that quantify stream habitat types.

Level 2 Attribute	Abbrev.	Weight	Rationale	Level of Proof
Habitat type - backwater pools	HbBckPls	0	Chinook spawning does not occur in backwater pools.	1
Habitat type - beaver ponds	HbBvrPnds	0	Chinook spawning does not occur in beaver ponds.	1
Habitat type - large cobble/boulder riffles	HbLrgCbl	0	Substrate size is typically too large for chinook spawning in large cobble/boulder riffles.	2
Habitat type - primary pools	HbPls	0	Chinook spawning does not typically occur in pools (pool tailouts are included as a separate habitat type).	2
Habitat type - small cobble/gravel riffles	HbSmlCbl	0.6	Chinook spawn heavily on riffles with substrate sizes suitable for nest building, as occurs for this habitat type.	1
Habitat type - glides	HbGlide	0.4	Chinook spawn in swifter areas of glides, similar to pool-tailouts in characteristics.	1
Habitat type - pool tailouts	HbPlTails	0.8	Chinook spawning densities are typically greatest on pool-tailouts. (Note: rule may need to be adjusted due to weighting toward glides)	1

Examples:	Example 1			Example 2			Example 3		
Level 2 Attribute	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent
Habitat type - backwater pools	10	0.00	0.0	5	0.00	0.0	0	0.00	0.0
Habitat type - beaver ponds	10	0.00	0.0	0	0.00	0.0	0	0.00	0.0
Habitat type - large cobble/boulder riffles	5	0.00	0.0	20	0.00	0.0	50	0.00	0.0
Habitat type - primary pools	40	0.00	0.0	32	0.00	0.0	20	0.00	0.0
Habitat type - small cobble/gravel riffles	15	0.60	9.0	35	0.60	21.0	25	0.60	15.0
Habitat type - glides	10	0.40	4.0	4	0.40	1.6	2.5	0.40	1.0
Habitat type - pool tailouts	10	0.80	8.0	4	0.80	3.2	2.5	0.80	2.0
	100		21.0	100		25.8	100		18.0

Level 3 Attribute: Key Habitat

Species: Chinook Life Stage: Egg incubation

Definition: The relative quantity of the primary habitat type(s) utilized by the focus species during a life stage; quantity is expressed as percent of wetted surface area of the stream channel. Environmental quality attributes characterize the quality of this habit for the focus species.

Rule: The quantity of Key Habitat in a stream reach is computed from reach channel length, channel width, and percent of Key Habitat within the reach. Percent Key Habitat is estimated from habitat type composition based on a weighted sum of six Level 2 Ecological Attributes (see table below) that quantify stream habitat types.

Level 2 Attribute	Abbrev.	Weight	Rationale	Level of Proof
Habitat type - backwater pools	HbBckPls	0	Eggs placed by spawners; weighting same as for Spawning. Chinook spawning does not occur in backwater pools.	1
Habitat type - beaver ponds	HbBvrPnds	0	Eggs placed by spawners; weighting same as for Spawning. Chinook spawning does not occur in beaver ponds.	1
Habitat type - large cobble/boulder riffles	HbLrgCbl	0	Eggs placed by spawners; weighting same as for Spawning. Substrate size typically too large for chinook spawning in large cobble/boulder riffles.	2
Habitat type - primary pools	HbPls	0	Eggs placed by spawners; weighting same as for Spawning. Chinook spawning does not typically occur in pools.	2
Habitat type - small cobble/gravel riffles	HbSmlCbl	0.6	Eggs placed by spawners; weighting same as for Spawning. Chinook spawn heavily on riffles with substrate sizes suitable for nest building.	1
Habitat type - glides	HbGlide	0.4	Chinook spawn in swifter areas of glides, similar to pool-tailouts in characteristics.	1
Habitat type - pool tailouts	HbPlTails	0.8	Eggs placed by spawners; weighting same as for Spawning. Chinook spawning densities are typically greatest on pool-tailouts.	1

Examples:	Example 1			Example 2			Example 3		
Level 2 Attribute	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent
Habitat type - backwater pools	10	0.00	0.0	5	0.00	0.0	0	0.00	0.0
Habitat type - beaver ponds	10	0.00	0.0	0	0.00	0.0	0	0.00	0.0
Habitat type - large cobble/boulder riffles	5	0.00	0.0	20	0.00	0.0	50	0.00	0.0
Habitat type - primary pools	40	0.00	0.0	32	0.00	0.0	20	0.00	0.0
Habitat type - small cobble/gravel riffles	15	0.60	9.0	35	0.60	21.0	25	0.60	15.0
Habitat type - glides	10	0.40	4.0	4	0.40	1.6	2.5	0.40	1.0
Habitat type - pool tailouts	10	0.80	8.0	4	0.80	3.2	2.5	0.80	2.0
	100		21.0	100		25.8	100		18.0

Level 3 Attribute: Key Habitat

Species: Chinook Life Stage: Fry colonization

Definition: The relative quantity of the primary habitat type(s) utilized by the focus species during a life stage; quantity is expressed as percent of wetted surface area of the stream channel. Environmental quality attributes characterize the quality of this habit for the focus species.

Rule: The quantity of Key Habitat in a stream reach is computed from reach channel length, channel width, and percent of Key Habitat within the reach. Percent Key Habitat is estimated from habitat type composition based on a weighted sum of six Level 2 Ecological Attributes (see table below) that quantify stream habitat types.

Level 2 Attribute	Abbrev.	Weight	Rationale	Level of Proof
Habitat type - backwater pools	HbBckPls	0.75	Emergent fry require shallow, slow velocity areas of channel, often associated with backwater areas and stream margins.	3
Habitat type - beaver ponds	HbBvrPnds	0.1	Key habitat within beaver ponds is assumed to be limited primarily to margins due to strong association with shallow water areas.	3
Habitat type - large cobble/boulder riffles	HbLrgCbl	0.05	Key habitat within large cobble/boulder riffles is assumed to be limited primarily to margins and pockets of quiet water.	3
Habitat type - primary pools	HbPls	0.15	Key habitat within pools is assumed to be limited primarily to margins due to strong association with shallow water areas.	3
Habitat type - small cobble/gravel riffles	HbSmlCbl	0.05	Key habitat within small cobble/gravel riffles is assumed to be limited primarily to margins and areas of quiet water.	3
Habitat type - glides	HbGlide	0.2	Key habitat within glides is assumed to be limited primarily to margins and areas of quiet water.	3
Habitat type - pool tailouts	HbPlTails	0.05	Key habitat within pool-tailouts/glides is assumed to be limited primarily to margins and areas of quiet water.	3

Examples:	Example 1			Example 2			Example 3		
Level 2 Attribute	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent
Habitat type - backwater pools	10	0.75	7.5	5	0.75	3.8	0	0.75	0.0
Habitat type - beaver ponds	10	0.10	1.0	0	0.10	0.0	0	0.10	0.0
Habitat type - large cobble/boulder riffles	5	0.05	0.3	20	0.05	1.0	50	0.05	2.5
Habitat type - primary pools	40	0.15	6.0	32	0.15	4.8	20	0.15	3.0
Habitat type - small cobble/gravel riffles	15	0.05	0.8	35	0.05	1.8	25	0.05	1.3
Habitat type - glides	10	0.20	2.0	4	0.20	0.8	2.5	0.20	0.5
Habitat type - pool tailouts	10	0.05	0.5	4	0.05	0.2	2.5	0.05	0.1
	100		18.1	100		12.4	100		7.4

Level 3 Attribute: Key Habitat

Species: Chinook Life Stage: 0-age resident rearing

Definition: The relative quantity of the primary habitat type(s) utilized by the focus species during a life stage; quantity is expressed as percent of wetted surface area of the stream channel. Environmental quality attributes characterize the quality of this habit for the focus species.

Rule: The quantity of Key Habitat in a stream reach is computed from reach channel length, channel width, and percent of Key Habitat within the reach. Percent Key Habitat is estimated from habitat type composition based on a weighted sum of six Level 2 Ecological Attributes (see table below) that quantify stream habitat types.

Level 2 Attribute	Abbrev.	Weight	Rationale	Level of Proof
Habitat type - backwater pools	HbBckPls	0.75	0-age rearing chinook prefer relatively slow water habitat types, often relatively close to velociy shears, as occurs along portions of backwater pools.	2
Habitat type - beaver ponds	HbBvrPnds	0.3	0-age rearing chinook prefer relatively slow water habitat types as can occurs along some portions of in-channel beaver ponds.	2
Habitat type - large cobble/boulder riffles	HbLrgCbl	0.05	Rearing chinook prefer relatively slow water habitat types, often near velocity shears; little typically present in this habitat type.	2
Habitat type - primary pools	HbPls	0.9	0-age rearing chinook prefer relatively slow water habitat types, often relatively close to velociy shears, as occurs in primary channel pools.	2
Habitat type - small cobble/gravel riffles	HbSmlCbl	0	Rearing chinook prefer relatively slow water habitat types, often near velocity shears; little typically present in this habitat type.	2
Habitat type - glides	HbGlide	0.3	0-age rearing chinook prefer relatively slow water habitat types, often relatively close to velociy shears, as occurs along tailouts and glides.	2
Habitat type - pool tailouts	HbPlTails	0.3	0-age rearing chinook prefer relatively slow water habitat types, often relatively close to velociy shears, as occurs along tailouts and glides.	2

Examples:	Example 1			Example 2			Example 3		
Level 2 Attribute	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent
Habitat type - backwater pools	10	0.75	7.5	5	0.75	3.8	0	0.75	0.0
Habitat type - beaver ponds	10	0.30	3.0	0	0.30	0.0	0	0.30	0.0
Habitat type - large cobble/boulder riffles	5	0.05	0.3	20	0.05	1.0	50	0.05	2.5
Habitat type - primary pools	40	0.90	36.0	32	0.90	28.8	20	0.90	18.0
Habitat type - small cobble/gravel riffles	15	0.00	0.0	35	0.00	0.0	25	0.00	0.0
Habitat type - glides	10	0.30	3.0	4	0.30	1.2	2.5	0.30	0.8
Habitat type - pool tailouts	10	0.30	3.0	4	0.30	1.2	2.5	0.30	0.8
	100		52.8	100		36.0	100		22.1

Level 3 Attribute: Key Habitat

Species: Chinook Life Stage: 0-age transient rearing

Definition: The relative quantity of the primary habitat type(s) utilized by the focus species during a life stage; quantity is expressed as percent of wetted surface area of the stream channel. Environmental quality attributes characterize the quality of this habit for the focus species.

Rule: The quantity of Key Habitat in a stream reach is computed from reach channel length, channel width, and percent of Key Habitat within the reach. Percent Key Habitat is estimated from habitat type composition based on a weighted sum of six Level 2 Ecological Attributes (see table below) that quantify stream habitat types.

Level 2 Attribute	Abbrev.	Weight	Rationale	Level of Proof
Habitat type - backwater pools	HbBckPls	0.75	0-age rearing chinook prefer relatively slow water habitat types, often relatively close to velociy shears, as occurs along portions of backwater pools.	2
Habitat type - beaver ponds	HbBvrPnds	0.3	0-age rearing chinook prefer relatively slow water habitat types as can occurs along some portions of in-channel beaver ponds.	2
Habitat type - large cobble/boulder riffles	HbLrgCbl	0.05	Rearing chinook prefer relatively slow water habitat types, often near velocity shears; little typically present in this habitat type.	2
Habitat type - primary pools	HbPls	0.9	0-age rearing chinook prefer relatively slow water habitat types, often relatively close to velociy shears, as occurs in primary channel pools.	2
Habitat type - small cobble/gravel riffles	HbSmlCbl	0	Rearing chinook prefer relatively slow water habitat types, often near velocity shears; little typically present in this habitat type.	2
Habitat type - glides	HbGlide	0.3	0-age rearing chinook prefer relatively slow water habitat types, often relatively close to velociy shears, as occurs along tailouts and glides.	2
Habitat type - pool tailouts	HbPlTails	0.3	0-age rearing chinook prefer relatively slow water habitat types, often relatively close to velociy shears, as occurs along tailouts and glides.	2

Examples:	Example 1			Example 2			Example 3		
Level 2 Attribute	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent
Habitat type - backwater pools	10	0.75	7.5	5	0.75	3.8	0	0.75	0.0
Habitat type - beaver ponds	10	0.30	3.0	0	0.30	0.0	0	0.30	0.0
Habitat type - large cobble/boulder riffles	5	0.05	0.3	20	0.05	1.0	50	0.05	2.5
Habitat type - primary pools	40	0.90	36.0	32	0.90	28.8	20	0.90	18.0
Habitat type - small cobble/gravel riffles	15	0.00	0.0	35	0.00	0.0	25	0.00	0.0
Habitat type - glides	10	0.30	3.0	4	0.30	1.2	2.5	0.30	0.8
Habitat type - pool tailouts	10	0.30	3.0	4	0.30	1.2	2.5	0.30	0.8
	100		52.8	100		36.0	100		22.1

Level 3 Attribute: Key Habitat

Species: Chinook Life Stage: 0-age migrant

Definition: The relative quantity of the primary habitat type(s) utilized by the focus species during a life stage; quantity is expressed as percent of wetted surface area of the stream channel. Environmental quality attributes characterize the quality of this habit for the focus species.

Rule: The quantity of Key Habitat in a stream reach is computed from reach channel length, channel width, and percent of Key Habitat within the reach. Percent Key Habitat is estimated from habitat type composition based on a weighted sum of six Level 2 Ecological Attributes (see table below) that quantify stream habitat types.

Level 2 Attribute	Abbrev.	Weight	Rationale	Level of Proof
Habitat type - backwater pools	HbBckPls	1	Actively migrating 0-age chinook will utilize all habitat types encountered along the migration route.	4
Habitat type - beaver ponds	HbBvrPnds	1	Actively migrating 0-age chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - large cobble/boulder riffles	HbLrgCbl	1	Actively migrating 0-age chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - primary pools	HbPls	1	Actively migrating 0-age chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - small cobble/gravel riffles	HbSmlCbl	1	Actively migrating 0-age chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - glides	HbGlide	1	Actively migrating 0-age chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - pool tailouts	HbPlTails	1	Actively migrating 0-age chinook will utilize all habitat types encountered along the migration route.	2

Examples:	Example 1			Example 2			Example 3		
Level 2 Attribute	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent
Habitat type - backwater pools	10	1.00	10.0	5	1.00	5.0	0	1.00	0.0
Habitat type - beaver ponds	10	1.00	10.0	0	1.00	0.0	0	1.00	0.0
Habitat type - large cobble/boulder riffles	5	1.00	5.0	20	1.00	20.0	50	1.00	50.0
Habitat type - primary pools	40	1.00	40.0	32	1.00	32.0	20	1.00	20.0
Habitat type - small cobble/gravel riffles	15	1.00	15.0	35	1.00	35.0	25	1.00	25.0
Habitat type - glides	10	1.00	10.0	4	1.00	4.0	2.5	1.00	2.5
Habitat type - pool tailouts	10	1.00	10.0	4	1.00	4.0	2.5	1.00	2.5
	100		100.0	100		100.0	100		100.0

Level 3 Attribute: Key Habitat

Species: Chinook Life Stage: Inactive

Definition: The relative quantity of the primary habitat type(s) utilized by the focus species during a life stage; quantity is expressed as percent of wetted surface area of the stream channel. Environmental quality attributes characterize the quality of this habit for the focus species.

Rule: The quantity of Key Habitat in a stream reach is computed from reach channel length, channel width, and percent of Key Habitat within the reach. Percent Key Habitat is estimated from habitat type composition based on a weighted sum of six Level 2 Ecological Attributes (see table below) that quantify stream habitat types.

Level 2 Attribute	Abbrev.	Weight	Rationale	Level of Proof
Habitat type - backwater pools	HbBckPls	0.2	Juvenile chinook primarily prefer non-turbulent habitat types for overwintering, particularly deeper water types within the main channel.	2
Habitat type - beaver ponds	HbBvrPnds	0.2	Juvenile chinook primarily prefer non-turbulent habitat types for overwintering, particularly deeper water types within the main channel.	2
Habitat type - large cobble/boulder riffles	HbLrgCbl	0.15	Although juvenile chinook primarily prefer slow and deep habitat types for overwintering, slower portions of large cobble riffles also used.	2
Habitat type - primary pools	HbPls	0.9	Juvenile chinook primarily prefer non-turbulent habitat types for overwintering, particularly deeper water types within the main channel.	2
Habitat type - small cobble/gravel riffles	HbSmlCbl	0	Substrate size withing this habitat type is smaller than preferred by chinook for overwintering in turbulent habitat types.	2
Habitat type - glides	HbGlide	0	Substrate size, water depth, and velocities within this habitat type are typically outside the preferred ranges for overwintering chinook.	2
Habitat type - pool tailouts	HbPlTails	0	Substrate size, water depth, and velocities within this habitat type are typically outside the preferred ranges for overwintering chinook.	2

Examples:	Example 1			Example 2			Example 3		
Level 2 Attribute	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent
Habitat type - backwater pools	10	0.20	2.0	5	0.20	1.0	0	0.20	0.0
Habitat type - beaver ponds	10	0.20	2.0	0	0.20	0.0	0	0.20	0.0
Habitat type - large cobble/boulder riffles	5	0.15	0.8	20	0.15	3.0	50	0.15	7.5
Habitat type - primary pools	40	0.90	36.0	32	0.90	28.8	20	0.90	18.0
Habitat type - small cobble/gravel riffles	15	0.00	0.0	35	0.00	0.0	25	0.00	0.0
Habitat type - glides	10	0.00	0.0	4	0.00	0.0	2.5	0.00	0.0
Habitat type - pool tailouts	10	0.00	0.0	4	0.00	0.0	2.5	0.00	0.0
	100		40.8	100		32.8	100		25.5

Level 3 Attribute: Key Habitat

Species: Chinook Life Stage: 1-age resident rearing

Definition: The relative quantity of the primary habitat type(s) utilized by the focus species during a life stage; quantity is expressed as percent of wetted surface area of the stream channel. Environmental quality attributes characterize the quality of this habit for the focus species.

Rule: The quantity of Key Habitat in a stream reach is computed from reach channel length, channel width, and percent of Key Habitat within the reach. Percent Key Habitat is estimated from habitat type composition based on a weighted sum of six Level 2 Ecological Attributes (see table below) that quantify stream habitat types.

Level 2 Attribute	Abbrev.	Weight	Rationale	Level of Proof
Habitat type - backwater pools	HbBckPls	0.3	Juvenile rearing chinook prefer relatively slow water habitat types, relatively close to velociy shears, as occurs along portions of backwater pools.	2
Habitat type - beaver ponds	HbBvrPnds	0.5	Juvenile rearing chinook prefer relatively slow water habitat types as can occurs along some portions of in-channel beaver ponds.	2
Habitat type - large cobble/boulder riffles	HbLrgCbl	0.1	Rearing chinook prefer relatively slow water habitat types, often near velocity shears; little typically present in this habitat type.	2
Habitat type - primary pools	HbPls	0.9	Juvenile rearing chinook prefer relatively slow water habitat types, often relatively close to velociy shears, as occurs in primary channel pools.	2
Habitat type - small cobble/gravel riffles	HbSmlCbl	0	Rearing chinook prefer relatively slow water habitat types, often near velocity shears; little typically present in this habitat type.	2
Habitat type - glides	HbGlide	0.3	Juvenile rearing chinook prefer relatively slow water habitat types, often relatively close to velociy shears, as occurs along tailouts and glides.	2
Habitat type - pool tailouts	HbPlTails	0.3	Juvenile rearing chinook prefer relatively slow water habitat types, often relatively close to velociy shears, as occurs along tailouts and glides.	2

Examples:	Example 1			Example 2			Example 3		
Level 2 Attribute	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent
Habitat type - backwater pools	10	0.30	3.0	5	0.30	1.5	0	0.30	0.0
Habitat type - beaver ponds	10	0.50	5.0	0	0.50	0.0	0	0.50	0.0
Habitat type - large cobble/boulder riffles	5	0.10	0.5	20	0.10	2.0	50	0.10	5.0
Habitat type - primary pools	40	0.90	36.0	32	0.90	28.8	20	0.90	18.0
Habitat type - small cobble/gravel riffles	15	0.00	0.0	35	0.00	0.0	25	0.00	0.0
Habitat type - glides	10	0.30	3.0	4	0.30	1.2	2.5	0.30	0.8
Habitat type - pool tailouts	10	0.30	3.0	4	0.30	1.2	2.5	0.30	0.8
	100		50.5	100		34.7	100		24.6

Level 3 Attribute: Key Habitat

Species: Chinook Life Stage: 1-age migrant

Definition: The relative quantity of the primary habitat type(s) utilized by the focus species during a life stage; quantity is expressed as percent of wetted surface area of the stream channel. Environmental quality attributes characterize the quality of this habit for the focus species.

Rule: The quantity of Key Habitat in a stream reach is computed from reach channel length, channel width, and percent of Key Habitat within the reach. Percent Key Habitat is estimated from habitat type composition based on a weighted sum of six Level 2 Ecological Attributes (see table below) that quantify stream habitat types.

Level 2 Attribute	Abbrev.	Weight	Rationale	Level of Proof
Habitat type - backwater pools	HbBckPls	1	Actively migrating -age chinook will utilize all habitat types encountered along the migration route.	4
Habitat type - beaver ponds	HbBvrPnds	1	Actively migrating -age chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - large cobble/boulder riffles	HbLrgCbl	1	Actively migrating -age chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - primary pools	HbPls	1	Actively migrating -age chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - small cobble/gravel riffles	HbSmlCbl	1	Actively migrating -age chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - glides	HbGlide	1	Actively migrating -age chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - pool tailouts	HbPlTails	1	Actively migrating -age chinook will utilize all habitat types encountered along the migration route.	2

Examples:	Example 1			Example 2			Example 3		
Level 2 Attribute	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent
Habitat type - backwater pools	10	1.00	10.0	5	1.00	5.0	0	1.00	0.0
Habitat type - beaver ponds	10	1.00	10.0	0	1.00	0.0	0	1.00	0.0
Habitat type - large cobble/boulder riffles	5	1.00	5.0	20	1.00	20.0	50	1.00	50.0
Habitat type - primary pools	40	1.00	40.0	32	1.00	32.0	20	1.00	20.0
Habitat type - small cobble/gravel riffles	15	1.00	15.0	35	1.00	35.0	25	1.00	25.0
Habitat type - glides	10	1.00	10.0	4	1.00	4.0	2.5	1.00	2.5
Habitat type - pool tailouts	10	1.00	10.0	4	1.00	4.0	2.5	1.00	2.5
	100		100.0	100		100.0	100		100.0

Level 3 Attribute: Key Habitat

Species: Chinook Life Stage: Migrant prespawner

Definition: The relative quantity of the primary habitat type(s) utilized by the focus species during a life stage; quantity is expressed as percent of wetted surface area of the stream channel. Environmental quality attributes characterize the quality of this habit for the focus species.

Rule: The quantity of Key Habitat in a stream reach is computed from reach channel length, channel width, and percent of Key Habitat within the reach. Percent Key Habitat is estimated from habitat type composition based on a weighted sum of six Level 2 Ecological Attributes (see table below) that quantify stream habitat types.

Level 2 Attribute	Abbrev.	Weight	Rationale	Level of Proof
Habitat type - backwater pools	HbBckPls	1	Actively migrating adult chinook will utilize all habitat types encountered along the migration route.	4
Habitat type - beaver ponds	HbBvrPnds	1	Actively migrating adult chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - large cobble/boulder riffles	HbLrgCbl	1	Actively migrating adult chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - primary pools	HbPls	1	Actively migrating adult chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - small cobble/gravel riffles	HbSmlCbl	1	Actively migrating adult chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - glides	HbGlide	1	Actively migrating adult chinook will utilize all habitat types encountered along the migration route.	2
Habitat type - pool tailouts	HbPlTails	1	Actively migrating adult chinook will utilize all habitat types encountered along the migration route.	2

Examples:	Example 1			Example 2			Example 3		
Level 2 Attribute	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent
Habitat type - backwater pools	10	1.00	10.0	5	1.00	5.0	0	1.00	0.0
Habitat type - beaver ponds	10	1.00	10.0	0	1.00	0.0	0	1.00	0.0
Habitat type - large cobble/boulder riffles	5	1.00	5.0	20	1.00	20.0	50	1.00	50.0
Habitat type - primary pools	40	1.00	40.0	32	1.00	32.0	20	1.00	20.0
Habitat type - small cobble/gravel riffles	15	1.00	15.0	35	1.00	35.0	25	1.00	25.0
Habitat type - glides	10	1.00	10.0	4	1.00	4.0	2.5	1.00	2.5
Habitat type - pool tailouts	10	1.00	10.0	4	1.00	4.0	2.5	1.00	2.5
	100		100.0	100		100.0	100		100.0

Level 3 Attribute: Key Habitat

Species: Chinook Life Stage: Holding prespawner

Definition: The relative quantity of the primary habitat type(s) utilized by the focus species during a life stage; quantity is expressed as percent of wetted surface area of the stream channel. Environmental quality attributes characterize the quality of this habit for the focus species.

Rule: The quantity of Key Habitat in a stream reach is computed from reach channel length, channel width, and percent of Key Habitat within the reach. Percent Key Habitat is estimated from habitat type composition based on a weighted sum of six Level 2 Ecological Attributes (see table below) that quantify stream habitat types.

Level 2 Attribute	Abbrev.	Weight	Rationale	Level of Proof
Habitat type - backwater pools	HbBckPls	0	Holding adult chinook prefer relatively slow, deep water habitat types, typically associated with the main channel (or immediately adjacent to).	4
Habitat type - beaver ponds	HbBvrPnds	0	Holding adult chinook prefer relatively slow, deep water habitat types, typically associated with the main channel (or immediately adjacent to).	4
Habitat type - large cobble/boulder riffles	HbLrgCbl	0.05	Holding adult chinook prefer relatively slow, deep water habitat types, typically associated with the main channel (or immediately adjacent to).	2
Habitat type - primary pools	HbPls	0.8	Holding adult chinook prefer relatively slow, deep water habitat types, typically associated with the main channel (or immediately adjacent to).	1
Habitat type - small cobble/gravel riffles	HbSmlCbl	0	Holding adult chinook prefer relatively slow, deep water habitat types, typically associated with the main channel (or immediately adjacent to).	2
Habitat type - glides	HbGlide	0.1	Holding adult chinook prefer relatively slow, deep water habitat types, typically associated with the main channel (or immediately adjacent to).	2
Habitat type - pool tailouts	HbPlTails	0	Holding adult chinook prefer relatively slow, deep water habitat types, typically associated with the main channel (or immediately adjacent to).	2

Examples:	Example 1			Example 2			Example 3		
Level 2 Attribute	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent	Percent of reach	Weight	Weighted Percent
Habitat type - backwater pools	10	0.00	0.0	5	0.00	0.0	0	0.00	0.0
Habitat type - beaver ponds	10	0.00	0.0	0	0.00	0.0	0	0.00	0.0
Habitat type - large cobble/boulder riffles	5	0.05	0.3	20	0.05	1.0	50	0.05	2.5
Habitat type - primary pools	40	0.80	32.0	32	0.80	25.6	20	0.80	16.0
Habitat type - small cobble/gravel riffles	15	0.00	0.0	35	0.00	0.0	25	0.00	0.0
Habitat type - glides	10	0.10	1.0	4	0.10	0.4	2.5	0.10	0.3
Habitat type - pool tailouts	10	0.00	0.0	4	0.00	0.0	2.5	0.00	0.0
	100		33.3	100		27.0	100		18.8

Obstructions

Level 3 Attribute: Obstructions

Species: Chinook Life Stage: Spawning

Definition: The effect of physical structures impeding movement of the focus species on its relative survival or performance within a stream reach; structures include dams and waterfalls.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Note: At this time, major passage obstructions are entered into the database as distinct reaches. Other obstructions that impede or block migration such as culverts and diversions have not been addressed. The rule needs to be developed to handle the latter conditions; data on small obstructions will be available for subbasin planning.	

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Obstructions

Species: Chinook Life Stage: Egg incubation

Definition: The effect of physical structures impeding movement of the focus species on its relative survival or performance within a stream reach; structures include dams and waterfalls.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Note: At this time, major passage obstructions are entered into the database as distinct reaches. Other obstructions that impede or block migration such as culverts and diversions have not been addressed. The rule needs to be developed to handle the latter conditions; data on small obstructions will be available for subbasin planning.	

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Obstructions

Species: Chinook Life Stage: Fry colonization

Definition: The effect of physical structures impeding movement of the focus species on its relative survival or performance within a stream reach; structures include dams and waterfalls.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Note: At this time, major passage obstructions are entered into the database as distinct reaches. Other obstructions that impede or block migration such as culverts and diversions have not been addressed. The rule needs to be developed to handle the latter conditions; data on small obstructions will be available for subbasin planning.	

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Obstructions

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of physical structures impeding movement of the focus species on its relative survival or performance within a stream reach; structures include dams and waterfalls.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Note: At this time, major passage obstructions are entered into the database as distinct reaches. Other obstructions that impede or block migration such as culverts and diversions have not been addressed. The rule needs to be developed to handle the latter conditions; data on small obstructions will be available for subbasin planning.	

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Obstructions

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of physical structures impeding movement of the focus species on its relative survival or performance within a stream reach; structures include dams and waterfalls.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Note: At this time, major passage obstructions are entered into the database as distinct reaches. Other obstructions that impede or block migration such as culverts and diversions have not been addressed. The rule needs to be developed to handle the latter conditions; data on small obstructions will be available for subbasin planning.	

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Obstructions

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of physical structures impeding movement of the focus species on its relative survival or performance within a stream reach; structures include dams and waterfalls.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Note: At this time, major passage obstructions are entered into the database as distinct reaches. Other obstructions that impede or block migration such as culverts and diversions have not been addressed. The rule needs to be developed to handle the latter conditions; data on small obstructions will be available for subbasin planning.	

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Obstructions

Species: Chinook Life Stage: Inactive

Definition: The effect of physical structures impeding movement of the focus species on its relative survival or performance within a stream reach; structures include dams and waterfalls.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Note: At this time, major passage obstructions are entered into the database as distinct reaches. Other obstructions that impede or block migration such as culverts and diversions have not been addressed. The rule needs to be developed to handle the latter conditions; data on small obstructions will be available for subbasin planning.	

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Obstructions

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of physical structures impeding movement of the focus species on its relative survival or performance within a stream reach; structures include dams and waterfalls.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Note: At this time, major passage obstructions are entered into the database as distinct reaches. Other obstructions that impede or block migration such as culverts and diversions have not been addressed. The rule needs to be developed to handle the latter conditions; data on small obstructions will be available for subbasin planning.	

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Obstructions

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of physical structures impeding movement of the focus species on its relative survival or performance within a stream reach; structures include dams and waterfalls.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Note: At this time, major passage obstructions are entered into the database as distinct reaches. Other obstructions that impede or block migration such as culverts and diversions have not been addressed. The rule needs to be developed to handle the latter conditions; data on small obstructions will be available for subbasin planning.	

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Obstructions

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of physical structures impeding movement of the focus species on its relative survival or performance within a stream reach; structures include dams and waterfalls.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Note: At this time, major passage obstructions are entered into the database as distinct reaches. Other obstructions that impede or block migration such as culverts and diversions have not been addressed. The rule needs to be developed to handle the latter conditions; data on small obstructions will be available for subbasin planning.	

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Obstructions

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of physical structures impeding movement of the focus species on its relative survival or performance within a stream reach; structures include dams and waterfalls.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Note: At this time, major passage obstructions are entered into the database as distinct reaches. Other obstructions that impede or block migration such as culverts and diversions have not been addressed. The rule needs to be developed to handle the latter conditions; data on small obstructions will be available for subbasin planning.	

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Oxygen

Level 3 Attribute: Oxygen

Species: Chinook Life Stage: Spawning

Definition: The effect of the concentration of dissolved oxygen within the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Dissolved oxygen	DisOxy	Primary	Level dissolved oxygen directly transfers to effects by the Level oxygen attribute. Reduced levels of dissolved oxygen causes stress and mortality to all life stages of salmon.	1

Primary Level 2 Attribute	
DisOxy	
Rating	**Sensitivity***
0	**0E+00**
1	*2.2E-02*
2	**1E-01**
3	*4.3E-01*
4	**9E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
DisOxy	0	1	1	1	2	3	4
Sensitivity (S)	0	.0219	.0219	.0219	.1438	.433	.9466
Relative Prod. (P=1-S)	1.0000	0.9781	0.9781	0.9781	0.8562	0.5670	0.0534

Level 3 Attribute: Oxygen

Species: Chinook Life Stage: Egg incubation

Definition: The effect of the concentration of dissolved oxygen within the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Dissolved oxygen	DisOxy	Primary	Level dissolved oxygen directly transfers to effects by the Level oxygen attribute. Reduced levels of dissolved oxygen causes stress and mortality to all life stages of salmon.	1

Primary Level 2 Attribute	
DisOxy	
Rating	**Sensitivity***
0	**0E+00**
1	*2.2E-02*
2	**1E-01**
3	*4.3E-01*
4	**9E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
DisOxy	0	1	1	1	2	3	4
Sensitivity (S)	0	.0219	.0219	.0219	.1438	.433	.9466
Relative Prod. (P=1-S)	1.0000	0.9781	0.9781	0.9781	0.8562	0.5670	0.0534

Level 3 Attribute: Oxygen

Species: Chinook Life Stage: Fry colonization

Definition: The effect of the concentration of dissolved oxygen within the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Dissolved oxygen	DisOxy	Primary	Level dissolved oxygen directly transfers to effects by the Level oxygen attribute. Reduced levels of dissolved oxygen causes stress and mortality to all life stages of salmon.	1

Primary Level 2 Attribute	
DisOxy	
Rating	**Sensitivity***
0	**0E+00**
1	*2.2E-02*
2	**1E-01**
3	*4.3E-01*
4	**9E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
DisOxy	0	1	1	1	2	3	4
Sensitivity (S)	0	.0219	.0219	.0219	.1438	.433	.9466
Relative Prod. (P=1-S)	1.0000	0.9781	0.9781	0.9781	0.8562	0.5670	0.0534

Level 3 Attribute: Oxygen

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of the concentration of dissolved oxygen within the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Dissolved oxygen	DisOxy	Primary	Level dissolved oxygen directly transfers to effects by the Level oxygen attribute. Reduced levels of dissolved oxygen causes stress and mortality to all life stages of salmon.	1

Primary Level 2 Attribute	
DisOxy	
Rating	**Sensitivity***
0	**0E+00**
1	*2.2E-02*
2	**1E-01**
3	*4.3E-01*
4	**9E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
DisOxy	0	1	1	1	2	3	4
Sensitivity (S)	0	.0219	.0219	.0219	.1438	.433	.9466
Relative Prod. (P=1-S)	1.0000	0.9781	0.9781	0.9781	0.8562	0.5670	0.0534

Level 3 Attribute: Oxygen

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of the concentration of dissolved oxygen within the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Dissolved oxygen	DisOxy	Primary	Level dissolved oxygen directly transfers to effects by the Level oxygen attribute. Reduced levels of dissolved oxygen causes stress and mortality to all life stages of salmon.	1

Primary Level 2 Attribute	
DisOxy	
Rating	**Sensitivity***
0	**0E+00**
1	*2.2E-02*
2	**1E-01**
3	*4.3E-01*
4	**9E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
DisOxy	0	1	1	1	2	3	4
Sensitivity (S)	0	.0219	.0219	.0219	.1438	.433	.9466
Relative Prod. (P=1-S)	1.0000	0.9781	0.9781	0.9781	0.8562	0.5670	0.0534

Level 3 Attribute: Oxygen

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of the concentration of dissolved oxygen within the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Dissolved oxygen	DisOxy	Primary	Level dissolved oxygen directly transfers to effects by the Level oxygen attribute. Reduced levels of dissolved oxygen causes stress and mortality to all life stages of salmon.	1

Primary Level 2 Attribute	
DisOxy	
Rating	**Sensitivity***
0	**0E+00**
1	*2.2E-02*
2	**1E-01**
3	*4.3E-01*
4	**9E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
DisOxy	0	1	1	1	2	3	4
Sensitivity (S)	0	.0219	.0219	.0219	.1438	.433	.9466
Relative Prod. (P=1-S)	1.0000	0.9781	0.9781	0.9781	0.8562	0.5670	0.0534

Level 3 Attribute: Oxygen

Species: Chinook Life Stage: Inactive

Definition: The effect of the concentration of dissolved oxygen within the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Dissolved oxygen	DisOxy	Primary	Level dissolved oxygen directly transfers to effects by the Level oxygen attribute. Reduced levels of dissolved oxygen causes stress and mortality to all life stages of salmon.	1

Primary Level 2 Attribute	
DisOxy	
Rating	**Sensitivity***
0	**0E+00**
1	*2.2E-02*
2	**1E-01**
3	*4.3E-01*
4	**9E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
DisOxy	0	1	1	1	2	3	4
Sensitivity (S)	0	.0219	.0219	.0219	.1438	.433	.9466
Relative Prod. (P=1-S)	1.0000	0.9781	0.9781	0.9781	0.8562	0.5670	0.0534

Level 3 Attribute: Oxygen

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of the concentration of dissolved oxygen within the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Dissolved oxygen	DisOxy	Primary	Level dissolved oxygen directly transfers to effects by the Level oxygen attribute. Reduced levels of dissolved oxygen causes stress and mortality to all life stages of salmon.	1

Primary Level 2 Attribute	
DisOxy	
Rating	**Sensitivity***
0	**0E+00**
1	*2.2E-02*
2	**1E-01**
3	*4.3E-01*
4	**9E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
DisOxy	0	1	1	1	2	3	4
Sensitivity (S)	0	.0219	.0219	.0219	.1438	.433	.9466
Relative Prod. (P=1-S)	1.0000	0.9781	0.9781	0.9781	0.8562	0.5670	0.0534

Level 3 Attribute: Oxygen

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of the concentration of dissolved oxygen within the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Dissolved oxygen	DisOxy	Primary	Level dissolved oxygen directly transfers to effects by the Level oxygen attribute. Reduced levels of dissolved oxygen causes stress and mortality to all life stages of salmon.	1

Primary Level 2 Attribute	
DisOxy	
Rating	**Sensitivity***
0	**0E+00**
1	*2.2E-02*
2	**1E-01**
3	*4.3E-01*
4	**9E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
DisOxy	0	1	1	1	2	3	4
Sensitivity (S)	0	.0219	.0219	.0219	.1438	.433	.9466
Relative Prod. (P=1-S)	1.0000	0.9781	0.9781	0.9781	0.8562	0.5670	0.0534

Level 3 Attribute: Oxygen

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of the concentration of dissolved oxygen within the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Dissolved oxygen	DisOxy	Primary	Level dissolved oxygen directly transfers to effects by the Level oxygen attribute. Reduced levels of dissolved oxygen causes stress and mortality to all life stages of salmon.	1

Primary Level 2 Attribute	
DisOxy	
Rating	**Sensitivity***
0	**0E+00**
1	*2.2E-02*
2	**1E-01**
3	*4.3E-01*
4	**9E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
DisOxy	0	1	1	1	2	3	4
Sensitivity (S)	0	.0219	.0219	.0219	.1438	.433	.9466
Relative Prod. (P=1-S)	1.0000	0.9781	0.9781	0.9781	0.8562	0.5670	0.0534

Level 3 Attribute: Oxygen

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of the concentration of dissolved oxygen within the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Dissolved oxygen	DisOxy	Primary	Level dissolved oxygen directly transfers to effects by the Level oxygen attribute. Reduced levels of dissolved oxygen causes stress and mortality to all life stages of salmon.	1

Primary Level 2 Attribute	
DisOxy	
Rating	**Sensitivity***
0	**0E+00**
1	*2.2E-02*
2	**1E-01**
3	*4.3E-01*
4	**9E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
DisOxy	0	1	1	1	2	3	4
Sensitivity (S)	0	.0219	.0219	.0219	.1438	.433	.9466
Relative Prod. (P=1-S)	1.0000	0.9781	0.9781	0.9781	0.8562	0.5670	0.0534

Pathogens

Level 3 Attribute: Pathogens

Species: Chinook Life Stage: Spawning

Definition: The effect of pathogens within the stream reach on the relative survival or performance of the focus species. The life stage when infection occurs is when this effect is accounted for.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish pathogens	FshPath	Primary	Extent of hatchery fish releases, potential for viruses, or known incidences of whirling disease or C. shasta was assumed to the most significant indicator of pathogen effects to chinook.	3
Fish species introductions	Fspintro	Modifying	Introductions of exotics assumed to pose added risk to chinook populations, over that posed by the Primary attribute, because of potential for associated introductions of new pathogens.	4
Temperature - daily Max(by month)	TmpMonMx	Modifying	The effect of many pathogens, though not all (e.g., furunculosis), are known to increase with increased water temperature.	1
Nutrient enrichment	NutEnrch	Modifying	Conditions associated with nutrient enrichment are assumed to increase the potential for pathogen effects, though this would be pathogen-specific. Increased effect assumed small.	4

Primary Level 2 Attribute

FshPath	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.6E-03*
4	**4E-03**

Modifying Level 2 Attributes

Rating	Added Sensitivity*							
	Fspintro	*TmpMonMx*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*2.4E-05*	*2.4E-05*	*1.1E-05*					
2	**2E-04**	**2E-04**	**7E-05**					
3	*6.4E-04*	*6.4E-04*	*2.2E-04*					
4	**2E-03**	**2E-03**	**5E-04**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshPath	0	1	1	1	2	3	4
Fspintro	0	0	1	1	1	2	3
TmpMonMx	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.0002	.0006	.0026	.0116	.0365
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9994	0.9974	0.9884	0.9635

Level 3 Attribute: Pathogens

Species: Chinook Life Stage: Egg incubation

Definition: The effect of pathogens within the stream reach on the relative survival or performance of the focus species. The life stage when infection occurs is when this effect is accounted for.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish pathogens	FshPath	Primary	Extent of hatchery fish releases, potential for viruses, or known incidences of whirling disease or C. shasta was assumed to the most significant indicator of pathogen effects to chinook.	3
Fish species introductions	Fspintro	Modifying	Introductions of exotics assumed to pose added risk to chinook populations, over that posed by the Primary attribute, because of potential for associated introductions of new pathogens.	4
Temperature - daily Max(by month)	TmpMonMx	Modifying	The effect of many pathogens, though not all (e.g., furunculosis), are known to increase with increased water temperature.	1
Nutrient enrichment	NutEnrch	Modifying	Conditions associated with nutrient enrichment are assumed to increase the potential for pathogen effects, though this would be pathogen-specific. Increased effect assumed small.	4

Primary Level 2 Attribute

FshPath	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.6E-03*
4	**4E-03**

Modifying Level 2 Attributes

Rating	Added Sensitivity*							
	Fspintro	*TmpMonMx*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*2.4E-05*	*2.4E-05*	*1.1E-05*					
2	**2E-04**	**2E-04**	**7E-05**					
3	*6.4E-04*	*6.4E-04*	*2.2E-04*					
4	**2E-03**	**2E-03**	**5E-04**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshPath	0	1	1	1	2	3	4
Fspintro	0	0	1	1	1	2	3
TmpMonMx	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.0002	.0006	.0026	.0116	.0365
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9994	0.9974	0.9884	0.9635

Level 3 Attribute: Pathogens

Species: Chinook Life Stage: Fry colonization

Definition: The effect of pathogens within the stream reach on the relative survival or performance of the focus species. The life stage when infection occurs is when this effect is accounted for.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish pathogens	FshPath	Primary	Extent of hatchery fish releases, potential for viruses, or known incidences of whirling disease or C. shasta was assumed to the most significant indicator of pathogen effects to chinook.	3
Fish species introductions	Fspintro	Modifying	Introductions of exotics assumed to pose added risk to chinook populations, over that posed by the Primary attribute, because of potential for associated introductions of new pathogens.	4
Temperature - daily Max(by month)	TmpMonMx	Modifying	The effect of many pathogens, though not all (e.g., furunculosis), are known to increase with increased water temperature.	1
Nutrient enrichment	NutEnrch	Modifying	Conditions associated with nutrient enrichment are assumed to increase the potential for pathogen effects, though this would be pathogen-specific. Increased effect assumed small.	4

Primary Level 2 Attribute

FshPath	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.6E-03*
4	**4E-03**

Modifying Level 2 Attributes

Rating	Added Sensitivity*							
	Fspintro	*TmpMonMx*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*2.4E-05*	*2.4E-05*	*1.1E-05*					
2	**2E-04**	**2E-04**	**7E-05**					
3	*6.4E-04*	*6.4E-04*	*2.2E-04*					
4	**2E-03**	**2E-03**	**5E-04**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshPath	0	1	1	1	2	3	4
Fspintro	0	0	1	1	1	2	3
TmpMonMx	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.0002	.0006	.0026	.0116	.0365
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9994	0.9974	0.9884	0.9635

Level 3 Attribute: Pathogens

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of pathogens within the stream reach on the relative survival or performance of the focus species. The life stage when infection occurs is when this effect is accounted for.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish pathogens	FshPath	Primary	Extent of hatchery fish releases, potential for viruses, or known incidences of whirling disease or C. shasta was assumed to the most significant indicator of pathogen effects to chinook.	3
Fish species introductions	Fspintro	Modifying	Introductions of exotics assumed to pose added risk to chinook populations, over that posed by the Primary attribute, because of potential for associated introductions of new pathogens.	4
Temperature - daily Max(by month)	TmpMonMx	Modifying	The effect of many pathogens, though not all (e.g., furunculosis), are known to increase with increased water temperature.	1
Nutrient enrichment	NutEnrch	Modifying	Conditions associated with nutrient enrichment are assumed to increase the potential for pathogen effects, though this would be pathogen-specific. Increased effect assumed small.	4

Primary Level 2 Attribute

FshPath	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**3E-03**
3	*1.8E-02*
4	**7E-02**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	Fspintro	*TmpMonMx*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*7.3E-05*	*7.3E-05*	*4.4E-05*					
2	**6E-04**	**6E-04**	**3E-04**					
3	*1.9E-03*	*1.9E-03*	*8.8E-04*					
4	**5E-03**	**5E-03**	**2E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshPath	0	1	1	1	2	3	4
Fspintro	0	0	1	1	1	2	3
TmpMonMx	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	.0001	.0006	.0017	.0124	.0722	.2731
Relative Prod. (P=1-S)	1.0000	0.9999	0.9994	0.9983	0.9876	0.9278	0.7269

Level 3 Attribute: Pathogens

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of pathogens within the stream reach on the relative survival or performance of the focus species. The life stage when infection occurs is when this effect is accounted for.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish pathogens	FshPath	Primary	Extent of hatchery fish releases, potential for viruses, or known incidences of whirling disease or C. shasta was assumed to the most significant indicator of pathogen effects to chinook.	3
Fish species introductions	Fspintro	Modifying	Introductions of exotics assumed to pose added risk to chinook populations, over that posed by the Primary attribute, because of potential for associated introductions of new pathogens.	4
Temperature - daily Max(by month)	TmpMonMx	Modifying	The effect of many pathogens, though not all (e.g., furunculosis), are known to increase with increased water temperature.	1
Nutrient enrichment	NutEnrch	Modifying	Conditions associated with nutrient enrichment are assumed to increase the potential for pathogen effects, though this would be pathogen-specific. Increased effect assumed small.	4

Primary Level 2 Attribute

FshPath	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**3E-03**
3	*1.8E-02*
4	**7E-02**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	Fspintro	*TmpMonMx*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*7.3E-05*	*7.3E-05*	*4.4E-05*					
2	**6E-04**	**6E-04**	**3E-04**					
3	*1.9E-03*	*1.9E-03*	*8.8E-04*					
4	**5E-03**	**5E-03**	**2E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshPath	0	1	1	1	2	3	4
Fspintro	0	0	1	1	1	2	3
TmpMonMx	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	.0001	.0006	.0017	.0124	.0722	.2731
Relative Prod. (P=1-S)	1.0000	0.9999	0.9994	0.9983	0.9876	0.9278	0.7269

Level 3 Attribute: Pathogens

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of pathogens within the stream reach on the relative survival or performance of the focus species. The life stage when infection occurs is when this effect is accounted for.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish pathogens	FshPath	Primary	Extent of hatchery fish releases, potential for viruses, or known incidences of whirling disease or C. shasta was assumed to the most significant indicator of pathogen effects to chinook.	3
Fish species introductions	Fspintro	Modifying	Introductions of exotics assumed to pose added risk to chinook populations, over that posed by the Primary attribute, because of potential for associated introductions of new pathogens.	4
Temperature - daily Max(by month)	TmpMonMx	Modifying	The effect of many pathogens, though not all (e.g., furunculosis), are known to increase with increased water temperature.	1
Nutrient enrichment	NutEnrch	Modifying	Conditions associated with nutrient enrichment are assumed to increase the potential for pathogen effects, though this would be pathogen-specific. Increased effect assumed small.	4

Primary Level 2 Attribute

FshPath	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.6E-03*
4	**4E-03**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	Fspintro	*TmpMonMx*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*2.4E-05*	*2.4E-05*	*1.1E-05*					
2	**2E-04**	**2E-04**	**7E-05**					
3	*6.4E-04*	*6.4E-04*	*2.2E-04*					
4	**2E-03**	**2E-03**	**5E-04**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshPath	0	1	1	1	2	3	4
Fspintro	0	0	1	1	1	2	3
TmpMonMx	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.0002	.0006	.0026	.0116	.0365
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9994	0.9974	0.9884	0.9635

Level 3 Attribute: Pathogens

Species: Chinook Life Stage: Inactive

Definition: The effect of pathogens within the stream reach on the relative survival or performance of the focus species. The life stage when infection occurs is when this effect is accounted for.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish pathogens	FshPath	Primary	Extent of hatchery fish releases, potential for viruses, or known incidences of whirling disease or C. shasta was assumed to the most significant indicator of pathogen effects to chinook.	3
Fish species introductions	Fspintro	Modifying	Introductions of exotics assumed to pose added risk to chinook populations, over that posed by the Primary attribute, because of potential for associated introductions of new pathogens.	4
Temperature - daily Max(by month)	TmpMonMx	Modifying	The effect of many pathogens, though not all (e.g., furunculosis), are known to increase with increased water temperature.	1
Nutrient enrichment	NutEnrch	Modifying	Conditions associated with nutrient enrichment are assumed to increase the potential for pathogen effects, though this would be pathogen-specific. Increased effect assumed small.	4

Primary Level 2 Attribute

FshPath	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.6E-03*
4	**4E-03**

Modifying Level 2 Attributes

Rating	Added Sensitivity*							
	Fspintro	*TmpMonMx*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*2.4E-05*	*2.4E-05*	*1.1E-05*					
2	**2E-04**	**2E-04**	**7E-05**					
3	*6.4E-04*	*6.4E-04*	*2.2E-04*					
4	**2E-03**	**2E-03**	**5E-04**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshPath	0	1	1	1	2	3	4
Fspintro	0	0	1	1	1	2	3
TmpMonMx	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.0002	.0006	.0026	.0116	.0365
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9994	0.9974	0.9884	0.9635

Level 3 Attribute: Pathogens

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of pathogens within the stream reach on the relative survival or performance of the focus species. The life stage when infection occurs is when this effect is accounted for.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish pathogens	FshPath	Primary	Extent of hatchery fish releases, potential for viruses, or known incidences of whirling disease or C. shasta was assumed to the most significant indicator of pathogen effects to chinook.	3
Fish species introductions	Fspintro	Modifying	Introductions of exotics assumed to pose added risk to chinook populations, over that posed by the Primary attribute, because of potential for associated introductions of new pathogens.	4
Temperature - daily Max(by month)	TmpMonMx	Modifying	The effect of many pathogens, though not all (e.g., furunculosis), are known to increase with increased water temperature.	1
Nutrient enrichment	NutEnrch	Modifying	Conditions associated with nutrient enrichment are assumed to increase the potential for pathogen effects, though this would be pathogen-specific. Increased effect assumed small.	4

Primary Level 2 Attribute	
FshPath	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**3E-03**
3	*1.8E-02*
4	**7E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Fspintro	*TmpMonMx*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*7.3E-05*	*7.3E-05*	*4.4E-05*					
2	**6E-04**	**6E-04**	**3E-04**					
3	*1.9E-03*	*1.9E-03*	*8.8E-04*					
4	**5E-03**	**5E-03**	**2E-03**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshPath	0	1	1	1	2	3	4
Fspintro	0	0	1	1	1	2	3
TmpMonMx	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	.0001	.0006	.0017	.0124	.0722	.2731
Relative Prod. (P=1-S)	1.0000	0.9999	0.9994	0.9983	0.9876	0.9278	0.7269

Level 3 Attribute: Pathogens

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of pathogens within the stream reach on the relative survival or performance of the focus species. The life stage when infection occurs is when this effect is accounted for.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish pathogens	FshPath	Primary	Extent of hatchery fish releases, potential for viruses, or known incidences of whirling disease or C. shasta was assumed to the most significant indicator of pathogen effects to chinook.	3
Fish species introductions	Fspintro	Modifying	Introductions of exotics assumed to pose added risk to chinook populations, over that posed by the Primary attribute, because of potential for associated introductions of new pathogens.	4
Temperature - daily Max(by month)	TmpMonMx	Modifying	The effect of many pathogens, though not all (e.g., furunculosis), are known to increase with increased water temperature.	1
Nutrient enrichment	NutEnrch	Modifying	Conditions associated with nutrient enrichment are assumed to increase the potential for pathogen effects, though this would be pathogen-specific. Increased effect assumed small.	4

Primary Level 2 Attribute	
FshPath	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.6E-03*
4	**4E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Fspintro	*TmpMonMx*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*2.4E-05*	*2.4E-05*	*1.1E-05*					
2	**2E-04**	**2E-04**	**7E-05**					
3	*6.4E-04*	*6.4E-04*	*2.2E-04*					
4	**2E-03**	**2E-03**	**5E-04**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshPath	0	1	1	1	2	3	4
Fspintro	0	0	1	1	1	2	3
TmpMonMx	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.0002	.0006	.0026	.0116	.0365
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9994	0.9974	0.9884	0.9635

Level 3 Attribute: Pathogens

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of pathogens within the stream reach on the relative survival or performance of the focus species. The life stage when infection occurs is when this effect is accounted for.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish pathogens	FshPath	Primary	Extent of hatchery fish releases, potential for viruses, or known incidences of whirling disease or C. shasta was assumed to the most significant indicator of pathogen effects to chinook.	3
Fish species introductions	Fspintro	Modifying	Introductions of exotics assumed to pose added risk to chinook populations, over that posed by the Primary attribute, because of potential for associated introductions of new pathogens.	4
Temperature - daily Max(by month)	TmpMonMx	Modifying	The effect of many pathogens, though not all (e.g., furunculosis), are known to increase with increased water temperature.	1
Nutrient enrichment	NutEnrch	Modifying	Conditions associated with nutrient enrichment are assumed to increase the potential for pathogen effects, though this would be pathogen-specific. Increased effect assumed small.	4

Primary Level 2 Attribute

FshPath	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.6E-03*
4	**4E-03**

Modifying Level 2 Attributes

Rating	Added Sensitivity*							
	Fspintro	*TmpMonMx*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*2.4E-05*	*2.4E-05*	*1.1E-05*					
2	**2E-04**	**2E-04**	**7E-05**					
3	*6.4E-04*	*6.4E-04*	*2.2E-04*					
4	**2E-03**	**2E-03**	**5E-04**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshPath	0	1	1	1	2	3	4
Fspintro	0	0	1	1	1	2	3
TmpMonMx	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.0002	.0006	.0026	.0116	.0365
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9994	0.9974	0.9884	0.9635

Level 3 Attribute: Pathogens

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of pathogens within the stream reach on the relative survival or performance of the focus species. The life stage when infection occurs is when this effect is accounted for.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fish pathogens	FshPath	Primary	Extent of hatchery fish releases, potential for viruses, or known incidences of whirling disease or C. shasta was assumed to the most significant indicator of pathogen effects to chinook.	3
Fish species introductions	Fspintro	Modifying	Introductions of exotics assumed to pose added risk to chinook populations, over that posed by the Primary attribute, because of potential for associated introductions of new pathogens.	4
Temperature - daily Max(by month)	TmpMonMx	Modifying	The effect of many pathogens, though not all (e.g., furunculosis), are known to increase with increased water temperature.	1
Nutrient enrichment	NutEnrch	Modifying	Conditions associated with nutrient enrichment are assumed to increase the potential for pathogen effects, though this would be pathogen-specific. Increased effect assumed small.	4

Primary Level 2 Attribute

FshPath	
Rating	**Sensitivity***
0	**0E+00**
1	*4.4E-05*
2	**4E-04**
3	*1.6E-03*
4	**4E-03**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	Fspintro	*TmpMonMx*	*NutEnrch*					
0	**0E+00**	**0E+00**	**0E+00**					
1	*2.4E-05*	*2.4E-05*	*1.1E-05*					
2	**2E-04**	**2E-04**	**7E-05**					
3	*6.4E-04*	*6.4E-04*	*2.2E-04*					
4	**2E-03**	**2E-03**	**5E-04**					

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FshPath	0	1	1	1	2	3	4
Fspintro	0	0	1	1	1	2	3
TmpMonMx	0	0	0	1	1	2	3
NutEnrch	0	0	0	0	1	1	2
Sensitivity (S)	0	0	.0002	.0006	.0026	.0116	.0365
Relative Prod. (P=1-S)	1.0000	1.0000	0.9998	0.9994	0.9974	0.9884	0.9635

Predation

Level 3 Attribute: Predation

Species: Chinook Life Stage: Spawning

Definition: The effect of the relative abundance of predators species on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Predation risk	PredRisk	Primary	Predation risk, indexed by presence of top-level carivores or concentration of other fish-eating species, is assumed to be an indicator of effect on life stage (without influence of cover habitat).	3

Primary Level 2 Attribute	
PredRisk	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**9E-03**
3	*7.9E-02*
4	**4E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
PredRisk	0	1	1	1	2	3	4
Sensitivity (S)	0	.0002	.0002	.0002	.0088	.0794	.3793
Relative Prod. (P=1-S)	1.0000	0.9998	0.9998	0.9998	0.9912	0.9206	0.6207

Level 3 Attribute: Predation

Species: Chinook Life Stage: Egg incubation

Definition: The effect of the relative abundance of predators species on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Predation risk, apart from the natural level that occurs associated with macroinvertebrates and some fish species like sculpins, is assumed to not be an issue. (Note: benchmark survivals allow for some amount of natural background level predation.)	

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Predation

Species: Chinook Life Stage: Fry colonization

Definition: The effect of the relative abundance of predators species on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Predation risk	PredRisk	Primary	Predation risk, indexed by presence of top-level carivores or concentration of other fish-eating species, is assumed to be an indicator of effect on life stage (without influence of cover habitat).	3
Fish community richness	FshComRch	Modifying	Presence of exotics is assumed to be an indicator of the potential risk added by exotic fish species that prey juvenile salmon.	4
Fish species introductions	Fspintro	Modifying	Number of fish species present is assumed to be an indicator of the potential for predation by fish species. Greater community richness in assumed to increase effect of Predation Risk.	4
Temperature - daily Max(by month)	TmpMonMx	Modifying	Predation rate on juvenile salmon by some piscivores increases as water temperature increases. Overall effect of predation therefore was assumed to increase as temperature increases.	1
Hatchery fish outplants	HatFOutp	Modifying	Hatchery salmonids can prey on naturally produced juvenile salmonids. Potential for predation therefore was assumed to be greater at higher levels of hatchery releases.	4

Primary Level 2 Attribute

PredRisk

Rating	Sensitivity*
0	**0E+00**
1	*7.3E-05*
2	**1E-03**
3	*4.7E-03*
4	**1E-02**

Modifying Level 2 Attributes

Rating	Added Sensitivity*							
	FshComRch	*Fspintro*	*TmpMonMx*	*HatFOutp*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*5.7E-05*	*5.7E-05*	*5.7E-05*	*4.4E-05*				
2	**5E-04**	**5E-04**	**5E-04**	**3E-04**				
3	*2.1E-03*	*2.1E-03*	*2.1E-03*	*8.8E-04*				
4	**5E-03**	**5E-03**	**5E-03**	**2E-03**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
PredRisk	0	1	1	1	2	3	4
FshComRch	0	0	1	1	1	2	3
Fspintro	0	0	0	1	1	2	3
TmpMonMx	0	0	0	0	1	1	2
HatFOutp	0	0	0	0	0	1	2
Sensitivity (S)	0	.0001	.0004	.0012	.0071	.0446	.1759
Relative Prod. (P=1-S)	1.0000	0.9999	0.9996	0.9988	0.9929	0.9554	0.8241

Level 3 Attribute: Predation

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of the relative abundance of predators species on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Predation risk	PredRisk	Primary	Predation risk, indexed by presence of top-level carivores or concentration of other fish-eating species, is assumed to be an indicator of effect on life stage (without influence of cover habitat).	3
Fish community richness	FshComRch	Modifying	Presence of exotics is assumed to be an indicator of the potential risk added by exotic fish species that prey juvenile salmon.	4
Fish species introductions	Fspintro	Modifying	Predation rate on juvenile salmon by some piscivores increases as water temperature increases. Overall effect of predation therefore was assumed to increase as temperature increases.	1
Temperature - daily Max(by month)	TmpMonMx	Modifying	Number of fish species present is assumed to be an indicator of the potential for predation by fish species. Greater community richness in assumed to increase effect of Predation Risk.	4
Hatchery fish outplants	HatFOutp	Modifying	Hatchery salmonids can prey on naturally produced juvenile salmonids. Potential for predation therefore was assumed to be greater at higher levels of hatchery releases.	4

Primary Level 2 Attribute

PredRisk	
Rating	**Sensitivity***
0	**0E+00**
1	*7.3E-05*
2	**1E-03**
3	*4.7E-03*
4	**1E-02**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	FshComRch	*Fspintro*	*TmpMonMx*	*HatFOutp*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*5.7E-05*	*5.7E-05*	*5.7E-05*	*4.4E-05*				
2	**5E-04**	**5E-04**	**5E-04**	**3E-04**				
3	*2.1E-03*	*2.1E-03*	*2.1E-03*	*8.8E-04*				
4	**5E-03**	**5E-03**	**5E-03**	**2E-03**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
PredRisk	0	1	1	1	2	3	4
FshComRch	0	0	1	1	1	2	3
Fspintro	0	0	0	1	1	2	3
TmpMonMx	0	0	0	0	1	1	2
HatFOutp	0	0	0	0	0	1	2
Sensitivity (S)	0	.0001	.0004	.0012	.0071	.0446	.1759
Relative Prod. (P=1-S)	1.0000	0.9999	0.9996	0.9988	0.9929	0.9554	0.8241

Level 3 Attribute: Predation

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of the relative abundance of predators species on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Predation risk	PredRisk	Primary	Predation risk, indexed by presence of top-level carivores or concentration of other fish-eating species, is assumed to be an indicator of effect on life stage (without influence of cover habitat).	3
Fish community richness	FshComRch	Modifying	Number of fish species present is assumed to be an indicator of the potential for predation by fish species. Greater community richness in assumed to increase effect of Predation Risk.	4
Fish species introductions	Fspintro	Modifying	Presence of exotics is assumed to be an indicator of the potential risk added by exotic fish species that prey juvenile salmon.	4
Temperature - daily Max(by month)	TmpMonMx	Modifying	Predation rate on juvenile salmon by some piscivores increases as water temperature increases. Overall effect of predation therefore was assumed to increase as temperature increases.	1
Hatchery fish outplants	HatFOutp	Modifying	Hatchery salmonids can prey on naturally produced juvenile salmonids. Potential for predation therefore was assumed to be greater at higher levels of hatchery releases.	4

Primary Level 2 Attribute

PredRisk	
Rating	**Sensitivity***
0	**0E+00**
1	*7.3E-05*
2	**1E-03**
3	*4.7E-03*
4	**1E-02**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	FshComRch	*Fspintro*	*TmpMonMx*	*HatFOutp*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*5.7E-05*	*5.7E-05*	*5.7E-05*	*4.4E-05*				
2	**5E-04**	**5E-04**	**5E-04**	**3E-04**				
3	*2.1E-03*	*2.1E-03*	*2.1E-03*	*8.8E-04*				
4	**5E-03**	**5E-03**	**5E-03**	**2E-03**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
PredRisk	0	1	1	1	2	3	4
FshComRch	0	0	1	1	1	2	3
Fspintro	0	0	0	1	1	2	3
TmpMonMx	0	0	0	0	1	1	2
HatFOutp	0	0	0	0	0	1	2
Sensitivity (S)	0	.0001	.0004	.0012	.0071	.0446	.1759
Relative Prod. (P=1-S)	1.0000	0.9999	0.9996	0.9988	0.9929	0.9554	0.8241

Level 3 Attribute: Predation

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of the relative abundance of predators species on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Predation risk	PredRisk	Primary	Predation risk, indexed by presence of top-level carivores or concentration of other fish-eating species, is assumed to be an indicator of effect on life stage (without influence of cover habitat).	3
Fish community richness	FshComRch	Modifying	Number of fish species present is assumed to be an indicator of the potential for predation by fish species. Greater community richness in assumed to increase effect of Predation Risk.	4
Fish species introductions	Fspintro	Modifying	Predation rate on juvenile salmon by some piscivores increases as water temperature increases. Overall effect of predation therefore was assumed to increase as temperature increases.	1
Temperature - daily Max(by month)	TmpMonMx	Modifying	Presence of exotics is assumed to be an indicator of the potential risk added by exotic fish species that prey juvenile salmon.	4
Hatchery fish outplants	HatFOutp	Modifying	Hatchery salmonids can prey on naturally produced juvenile salmonids. Potential for predation therefore was assumed to be greater at higher levels of hatchery releases.	4

Primary Level 2 Attribute

PredRisk	
Rating	**Sensitivity***
0	**0E+00**
1	*7.3E-05*
2	**1E-03**
3	*4.7E-03*
4	**1E-02**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	FshComRch	*Fspintro*	*TmpMonMx*	*HatFOutp*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*5.7E-05*	*5.7E-05*	*5.7E-05*	*4.4E-05*				
2	**5E-04**	**5E-04**	**5E-04**	**3E-04**				
3	*2.1E-03*	*2.1E-03*	*2.1E-03*	*8.8E-04*				
4	**5E-03**	**5E-03**	**5E-03**	**2E-03**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
PredRisk	0	1	1	1	2	3	4
FshComRch	0	0	1	1	1	2	3
Fspintro	0	0	0	1	1	2	3
TmpMonMx	0	0	0	0	1	1	2
HatFOutp	0	0	0	0	0	1	2
Sensitivity (S)	0	.0001	.0004	.0012	.0071	.0446	.1759
Relative Prod. (P=1-S)	1.0000	0.9999	0.9996	0.9988	0.9929	0.9554	0.8241

Level 3 Attribute: Predation

Species: Chinook Life Stage: Inactive

Definition: The effect of the relative abundance of predators species on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Predation risk	PredRisk	Primary	Predation risk, indexed by presence of top-level carivores or concentration of other fish-eating species, is assumed to be an indicator of effect on life stage (without influence of cover habitat).	3
Fish community richness	FshComRch	Modifying	Predation rate on juvenile salmon by many piscivores decreases as water temperature decreases. Overall effect of predation therefore was assumed to decrease with dropping temperature in winter.	2
Fish species introductions	Fspintro	Modifying	Presence of exotics is assumed to be an indicator of the potential risk added by exotic fish species that prey juvenile salmon.	4
Temperature - daily Min(by month)	TmpMonMn	Modifying	Number of fish species present is assumed to be an indicator of the potential for predation by fish species. Greater community richness in assumed to increase effect of Predation Risk.	4
Hatchery fish outplants	HatFOutp	Modifying	Hatchery salmonids can prey on naturally produced juvenile salmonids. Potential for predation therefore was assumed to be greater at higher levels of hatchery releases.	4

Primary Level 2 Attribute

PredRisk	
Rating	**Sensitivity***
0	**0E+00**
1	*7.3E-05*
2	**1E-03**
3	*4.7E-03*
4	**1E-02**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	FshComRch	*Fspintro*	*TmpMonMn*	*HatFOutp*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*5.7E-05*	*5.7E-05*	*-1.3E-04*	*4.4E-05*				
2	**5E-04**	**5E-04**	**-9E-04**	**3E-04**				
3	*2.1E-03*	*2.1E-03*	*-2.6E-03*	*8.8E-04*				
4	**5E-03**	**5E-03**	**-6E-03**	**2E-03**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
PredRisk	0	1	1	1	2	3	4
FshComRch	0	0	1	1	1	2	3
Fspintro	0	0	0	1	1	2	3
TmpMonMn	0	0	0	0	1	1	2
HatFOutp	0	0	0	0	0	1	2
Sensitivity (S)	0	.0001	.0004	.0012	.0017	.024	.0771
Relative Prod. (P=1-S)	1.0000	0.9999	0.9996	0.9988	0.9983	0.9760	0.9229

Level 3 Attribute: Predation

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of the relative abundance of predators species on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Predation risk	PredRisk	Primary	Predation risk, indexed by presence of top-level carivores or concentration of other fish-eating species, is assumed to be an indicator of effect on life stage (without influence of cover habitat).	3
Fish community richness	FshComRch	Modifying	Presence of exotics is assumed to be an indicator of the potential risk added by exotic fish species that prey juvenile salmon.	4
Fish species introductions	Fspintro	Modifying	Predation rate on juvenile salmon by some piscivores increases as water temperature increases. Overall effect of predation therefore was assumed to increase as temperature increases.	1
Temperature - daily Max(by month)	TmpMonMx	Modifying	Number of fish species present is assumed to be an indicator of the potential for predation by fish species. Greater community richness in assumed to increase effect of Predation Risk.	4
Hatchery fish outplants	HatFOutp	Modifying	Hatchery salmonids can prey on naturally produced juvenile salmonids. Potential for predation therefore was assumed to be greater at higher levels of hatchery releases.	4

Primary Level 2 Attribute

PredRisk	
Rating	**Sensitivity***
0	**0E+00**
1	*7.3E-05*
2	**1E-03**
3	*4.7E-03*
4	**1E-02**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	FshComRch	*Fspintro*	*TmpMonMx*	*HatFOutp*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*5.7E-05*	*5.7E-05*	*5.7E-05*	*4.4E-05*				
2	**5E-04**	**5E-04**	**5E-04**	**3E-04**				
3	*2.1E-03*	*2.1E-03*	*2.1E-03*	*8.8E-04*				
4	**5E-03**	**5E-03**	**5E-03**	**2E-03**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
PredRisk	0	1	1	1	2	3	4
FshComRch	0	0	1	1	1	2	3
Fspintro	0	0	0	1	1	2	3
TmpMonMx	0	0	0	0	1	1	2
HatFOutp	0	0	0	0	0	1	2
Sensitivity (S)	0	.0001	.0004	.0012	.0071	.0446	.1759
Relative Prod. (P=1-S)	1.0000	0.9999	0.9996	0.9988	0.9929	0.9554	0.8241

Level 3 Attribute: Predation

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of the relative abundance of predators species on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Predation risk	PredRisk	Primary	Predation risk, indexed by presence of top-level carivores or concentration of other fish-eating species, is assumed to be an indicator of effect on life stage (without influence of cover habitat).	3
Fish community richness	FshComRch	Modifying	Predation rate on juvenile salmon by some piscivores increases as water temperature increases. Overall effect of predation therefore was assumed to increase as temperature increases.	1
Fish species introductions	Fspintro	Modifying	Presence of exotics is assumed to be an indicator of the potential risk added by exotic fish species that prey juvenile salmon.	4
Temperature - daily Max(by month)	TmpMonMx	Modifying	Number of fish species present is assumed to be an indicator of the potential for predation by fish species. Greater community richness in assumed to increase effect of Predation Risk.	4
Hatchery fish outplants	HatFOutp	Modifying	Hatchery salmonids can prey on naturally produced juvenile salmonids. Potential for predation therefore was assumed to be greater at higher levels of hatchery releases.	4

Primary Level 2 Attribute	
PredRisk	
Rating	**Sensitivity***
0	**0E+00**
1	*7.3E-05*
2	**1E-03**
3	*4.7E-03*
4	**1E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	FshComRch	*Fspintro*	*TmpMonMx*	*HatFOutp*				
0	**0E+00**	**0E+00**	**0E+00**	**0E+00**				
1	*5.7E-05*	*5.7E-05*	*5.7E-05*	*4.4E-05*				
2	**5E-04**	**5E-04**	**5E-04**	**3E-04**				
3	*2.1E-03*	*2.1E-03*	*2.1E-03*	*8.8E-04*				
4	**5E-03**	**5E-03**	**5E-03**	**2E-03**				

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
PredRisk	0	1	1	1	2	3	4
FshComRch	0	0	1	1	1	2	3
Fspintro	0	0	0	1	1	2	3
TmpMonMx	0	0	0	0	1	1	2
HatFOutp	0	0	0	0	0	1	2
Sensitivity (S)	0	.0001	.0004	.0012	.0071	.0446	.1759
Relative Prod. (P=1-S)	1.0000	0.9999	0.9996	0.9988	0.9929	0.9554	0.8241

Level 3 Attribute: Predation

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of the relative abundance of predators species on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Predation risk	PredRisk	Primary	Predation risk, indexed by presence of top-level carivores or concentration of other fish-eating species, is assumed to be an indicator of effect on life stage (without influence of cover habitat).	3

Primary Level 2 Attribute	
PredRisk	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**9E-03**
3	*7.9E-02*
4	**4E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
PredRisk	0	1	1	1	2	3	4
Sensitivity (S)	0	.0002	.0002	.0002	.0088	.0794	.3793
Relative Prod. (P=1-S)	1.0000	0.9998	0.9998	0.9998	0.9912	0.9206	0.6207

Level 3 Attribute: Predation

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of the relative abundance of predators species on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Predation risk	PredRisk	Primary	Predation risk, indexed by presence of top-level carivores or concentration of other fish-eating species, is assumed to be an indicator of effect on life stage (without influence of cover habitat).	3

Primary Level 2 Attribute	
PredRisk	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**9E-03**
3	*7.9E-02*
4	**4E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
PredRisk	0	1	1	1	2	3	4
Sensitivity (S)	0	.0002	.0002	.0002	.0088	.0794	.3793
Relative Prod. (P=1-S)	1.0000	0.9998	0.9998	0.9998	0.9912	0.9206	0.6207

Sediment Load

Level 3 Attribute: Sediment load

Species: Chinook Life Stage: Spawning

Definition: The effect of the amount of fine sediment present in, or passing through, the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Turbidity	Turb	Primary	High turbidity can cause significant stress and mortality to adult salmon by impairing respiration. Spawning success is likely reduced at high concentrations due to stress or visual impairment.	1
Temperature - daily Max(by month)	TmpMonMx	Modifying	Tolerance to turbidity is decreased as water temperatures increase above preferred temperatures and can increase effect of sediment.	1

Primary Level 2 Attribute	
Turb	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**3E-02**
3	*6.4E-01*
4	**6E+00**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpMonMx							
0	**0E+00**							
1	*4.4E-05*							
2	**4E-04**							
3	*1.6E-03*							
4	**4E-03**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Turb	0	1	1	1	2	3	4
TmpMonMx	0	0	1	1	1	2	3
Sensitivity (S)	0	.0001	.0005	.0005	.0334	.7603	1
Relative Prod. (P=1-S)	1.0000	0.9999	0.9995	0.9995	0.9666	0.2397	-5.9769

Level 3 Attribute: Sediment load

Species: Chinook Life Stage: Egg incubation

Definition: The effect of the amount of fine sediment present in, or passing through, the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Fine sediment	FnSedi	Primary	Moderate to high concentrations of intragravel fine sediment can cause significant stress and mortality to incubating eggs and alevins by impairing respiration.	1

Primary Level 2 Attribute	
FnSedi	
Rating	**Sensitivity***
0	**0E+00**
1	*-1.1E+01*
2	**3.7E+01**
3	*6.5E+01*
4	**8.5E+01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft) and Hydrologic Regime Natural class 2 (rain-on-snow transitional); effect is less in channels fed mainly by groundwater due to action of upwelling.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
FnSedi	0	1	1	1	2	3	4
Sensitivity (S)	0	0	0	0	.3695	.65	.849
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	0.6305	0.3500	0.1510

Level 3 Attribute: Sediment load

Species: Chinook Life Stage: Fry colonization

Definition: The effect of the amount of fine sediment present in, or passing through, the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Turbidity	Turb	Primary	High turbidity can cause significant stress and mortality to salmonid fry. Feeding efficiency of newly emerged fry can be particularly affected at moderate to elevated concentrations.	1
Embeddedness	Emb	Modifying	Embeddedness of the substrate surface can reduce interstitial spacing between cobbles, diminishing the effectiveness of the substrate as hiding or refuge cover for newly emerged fry.	2

Primary Level 2 Attribute	
Turb	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**5E-02**
3	*1.2E+00*
4	**1E+01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Emb							
0	**0E+00**							
1	*1.1E-04*							
2	**3E-03**							
3	*2.4E-02*							
4	**1E-01**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Turb	0	1	1	1	2	3	4
Emb	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.001	.001	.063	1	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9990	0.9990	0.9370	-0.5690	-13.7355

Level 3 Attribute: Sediment load

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of the amount of fine sediment present in, or passing through, the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Turbidity	Turb	Primary	High turbidity can cause significant stress and mortality to juvenile salmonids due to impairment of respiration and feeding efficiency.	1
Temperature - daily Max(by month)	TmpMonMx	Modifying	Tolerance to turbidity is decreased as water temperatures increase above preferred temperatures and can increase effect of sediment.	1

Primary Level 2 Attribute	
Turb	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**3E-02**
3	*6.4E-01*
4	**6E+00**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpMonMx							
0	**0E+00**							
1	*4.4E-05*							
2	**4E-04**							
3	*1.6E-03*							
4	**4E-03**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Turb	0	1	1	1	2	3	4
TmpMonMx	0	0	1	1	1	2	3
Sensitivity (S)	0	.0001	.0005	.0005	.0334	.7603	1
Relative Prod. (P=1-S)	1.0000	0.9999	0.9995	0.9995	0.9666	0.2397	-5.9769

Level 3 Attribute: Sediment load

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of the amount of fine sediment present in, or passing through, the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Turbidity	Turb	Primary	High turbidity can cause significant stress and mortality to juvenile salmonids due to impairment of respiration and feeding efficiency.	1
Temperature - daily Max(by month)	TmpMonMx	Modifying	Tolerance to turbidity is decreased as water temperatures increase above preferred temperatures and can increase effect of sediment.	1

Primary Level 2 Attribute	
Turb	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**5E-02**
3	*1.2E+00*
4	**1E+01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpMonMx							
0	**0E+00**							
1	*4.4E-05*							
2	**4E-04**							
3	*1.6E-03*							
4	**4E-03**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Turb	0	1	1	1	2	3	4
TmpMonMx	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.0007	.0007	.0583	1	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9993	0.9993	0.9417	-0.3469	-11.4810

Level 3 Attribute: Sediment load

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of the amount of fine sediment present in, or passing through, the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Turbidity	Turb	Primary	High turbidity can cause significant stress and mortality to juvenile salmonids due to impairment of respiration and feeding efficiency.	1
Temperature - daily Max(by month)	TmpMonMx	Modifying	Tolerance to turbidity is decreased as water temperatures increase above preferred temperatures and can increase effect of sediment.	1

Primary Level 2 Attribute	
Turb	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**2E-02**
3	*3.5E-01*
4	**2E+00**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpMonMx							
0	**0E+00**							
1	*4.4E-05*							
2	**4E-04**							
3	*1.6E-03*							
4	**4E-03**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Turb	0	1	1	1	2	3	4
TmpMonMx	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.0007	.0007	.0292	.4402	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9993	0.9993	0.9708	0.5598	-1.9750

Level 3 Attribute: Sediment load

Species: Chinook Life Stage: Inactive

Definition: The effect of the amount of fine sediment present in, or passing through, the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Embeddedness	Emb	Primary	Embeddedness of the substrate surface reduces interstitial spacing between cobbles, reducing the effectiveness of substrate as hiding or refuge cover by overwintering juveniles.	1
Turbidity	Turb	Modifying	Turbidity can cause sublethal and lethal effects to juvenile salmon; turbidity during winter is assumed to be less of a factor than access (embeddedness) to substrate for hiding and refuge.	2

Primary Level 2 Attribute	
Emb	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**2E-02**
3	*2.6E-01*
4	**2E+00**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	Turb							
0	**0E+00**							
1	*7.3E-05*							
2	**8E-03**							
3	*1.3E-01*							
4	**9E-01**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Emb	0	1	1	1	2	3	4
Turb	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.0008	.0008	.0259	.5103	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9992	0.9992	0.9741	0.4897	-3.1396

Level 3 Attribute: Sediment load

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of the amount of fine sediment present in, or passing through, the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Turbidity	Turb	Primary	High turbidity can cause significant stress and mortality to juvenile salmonids due to impairment of respiration and feeding efficiency.	1
Temperature - daily Max(by month)	TmpMonMx	Modifying	Tolerance to turbidity is decreased as water temperatures increase above preferred temperatures and can increase effect of sediment.	1

Primary Level 2 Attribute	
Turb	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**3E-02**
3	*6.4E-01*
4	**6E+00**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpMonMx							
0	**0E+00**							
1	*4.4E-05*							
2	**4E-04**							
3	*1.6E-03*							
4	**4E-03**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Turb	0	1	1	1	2	3	4
TmpMonMx	0	0	1	1	1	2	3
Sensitivity (S)	0	.0001	.0005	.0005	.0334	.7603	1
Relative Prod. (P=1-S)	1.0000	0.9999	0.9995	0.9995	0.9666	0.2397	-5.9769

Level 3 Attribute: Sediment load

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of the amount of fine sediment present in, or passing through, the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Turbidity	Turb	Primary	High turbidity can cause significant stress and mortality to juvenile salmonids due to impairment of respiration and feeding efficiency.	1
Temperature - daily Max(by month)	TmpMonMx	Modifying	Tolerance to turbidity is decreased as water temperatures increase above preferred temperatures and can increase effect of sediment.	1

Primary Level 2 Attribute	
Turb	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**2E-02**
3	*3.5E-01*
4	**2E+00**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpMonMx							
0	**0E+00**							
1	*4.4E-05*							
2	**4E-04**							
3	*1.6E-03*							
4	**4E-03**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Turb	0	1	1	1	2	3	4
TmpMonMx	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.0007	.0007	.0292	.4402	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9993	0.9993	0.9708	0.5598	-1.9750

Level 3 Attribute: Sediment load

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of the amount of fine sediment present in, or passing through, the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Turbidity	Turb	Primary	High turbidity can cause significant stress and mortality to adult salmon due to impairment of respiration. Very high levels can impede migration through zone of high concentration.	1
Temperature - daily Max(by month)	TmpMonMx	Modifying	Tolerance to turbidity is decreased as water temperatures increase above preferred temperatures and can increase effect of sediment.	1

Primary Level 2 Attribute	
Turb	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**1E-02**
3	*1.9E-01*
4	**1E+00**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpMonMx							
0	**0E+00**							
1	*4.4E-05*							
2	**4E-04**							
3	*1.6E-03*							
4	**4E-03**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Turb	0	1	1	1	2	3	4
TmpMonMx	0	0	1	1	1	2	3
Sensitivity (S)	0	.0001	.0005	.0005	.0169	.2529	1
Relative Prod. (P=1-S)	1.0000	0.9999	0.9995	0.9995	0.9831	0.7471	-0.6919

Level 3 Attribute: Sediment load

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of the amount of fine sediment present in, or passing through, the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Turbidity	Turb	Primary	High turbidity can cause significant stress and mortality to adult salmon due to impairment of respiration.	1
Temperature - daily Max(by month)	TmpMonMx	Modifying	Tolerance to turbidity is decreased as water temperatures increase above preferred temperatures and can increase effect of sediment.	1

Primary Level 2 Attribute	
Turb	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**2E-02**
3	*3.5E-01*
4	**2E+00**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpMonMx							
0	**0E+00**							
1	*4.4E-05*							
2	**4E-04**							
3	*1.6E-03*							
4	**4E-03**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Turb	0	1	1	1	2	3	4
TmpMonMx	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.0007	.0007	.0292	.4402	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9993	0.9993	0.9708	0.5598	-1.9750

Temperature

Level 3 Attribute: Temperature

Species: Chinook Life Stage: Spawning

Definition: The effect of water temperature within the the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Temperature - daily Max(by month)	TmpMonMx	Primary	Water temperatures higher than preferred levels by chinook can cause significant stress or death. Elevated temperatures affect growth and behavior and can cause shock.	1
Temperature - spatial variation	TmpSptVar	Modifying	Lack of spatial variation in water temperature can increase overall effect of water temperature in a stream reach. Spatial variation provides relief or refuge from high temperatures.	1

Primary Level 2 Attribute	
TmpMonMx	
Rating	**Sensitivity***
0	**0E+00**
1	*5.3E-04*
2	**5E-02**
3	*6.9E-01*
4	**5E+00**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpSptVar							
0	**0E+00**							
1	*5.7E-05*							
2	**8E-04**							
3	*3.7E-03*							
4	**1E-02**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
TmpMonMx	0	1	1	1	2	3	4
TmpSptVar	0	0	1	1	1	2	3
Sensitivity (S)	0	.0005	.0014	.0014	.061	.8587	1
Relative Prod. (P=1-S)	1.0000	0.9995	0.9986	0.9986	0.9390	0.1413	-4.4751

Level 3 Attribute: Temperature

Species: Chinook Life Stage: Egg incubation

Definition: The effect of water temperature within the the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Temperature - daily Max(by month)	TmpMonMx	Primary	Water temperatures higher than optimum levels for chinook can cause significant stress or death. Elevated temperatures affects effectiveness of fertilization and rate of development.	1
Temperature - spatial variation	TmpSptVar	Modifying	Spatial variation in water temperature can provide opportunities for relief from high temperature effects; lack of variation increases temperature effect.	1

Primary Level 2 Attribute	
TmpMonMx	
Rating	**Sensitivity***
0	**0E+00**
1	*1.3E-03*
2	**2E-01**
3	*3.1E+00*
4	**2E+01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpSptVar							
0	**0E+00**							
1	*1.1E-04*							
2	**2E-03**							
3	*7.2E-03*							
4	**2E-02**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
TmpMonMx	0	1	1	1	2	3	4
TmpSptVar	0	0	1	1	1	2	3
Sensitivity (S)	0	.0013	.0033	.0033	.2123	1	1
Relative Prod. (P=1-S)	1.0000	0.9987	0.9967	0.9967	0.7877	-2.6786	-26.3842

Level 3 Attribute: Temperature

Species: Chinook Life Stage: Fry colonization

Definition: The effect of water temperature within the the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Temperature - daily Min(by month)	TmpMonMn	Primary	Potential for cold temperatures is assumed to be a greater issue than warm temperatures for emergent fry. Temperatures colder than optimal levels can cause stress and poor growth.	1
Temperature - spatial variation	TmpSptVar	Modifying	Lack of spatial variation in water temperature can increase overall effect of water temperature in a stream reach. Spatial variation provides relief or refuge from cold temperatures.	1
			Note: This rule should be expanded upon to include effects of high temperture during spring also.	

Primary Level 2 Attribute	
TmpMonMn	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpSptVar							
0	**0E+00**							
1	*5.7E-05*							
2	**8E-04**							
3	*3.7E-03*							
4	**1E-02**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
TmpMonMn	0	1	1	1	2	3	4
TmpSptVar	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.0008	.0008	.0181	.2099	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9992	0.9992	0.9819	0.7901	-0.1468

Level 3 Attribute: Temperature

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of water temperature within the the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Temperature - daily Max(by month)	TmpMonMx	Primary	Water temperatures higher than preferred levels by chinook can cause significant stress or death. Elevated temperatures affect growth and behavior and can cause shock.	1
Temperature - spatial variation	TmpSptVar	Modifying	Lack of spatial variation in water temperature can increase overall effect of water temperature in a stream reach. Spatial variation provides relief or refuge from high temperatures.	1

Primary Level 2 Attribute	
TmpMonMx	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**2E-02**
3	*1.9E-01*
4	**1E+00**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpSptVar							
0	**0E+00**							
1	*5.7E-05*							
2	**8E-04**							
3	*3.7E-03*							
4	**1E-02**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
TmpMonMx	0	1	1	1	2	3	4
TmpSptVar	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.0008	.0008	.0214	.2727	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9992	0.9992	0.9786	0.7273	-0.6010

Level 3 Attribute: Temperature

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of water temperature within the the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Temperature - daily Max(by month)	TmpMonMx	Primary	Water temperatures higher than preferred levels by chinook can cause significant stress or death. Elevated temperatures affect growth and behavior and can cause shock.	1
Temperature - spatial variation	TmpSptVar	Modifying	Lack of spatial variation in water temperature can increase overall effect of water temperature in a stream reach. Spatial variation provides relief or refuge from high temperatures.	1

Primary Level 2 Attribute	
TmpMonMx	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**2E-02**
3	*1.9E-01*
4	**1E+00**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpSptVar							
0	**0E+00**							
1	*5.7E-05*							
2	**8E-04**							
3	*3.7E-03*							
4	**1E-02**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
TmpMonMx	0	1	1	1	2	3	4
TmpSptVar	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.0008	.0008	.0214	.2727	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9992	0.9992	0.9786	0.7273	-0.6010

Level 3 Attribute: Temperature

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of water temperature within the the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Temperature - daily Min(by month)	TmpMonMn	Primary	Water temperatures higher than preferred levels by chinook can cause significant stress or death. Elevated temperatures affect growth and behavior and can cause shock.	1
Temperature - spatial variation	TmpSptVar	Modifying	Lack of spatial variation in water temperature can increase overall effect of water temperature in a stream reach. Spatial variation provides relief or refuge from high temperatures.	1

Primary Level 2 Attribute	
TmpMonMn	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpSptVar							
0	**0E+00**							
1	*5.7E-05*							
2	**8E-04**							
3	*3.7E-03*							
4	**1E-02**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
TmpMonMn	0	1	1	1	2	3	4
TmpSptVar	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.0008	.0008	.0181	.2099	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9992	0.9992	0.9819	0.7901	-0.1468

Level 3 Attribute: Temperature

Species: Chinook Life Stage: Inactive

Definition: The effect of water temperature within the the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Temperature - daily Min(by month)	TmpMonMn	Primary	Extremely cold water temperatures during winter can cause stress, poor growth, and death.	1
Temperature - spatial variation	TmpSptVar	Modifying	Lack of spatial variation in water temperature can increase overall effect of water temperature in a stream reach. Spatial variation provides relief or refuge from cold temperatures.	1

Primary Level 2 Attribute	
TmpMonMn	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.1E-01*
4	**6E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpSptVar							
0	**0E+00**							
1	*5.7E-05*							
2	**5E-04**							
3	*2.1E-03*							
4	**5E-03**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
TmpMonMn	0	1	1	1	2	3	4
TmpSptVar	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.0008	.0008	.0153	.1542	.7666
Relative Prod. (P=1-S)	1.0000	0.9998	0.9992	0.9992	0.9847	0.8458	0.2334

Level 3 Attribute: Temperature

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of water temperature within the the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Temperature - daily Min(by month)	TmpMonMn	Primary	Potential for cold temperatures is assumed to be a greater issue than warm temperatures for presmolts. Temperatures colder than optimal levels can cause stress and poor growth.	1
Temperature - spatial variation	TmpSptVar	Modifying	Lack of spatial variation in water temperature can increase overall effect of water temperature in a stream reach. Spatial variation provides relief or refuge from cold temperatures.	1
			Note: This rule should be expanded upon to include effects of high temperture during spring also.	

Primary Level 2 Attribute

TmpMonMn	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**2E-02**
3	*1.9E-01*
4	**1E+00**

Modifying Level 2 Attributes

Rating	**Added Sensitivity***							
	TmpSptVar							
0	**0E+00**							
1	*5.7E-05*							
2	**8E-04**							
3	*3.7E-03*							
4	**1E-02**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
TmpMonMn	0	1	1	1	2	3	4
TmpSptVar	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.0008	.0008	.0214	.2727	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9992	0.9992	0.9786	0.7273	-0.6010

Level 3 Attribute: Temperature

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of water temperature within the the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Temperature - daily Min(by month)	TmpMonMn	Primary	Potential for cold temperatures is assumed to be a greater issue than warm temperatures for -age migrants. Temperatures colder than optimal levels can cause stress and poor growth.	
Temperature - spatial variation	TmpSptVar	Modifying	Lack of spatial variation in water temperature can increase overall effect of water temperature in a stream reach. Spatial variation provides relief or refuge from cold temperatures.	1
			Note: This rule should be expanded upon to include effects of high temperture during spring also.	

Primary Level 2 Attribute	
TmpMonMn	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpSptVar							
0	**0E+00**							
1	*5.7E-05*							
2	**8E-04**							
3	*3.7E-03*							
4	**1E-02**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
TmpMonMn	0	1	1	1	2	3	4
TmpSptVar	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.0008	.0008	.0181	.2099	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9992	0.9992	0.9819	0.7901	-0.1468

Level 3 Attribute: Temperature

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of water temperature within the the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Temperature - daily Max(by month)	TmpMonMx	Primary	Water temperatures higher than preferred levels by chinook can cause significant stress or death. Elevated temperatures affect growth and behavior and can cause shock.	1
Temperature - spatial variation	TmpSptVar	Modifying	Lack of spatial variation in water temperature can increase overall effect of water temperature in a stream reach. Spatial variation provides relief or refuge from high temperatures.	1

Primary Level 2 Attribute	
TmpMonMx	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpSptVar							
0	**0E+00**							
1	*5.7E-05*							
2	**8E-04**							
3	*3.7E-03*							
4	**1E-02**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
TmpMonMx	0	1	1	1	2	3	4
TmpSptVar	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.0008	.0008	.0181	.2099	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9992	0.9992	0.9819	0.7901	-0.1468

Level 3 Attribute: Temperature

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of water temperature within the the stream reach on the relative survival or performance of the focus species.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Temperature - daily Max(by month)	TmpMonMx	Primary	Water temperatures higher than preferred levels by chinook can cause significant stress or death. Elevated temperatures affect growth and behavior and can cause shock.	1
Temperature - spatial variation	TmpSptVar	Modifying	Lack of spatial variation in water temperature can increase overall effect of water temperature in a stream reach. Spatial variation provides relief or refuge from high temperatures.	1

Primary Level 2 Attribute	
TmpMonMx	
Rating	**Sensitivity***
0	**0E+00**
1	*2.0E-04*
2	**1E-02**
3	*1.4E-01*
4	**8E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
	TmpSptVar							
0	**0E+00**							
1	*5.7E-05*							
2	**8E-04**							
3	*3.7E-03*							
4	**1E-02**							

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
TmpMonMx	0	1	1	1	2	3	4
TmpSptVar	0	0	1	1	1	2	3
Sensitivity (S)	0	.0002	.0008	.0008	.0181	.2099	1
Relative Prod. (P=1-S)	1.0000	0.9998	0.9992	0.9992	0.9819	0.7901	-0.1468

Withdrawals

Level 3 Attribute: Withdrawals

Species: Chinook Life Stage: Spawning

Definition: The effect of entrainment (or injury by screens) at water withdrawal structures on the relative survival or performance of the focus species. This effect does not include dewatering due to water withdrawals, which is covered by the flow attribute.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Potential for entrainment of spawners was assumed to be nil.	4

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Withdrawals

Species: Chinook Life Stage: Egg incubation

Definition: The effect of entrainment (or injury by screens) at water withdrawal structures on the relative survival or performance of the focus species. This effect does not include dewatering due to water withdrawals, which is covered by the flow attribute.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Entrainment is not an issue for incubating eggs and alevins.	

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Withdrawals

Species: Chinook Life Stage: Fry colonization

Definition: The effect of entrainment (or injury by screens) at water withdrawal structures on the relative survival or performance of the focus species. This effect does not include dewatering due to water withdrawals, which is covered by the flow attribute.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Water withdrawals	Wdrwl	Primary	Level water withdrawals directly transfers to effects by the Level withdrawals attribute. Entrainment or injury by poorly designed screens can be a major source of mortality to emergent fry.	1

Primary Level 2 Attribute	
Wdrwl	
Rating	**Sensitivity***
0	**0E+00**
1	*1.6E-04*
2	**7E-03**
3	*6.2E-02*
4	**3E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft); effect more severe in smaller channels and less severe in larger.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Wdrwl	0	1	1	1	2	3	4
Sensitivity (S)	0	.0002	.0002	.0002	.0069	.0622	.2973
Relative Prod. (P=1-S)	1.0000	0.9998	0.9998	0.9998	0.9931	0.9378	0.7027

Level 3 Attribute: Withdrawals

Species: Chinook Life Stage: 0-age resident rearing

Definition: The effect of entrainment (or injury by screens) at water withdrawal structures on the relative survival or performance of the focus species. This effect does not include dewatering due to water withdrawals, which is covered by the flow attribute.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Water withdrawals	Wdrwl	Primary	Level water withdrawals directly transfers to effects by the Level withdrawals attribute. Entrainment or injury by poorly designed screens can kill juveniles rearing in vicinity of diversion.	1

Primary Level 2 Attribute	
Wdrwl	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**2E-03**
3	*1.3E-02*
4	**5E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft); effect more severe in smaller channels and less severe in larger.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Wdrwl	0	1	1	1	2	3	4
Sensitivity (S)	0	.0001	.0001	.0001	.0022	.0131	.0458
Relative Prod. (P=1-S)	1.0000	0.9999	0.9999	0.9999	0.9978	0.9869	0.9542

Level 3 Attribute: Withdrawals

Species: Chinook Life Stage: 0-age transient rearing

Definition: The effect of entrainment (or injury by screens) at water withdrawal structures on the relative survival or performance of the focus species. This effect does not include dewatering due to water withdrawals, which is covered by the flow attribute.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Water withdrawals	Wdrwl	Primary	Level water withdrawals directly transfers to effects by the Level withdrawals attribute. Entrainment or injury by poorly designed screens can be a major mortality source to juvenile migrants.	1

Primary Level 2 Attribute	
Wdrwl	
Rating	**Sensitivity***
0	**0E+00**
1	*1.6E-04*
2	**7E-03**
3	*6.2E-02*
4	**3E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft); effect more severe in smaller channels and less severe in larger.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Wdrwl	0	1	1	1	2	3	4
Sensitivity (S)	0	.0002	.0002	.0002	.0069	.0622	.2973
Relative Prod. (P=1-S)	1.0000	0.9998	0.9998	0.9998	0.9931	0.9378	0.7027

Level 3 Attribute: Withdrawals

Species: Chinook Life Stage: 0-age migrant

Definition: The effect of entrainment (or injury by screens) at water withdrawal structures on the relative survival or performance of the focus species. This effect does not include dewatering due to water withdrawals, which is covered by the flow attribute.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Water withdrawals	Wdrwl	Primary	Level water withdrawals directly transfers to effects by the Level withdrawals attribute. Entrainment or injury by poorly designed screens can be a major mortality source to juvenile migrants.	1

Primary Level 2 Attribute	
Wdrwl	
Rating	**Sensitivity***
0	**0E+00**
1	*1.6E-04*
2	**7E-03**
3	*6.2E-02*
4	**3E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft); effect more severe in smaller channels and less severe in larger.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Wdrwl	0	1	1	1	2	3	4
Sensitivity (S)	0	.0002	.0002	.0002	.0069	.0622	.2973
Relative Prod. (P=1-S)	1.0000	0.9998	0.9998	0.9998	0.9931	0.9378	0.7027

Level 3 Attribute: Withdrawals

Species: Chinook Life Stage: Inactive

Definition: The effect of entrainment (or injury by screens) at water withdrawal structures on the relative survival or performance of the focus species. This effect does not include dewatering due to water withdrawals, which is covered by the flow attribute.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Water withdrawals	Wdrwl	Primary	Level water withdrawals directly transfers to effects by the Level withdrawals attribute. Entrainment or injury by poorly designed screens can kill juveniles rearing in vicinity of diversion.	1

Primary Level 2 Attribute	
Wdrwl	
Rating	**Sensitivity***
0	**0E+00**
1	*7.3E-05*
2	**5E-04**
3	*1.5E-03*
4	**3E-03**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft); effect more severe in smaller channels and less severe in larger.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Wdrwl	0	1	1	1	2	3	4
Sensitivity (S)	0	.0001	.0001	.0001	.0005	.0015	.0033
Relative Prod. (P=1-S)	1.0000	0.9999	0.9999	0.9999	0.9995	0.9985	0.9967

Level 3 Attribute: Withdrawals

Species: Chinook Life Stage: 1-age resident rearing

Definition: The effect of entrainment (or injury by screens) at water withdrawal structures on the relative survival or performance of the focus species. This effect does not include dewatering due to water withdrawals, which is covered by the flow attribute.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Water withdrawals	Wdrwl	Primary	Level water withdrawals directly transfers to effects by the Level withdrawals attribute. Entrainment or injury by poorly designed screens can kill juveniles rearing in vicinity of diversion.	1

Primary Level 2 Attribute	
Wdrwl	
Rating	**Sensitivity***
0	**0E+00**
1	*1.1E-04*
2	**2E-03**
3	*1.3E-02*
4	**5E-02**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft); effect more severe in smaller channels and less severe in larger.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Wdrwl	0	1	1	1	2	3	4
Sensitivity (S)	0	.0001	.0001	.0001	.0022	.0131	.0458
Relative Prod. (P=1-S)	1.0000	0.9999	0.9999	0.9999	0.9978	0.9869	0.9542

Level 3 Attribute: Withdrawals

Species: Chinook Life Stage: 1-age migrant

Definition: The effect of entrainment (or injury by screens) at water withdrawal structures on the relative survival or performance of the focus species. This effect does not include dewatering due to water withdrawals, which is covered by the flow attribute.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
Water withdrawals	Wdrwl	Primary	Level water withdrawals directly transfers to effects by the Level withdrawals attribute. Entrainment or injury by poorly designed screens can be a major mortality source to juvenile migrants.	1

Primary Level 2 Attribute	
Wdrwl	
Rating	**Sensitivity***
0	**0E+00**
1	*1.6E-04*
2	**7E-03**
3	*6.2E-02*
4	**3E-01**

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Note: Rule shown for Channel Width class 1 (15-60 ft); effect more severe in smaller channels and less severe in larger.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Wdrwl	0	1	1	1	2	3	4
Sensitivity (S)	0	.0002	.0002	.0002	.0069	.0622	.2973
Relative Prod. (P=1-S)	1.0000	0.9998	0.9998	0.9998	0.9931	0.9378	0.7027

Level 3 Attribute: Withdrawals

Species: Chinook Life Stage: Migrant prespawner

Definition: The effect of entrainment (or injury by screens) at water withdrawal structures on the relative survival or performance of the focus species. This effect does not include dewatering due to water withdrawals, which is covered by the flow attribute.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Potential for entrainment of migrant adults was assumed to be nil.	4

Primary Level 2 Attribute	
Rating	Sensitivity*
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	Added Sensitivity*							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Level 3 Attribute: Withdrawals

Species: Chinook Life Stage: Holding prespawner

Definition: The effect of entrainment (or injury by screens) at water withdrawal structures on the relative survival or performance of the focus species. This effect does not include dewatering due to water withdrawals, which is covered by the flow attribute.

Level 2 Attribute	Abbrev.	Role	Rationale	Level of Proof
			Potential for entrainment of holding pre-spawners was assumed to be nil.	4

Primary Level 2 Attribute	
Rating	**Sensitivity***
0	
1	
2	
3	
4	

Modifying Level 2 Attributes								
Rating	**Added Sensitivity***							
0								
1								
2								
3								
4								

* Expressed as percent. 2E-02 is notation for 2 x 10^-2, or .02 %. Values not in bold are derived through curvilinear interpolation.

The combined effect of the Modifying level 2 attributes and the Primary level 2 attribute on sensitivity is computed using the default hypothesis:

$$S = \left[\mathrm{Sum}\, S_j^{1/e} \right]^e,$$

where Sj's are the sensitivities of all contributing Level2's (including the Primary). (If S > 1 we set S = 1.) See examples below.

Examples showing how the Primary sensitivity (Sp) value and the relative productivity (P) are affected by the ratings for the Modifying Level2 attributes.

Level 2 Attribute	Rating	Rating	Rating	Rating	Rating	Rating	Rating
Sensitivity (S)	0	0	0	0	0	0	0
Relative Prod. (P=1-S)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000