

CHAPTER 12
EFFECTS OF THE ACTION TO ESA-LISTED SPECIES

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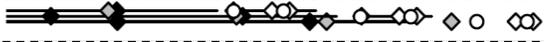
12 EFFECTS OF THE ACTION ANALYSIS

12.1 Introduction

See Chapters 4 (Approach to the Assessment) and 11 (Effects Analysis Introduction) for descriptions of the methods and information used in this section. In this section we integrate the exposure and response information to evaluate the likelihood of adverse effects from stressors of the action at the population and species level. The information is organized by species. Within each species section the information is presented in the following order:

1. R- Plots figures: Demonstrate the relationship between geographically-specific potential exposure distributions and assessment measures (response distributions). These figures also convey the prevalence of registered use sites within the species range by providing potential acreage of allowed uses within the species range and the percent overlap of that use relative to the size of the species range. See Table 1 below, the assessment framework (chapter 4), and the introduction to the effects analysis (Chapter 11) for more information on the interpretation of risk plots.

Table 1. General risk plot components

<p>Title Species name is given, with ESU or DPS abbreviated, for example:</p> <p style="border: 1px dashed black; padding: 5px; display: inline-block;">Chinook salmon PS (4799) Range: 305 HUC12s</p> <p>“(4799)” is an identification number used for internal tracking purposes. “Range” indicates that the species range, rather than designated critical habitat, was used to calculate overlap percentages. The number of individual sub-watersheds (HUC 12) that make up the species range is also provided, here 305.</p>
<p>Toxicity Data See Chapter 11 for bromoxynil and prometryn specific information.</p>
<p>Uses The overlap category is listed, followed by the acres within species range, a graphical depiction of the exposure estimates, and finally the percent of species range composed of those acres, for example:</p> <p style="border: 1px dashed black; padding: 5px; display: inline-block;">Corn (29905)  0.44 % (0.26, 0.58)</p> <p>See chapter 11 for a crosswalk of authorized use sites to overlap category. Note that there are three rows of estimated exposure concentrations for each overlap category; each row represents a different time-weighted average: 1-day (bottom row); 4-day (middle row); and 21-day (top row).</p>

2. Likelihood of exposure tables: Tables summarizing assessment of likelihood of exposure to each pesticide use that can occur within the species range.
3. Risk Hypotheses Tables: tables for each risk hypothesis summarizing risk and confidence associated with each registered use that occurs within the species range. We analyzed only four of the five risk hypotheses introduced in chapter 11. We did not have sufficient data to evaluate the risk hypothesis: Exposure to the a.i. is sufficient to reduce abundance and productivity via impairments to ecologically significant behaviors. Thus we did not carry this risk hypothesis forward into the species specific effects analyses which follow.
4. Final effects analysis table and narrative summary: Each species sections concludes with a Table indicating which risk hypotheses were supported and associated narrative summary of overall risk of the action to the species. Where applicable, the effects analysis table includes Pacific salmon population model output. Population model output is also provided in appendix A: Pacific Salmon Population Modeling. The maximum EEC values on the Risk-plots relate to juvenile mortality of approximately 1% and 10%. These values were combined with percent overlap values from the use area and species range data to create acute mortality scenarios that were assessed using acute mortality salmon population models to estimate population productivity. The models assessed impacts to population growth rates for ocean-type Chinook, stream-type Chinook, sockeye, and coho salmon.

12.2 Bromoxynil Effects Analysis

We considered the risk posed to listed species and habitat from bromoxynil and its esters: octanoate and heptanoate. In Chapter 12, the risk characterization (i.e. low, medium, and high determinations) are made in reference to the octanoate ester. In other words, the determinations are made by comparing the EECs associated with the octanoate to the toxicity response data for that ester. However, species and habitats are also likely to be exposed to bromoxynil in both phenol and heptanoate ester forms.

Risk associated with heptanoate exposure is well-represented by the modeled octanoate EECs as the two esters have similar fate properties and labeled allowances (application sites, rates, methods, etc.). We qualitatively evaluated the available information regarding the toxicity of the heptanoate ester while conducting our octanoate-based risk characterization.

Risk associated with bromoxynil (the phenol) was considered and found to pose considerably less risk as compared to the parent compound (octanoate). As described in Chapter 11, EECs were developed for a subset of scenarios in order to evaluate the potential for risk posed by the phenol. Bromoxynil presence in the environment (the phenol) is the result of breakdown of the parent ester compounds (bromoxynil octanoate or heptanoate) following application.

Environmental concentrations of bromoxynil are generally anticipated to be lower, or within similar ranges to that of the octanoate (as seen in Figure 1). Of greater significance, the toxicity associated with the bromoxynil is notably less than that of the octanoate or heptanoate (see Figure 1). We qualitatively evaluated the relative risk of bromoxynil as compared to the octanoate for a number of representative uses, habitats and huc-2 regions. The risk associated with the phenol was found to be less, and therefore captured, by the evaluation of the octanoate ester. We qualitatively considered the decrease in risk associated with the phenol up-front, as opposed to on a species-by-species basis.

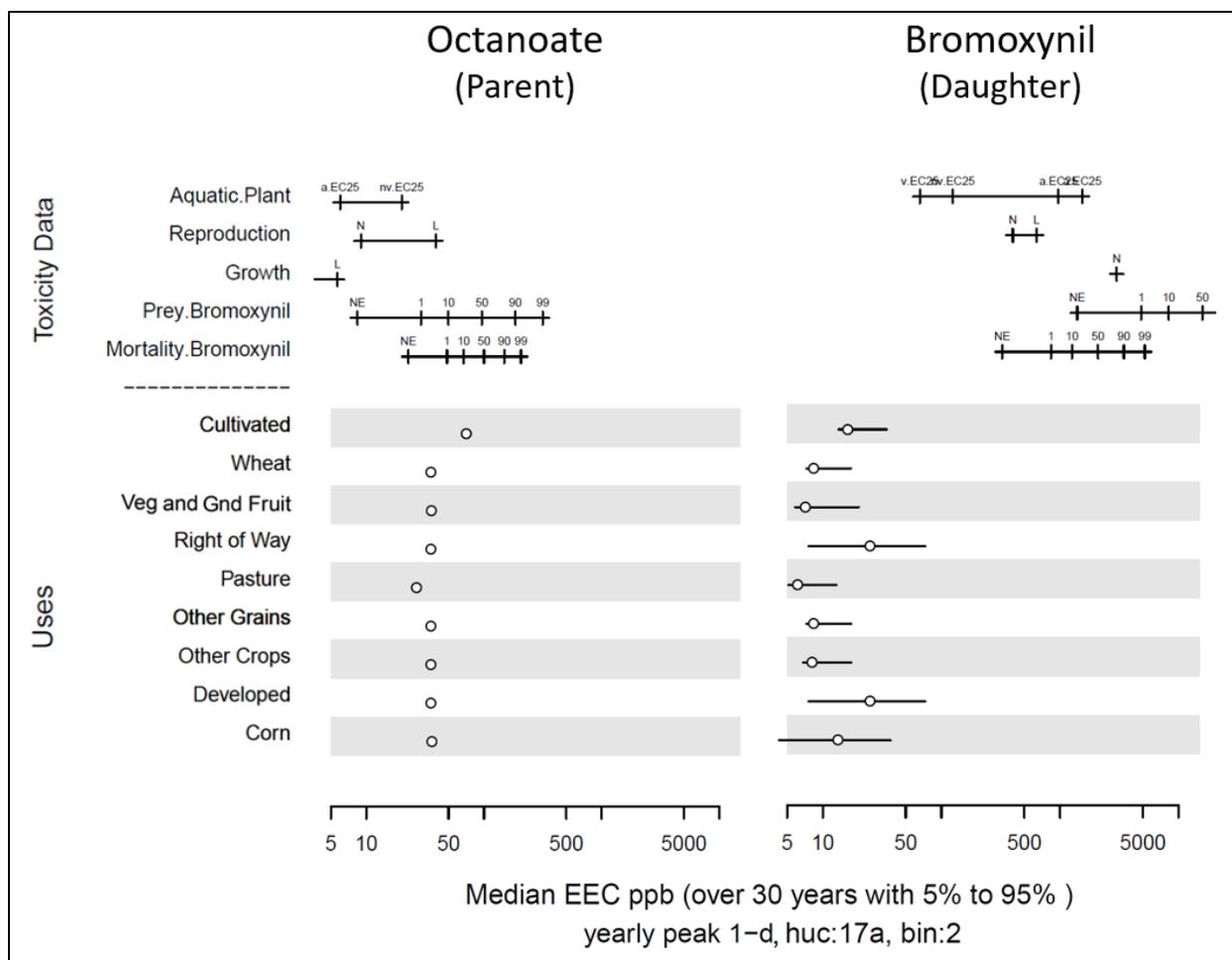


Figure 1. Estimated environmental concentrations and toxicological information for bromoxynil octanoate (a parent ester form) and bromoxynil (the phenol degradate). Concentrations are based on low-flow edge-of-field (bin 2) habitats. A comparison of scenarios that resulted in the highest estimated environmental concentrations suggests bromoxynil risk is lower than that of the octanoate.

12.2.1 Chum salmon, Columbia River ESU (*Oncorhynchus keta*)

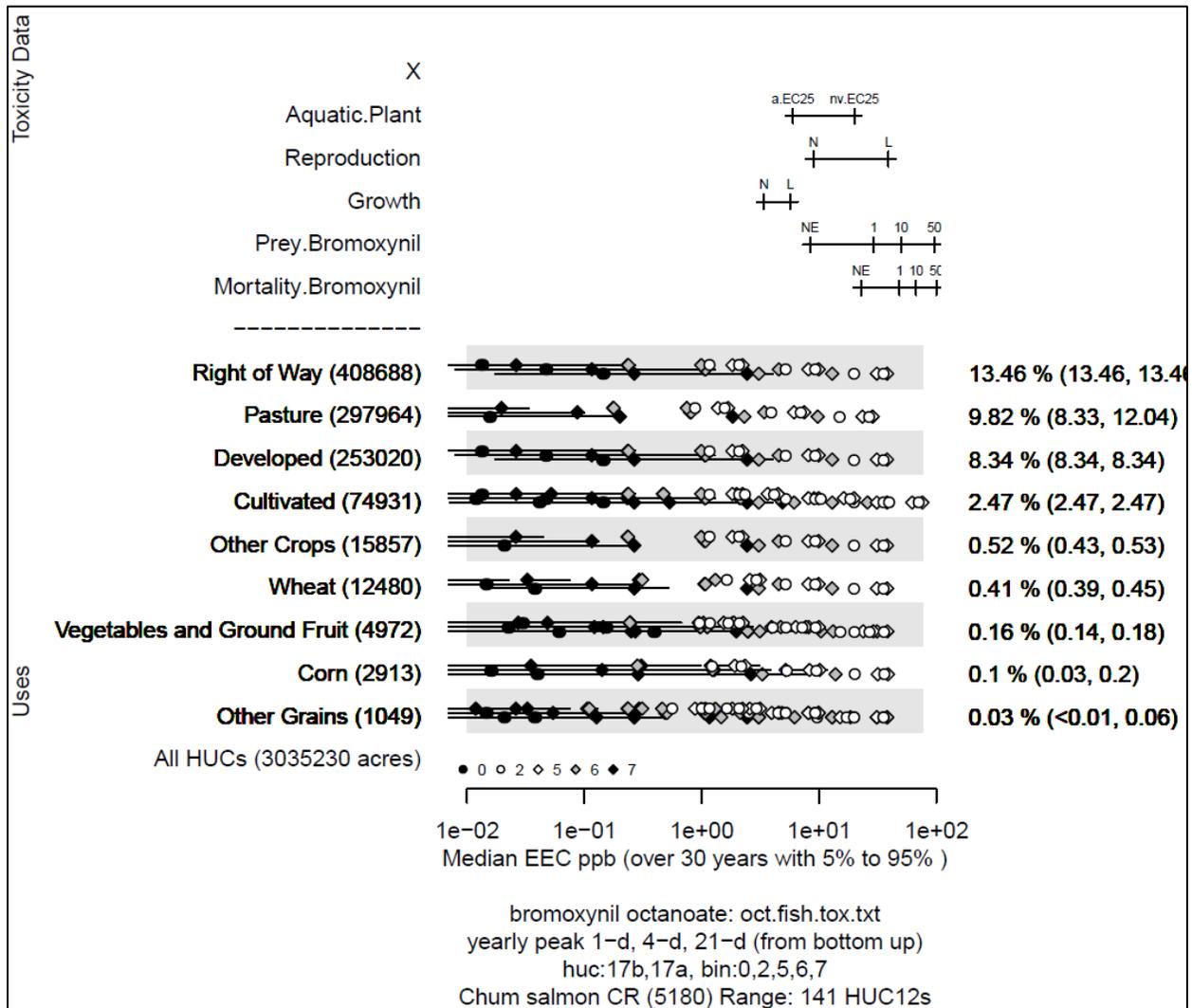


Figure 2. Effects analysis Risk-plot for Columbia River ESU chum salmon and bromoxynil

Table 2. Likelihood of exposure determination for Columbia River ESU; chum salmon and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	2	Low
Right of Way	3	yes	no	no	NA	2	Medium
Developed	3	yes	no	no	NA	2	Medium
Cultivated	1	yes	no	no	NA	2	Low
Other Crops	1	yes	no	no	yes	2	Low
Corn	1	yes	no	no	yes	2	Low
Wheat	1	yes	no	no	yes	2	Low
Vegetables and Ground Fruit	1	yes	no	no	yes	2	Low
Other Grains	1	yes	no	no	no	2	Low

Table 3. Direct mortality risk hypothesis; Columbia River ESU chum salmon and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.3 (9.8)	Low	Low
Right of Way	13.5	Low	Medium
Developed	8.3	Low	Medium
Fallow; CRP (cultivated)	0.4; 4.3 (2.5)	Medium	Low
Other Crops	0.5	Low	Low
Corn	0.1	Low	Low
Wheat	0.4	Low	Low
Vegetables and Ground Fruit	0.2	Low	Low
Other Grains	<0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 4. Prey risk hypothesis; Columbia River ESU chum salmon and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.3 (9.8)	Low	Low
Right of Way	13.5	Low	Medium

Developed	8.3	Low	Medium
Fallow; CRP (cultivated)	0.4; 4.3 (2.5)	Medium	Low
Other Crops	0.5	Low	Low
Corn	0.1	Low	Low
Wheat	0.4	Low	Low
Vegetables and Ground Fruit	0.2	Low	Low
Other Grains	<0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk		Confidence	
Medium		Low	

Table 5. Growth risk hypothesis; Columbia River ESU chum salmon and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.3 (9.8)	None Expected	Low
Right of Way	13.5	None Expected	Medium
Developed	8.3	None Expected	Medium
Fallow; CRP (cultivated)	0.4; 4.3 (2.5)	Low	Low
Other Crops	0.5	None Expected	Low
Corn	0.1	None Expected	Low
Wheat	0.4	None Expected	Low
Vegetables and Ground Fruit	0.2	None Expected	Low
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk		Confidence	
Low		Medium	

Table 6. Reproduction risk hypothesis; Columbia River ESU chum salmon and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.3 (9.8)	None Expected	Low
Right of Way	13.5	None Expected	Medium
Developed	8.3	None Expected	Medium

Fallow; CRP (cultivated)	0.4; 4.3 (2.5)	None Expected	Low
Other Crops	0.5	None Expected	Low
Corn	0.1	None Expected	Low
Wheat	0.4	None Expected	Low
Vegetables and Ground Fruit	0.2	None Expected	Low
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 7. Effects analysis summary table: Columbia River ESU chum salmon and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low		No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium		No

Effects analysis summary: Columbia River ESU chum salmon are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.2 Chum Salmon, Hood Canal summer-run ESU (*Oncorhynchus keta*)

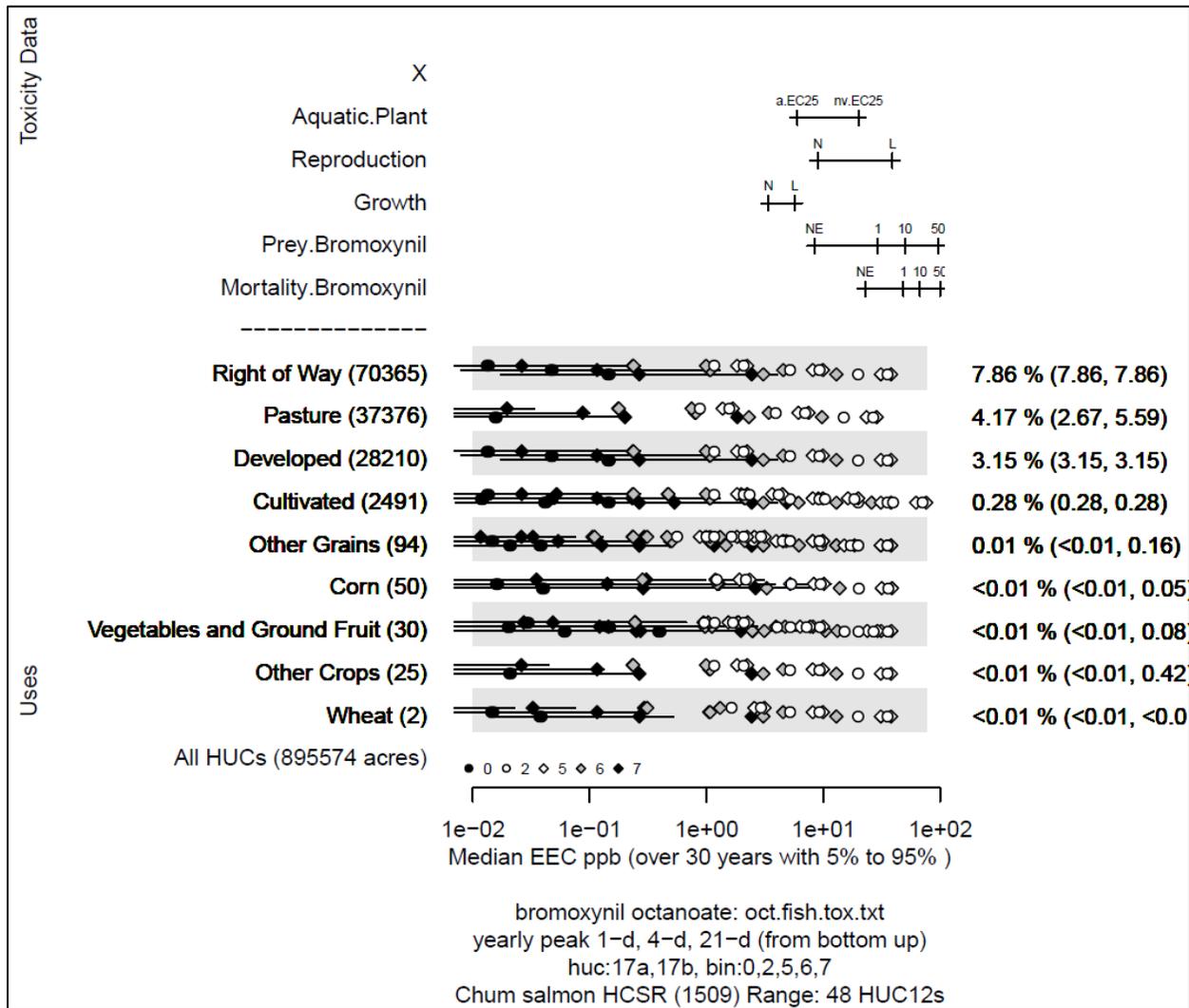


Figure 3. Effects analysis Risk-plot for Hood Canal summer-run ESU chum salmon and bromoxynil

Table 8. Likelihood of exposure determination for Hood Canal summer-run ESU chum salmon and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	2	Low
Right of Way	3	yes	no	no	NA	2	Medium
Developed	2	yes	no	no	NA	2	Low
Cultivated	1	yes	no	no	NA	2	Low
Other Crops	1	yes	no	no	no	2	Low
Corn	1	yes	no	no	no	2	Low
Wheat	1	yes	no	no	no	2	Low
Vegetables and Ground Fruit	1	yes	no	no	no	2	Low
Other Grains	1	yes	no	no	no	2	Low

Table 9. Direct mortality risk hypothesis; Hood Canal summer-run chum salmon and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	< 0.1 (4.2)	Low	Low
Right of Way	7.9	Low	Medium
Developed	3.2	Low	Low
Fallow; CRP (cultivated)	< 0.1; 0.4 (0.3)	Medium	Low
Other Crops	< 0.1	Low	Low
Corn	< 0.1	Low	Low
Wheat	< 0.1	Low	Low
Vegetables and Ground Fruit	< 0.1	Low	Low
Other Grains	< 0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Low	Medium		

Table 10. Prey risk hypothesis; Hood Canal summer-run chum salmon and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	< 0.1 (4.2)	Low	Low
Right of Way	7.9	Low	Medium
Developed	3.2	Low	Low

Fallow; CRP (cultivated)	< 0.1; 0.4 (0.3)	Medium	Low
Other Crops	< 0.1	Low	Low
Corn	< 0.1	Low	Low
Wheat	< 0.1	Low	Low
Vegetables and Ground Fruit	< 0.1	Low	Low
Other Grains	< 0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 11. Growth risk hypothesis; Hood Canal summer-run chum salmon and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	< 0.1 (4.2)	None Expected	Low
Right of Way	7.9	None Expected	Medium
Developed	3.2	None Expected	Low
Fallow; CRP (cultivated)	< 0.1; 0.4 (0.3)	Low	Low
Other Crops	< 0.1	None Expected	Low
Corn	< 0.1	None Expected	Low
Wheat	< 0.1	None Expected	Low
Vegetables and Ground Fruit	< 0.1	None Expected	Low
Other Grains	< 0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 12. Reproduction risk hypothesis; Hood Canal summer-run chum salmon and bromoxynil

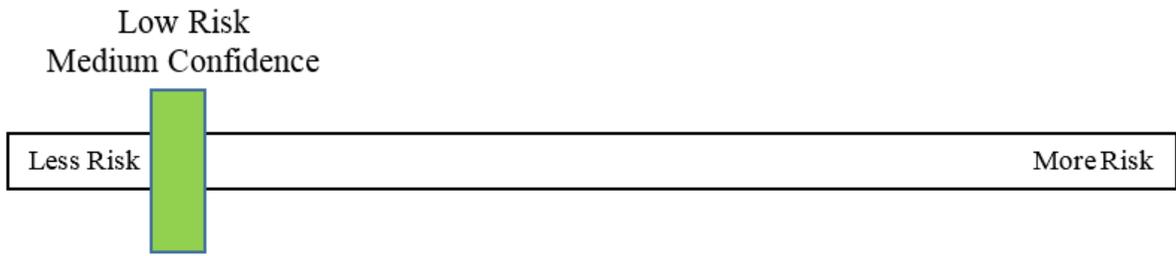
Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	< 0.1 (4.2)	None Expected	Low
Right of Way	7.9	None Expected	Medium
Developed	3.2	None Expected	Low
Fallow; CRP (cultivated)	< 0.1; 0.4 (0.3)	None Expected	Low

Other Crops	< 0.1	None Expected	Low
Corn	< 0.1	None Expected	Low
Wheat	< 0.1	None Expected	Low
Vegetables and Ground Fruit	< 0.1	None Expected	Low
Other Grains	< 0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 13. Effects analysis summary table: Hood Canal summer-run ESU chum salmon and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Low	Medium	Not Applicable	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium		No

Effects analysis summary: Hood Canal summer-run ESU chum salmon are not anticipated to experience reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in prey availability. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is low and the confidence associated with that risk is medium.



12.2.3 Chinook, California Coastal (*Oncorhynchus tshawytscha*)

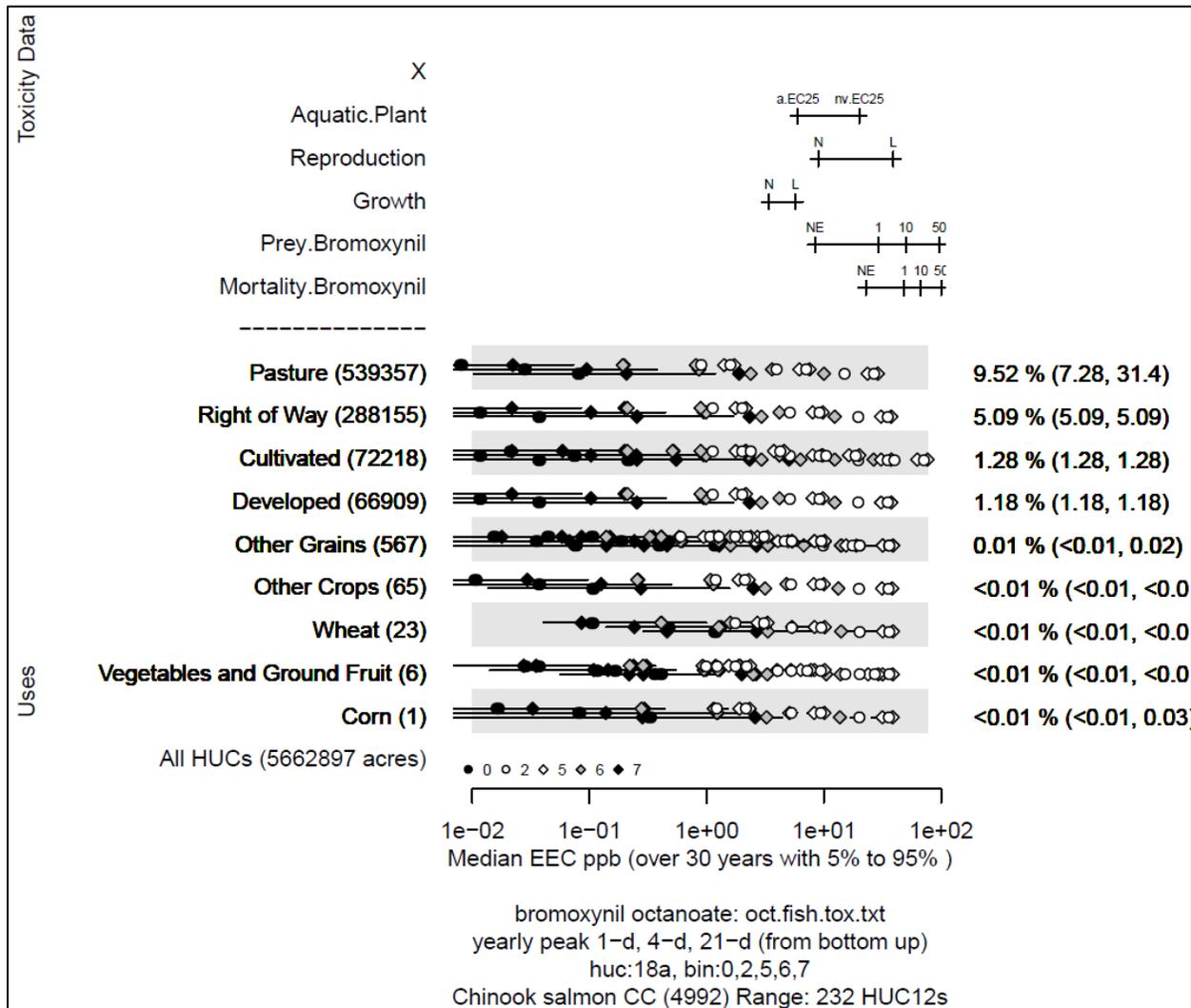


Figure 4. Effects analysis Risk-plot for California Coastal ESU chinook and bromoxynil

Table 14. Likelihood of exposure determination for California Coastal ESU Chinook salmon and bromoxynil

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low	
Right of Way	NA	NA	NA	NA	NA	NA	NA	
Developed	2	yes	no	no	NA	3	Medium	
Cultivated	NA	NA	NA	NA	NA	NA	NA	
Other Crops	1	yes	no	no	no	3	Low	
Corn	1	yes	no	no	no	3	Low	
Wheat	1	yes	no	no	no	3	Low	
Vegetables and Ground Fruit	1	yes	no	no	no	3	Low	
Other Grains	1	yes	no	no	no	3	Low	

Table 15. Direct mortality risk hypothesis; California Coastal Chinook salmon and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (9.5)	Low	Low
Right of Way	NA	NA	NA
Developed	1.2	Low	Medium
Cultivated	NA	NA	NA
Other Crops	<0.1	Low	Low
Corn	<0.1	Low	Low
Wheat	<0.1	Low	Low
Vegetables and Ground Fruit	<0.1	Low	Low
Other Grains	<0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Low	Medium		

Table 16. Reproduction risk hypothesis; California Coastal Chinook salmon and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (9.5)	None Expected	Low
Right of Way	NA	NA	NA
Developed	1.2	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	<0.1	None Expected	Low
Corn	<0.1	None Expected	Low
Wheat	<0.1	None Expected	Low
Vegetables and Ground Fruit	<0.1	None Expected	Low
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk		Confidence	
Low		Medium	

Table 17. Growth risk hypothesis; California Coastal Chinook salmon and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (9.5)	None Expected	Low
Right of Way	NA	NA	NA
Developed	1.2	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	<0.1	None Expected	Low
Corn	<0.1	None Expected	Low
Wheat	<0.1	None Expected	Low
Vegetables and Ground Fruit	<0.1	None Expected	Low
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk		Confidence	
Low		Medium	

Table 18. Prey risk hypothesis; California Coastal Chinook salmon and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure

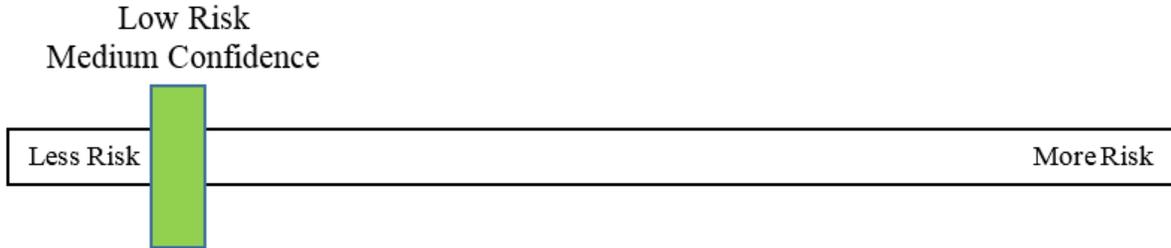
Alfalfa (pasture)	0.1 (9.5)	Low	Low
Right of Way	NA	NA	NA
Developed	1.2	Low	Medium
Cultivated	NA	NA	NA
Other Crops	<0.1	Low	Low
Corn	<0.1	Low	Low
Wheat	<0.1	Low	Low
Vegetables and Ground Fruit	<0.1	Low	Low
Other Grains	<0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 19. Effects analysis summary table: California Coastal ESU Chinook salmon and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Low	Medium	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium	Not modelled	No

Effects analysis summary: California Coastal Chinook salmon are not anticipated to experience reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in prey availability. No changes in population growth rate occurred at the 1%

mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is low and the confidence associated with that risk is medium.



12.2.4 Chinook Salmon, Central Valley spring-run ESU (*Oncorhynchus tshawytscha*)

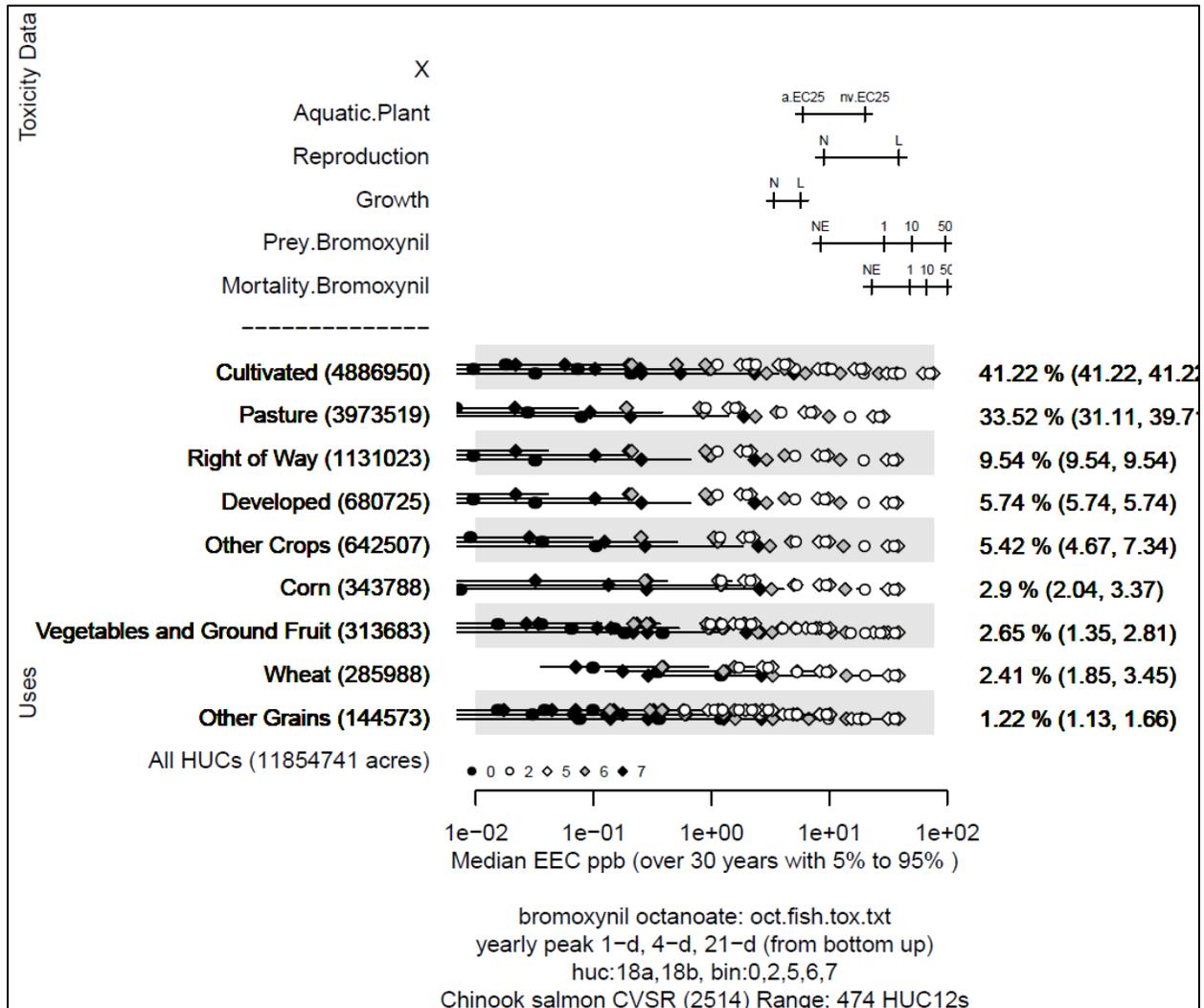


Figure 5. Effects analysis Risk-plot for Chinook salmon, Central Valley spring-run ESU and bromoxynil

Table 20. Likelihood of exposure determination for Chinook salmon, Central Valley spring-run ESU and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	2	yes	no	no	NA	3	Medium
Right of Way	NA	NA	NA	NA	NA	NA	NA
Developed	3	yes	no	no	NA	3	Medium
Cultivated	NA	NA	NA	NA	NA	NA	NA
Other Crops	3	yes	no	no	NA	3	Medium
Corn	2	yes	no	no	NA	3	Medium
Wheat	2	yes	no	no	NA	3	Medium
Vegetables and Ground Fruit	2	yes	no	no	NA	3	Medium
Other Grains	2	yes	no	no	NA	3	Medium

Table 21. Direct mortality risk hypothesis; Chinook salmon, Central Valley spring-run ESU and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.8 (33.5)	Low	Medium
Right of Way	NA	NA	NA
Developed	5.7	Low	Medium
Cultivated	NA	NA	NA
Other Crops	5.4	Low	Medium
Corn	2.9	Low	Medium
Wheat	2.4	Low	Medium
Vegetables and Ground Fruit	2.7	Low	Medium
Other Grains	1.2	Low	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 22. Reproduction risk hypothesis; Chinook salmon, Central Valley spring-run ESU and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure

Alfalfa (pasture)	1.8 (33.5)	None Expected	Medium
Right of Way	NA	NA	NA
Developed	5.7	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	5.4	None Expected	Medium
Corn	2.9	None Expected	Medium
Wheat	2.4	None Expected	Medium
Vegetables and Ground Fruit	2.7	None Expected	Medium
Other Grains	1.2	None Expected	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 23. Growth risk hypothesis; Chinook salmon, Central Valley spring-run ESU and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.8 (33.5)	None Expected	Medium
Right of Way	NA	NA	NA
Developed	5.7	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	5.4	None Expected	Medium
Corn	2.9	None Expected	Medium
Wheat	2.4	None Expected	Medium
Vegetables and Ground Fruit	2.7	None Expected	Medium
Other Grains	1.2	None Expected	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 24. Prey risk hypothesis; Chinook salmon, Central Valley spring-run ESU and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.8 (33.5)	Low	Medium
Right of Way	NA	NA	NA
Developed	5.7	Low	Medium

Cultivated	NA	NA	NA
Other Crops	5.4	Low	Medium
Corn	2.9	Low	Medium
Wheat	2.4	Low	Medium
Vegetables and Ground Fruit	2.7	Low	Medium
Other Grains	1.2	Low	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 25. Effects analysis summary table: Chinook salmon, Central Valley spring-run ESU and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium	Not modelled	No

Effects analysis summary: Central Valley spring-run Chinook are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10% mortality levels and increased with the percentage of the

population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.5 Chinook Salmon, Lower Columbia River ESU (*Oncorhynchus tshawytscha*)

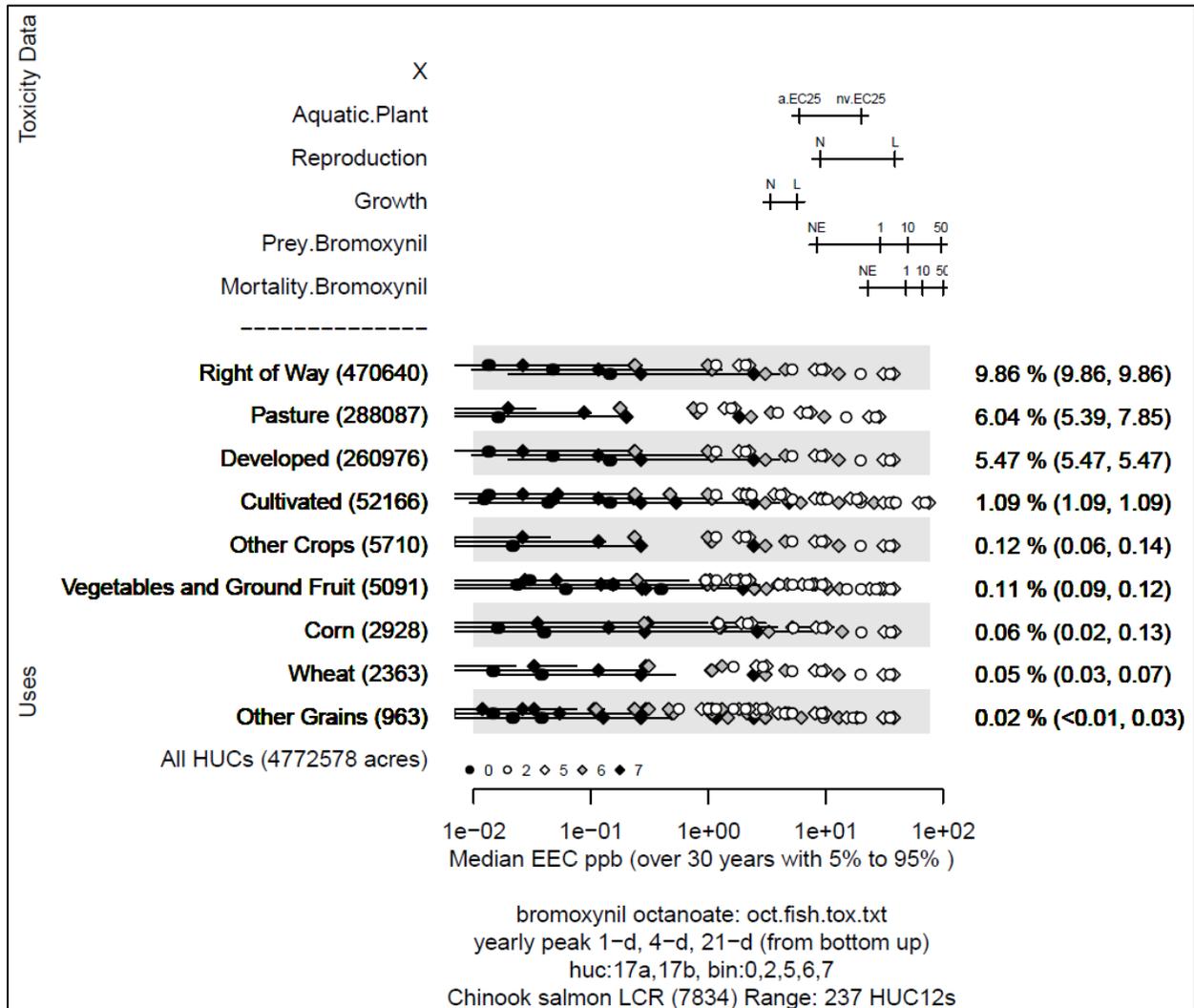


Figure 6. Effects analysis Risk-plot for Lower Columbia River ESU, Chinook salmon and bromoxynil

Table 26. Likelihood of exposure determination for Lower Columbia River ESU, Chinook salmon and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low
Right of Way	3	yes	no	no	NA	3	Medium
Developed	3	yes	no	no	NA	3	Medium
Cultivated	1	yes	no	no	NA	3	Low
Other Crops	1	yes	no	no	yes	3	Medium
Corn	1	yes	no	no	yes	3	Medium
Wheat	1	yes	no	no	yes	3	Medium
Vegetables and Ground Fruit	1	yes	no	no	yes	3	Medium
Other Grains	1	yes	no	no	no	3	Low

Table 27. Direct mortality risk hypothesis; Chinook salmon, Lower Columbia River ESU and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.3 (6.0)	Low	Low
Right of Way	9.9	Low	Medium
Developed	5.5	Low	Medium
Fallow; CRP (cultivated)	0.1; 3.1 (1.1)	Medium	Low
Other Crops	0.1	Low	Medium
Corn	0.1	Low	Medium
Wheat	0.1	Low	Medium
Vegetables and Ground Fruit	0.1	Low	Medium
Other Grains	<0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 28. Reproduction risk hypothesis; Chinook salmon, Lower Columbia River ESU and bromoxynil

Endpoint: Reproduction

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.3 (6.0)	None Expected	Low
Right of Way	9.9	None Expected	Medium
Developed	5.5	None Expected	Medium
Fallow; CRP (cultivated)	0.1; 3.1 (1.1)	None Expected	Low
Other Crops	0.1	None Expected	Medium
Corn	0.1	None Expected	Medium
Wheat	0.1	None Expected	Medium
Vegetables and Ground Fruit	0.1	None Expected	Medium
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 29. Growth risk hypothesis; Chinook salmon, Lower Columbia River ESU and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.3 (6.0)	None Expected	Low
Right of Way	9.9	None Expected	Medium
Developed	5.5	None Expected	Medium
Fallow; CRP (cultivated)	0.1; 3.1 (1.1)	Low	Low
Other Crops	0.1	None Expected	Medium
Corn	0.1	None Expected	Medium
Wheat	0.1	None Expected	Medium
Vegetables and Ground Fruit	0.1	None Expected	Medium
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 30. Prey risk hypothesis; Chinook salmon, Lower Columbia River ESU and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure

Alfalfa (pasture)	0.3 (6.0)	Low	Low
Right of Way	9.9	Low	Medium
Developed	5.5	Low	Medium
Fallow; CRP (cultivated)	0.1; 3.1 (1.1)	Medium	Low
Other Crops	0.1	Low	Medium
Corn	0.1	Low	Medium
Wheat	0.1	Low	Medium
Vegetables and Ground Fruit	0.1	Low	Medium
Other Grains	<0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 31. Effects analysis summary table: Chinook salmon, Lower Columbia River ESU and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to ecologically significant behaviors.	Low	Medium	Not modelled	No

Effects analysis summary: Lower Columbia River Chinook are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil.

Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.6 Chinook Salmon, Puget Sound ESU (*Oncorhynchus tshawytscha*)

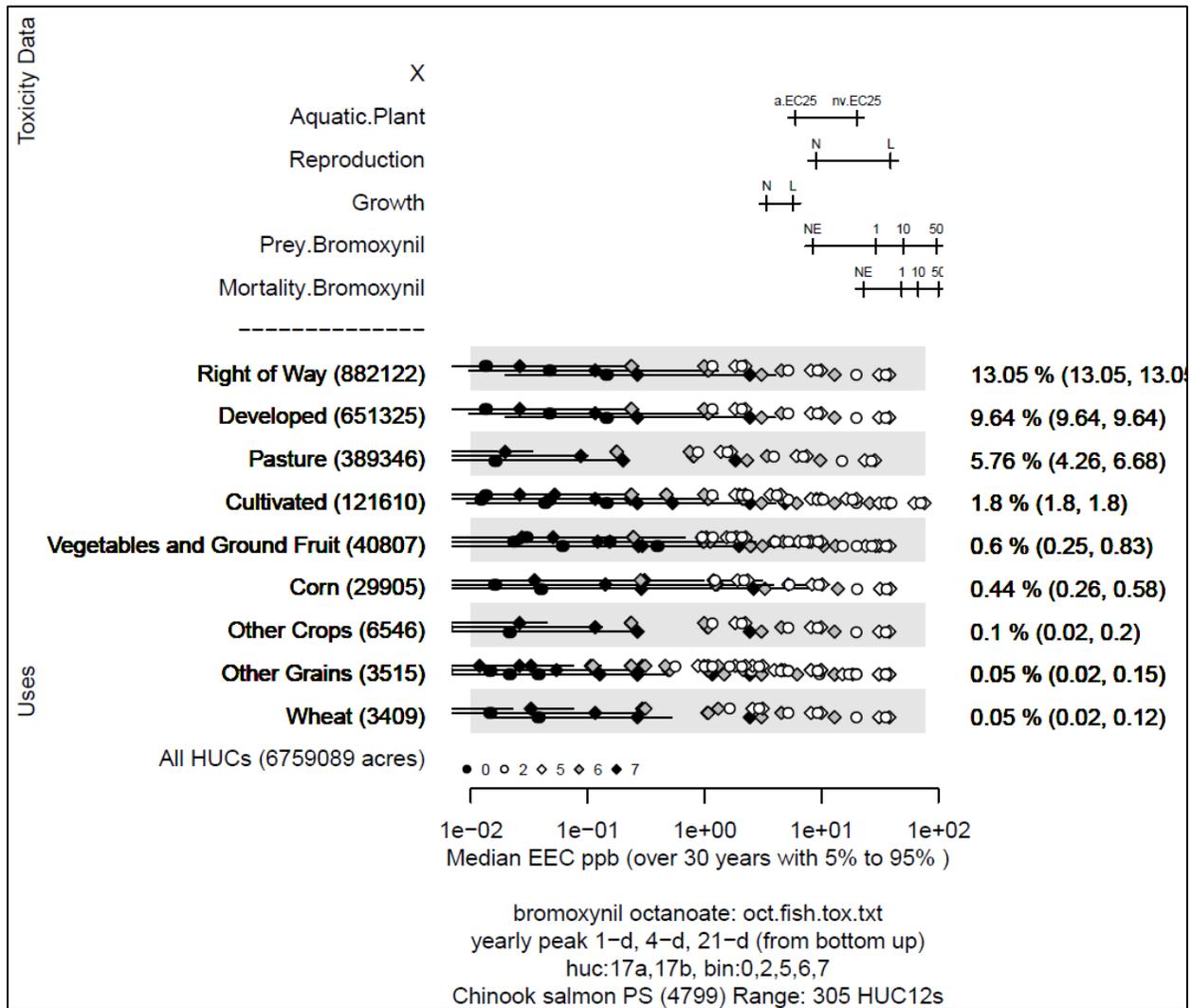


Figure 7. Effects analysis Risk-plot for Chinook salmon, Puget Sound ESU and bromoxynil

Table 32. Likelihood of exposure determination for Chinook salmon, Puget Sound ESU and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low
Right of Way	3	yes	no	no	NA	3	Medium
Developed	3	yes	no	no	NA	3	Medium
Cultivated	1	yes	no	no	NA	3	Low
Other Crops	1	yes	no	no	no	3	Low
Corn	1	yes	no	no	yes	3	Medium
Wheat	1	yes	no	no	no	3	Low
Vegetables and Ground Fruit	1	yes	no	no	yes	3	Medium
Other Grains	1	yes	no	no	no	3	Low

Table 33. Direct mortality risk hypothesis; Chinook salmon, Puget Sound ESU and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (5.8)	Low	Low
Right of Way	13.1	Low	Medium
Developed	9.6	Low	Medium
Fallow; CRP (cultivated)	0.1; 1.4 (1.8)	Medium	Low
Other Crops	0.1	Low	Low
Corn	0.4	Low	Medium
Wheat	0.1	Low	Low
Vegetables and Ground Fruit	0.6	Low	Medium
Other Grains	0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence	High density of vegetables and ground fruit use sites proximal to the Nooksack populations (middle fork, north fork, and south fork), the upper and lower Skagit populations, and the Sauk population. These populations have been determined essential to the recovery of the ESU per the 2007 Puget Sound Chinook Recovery Plan.	
Medium	Low		

Table 34. Reproduction risk hypothesis; Chinook salmon, Puget Sound ESU and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (5.8)	None Expected	Low
Right of Way	13.1	None Expected	Medium
Developed	9.6	None Expected	Medium
Fallow; CRP (cultivated)	0.1; 1.4 (1.8)	None Expected	Low
Other Crops	0.1	None Expected	Low
Corn	0.4	None Expected	Medium
Wheat	0.1	None Expected	Low
Vegetables and Ground Fruit	0.6	None Expected	Medium
Other Grains	0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence	High density of vegetables and ground fruit use sites proximal to the Nooksack populations (middle fork, north fork, and south fork), the upper and lower Skagit populations, and the Sauk population. These populations have been determined essential to the recovery of the ESU per the 2007 Puget Sound Chinook Recovery Plan.	
Low	Medium		

Table 35. Growth risk hypothesis; Chinook salmon, Puget Sound ESU and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (5.8)	None Expected	Low
Right of Way	13.1	None Expected	Medium
Developed	9.6	None Expected	Medium
Fallow; CRP (cultivated)	0.1; 1.4 (1.8)	Low	Low
Other Crops	0.1	None Expected	Low
Corn	0.4	None Expected	Medium
Wheat	0.1	None Expected	Low
Vegetables and Ground Fruit	0.6	None Expected	Medium
Other Grains	0.1	None Expected	Low

Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).		
Risk	Confidence	High density of vegetables and ground fruit use sites proximal to the Nooksack populations (middle fork, north fork, and south fork), the upper and lower Skagit populations, and the Sauk population. These populations have been determined essential to the recovery of the ESU per the 2007 Puget Sound Chinook Recovery Plan.
Low	Medium	

Table 36. Prey risk hypothesis; Chinook salmon, Puget Sound ESU and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (5.8)	Low	Low
Right of Way	13.1	Low	Medium
Developed	9.6	Low	Medium
Fallow; CRP (cultivated)	0.1; 1.4 (1.8)	Medium	Low
Other Crops	0.1	Low	Low
Corn	0.4	Low	Medium
Wheat	0.1	Low	Low
Vegetables and Ground Fruit	0.6	Low	Medium
Other Grains	0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence	High density of vegetables and ground fruit use sites proximal to the Nooksack populations (middle fork, north fork, and south fork), the upper and lower Skagit populations, and the Sauk population. These populations have been determined essential to the recovery of the ESU per the 2007 Puget Sound Chinook Recovery Plan.	
Medium	Low		

Table 37. Effects analysis summary table: Chinook salmon, Puget Sound ESU and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		

Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium	Not modelled	No

Effects analysis summary: Puget Sound Chinook are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.7 Chinook Salmon, Sacramento River winter-run (*Oncorhynchus tshawytscha*)

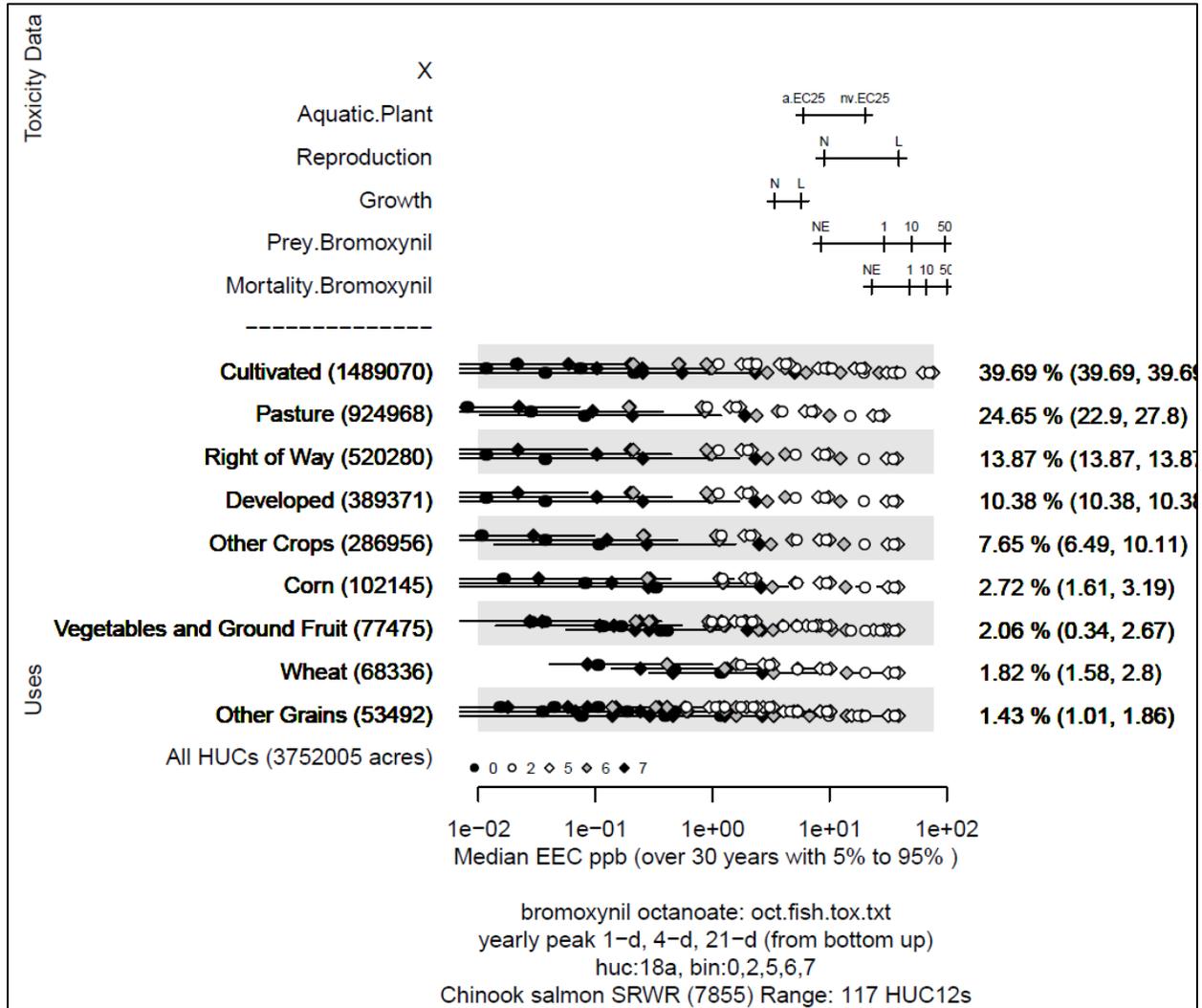


Figure 8. Effects analysis Risk-plot for Chinook salmon, Sacramento River winter-run ESU and bromoxynil

Table 38. Likelihood of exposure determination for Chinook salmon, Sacramento River winter-run ESU and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	2	yes	no	no	NA	3	Medium
Right of Way	NA	NA	NA	NA	NA	NA	NA
Developed	3	yes	no	no	NA	3	Medium
Cultivated	NA	NA	NA	NA	NA	NA	NA
Other Crops	3	yes	no	no	NA	3	Medium
Corn	2	yes	no	no	NA	3	Medium
Wheat	2	yes	no	no	NA	3	Medium
Vegetables and Ground Fruit	2	yes	no	no	NA	3	Medium
Other Grains	2	yes	no	no	NA	3	Medium

Table 39. Direct mortality risk hypothesis; Chinook salmon, Sacramento River winter-run ESU and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.1 (24.7)	Low	Medium
Right of Way	NA	NA	NA
Developed	10.4	Low	Medium
Cultivated	NA	NA	NA
Other Crops	7.7	Low	Medium
Corn	2.7	Low	Medium
Wheat	1.8	Low	Medium
Vegetables and Ground Fruit	2.1	Low	Medium
Other Grains	1.4	Low	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 40. Reproduction risk hypothesis; Chinook salmon, Sacramento River winter-run ESU and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.1 (24.7)	None Expected	Medium
Right of Way	NA	NA	NA
Developed	10.4	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	7.7	None Expected	Medium
Corn	2.7	None Expected	Medium
Wheat	1.8	None Expected	Medium
Vegetables and Ground Fruit	2.1	None Expected	Medium
Other Grains	1.4	None Expected	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 41. Growth risk hypothesis; Chinook salmon, Sacramento River winter-run ESU and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.1 (24.7)	None Expected	Medium
Right of Way	NA	NA	NA
Developed	10.4	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	7.7	None Expected	Medium
Corn	2.7	None Expected	Medium
Wheat	1.8	None Expected	Medium
Vegetables and Ground Fruit	2.1	None Expected	Medium
Other Grains	1.4	None Expected	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 42. Prey risk hypothesis; Chinook salmon, Sacramento River winter-run ESU and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.1 (24.7)	Low	Medium
Right of Way	NA	NA	NA
Developed	10.4	Low	Medium
Cultivated	NA	NA	NA
Other Crops	7.7	Low	Medium
Corn	2.7	Low	Medium
Wheat	1.8	Low	Medium
Vegetables and Ground Fruit	2.1	Low	Medium
Other Grains	1.4	Low	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk		Confidence	
Medium		Low	

Table 43. Effects analysis summary table: Chinook salmon, Sacramento River winter-run ESU and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium	Not modelled	No

Effects analysis summary: Sacramento River winter-run Chinook are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.8 Chinook Salmon, Snake River fall-run ESU (*Oncorhynchus tshawytscha*)

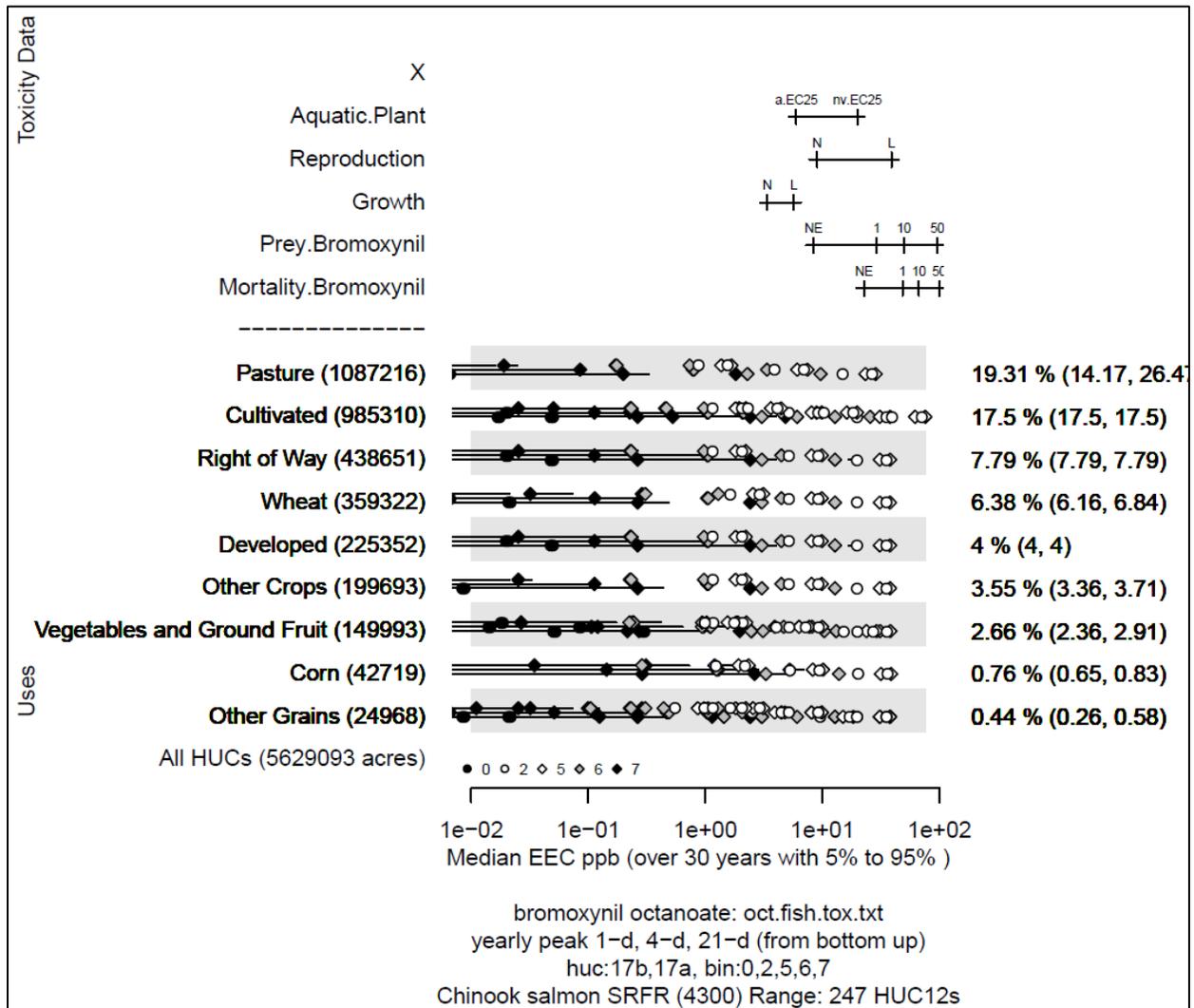


Figure 9. Effects analysis Risk-plot for Chinook salmon, Snake River fall-run ESU and bromoxynil

Table 44. Likelihood of exposure determination for Chinook salmon, Snake River fall-run ESU and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	2	yes	no	no	NA	3	Medium
Right of Way	3	yes	no	no	NA	3	Medium
Developed	2	yes	no	no	NA	3	Medium
Cultivated	2	yes	no	no	NA	3	Medium
Other Crops	2	yes	no	no	NA	3	Medium
Corn	1	yes	no	no	yes	3	Medium
Wheat	3	yes	no	no	NA	3	Medium
Vegetables and Ground Fruit	2	yes	no	no	NA	3	Medium
Other Grains	1	yes	no	no	no	3	Low

Table 45. Direct mortality risk hypothesis; Chinook salmon, Snake River fall-run ESU and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.2 (19.3)	Low	Medium
Right of Way	7.8	Low	Medium
Developed	4.0	Low	Medium
Fallow; CRP (cultivated)	3.5; 10.9 (17.5)	Medium	Medium
Other Crops	3.6	Low	Medium
Corn	0.8	Low	Medium
Wheat	6.4	Low	Medium
Vegetables and Ground Fruit	2.7	Low	Medium
Other Grains	0.4	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 46. Reproduction risk hypothesis; Chinook salmon, Snake River fall-run ESU and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure

Alfalfa (pasture)	1.2 (19.3)	None Expected	Low
Right of Way	7.8	None Expected	Medium
Developed	4.0	None Expected	Medium
Fallow; CRP (cultivated)	3.5; 10.9 (17.5)	None Expected	Low
Other Crops	3.6	None Expected	Medium
Corn	0.8	None Expected	Medium
Wheat	6.4	None Expected	Medium
Vegetables and Ground Fruit	2.7	None Expected	Medium
Other Grains	0.4	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 47. Growth risk hypothesis; Chinook salmon, Snake River fall-run ESU and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.2 (19.3)	None Expected	Low
Right of Way	7.8	None Expected	Medium
Developed	4.0	None Expected	Medium
Fallow; CRP (cultivated)	3.5; 10.9 (17.5)	Low	Low
Other Crops	3.6	None Expected	Medium
Corn	0.8	None Expected	Medium
Wheat	6.4	None Expected	Medium
Vegetables and Ground Fruit	2.7	None Expected	Medium
Other Grains	0.4	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 48. Prey risk hypothesis; Chinook salmon, Snake River fall-run ESU and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.2 (19.3)	Low	Low
Right of Way	7.8	Low	Medium

Developed	4.0	Low	Medium
Fallow; CRP (cultivated)	3.5; 10.9 (17.5)	Medium	Low
Other Crops	3.6	Low	Medium
Corn	0.8	Low	Medium
Wheat	6.4	Low	Medium
Vegetables and Ground Fruit	2.7	Low	Medium
Other Grains	0.4	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 49. Effects analysis summary table: Chinook salmon, Snake River fall-run ESU and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium	Not modelled	No

Effects analysis summary: Snake River fall-run Chinook are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for

Chinook salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.9 Chinook Salmon, Snake River spring/summer-run ESU (*Oncorhynchus tshawytscha*)

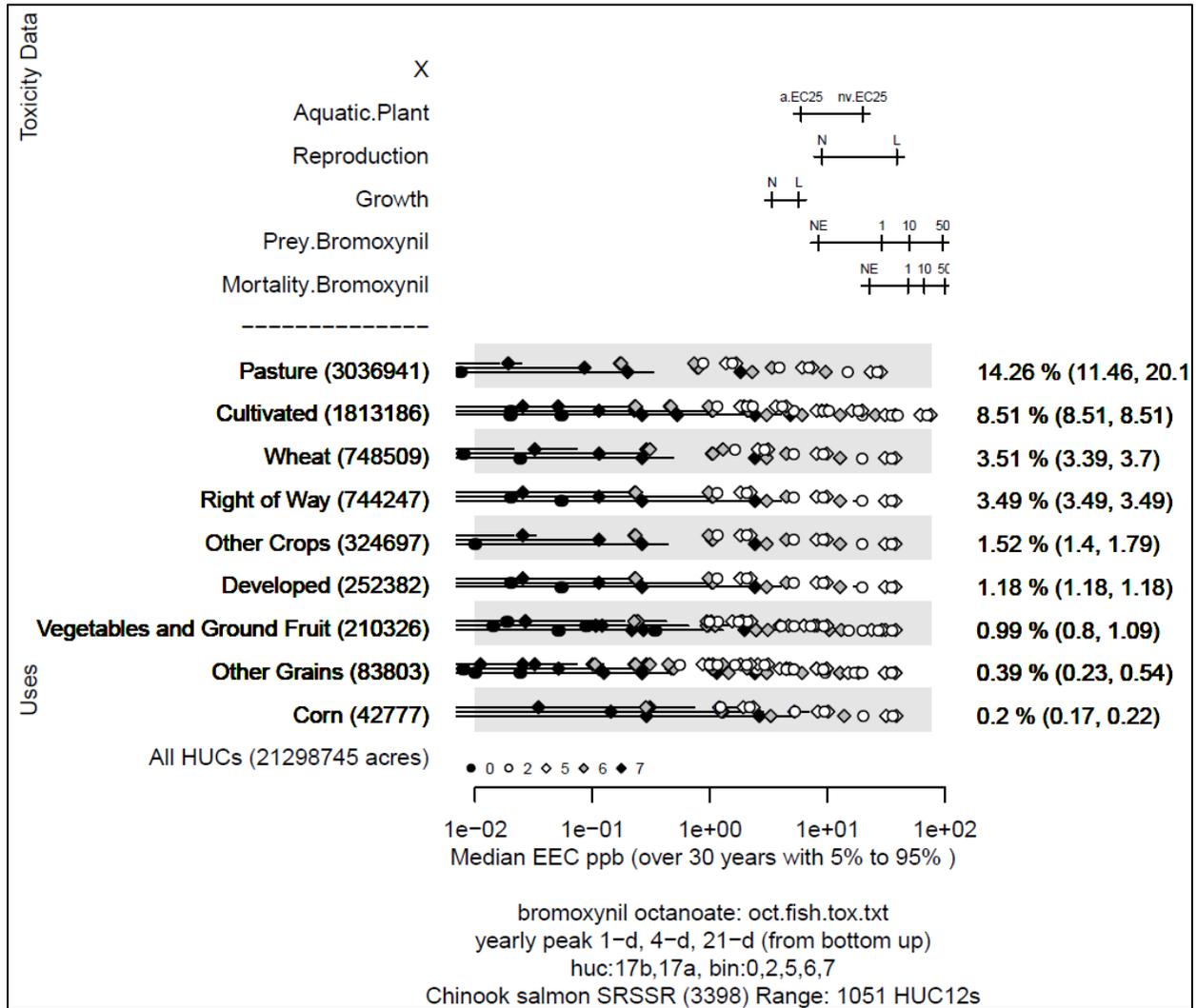


Figure 10. Effects analysis Risk-plot for Chinook salmon, Snake River spring/summer-run ESU and bromoxynil

Table 50. Likelihood of exposure determination for Chinook salmon, Snake River spring/summer-run ESU and bromoxynil

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low	
Right of Way	2	yes	no	no	NA	3	Medium	
Developed	2	yes	no	no	NA	3	Medium	
Cultivated	2	yes	no	no	NA	3	Medium	
Other Crops	2	yes	no	no	NA	3	Medium	
Corn	1	yes	no	no	yes	3	Medium	
Wheat	2	yes	no	no	NA	3	Medium	
Vegetables and Ground Fruit	1	yes	no	no	yes	3	Medium	
Other Grains	1	yes	no	no	yes	3	Medium	

Table 51. Direct mortality risk hypothesis; Chinook salmon, Snake River spring/summer-run ESU and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.9 (14.3)	Low	Low
Right of Way	3.5	Low	Medium
Developed	1.2	Low	Medium
Fallow; CRP (cultivated)	1.6; 9.8 (8.5)	Medium	Medium
Other Crops	1.5	Low	Medium
Corn	0.2	Low	Medium
Wheat	3.5	Low	Medium
Vegetables and Ground Fruit	1.0	Low	Medium
Other Grains	0.4	Low	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 52. Reproduction risk hypothesis; Chinook salmon, Snake River spring/summer-run ESU and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.9 (14.3)	None Expected	Low
Right of Way	3.5	None Expected	Medium
Developed	1.2	None Expected	Medium
Fallow; CRP (cultivated)	1.6; 9.8 (8.5)	None Expected	Medium
Other Crops	1.5	None Expected	Medium
Corn	0.2	None Expected	Medium
Wheat	3.5	None Expected	Medium
Vegetables and Ground Fruit	1.0	None Expected	Medium
Other Grains	0.4	None Expected	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 53. Growth risk hypothesis; Chinook salmon, Snake River spring/summer-run ESU and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.9 (14.3)	None Expected	Low
Right of Way	3.5	None Expected	Medium
Developed	1.2	None Expected	Medium
Fallow; CRP (cultivated)	1.6; 9.8 (8.5)	Low	Medium
Other Crops	1.5	None Expected	Medium
Corn	0.2	None Expected	Medium
Wheat	3.5	None Expected	Medium
Vegetables and Ground Fruit	1.0	None Expected	Medium
Other Grains	0.4	None Expected	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 54. Prey risk hypothesis; Chinook salmon, Snake River spring/summer-run ESU and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.9 (14.3)	Low	Low
Right of Way	3.5	Low	Medium
Developed	1.2	Low	Medium
Fallow; CRP (cultivated)	1.6; 9.8 (8.5)	Medium	Medium
Other Crops	1.5	Low	Medium
Corn	0.2	Low	Medium
Wheat	3.5	Low	Medium
Vegetables and Ground Fruit	1.0	Low	Medium
Other Grains	0.4	Low	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 55. Effects analysis summary table: Chinook salmon, Snake River spring/summer-run ESU and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce	Low	Medium	Not modelled	No

productivity via impairments to reproduction.				
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Effects analysis summary: Snake River spring/summer-run Chinook are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.10 Chinook salmon, Upper Columbia River spring-run ESU (*Oncorhynchus tshawytscha*)

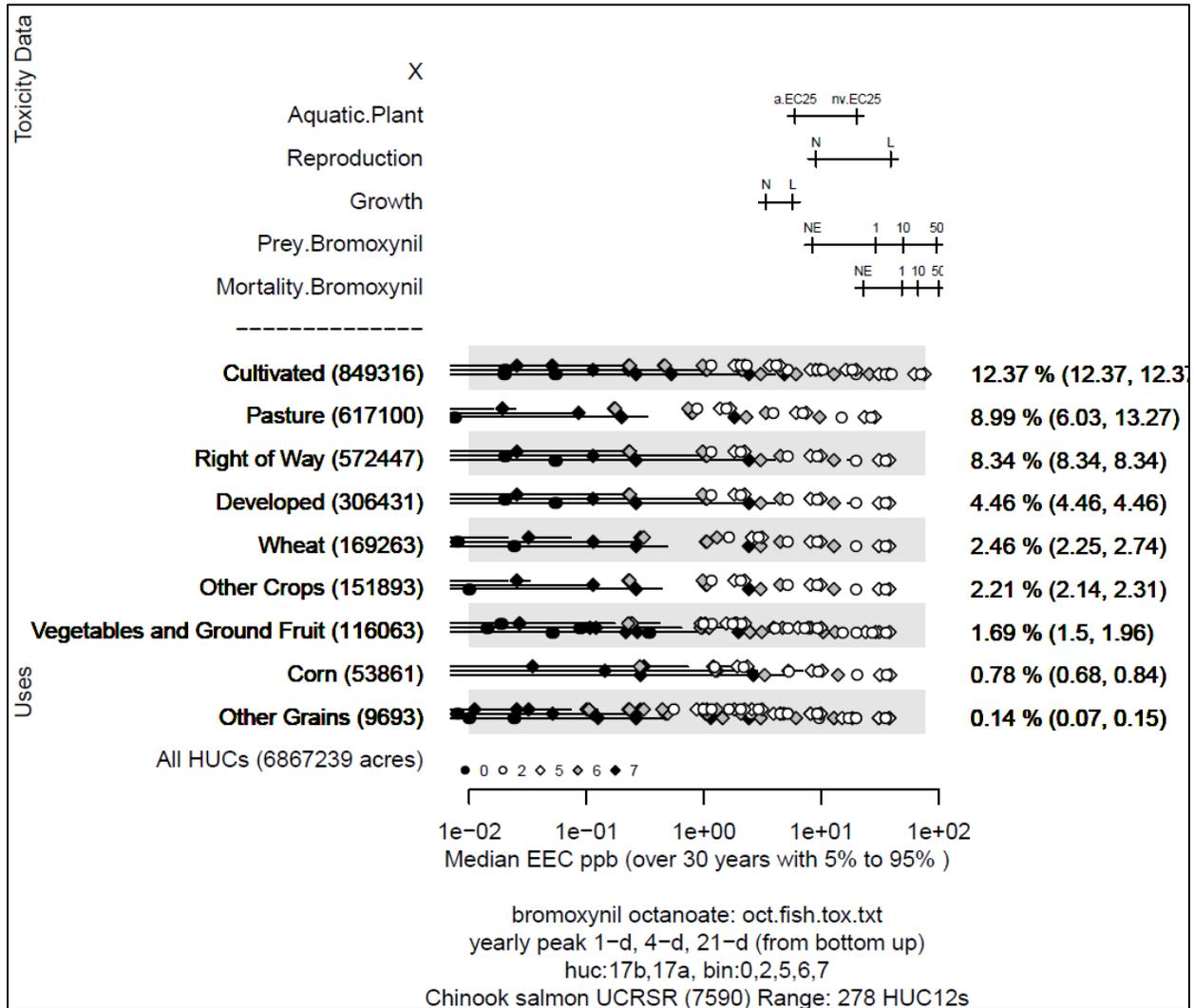


Figure 11. Effects analysis Risk-plot for Chinook salmon, upper Columbia spring-run ESU and bromoxynil

Table 56. Likelihood of exposure determination for Chinook salmon, upper Columbia spring-run ESU and bromoxynil

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	2	yes	no	no	NA	3	Medium	
Right of Way	3	yes	no	no	NA	3	Medium	
Developed	2	yes	no	no	NA	3	Medium	
Cultivated	2	yes	no	no	NA	3	Medium	
Other Crops	2	yes	no	no	NA	3	Medium	
Corn	1	yes	no	no	yes	3	Medium	
Wheat	2	yes	no	no	NA	3	Medium	
Vegetables and Ground Fruit	2	yes	no	no	NA	3	Medium	
Other Grains	1	yes	no	no	no	3	Low	

Table 57. Direct mortality risk hypothesis; Chinook salmon, upper Columbia spring-run ESU and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.2 (9.0)	Low	Medium
Right of Way	8.3	Low	Medium
Developed	4.5	Low	Medium
Fallow; CRP (cultivated)	2.8; 10.0 (12.4)	Medium	Medium
Other Crops	2.2	Low	Medium
Corn	0.8	Low	Medium
Wheat	2.5	Low	Medium
Vegetables and Ground Fruit	1.7	Low	Medium
Other Grains	0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 58. Reproduction risk hypothesis; Chinook salmon, upper Columbia spring-run ESU and bromoxynil

Endpoint: Reproduction

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.2 (9.0)	None Expected	Medium
Right of Way	8.3	None Expected	Medium
Developed	4.5	None Expected	Medium
Fallow; CRP (cultivated)	2.8; 10.0 (12.4)	None Expected	Medium
Other Crops	2.2	None Expected	Medium
Corn	0.8	None Expected	Medium
Wheat	2.5	None Expected	Medium
Vegetables and Ground Fruit	1.7	None Expected	Medium
Other Grains	0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 59. Growth risk hypothesis; Chinook salmon, upper Columbia spring-run ESU and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.2 (9.0)	None Expected	Medium
Right of Way	8.3	None Expected	Medium
Developed	4.5	None Expected	Medium
Fallow; CRP (cultivated)	2.8; 10.0 (12.4)	Low	Medium
Other Crops	2.2	None Expected	Medium
Corn	0.8	None Expected	Medium
Wheat	2.5	None Expected	Medium
Vegetables and Ground Fruit	1.7	None Expected	Medium
Other Grains	0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 60. Prey risk hypothesis; Chinook salmon, upper Columbia spring-run ESU and bromoxynil

Endpoint: Prey

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.2 (9.0)	Low	Medium
Right of Way	8.3	Low	Medium
Developed	4.5	Low	Medium
Fallow; CRP (cultivated)	2.8; 10.0 (12.4)	Medium	Medium
Other Crops	2.2	Low	Medium
Corn	0.8	Low	Medium
Wheat	2.5	Low	Medium
Vegetables and Ground Fruit	1.7	Low	Medium
Other Grains	0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 61. Effects analysis summary table: Chinook salmon, upper Columbia spring-run ESU and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium	Not modelled	No

Effects analysis summary: Upper Columbia spring-run Chinook are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.11 Chinook Salmon, Upper Willamette River ESU (*Oncorhynchus tshawytscha*)

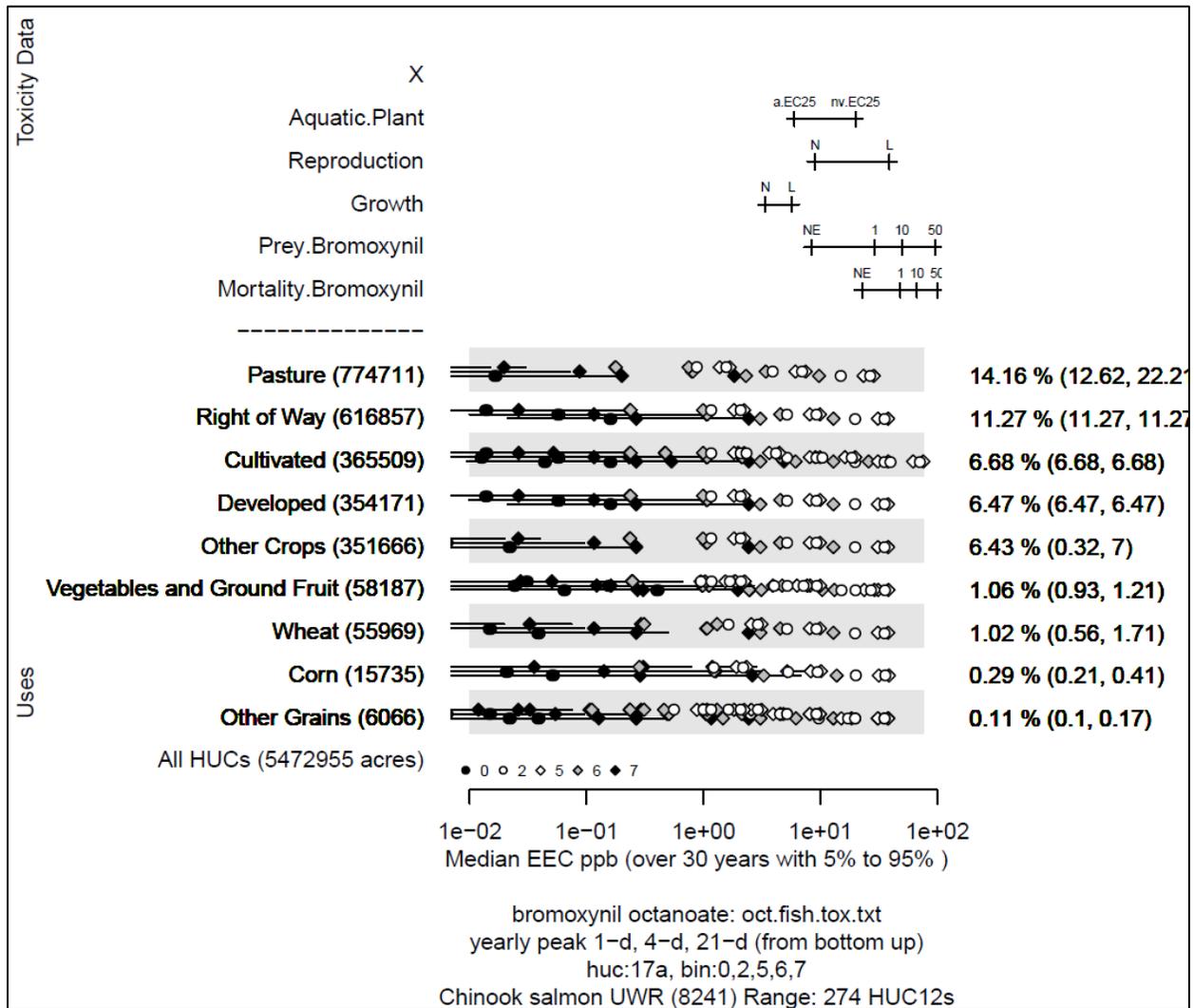


Figure 12. Effects analysis Risk-plot for Chinook salmon, upper Willamette River ESU and bromoxynil

Table 62. Likelihood of exposure determination for Chinook salmon, upper Willamette River ESU and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low
Right of Way	3	yes	no	no	NA	3	Medium
Developed	3	yes	no	no	NA	3	Medium
Cultivated	1	yes	no	no	NA	3	Low
Other Crops	3	yes	no	no	NA	3	Medium
Corn	1	yes	no	no	no	3	Low
Wheat	2	yes	no	no	NA	3	Medium
Vegetables and Ground Fruit	2	yes	no	no	NA	3	Medium
Other Grains	1	yes	no	no	no	3	Low

Table 63. Direct mortality risk hypothesis; Chinook salmon, upper Willamette River ESU and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (14.2)	Low	Low
Right of Way	11.3	Low	Medium
Developed	6.5	Low	Medium
Fallow; CRP (cultivated)	0.2; 0.6 (6.7)	Medium	Low
Other Crops	6.4	Low	Medium
Corn	0.3	Low	Low
Wheat	1.0	Low	Medium
Vegetables and Ground Fruit	1.1	Low	Medium
Other Grains	0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 64. Reproduction risk hypothesis; Chinook salmon, upper Willamette River ESU and bromoxynil

Endpoint: Reproduction

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (14.2)	None Expected	Low
Right of Way	11.3	None Expected	Medium
Developed	6.5	None Expected	Medium
Fallow; CRP (cultivated)	0.2; 0.6 (6.7)	None Expected	Low
Other Crops	6.4	None Expected	Medium
Corn	0.3	None Expected	Low
Wheat	1.0	None Expected	Medium
Vegetables and Ground Fruit	1.1	None Expected	Medium
Other Grains	0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 65. Growth risk hypothesis; Chinook salmon, upper Willamette River ESU and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (14.2)	None Expected	Low
Right of Way	11.3	None Expected	Medium
Developed	6.5	None Expected	Medium
Fallow; CRP (cultivated)	0.2; 0.6 (6.7)	Low	Low
Other Crops	6.4	None Expected	Medium
Corn	0.3	None Expected	Low
Wheat	1.0	None Expected	Medium
Vegetables and Ground Fruit	1.1	None Expected	Medium
Other Grains	0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 66. Prey risk hypothesis; Chinook salmon, upper Willamette River ESU and bromoxynil

Endpoint: Prey

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (14.2)	Low	Low
Right of Way	11.3	Low	Medium
Developed	6.5	Low	Medium
Fallow; CRP (cultivated)	0.2; 0.6 (6.7)	Medium	Low
Other Crops	6.4	Low	Medium
Corn	0.3	Low	Low
Wheat	1.0	Low	Medium
Vegetables and Ground Fruit	1.1	Low	Medium
Other Grains	0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 67. Effects analysis summary table: Chinook salmon, upper Willamette River ESU and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium	Not modelled	No

Effects analysis summary: Upper Willamette River Chinook are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.12 Coho Salmon, Central California Coast ESU (*Oncorhynchus kisutch*)

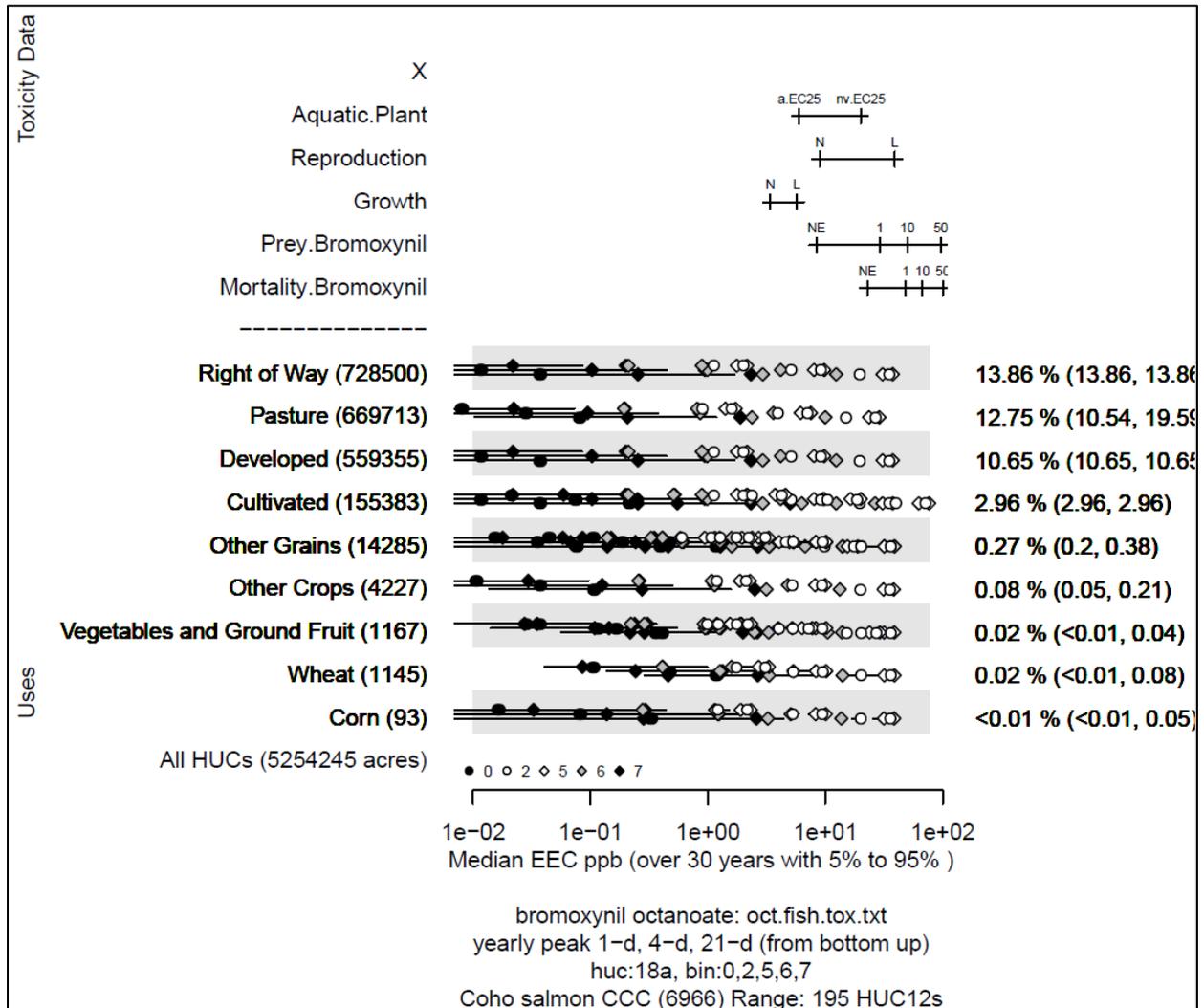


Figure 13. Effects analysis Risk-plot for Coho salmon, Central California Coast ESU and bromoxynil

Table 68. Likelihood of exposure determination for Coho salmon, Central California Coast ESU and bromoxynil

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low	
Right of Way	NA	NA	NA	NA	NA	NA	NA	
Developed	3	yes	no	no	NA	3	Medium	
Cultivated	NA	NA	NA	NA	NA	NA	NA	
Other Crops	1	yes	no	no	no	3	Low	
Corn	1	yes	no	no	no	3	Low	
Wheat	1	yes	no	no	no	3	Low	
Vegetables and Ground Fruit	1	yes	no	no	no	3	Low	
Other Grains	1	yes	no	no	no	3	Low	

Table 69. Direct mortality risk hypothesis; Coho salmon, Central California Coast ESU and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.2 (12.8)	Low	Low
Right of Way	NA	NA	NA
Developed	10.7	Low	Medium
Cultivated	NA	NA	NA
Other Crops	0.1	Low	Low
Corn	<0.1	Low	Low
Wheat	<0.1	Low	Low
Vegetables and Ground Fruit	<0.1	Low	Low
Other Grains	0.3	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Low	Medium		

Table 70. Reproduction risk hypothesis; Coho salmon, Central California Coast ESU and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.2 (12.8)	None Expected	Low
Right of Way	NA	NA	NA
Developed	10.7	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	0.1	None Expected	Low
Corn	<0.1	None Expected	Low
Wheat	<0.1	None Expected	Low
Vegetables and Ground Fruit	<0.1	None Expected	Low
Other Grains	0.3	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 71. Growth risk hypothesis; Coho salmon, Central California Coast ESU and bromoxynil; Juveniles

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.2 (12.8)	None Expected	Low
Right of Way	NA	NA	NA
Developed	10.7	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	0.1	None Expected	Low
Corn	<0.1	None Expected	Low
Wheat	<0.1	None Expected	Low
Vegetables and Ground Fruit	<0.1	None Expected	Low
Other Grains	0.3	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

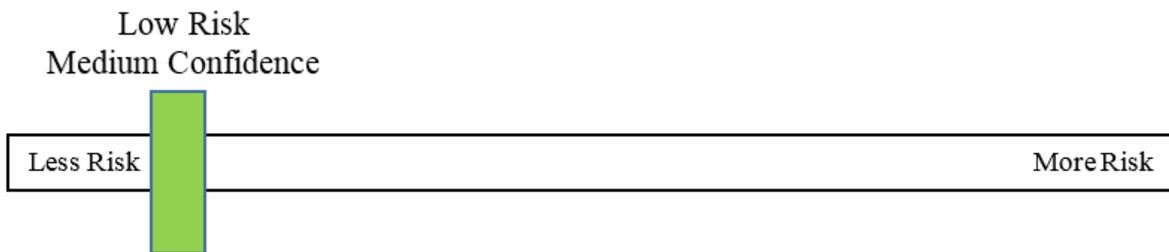
Table 72. Prey risk hypothesis; Coho salmon, Central California Coast ESU and bromoxynil; Juveniles

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.2 (12.8)	Low	Low
Right of Way	NA	NA	NA
Developed	10.7	Low	Medium
Cultivated	NA	NA	NA
Other Crops	0.1	Low	Low
Corn	<0.1	Low	Low
Wheat	<0.1	Low	Low
Vegetables and Ground Fruit	<0.1	Low	Low
Other Grains	0.3	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk		Confidence	
Low		Medium	

Table 73. Effects analysis summary table: Coho salmon, Central California Coast ESU and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Low	Medium	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium	Not modelled	No

Effects analysis summary: Central California Coast Coho ESU are not anticipated to experience reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in prey availability. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for coho salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is low and the confidence associated with that risk is medium.



12.2.13 Coho Salmon, Lower Columbia River ESU (*Oncorhynchus kisutch*)

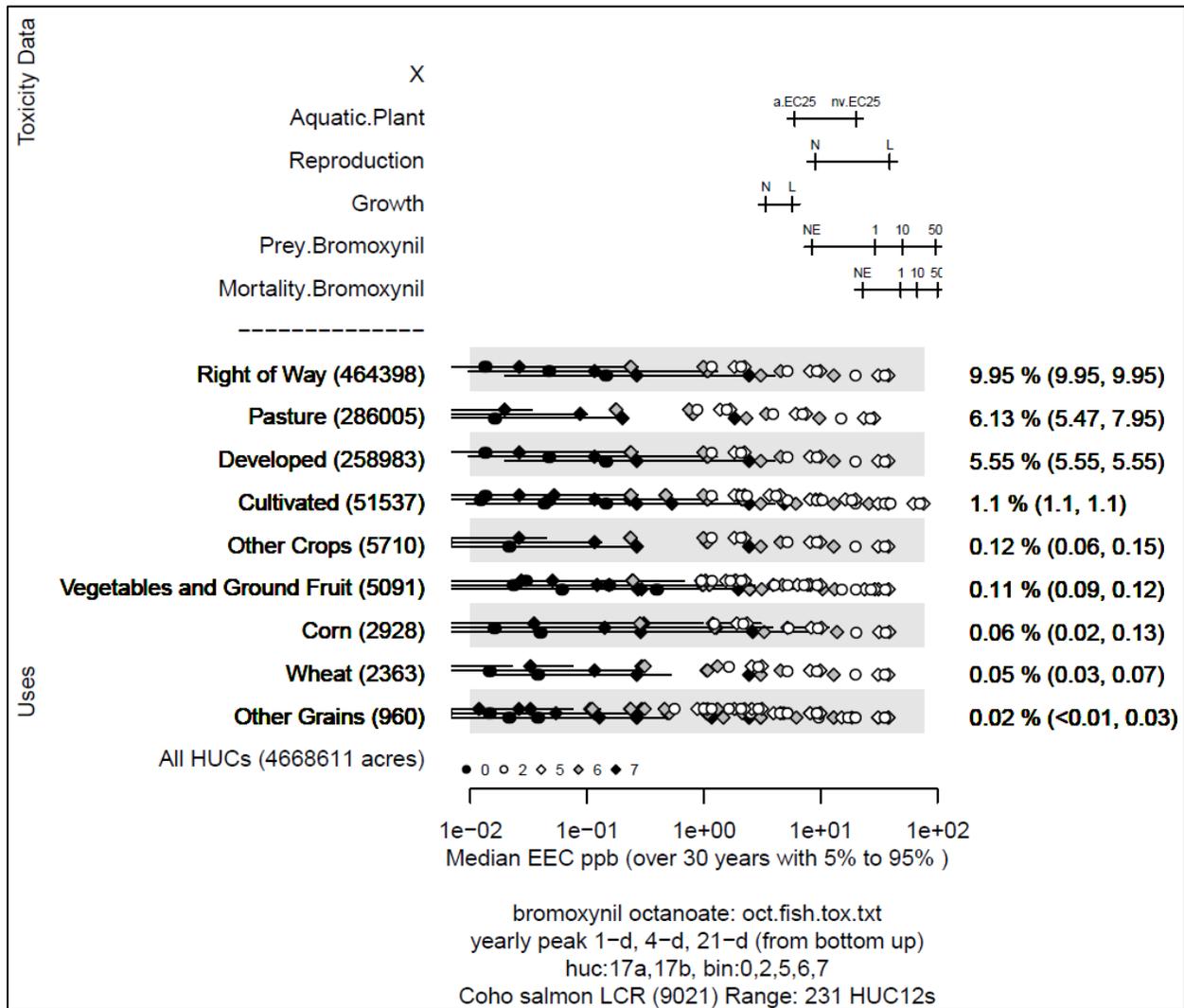


Figure 14. Effects analysis Risk-plot for Coho salmon, lower Columbia River ESU and bromoxynil

Table 74. Likelihood of exposure determination for Coho salmon, lower Columbia River ESU and bromoxynil

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low	
Right of Way	3	yes	no	no	NA	3	Medium	
Developed	3	yes	no	no	NA	3	Medium	
Cultivated	1	yes	no	no	NA	3	Low	
Other Crops	1	yes	no	no	yes	3	Medium	
Corn	1	yes	no	no	yes	3	Medium	
Wheat	1	yes	no	no	yes	3	Medium	
Vegetables and Ground Fruit	1	yes	no	no	yes	3	Medium	
Other Grains	1	yes	no	no	no	3	Low	

Life Stage: Adults (full-range)

Table 75. Direct mortality risk hypothesis; Coho salmon, lower Columbia River ESU and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (6.1)	Low	Low
Right of Way	10.0	Low	Medium
Developed	5.6	Low	Medium
Fallow; CRP (cultivated)	<0.1; 0.8 (1.1)	Medium	Low
Other Crops	0.1	Low	Medium
Corn	0.1	Low	Medium
Wheat	0.1	Low	Medium
Vegetables and Ground Fruit	0.1	Low	Medium
Other Grains	<0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 76. Reproduction risk hypothesis; Coho salmon, lower Columbia River ESU and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (6.1)	None Expected	Low
Right of Way	10.0	None Expected	Medium
Developed	5.6	None Expected	Medium
Fallow; CRP (cultivated)	<0.1; 0.8 (1.1)	None Expected	Low
Other Crops	0.1	None Expected	Medium
Corn	0.1	None Expected	Medium
Wheat	0.1	None Expected	Medium
Vegetables and Ground Fruit	0.1	None Expected	Medium
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk		Confidence	
Low		Medium	

Table 77. Growth risk hypothesis; Coho salmon, lower Columbia River ESU and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (6.1)	None Expected	Low
Right of Way	10.0	None Expected	Medium
Developed	5.6	None Expected	Medium
Fallow; CRP (cultivated)	<0.1; 0.8 (1.1)	Low	Low
Other Crops	0.1	None Expected	Medium
Corn	0.1	None Expected	Medium
Wheat	0.1	None Expected	Medium
Vegetables and Ground Fruit	0.1	None Expected	Medium
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk		Confidence	
Low		Medium	

Table 78. Prey risk hypothesis; Coho salmon, lower Columbia River ESU and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (6.1)	Low	Low
Right of Way	10.0	Low	Medium
Developed	5.6	Low	Medium
Fallow; CRP (cultivated)	<0.1; 0.8 (1.1)	Medium	Low
Other Crops	0.1	Low	Medium
Corn	0.1	Low	Medium
Wheat	0.1	Low	Medium
Vegetables and Ground Fruit	0.1	Low	Medium
Other Grains	<0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 79. Effects analysis summary table: Coho salmon, lower Columbia River ESU and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium	Not modelled	No

Effects analysis summary: Lower Columbia River Coho are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for coho salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.14 Coho Salmon, Oregon Coast ESU (*Oncorhynchus kisutch*)

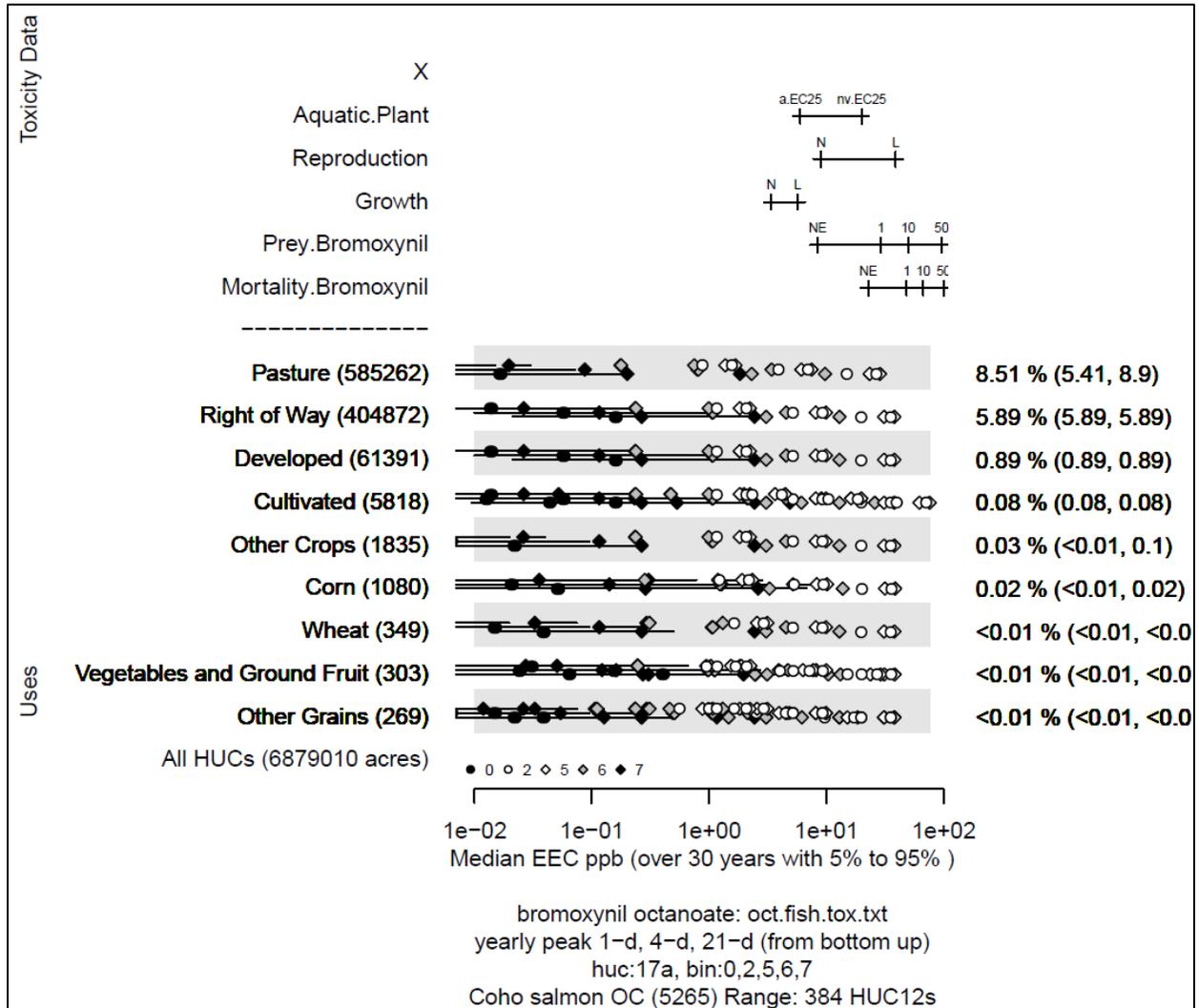


Figure 15. Effects analysis Risk-plot for Coho salmon, Oregon coast ESU and bromoxynil

Table 80. Likelihood of exposure determination for Coho salmon, Oregon coast ESU and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low
Right of Way	3	yes	no	no	NA	3	Medium
Developed	1	yes	no	no	no	3	Low
Cultivated	1	yes	no	no	NA	3	Low
Other Crops	1	yes	no	no	no	3	Low
Corn	1	yes	no	no	no	3	Low
Wheat	1	yes	no	no	no	3	Low
Vegetables and Ground Fruit	1	yes	no	no	no	3	Low
Other Grains	1	yes	no	no	no	3	Low

Table 81. Direct mortality risk hypothesis; Coho salmon, Oregon coast ESU and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	<0.1 (8.5)	Low	Low
Right of Way	5.9	Low	Medium
Developed	0.9	Low	Low
Fallow; CRP (cultivated)	<0.1; 0.8 (0.1)	Medium	Low
Other Crops	<0.1	Low	Low
Corn	<0.1	Low	Low
Wheat	<0.1	Low	Low
Vegetables and Ground Fruit	<0.1	Low	Low
Other Grains	<0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Low	Medium		

Table 82. Reproduction risk hypothesis; Coho salmon, Oregon coast ESU and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	<0.1 (8.5)	None Expected	Low
Right of Way	5.9	None Expected	Medium
Developed	0.9	None Expected	Low

Fallow; CRP (cultivated)	<0.1; 0.8 (0.1)	None Expected	Low
Other Crops	<0.1	None Expected	Low
Corn	<0.1	None Expected	Low
Wheat	<0.1	None Expected	Low
Vegetables and Ground Fruit	<0.1	None Expected	Low
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 83. Growth risk hypothesis; Coho salmon, Oregon coast ESU and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	<0.1 (8.5)	None Expected	Low
Right of Way	5.9	None Expected	Medium
Developed	0.9	None Expected	Low
Fallow; CRP (cultivated)	<0.1; 0.8 (0.1)	Low	Low
Other Crops	<0.1	None Expected	Low
Corn	<0.1	None Expected	Low
Wheat	<0.1	None Expected	Low
Vegetables and Ground Fruit	<0.1	None Expected	Low
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 84. Prey risk hypothesis; Coho salmon, Oregon coast ESU and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	<0.1 (8.5)	Low	Low
Right of Way	5.9	Low	Medium
Developed	0.9	Low	Low
Fallow; CRP (cultivated)	<0.1; 0.8 (0.1)	Medium	Low

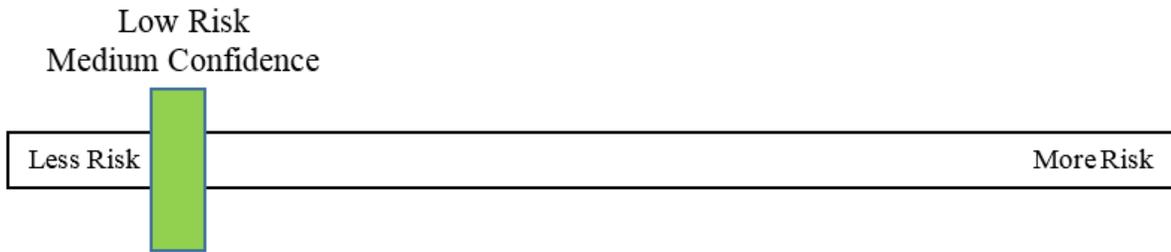
Other Crops	<0.1	Low	Low
Corn	<0.1	Low	Low
Wheat	<0.1	Low	Low
Vegetables and Ground Fruit	<0.1	Low	Low
Other Grains	<0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 85. Effects analysis summary table: Coho salmon, Oregon coast ESU and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Low	Medium	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium	Not modelled	No

Effects analysis summary: Oregon Coast Coho are not anticipated to experience reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in prey availability. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for coho salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience

increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is low and the confidence associated with that risk is medium.



12.2.15 Coho Salmon, Southern Oregon/Northern California Coast ESU (*Oncorhynchus kisutch*)

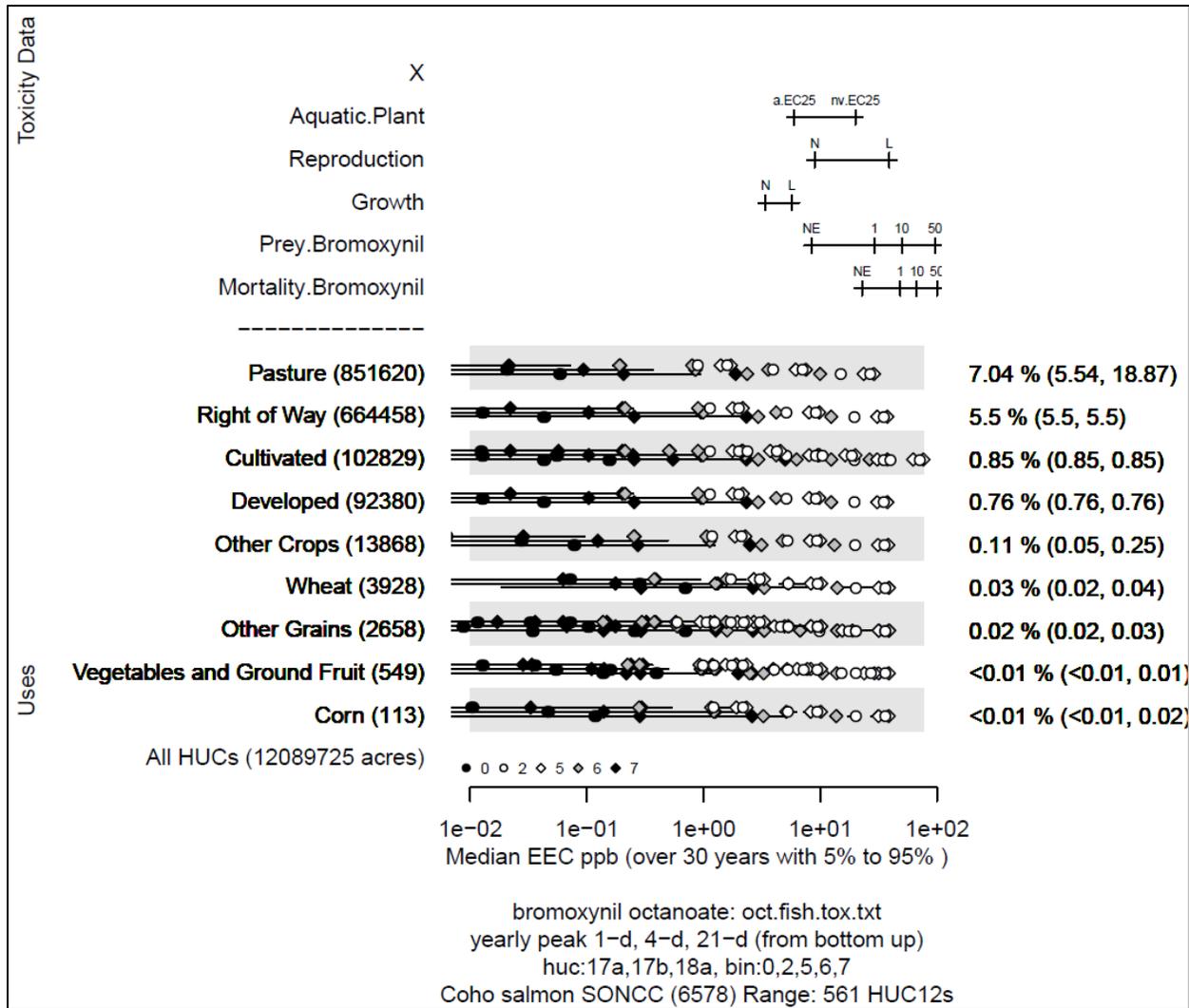


Figure 16. Effects analysis Risk-plot for Coho salmon, southern Oregon/northern California coast ESU and bromoxynil

Table 86. Likelihood of exposure determination for Coho salmon, southern Oregon/northern California coast ESU and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low
Right of Way	3	yes	no	no	NA	3	Low
Developed	1	yes	no	no	no	3	Low
Cultivated	1	yes	no	no	NA	3	Low
Other Crops	1	yes	no	no	yes	3	Medium
Corn	1	yes	no	no	no	3	Low
Wheat	1	yes	no	no	no	3	Low
Vegetables and Ground Fruit	1	yes	no	no	no	3	Low
Other Grains	1	yes	no	no	no	3	Low

Table 87. Direct mortality risk hypothesis; Coho salmon, southern Oregon/northern California coast ESU and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.4 (7.0)	Low	Low
Right of Way	5.5	Low	Low*
Developed	0.8	Low	Low
Fallow; CRP (cultivated)	<0.1; 0.1 (0.9)	Medium	Low*
Other Crops	0.1	Low	Medium
Corn	<0.1	Low	Low
Wheat	<0.1	Low	Low
Vegetables and Ground Fruit	<0.1	Low	Low
Other Grains	<0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence	High density of use sites proximal to the Shasta River population. This population has been determined essential to the recovery of the ESU per the 2014 SONCC Coho Recovery Plan. *Use is not authorized in California for right of way, CRP, or fallow land; likelihood of exposure rankings only reflect the likelihood	
Low	Medium		

		of exposure to these uses in the Oregon portion of the species range.
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Table 88. Reproduction risk hypothesis; Coho salmon, southern Oregon/northern California coast ESU and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.4 (7.0)	None Expected	Low
Right of Way	5.5	None Expected	Low*
Developed	0.8	None Expected	Low
Fallow; CRP (cultivated)	<0.1; 0.1 (0.9)	None Expected	Low*
Other Crops	0.1	None Expected	Medium
Corn	<0.1	None Expected	Low
Wheat	<0.1	None Expected	Low
Vegetables and Ground Fruit	<0.1	None Expected	Low
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence	High density of use sites proximal to the Shasta River population. This population has been determined essential to the recovery of the ESU per the 2014 SONCC Coho Recovery Plan. *Use is not authorized in California for right of way, CRP, or fallow land; likelihood of exposure rankings only reflect the likelihood of exposure to these uses in the Oregon portion of the species range.	
Low	Medium		

Table 89. Growth risk hypothesis; Coho salmon, southern Oregon/northern California coast ESU and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.4 (7.0)	None Expected	Low
Right of Way	5.5	None Expected	Low*
Developed	0.8	None Expected	Low
Fallow; CRP (cultivated)	<0.1; 0.1 (0.9)	Low	Low*
Other Crops	0.1	None Expected	Medium
Corn	<0.1	None Expected	Low

Wheat	<0.1	None Expected	Low
Vegetables and Ground Fruit	<0.1	None Expected	Low
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence	High density of use sites proximal to the Shasta River population. This population has been determined essential to the recovery of the ESU per the 2014 SONCC Coho Recovery Plan. *Use is not authorized in California for right of way, CRP, or fallow land; likelihood of exposure rankings only reflect the likelihood of exposure to these uses in the Oregon portion of the species range.	
Low	Medium		

Table 90. Prey risk hypothesis; Coho salmon, southern Oregon/northern California coast ESU and bromoxynil

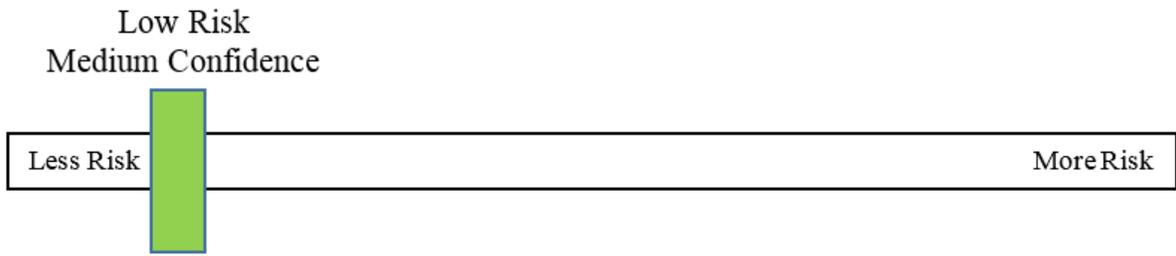
Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.4 (7.0)	Low	Low
Right of Way	5.5	Low	Low*
Developed	0.8	Low	Low
Fallow; CRP (cultivated)	<0.1; 0.1 (0.9)	Medium	Low*
Other Crops	0.1	Low	Medium
Corn	<0.1	Low	Low
Wheat	<0.1	Low	Low
Vegetables and Ground Fruit	<0.1	Low	Low
Other Grains	<0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence	High density of use sites proximal to the Shasta River population. This population has been determined essential to the recovery of the ESU per the 2014 SONCC Coho Recovery Plan. *Use is not authorized in California for right of way, CRP, or fallow land; likelihood of exposure rankings only reflect the likelihood	
Low	Medium		

		of exposure to these uses in the Oregon portion of the species range.
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Table 91. Effects analysis summary table: Coho salmon, southern Oregon/northern California coast ESU and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Low	Medium	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium	Not modelled	No

Effects analysis summary: Southern Oregon/northern California Coast Coho are not anticipated to experience reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in prey availability. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for coho salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is low and the confidence associated with that risk is medium.



12.2.16 Sockeye Salmon, Ozette Lake ESU (*Oncorhynchus nerka*)

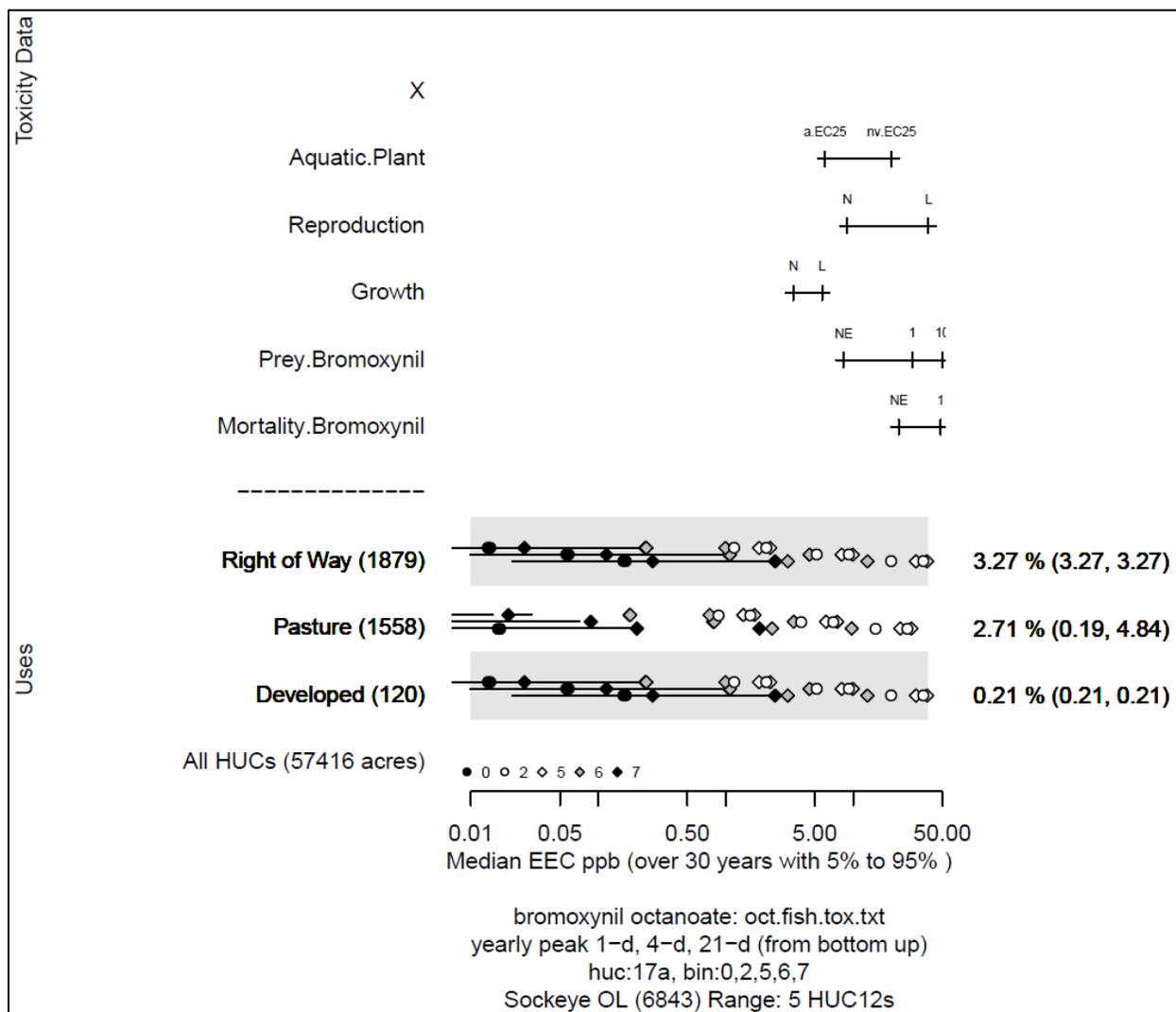


Figure 17. Effects analysis Risk-plot for Sockeye salmon, Ozette Lake ESU and bromoxynil

Table 92. Likelihood of exposure determination for Sockeye salmon, Ozette Lake ESU and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low
Right of Way	2	yes	no	no	NA	3	Medium
Developed	1	yes	no	no	no	3	Low

Table 93. Direct mortality risk hypothesis; Sockeye salmon, Ozette Lake ESU and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (2.7)	Low	Low
Right of Way	3.3	Low	Medium
Developed	0.2	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk		Confidence	
Low		Medium	

Table 94. Reproduction risk hypothesis; Sockeye salmon, Ozette Lake ESU and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (2.7)	None Expected	Low
Right of Way	3.3	None Expected	Medium
Developed	0.2	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk		Confidence	
Low		Medium	

Table 95. Growth risk hypothesis; Sockeye salmon, Ozette Lake ESU and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (2.7)	None Expected	Low
Right of Way	3.3	None Expected	Medium
Developed	0.2	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk		Confidence	
Low		Medium	

Table 96. Prey risk hypothesis; Sockeye salmon, Ozette Lake ESU and bromoxynil

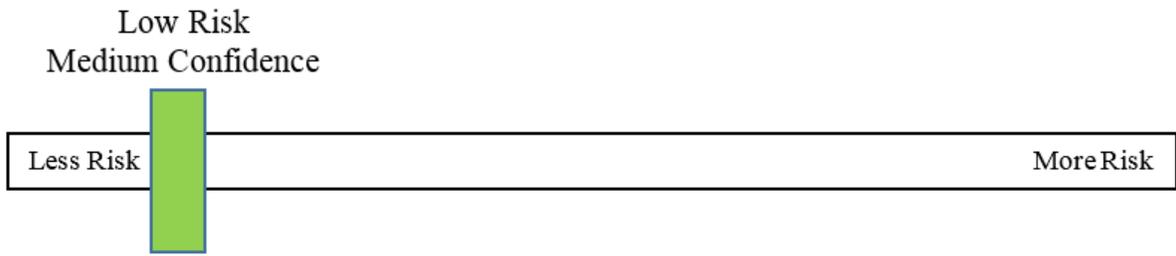
Endpoint: Prey

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (2.7)	Low	Low
Right of Way	3.3	Low	Medium
Developed	0.2	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 97. Effects analysis summary table: Sockeye salmon, Ozette Lake ESU and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Low	Medium	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium	Not modelled	No

Effects analysis summary: Ozette Lake sockeye salmon are not anticipated to experience reductions in abundance, reproduction, or growth from exposure to bromoxynil. No changes in population growth rate occurred at the 1% mortality level for any model runs. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in prey availability. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is low and the confidence associated with that risk is medium.



12.2.17 Sockeye Salmon, Snake River ESU (*Oncorhynchus nerka*)

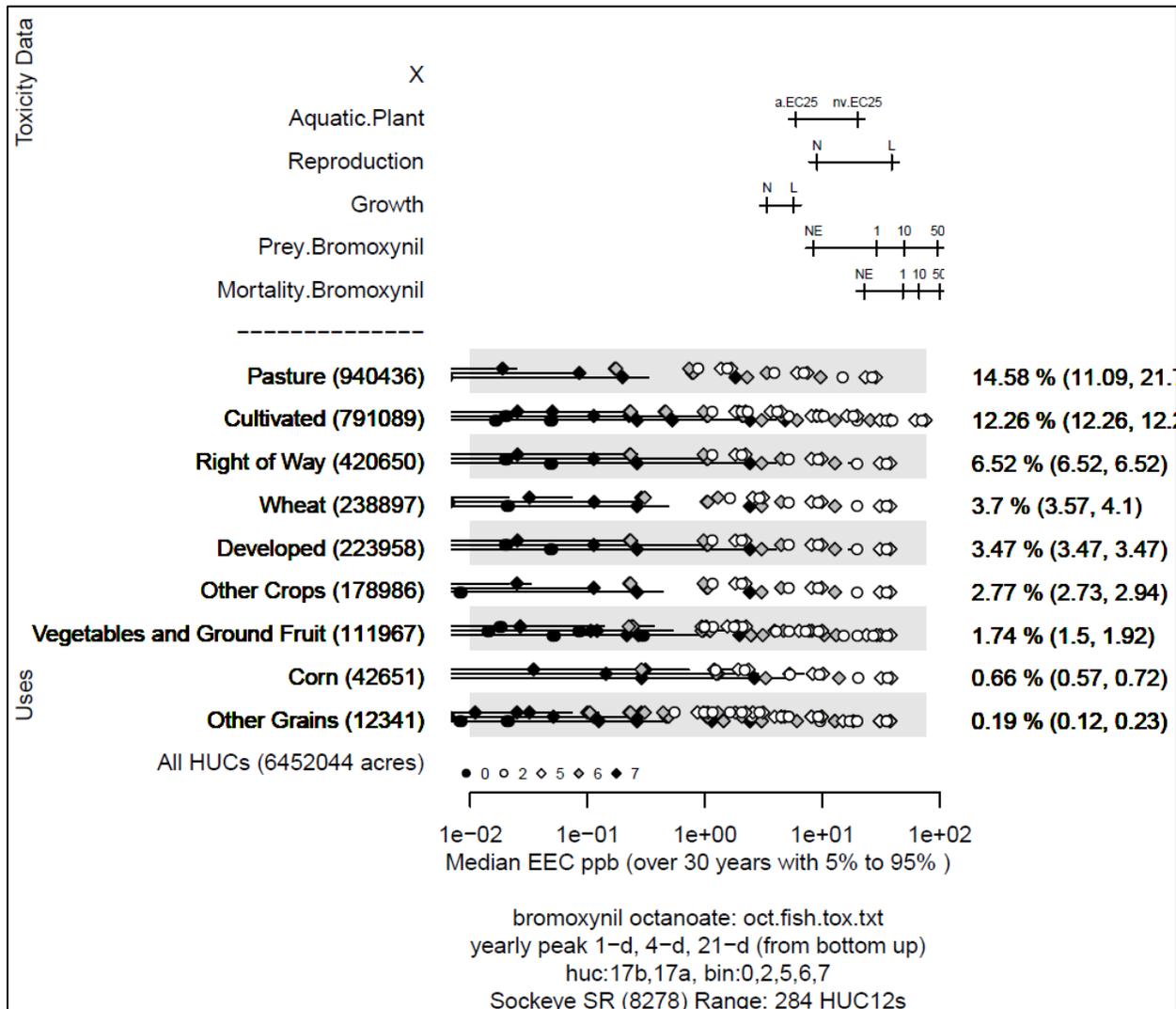


Figure 18. Effects analysis Risk-plot for Sockeye salmon, Snake River ESU and bromoxynil; full range

Table 98. Likelihood of exposure determination for Sockeye salmon, Snake River ESU and bromoxynil

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low	
Right of Way	3	yes	no	no	NA	3	Medium	
Developed	2	yes	no	no	NA	3	Medium	
Cultivated	2	yes	no	no	NA	3	Medium	
Other Crops	2	yes	no	no	NA	3	Medium	
Corn	1	yes	no	no	yes	3	Medium	
Wheat	2	yes	no	no	NA	3	Medium	
Vegetables and Ground Fruit	2	yes	no	no	NA	3	Medium	
Other Grains	1	yes	no	no	no	3	Low	

Table 99. Direct mortality risk hypothesis; Sockeye salmon, Snake River ESU and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.9 (14.6)	Low	Low
Right of Way	6.5	Low	Medium
Developed	3.5	Low	Medium
Fallow; CRP (cultivated)	2.4; 10.2 (12.3)	Medium	Medium
Other Crops	2.8	Low	Medium
Corn	0.7	Low	Medium
Wheat	3.7	Low	Medium
Vegetables and Ground Fruit	1.7	Low	Medium
Other Grains	0.2	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 100. Prey risk hypothesis; Sockeye salmon, Snake River ESU and bromoxynil

Endpoint: Prey

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.9 (14.6)	Low	Low
Right of Way	6.5	Low	Medium
Developed	3.5	Low	Medium
Fallow; CRP (cultivated)	2.4; 10.2 (12.3)	Medium	Medium
Other Crops	2.8	Low	Medium
Corn	0.7	Low	Medium
Wheat	3.7	Low	Medium
Vegetables and Ground Fruit	1.7	Low	Medium
Other Grains	0.2	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 101. Growth risk hypothesis; Sockeye salmon, Snake River ESU and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.9 (14.6)	None Expected	Low
Right of Way	6.5	None Expected	Medium
Developed	3.5	None Expected	Medium
Fallow; CRP (cultivated)	2.4; 10.2 (12.3)	Low	Medium
Other Crops	2.8	None Expected	Medium
Corn	0.7	None Expected	Medium
Wheat	3.7	None Expected	Medium
Vegetables and Ground Fruit	1.7	None Expected	Medium
Other Grains	0.2	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 102. Reproduction risk hypothesis; Sockeye salmon, Snake River ESU and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure

Alfalfa (pasture)	0.9 (14.6)	None Expected	Low
Right of Way	6.5	None Expected	Medium
Developed	3.5	None Expected	Medium
Fallow; CRP (cultivated)	2.4; 10.2 (12.3)	None Expected	Medium
Other Crops	2.8	None Expected	Medium
Corn	0.7	None Expected	Medium
Wheat	3.7	None Expected	Medium
Vegetables and Ground Fruit	1.7	None Expected	Medium
Other Grains	0.2	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 103. Effects analysis summary table: Sockeye salmon, Snake River ESU and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low	Not modelled	No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium	Not modelled	No

Effects analysis summary: Snake River sockeye salmon are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. No changes in population growth rate occurred at the

1% mortality level for any model runs. Slight shifts in population growth rate occurred for sockeye salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.18 Steelhead, California Central Valley DPS (*Oncorhynchus mykiss*)

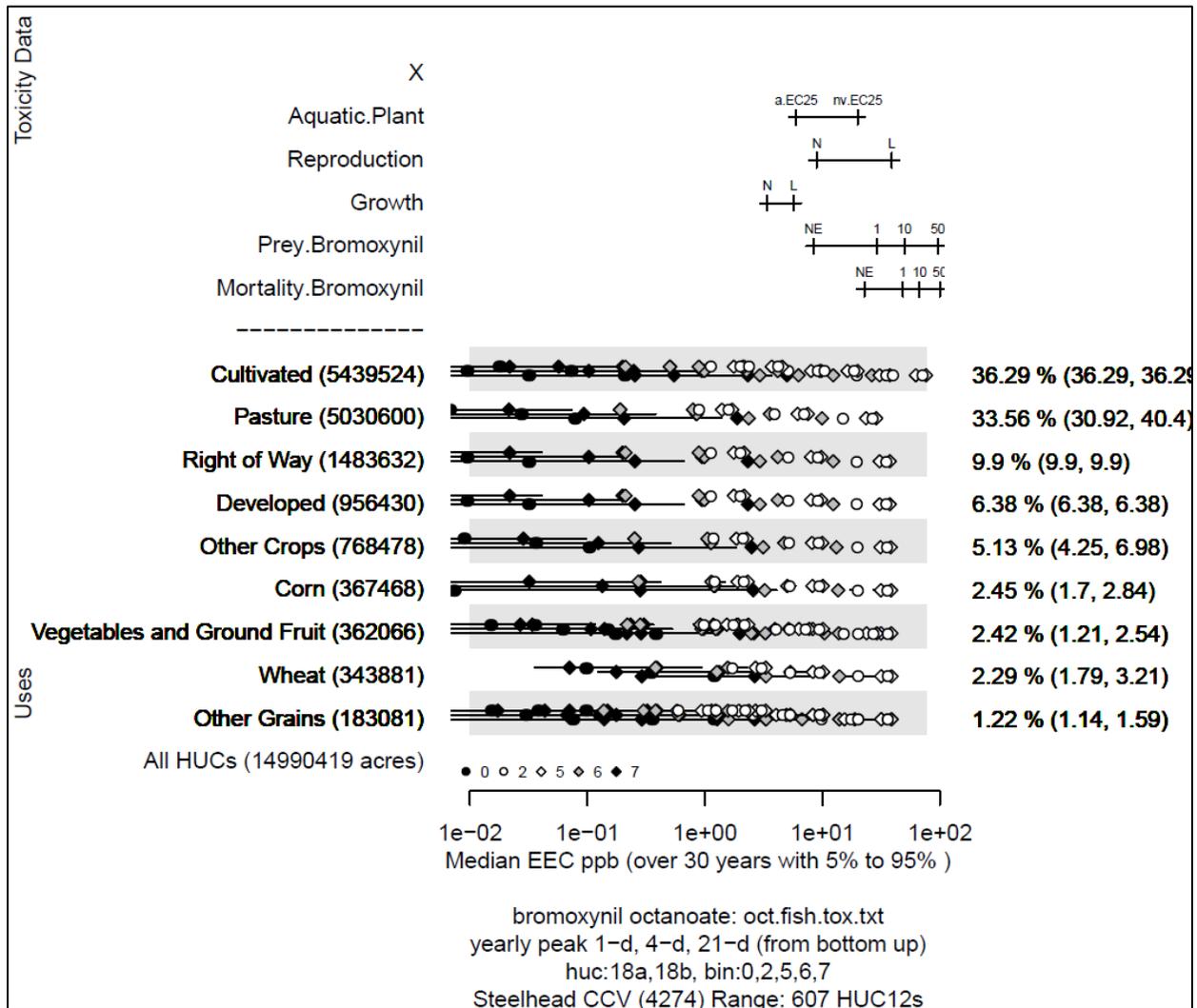


Figure 19. Effects analysis Risk-plot for Steelhead, California Central Valley DPS and bromoxynil

Table 104. Likelihood of exposure determination for Steelhead, California Central Valley DPS and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	2	yes	no	no	NA	3	Medium
Right of Way	NA	NA	NA	NA	NA	NA	NA
Developed	3	yes	no	no	NA	3	Medium
Cultivated	NA	NA	NA	NA	NA	NA	NA
Other Crops	3	yes	no	no	NA	3	Medium
Corn	2	yes	no	no	NA	3	Medium
Wheat	2	yes	no	no	NA	3	Medium
Vegetables and Ground Fruit	2	yes	no	no	NA	3	Medium
Other Grains	2	yes	no	no	NA	3	Medium

Table 105. Direct mortality risk hypothesis; Steelhead, California Central Valley DPS and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.8 (33.6)	Low	Medium
Right of Way	NA	NA	NA
Developed	6.4	Low	Medium
Cultivated	NA	NA	NA
Other Crops	5.1	Low	Medium
Corn	2.5	Low	Medium
Wheat	2.3	Low	Medium
Vegetables and Ground Fruit	2.4	Low	Medium
Other Grains	1.2	Low	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 106. Reproduction risk hypothesis; Steelhead, California Central Valley DPS and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure

Alfalfa (pasture)	1.8 (33.6)	None Expected	Medium
Right of Way	NA	NA	NA
Developed	6.4	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	5.1	None Expected	Medium
Corn	2.5	None Expected	Medium
Wheat	2.3	None Expected	Medium
Vegetables and Ground Fruit	2.4	None Expected	Medium
Other Grains	1.2	None Expected	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 107. Growth risk hypothesis; Steelhead, California Central Valley DPS and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.8 (33.6)	None Expected	Medium
Right of Way	NA	NA	NA
Developed	6.4	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	5.1	None Expected	Medium
Corn	2.5	None Expected	Medium
Wheat	2.3	None Expected	Medium
Vegetables and Ground Fruit	2.4	None Expected	Medium
Other Grains	1.2	None Expected	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 108. Prey risk hypothesis; Steelhead, California Central Valley DPS and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Alfalfa (pasture)	1.8 (33.6)	Low / Low	Medium
Right of Way	NA	NA	NA
Developed	6.4	Low / Low	Medium
Cultivated	NA	NA	NA

Other Crops	5.1	Low / Low	Medium
Corn	2.5	Low / Low	Medium
Wheat	2.3	Low / Low	Medium
Vegetables and Ground Fruit	2.4	Low / Low	Medium
Other Grains	1.2	Low / Low	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 109. Effects analysis summary table: Steelhead, California Central Valley DPS and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low		No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium		No

Effects analysis summary: California Central Valley Steelhead are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.19 Steelhead, Central California Coast DPS (*Oncorhynchus mykiss*)

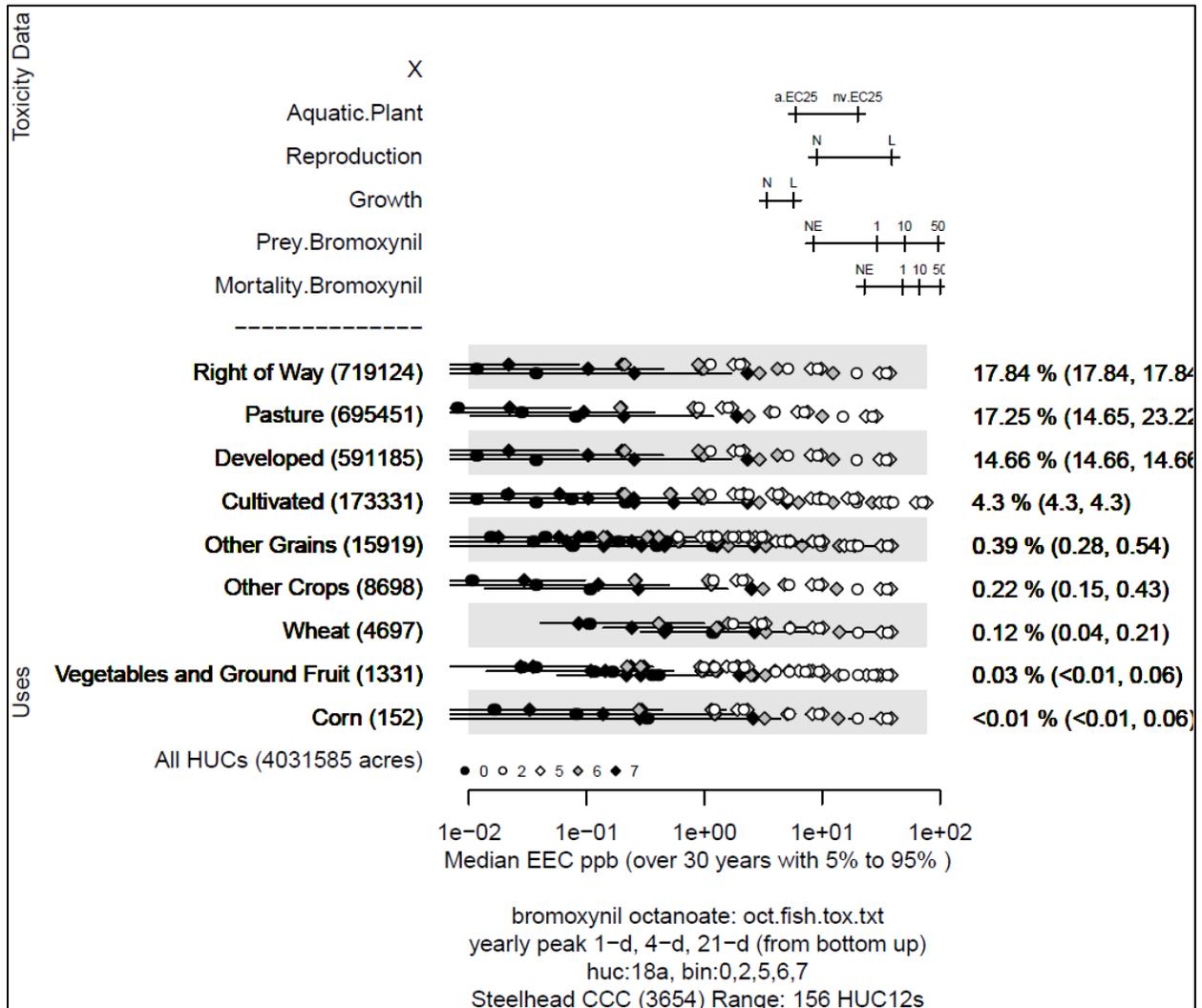


Figure 20. Effects analysis Risk-plot for Steelhead, Central California Coast DPS and bromoxynil

Table 110. Likelihood of exposure determination for Steelhead, Central California Coast DPS and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low
Right of Way	NA	NA	NA	NA	NA	NA	NA
Developed	3	yes	no	no	NA	3	Medium
Cultivated	NA	NA	NA	NA	NA	NA	NA
Other Crops	1	yes	no	no	no	3	Low
Corn	1	yes	no	no	no	3	Low
Wheat	1	yes	no	no	no	3	Low
Vegetables and Ground Fruit	1	yes	no	no	no	3	Low
Other Grains	1	yes	no	no	no	3	Low

Table 111. Direct mortality risk hypothesis; Steelhead, Central California Coast DPS and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.3 (17.3)	Low	Low
Right of Way	NA	NA	NA
Developed	14.7	Low	Medium
Cultivated	NA	NA	NA
Other Crops	0.2	Low	Low
Corn	<0.1	Low	Low
Wheat	0.1	Low	Low
Vegetables and Ground Fruit	<0.1	Low	Low
Other Grains	0.4	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Low	Medium		

Table 112. Reproduction risk hypothesis; Steelhead, Central California Coast DPS and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure

Alfalfa (pasture)	0.3 (17.3)	None Expected	Low
Right of Way	NA	NA	NA
Developed	14.7	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	0.2	None Expected	Low
Corn	<0.1	None Expected	Low
Wheat	0.1	None Expected	Low
Vegetables and Ground Fruit	<0.1	None Expected	Low
Other Grains	0.4	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 113. Growth risk hypothesis; Steelhead, Central California Coast DPS and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.3 (17.3)	None Expected	Low
Right of Way	NA	NA	NA
Developed	14.7	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	0.2	None Expected	Low
Corn	<0.1	None Expected	Low
Wheat	0.1	None Expected	Low
Vegetables and Ground Fruit	<0.1	None Expected	Low
Other Grains	0.4	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 114. Prey risk hypothesis; Steelhead, Central California Coast DPS and bromoxynil

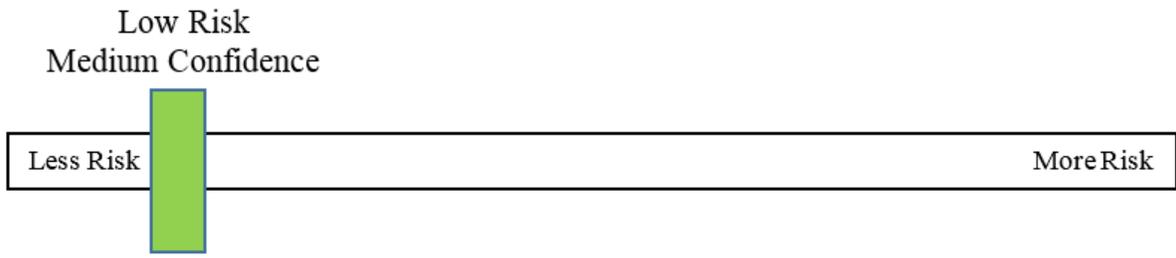
Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Alfalfa (pasture)	0.3 (17.3)	Low / Low	Low
Right of Way	NA	NA	NA
Developed	14.7	Low / Low	Medium
Cultivated	NA	NA	NA

Other Crops	0.2	Low / Low	Low
Corn	<0.1	Low / Low	Low
Wheat	0.1	Low / Low	Low
Vegetables and Ground Fruit	<0.1	Low / Low	Low
Other Grains	0.4	Low / Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 115. Effects analysis summary table: Steelhead, Central California Coast DPS and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Low	Medium	Not Applicable	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium		No

Effects analysis summary: Central California Coast Steelhead are not anticipated to experience reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in prey availability. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is low and the confidence associated with that risk is medium.



12.2.20 Steelhead, Lower Columbia River DPS (*Oncorhynchus mykiss*)

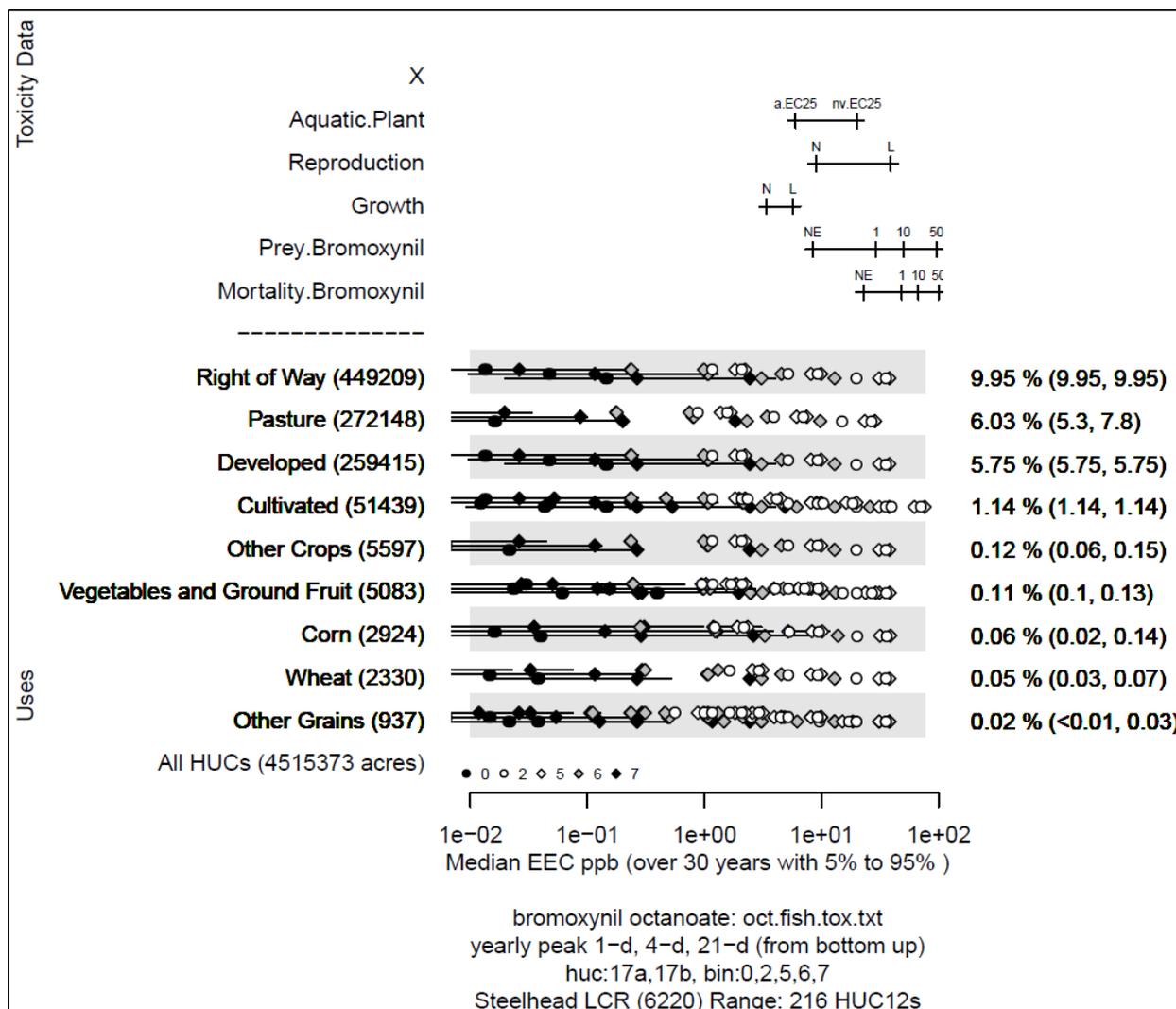


Figure 21. Effects analysis Risk-plot for Steelhead, Lower Columbia River DPS and bromoxynil

Table 116. Likelihood of exposure determination for Steelhead, Lower Columbia River DPS and bromoxynil

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low	
Right of Way	3	yes	no	no	NA	3	Medium	
Developed	3	yes	no	no	NA	3	Medium	
Cultivated	1	yes	no	no	NA	3	Low	
Other Crops	1	yes	no	no	yes	3	Medium	
Corn	1	yes	no	no	yes	3	Medium	
Wheat	1	yes	no	no	yes	3	Medium	
Vegetables and Ground Fruit	1	yes	no	no	yes	3	Medium	
Other Grains	1	yes	no	no	no	3	Low	

Table 117. Direct mortality risk hypothesis; Steelhead, Lower Columbia River DPS and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (6.0)	Low	Low
Right of Way	10.0	Low	Medium
Developed	5.8	Low	Medium
Fallow; CRP (cultivated)	<0.1; 0.8 (1.1)	Medium	Low
Other Crops	0.1	Low	Medium
Corn	0.1	Low	Medium
Wheat	0.1	Low	Medium
Vegetables and Ground Fruit	0.1	Low	Medium
Other Grains	<0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence	High density of use sites proximal to the migratory corridor at Sauvie Island.	
Medium	Low		

Table 118. Reproduction risk hypothesis; Steelhead, Lower Columbia River DPS and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (6.0)	None Expected	Low

Right of Way	10.0	None Expected	Medium
Developed	5.8	None Expected	Medium
Fallow; CRP (cultivated)	<0.1; 0.8 (1.1)	None Expected	Low
Other Crops	0.1	None Expected	Medium
Corn	0.1	None Expected	Medium
Wheat	0.1	None Expected	Medium
Vegetables and Ground Fruit	0.1	None Expected	Medium
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence	High density of use sites proximal to the migratory corridor at Sauvie Island.	
Low	Medium		

Table 119. Growth risk hypothesis; Steelhead, Lower Columbia River DPS and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (6.0)	None Expected	Low
Right of Way	10.0	None Expected	Medium
Developed	5.8	None Expected	Medium
Fallow; CRP (cultivated)	<0.1; 0.8 (1.1)	Low	Low
Other Crops	0.1	None Expected	Medium
Corn	0.1	None Expected	Medium
Wheat	0.1	None Expected	Medium
Vegetables and Ground Fruit	0.1	None Expected	Medium
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence	High density of use sites proximal to the migratory corridor at Sauvie Island.	
Low	Medium		

Table 120. Prey risk hypothesis; Steelhead, Lower Columbia River DPS and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Alfalfa (pasture)	0.1 (6.0)	Low / Low	Low
Right of Way	10.0	Low / Low	Medium
Developed	5.8	Low / Low	Medium

Fallow; CRP (cultivated)	<0.1; 0.8 (1.1)	Medium / Medium	Low
Other Crops	0.1	Low / Low	Medium
Corn	0.1	Low / Low	Medium
Wheat	0.1	Low / Low	Medium
Vegetables and Ground Fruit	0.1	Low / Low	Medium
Other Grains	<0.1	Low / Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 121. Effects analysis summary table: Steelhead, Lower Columbia River DPS and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low		No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium		No

Effects analysis summary: Lower Columbia River Steelhead are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and

the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.21 Steelhead, Middle Columbia River DPS (*Oncorhynchus mykiss*)

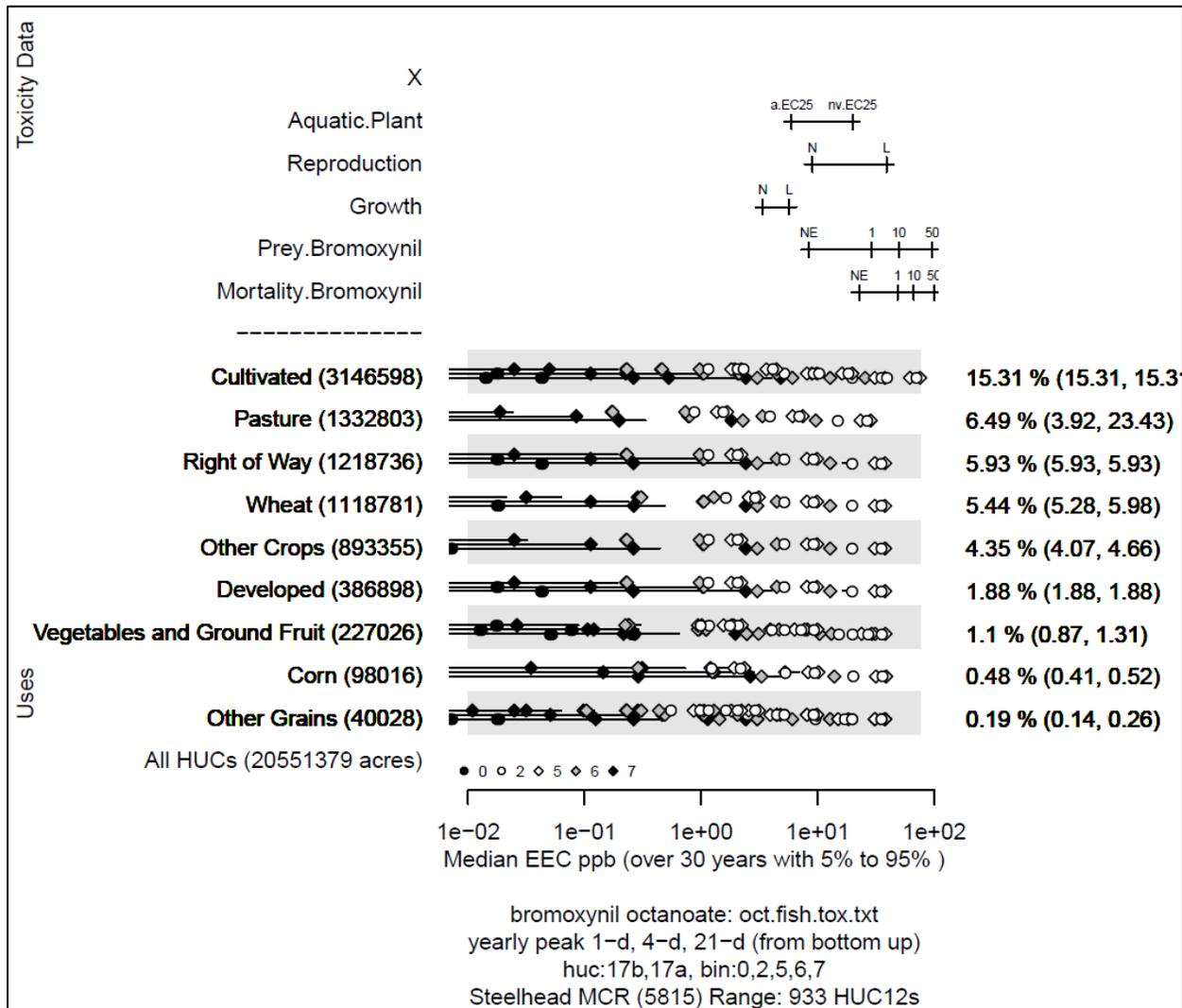


Figure 22. Effects analysis Risk-plot for Steelhead, Middle Columbia River DPS and bromoxynil

Table 122. Likelihood of exposure determination for Steelhead, Middle Columbia River DPS and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low
Right of Way	3	yes	no	no	NA	3	Medium
Developed	2	yes	no	no	NA	3	Medium
Cultivated	2	yes	no	no	NA	3	Medium
Other Crops	2	yes	no	no	NA	3	Medium
Corn	1	yes	no	no	yes	3	Medium
Wheat	3	yes	no	no	NA	3	Medium
Vegetables and Ground Fruit	2	yes	no	no	NA	3	Medium
Other Grains	1	yes	no	no	no	3	Low

Table 123. Direct mortality risk hypothesis; Steelhead, Middle Columbia River DPS and bromoxynil; Adults

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.6 (6.5)	Low	Low
Right of Way	5.9	Low	Medium
Developed	1.9	Low	Medium
Fallow; CRP (cultivated)	3.2; 6.9 (15.3)	Medium	Medium
Other Crops	4.4	Low	Medium
Corn	0.5	Low	Medium
Wheat	5.4	Low	Medium
Vegetables and Ground Fruit	1.1	Low	Medium
Other Grains	0.2	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 124. Reproduction risk hypothesis; Steelhead, Middle Columbia River DPS and bromoxynil

Endpoint: Reproduction

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.6 (6.5)	None Expected	Low
Right of Way	5.9	None Expected	Medium
Developed	1.9	None Expected	Medium
Fallow; CRP (cultivated)	3.2; 6.9 (15.3)	None Expected	Medium
Other Crops	4.4	None Expected	Medium
Corn	0.5	None Expected	Medium
Wheat	5.4	None Expected	Medium
Vegetables and Ground Fruit	1.1	None Expected	Medium
Other Grains	0.2	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 125. Growth risk hypothesis; Steelhead, Middle Columbia River DPS and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.6 (6.5)	None Expected	Low
Right of Way	5.9	None Expected	Medium
Developed	1.9	None Expected	Medium
Fallow; CRP (cultivated)	3.2; 6.9 (15.3)	Low	Medium
Other Crops	4.4	None Expected	Medium
Corn	0.5	None Expected	Medium
Wheat	5.4	None Expected	Medium
Vegetables and Ground Fruit	1.1	None Expected	Medium
Other Grains	0.2	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 126. Prey risk hypothesis; Steelhead, Middle Columbia River DPS and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure

Alfalfa (pasture)	0.6 (6.5)	Low / Low	Low
Right of Way	5.9	Low / Low	Medium
Developed	1.9	Low / Low	Medium
Fallow; CRP (cultivated)	3.2; 6.9 (15.3)	Medium / Medium	Medium
Other Crops	4.4	Low / Low	Medium
Corn	0.5	Low / Low	Medium
Wheat	5.4	Low / Low	Medium
Vegetables and Ground Fruit	1.1	Low / Low	Medium
Other Grains	0.2	Low / Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 127. Effects analysis summary table: Steelhead, Middle Columbia River DPS and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low		No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium		No

Effects analysis summary: Middle Columbia River Steelhead are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in

substantial reductions in prey availability. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.22 Steelhead, Northern California DPS (*Oncorhynchus mykiss*)

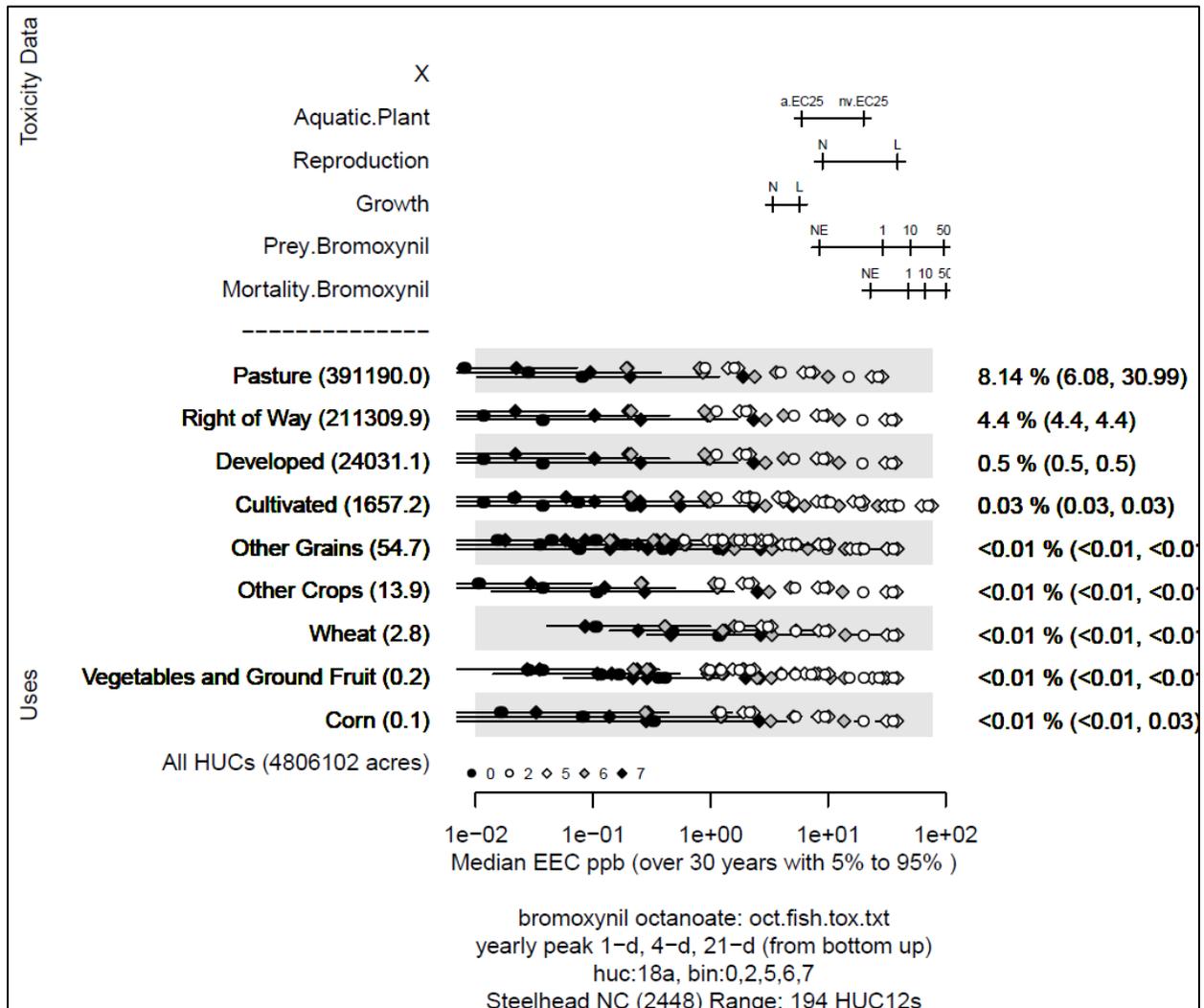


Figure 23. Effects analysis Risk-plot for Steelhead, Northern California DPS and bromoxynil

Table 128. Likelihood of exposure determination for Steelhead, Northern California DPS and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low
Right of Way	NA	NA	NA	NA	NA	NA	NA
Developed	1	yes	no	no	no	3	Low
Cultivated	NA	NA	NA	NA	NA	NA	NA
Other Crops	1	yes	no	no	no	3	Low
Corn	1	yes	no	no	no	3	Low
Wheat	1	yes	no	no	no	3	Low
Vegetables and Ground Fruit	1	yes	no	no	no	3	Low
Other Grains	1	yes	no	no	no	3	Low

Table 129. Direct mortality risk hypothesis; Steelhead, Northern California DPS and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (8.1)	Low	Low
Right of Way	NA	NA	NA
Developed	0.5	Low	Low
Cultivated	NA	NA	NA
Other Crops	<0.1	Low	Low
Corn	<0.1	Low	Low
Wheat	<0.1	Low	Low
Vegetables and Ground Fruit	<0.1	Low	Low
Other Grains	<0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Low	Medium		

Table 130. Reproduction risk hypothesis; Steelhead, Northern California DPS and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (8.1)	None Expected	Low
Right of Way	NA	NA	NA

Developed	0.5	None Expected	Low
Cultivated	NA	NA	NA
Other Crops	<0.1	None Expected	Low
Corn	<0.1	None Expected	Low
Wheat	<0.1	None Expected	Low
Vegetables and Ground Fruit	<0.1	None Expected	Low
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 131. Growth risk hypothesis; Steelhead, Northern California DPS and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (8.1)	None Expected	Low
Right of Way	NA	NA	NA
Developed	0.5	None Expected	Low
Cultivated	NA	NA	NA
Other Crops	<0.1	None Expected	Low
Corn	<0.1	None Expected	Low
Wheat	<0.1	None Expected	Low
Vegetables and Ground Fruit	<0.1	None Expected	Low
Other Grains	<0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 132. Prey risk hypothesis; Steelhead, Northern California DPS and bromoxynil

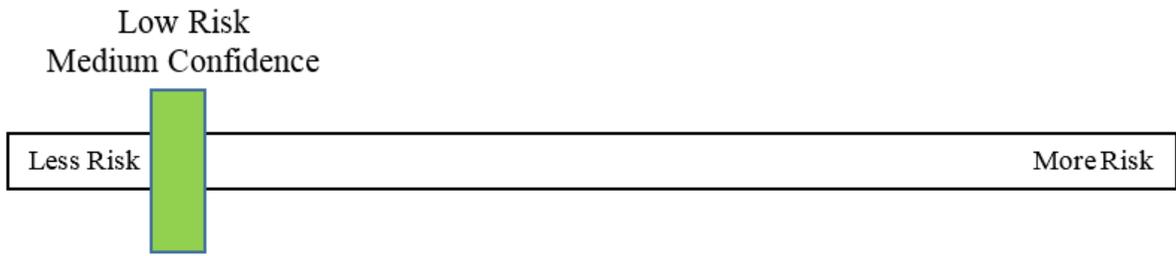
Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Alfalfa (pasture)	0.1 (8.1)	Low / Low	Low
Right of Way	NA	NA	NA
Developed	0.5	Low / Low	Low
Cultivated	NA	NA	NA
Other Crops	<0.1	Low / Low	Low
Corn	<0.1	Low / Low	Low

Wheat	<0.1	Low / Low	Low
Vegetables and Ground Fruit	<0.1	Low / Low	Low
Other Grains	<0.1	Low / Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 133. Effects analysis summary table: Steelhead, Northern California DPS and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Low	Medium	Not Applicable	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium		No

Effects analysis summary: Northern California Steelhead are not anticipated to experience reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in prey availability. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is low and the confidence associated with that risk is medium.



12.2.23 Steelhead, Puget Sound DPS (*Oncorhynchus mykiss*)

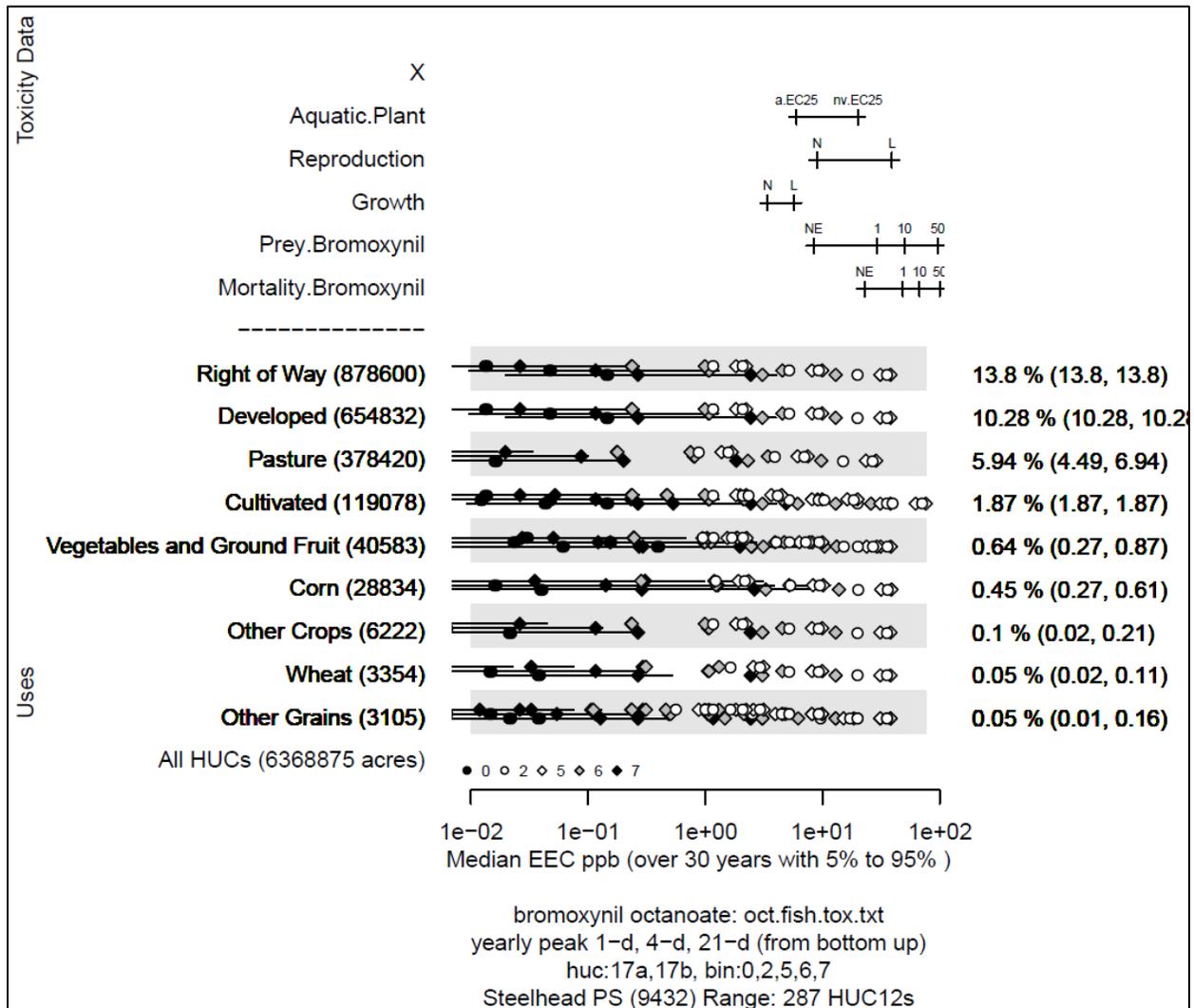


Figure 24. Effects analysis Risk-plot for Steelhead, Puget Sound DPS and bromoxynil

Table 134. Likelihood of exposure determination for Steelhead, Puget Sound DPS and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low
Right of Way	3	yes	no	no	NA	3	Medium
Developed	3	yes	no	no	NA	3	Medium
Cultivated	1	yes	no	no	NA	3	Low
Other Crops	1	yes	no	no	no	3	Low
Corn	1	yes	no	no	yes	3	Medium
Wheat	1	yes	no	no	no	3	Low
Vegetables and Ground Fruit	1	yes	no	no	yes	3	Medium
Other Grains	1	yes	no	no	no	3	Low

Table 135. Direct mortality risk hypothesis; Steelhead, Puget Sound DPS and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	<0.1 (5.9)	Low	Low
Right of Way	13.8	Low	Medium
Developed	10.3	Low	Medium
Fallow; CRP (cultivated)	<0.1; 1.4 (1.9)	Medium	Low
Other Crops	0.1	Low	Low
Corn	0.5	Low	Medium
Wheat	0.1	Low	Low
Vegetables and Ground Fruit	0.6	Low	Medium
Other Grains	0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 136. Reproduction risk hypothesis; Steelhead, Puget Sound DPS and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	<0.1 (5.9)	None Expected	Low

Right of Way	13.8	None Expected	Medium
Developed	10.3	None Expected	Medium
Fallow; CRP (cultivated)	<0.1; 1.4 (1.9)	None Expected	Low
Other Crops	0.1	None Expected	Low
Corn	0.5	None Expected	Medium
Wheat	0.1	None Expected	Low
Vegetables and Ground Fruit	0.6	None Expected	Medium
Other Grains	0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 137. Growth risk hypothesis; Steelhead, Puget Sound DPS and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	<0.1 (5.9)	None Expected	Low
Right of Way	13.8	None Expected	Medium
Developed	10.3	None Expected	Medium
Fallow; CRP (cultivated)	<0.1; 1.4 (1.9)	Low	Low
Other Crops	0.1	None Expected	Low
Corn	0.5	None Expected	Medium
Wheat	0.1	None Expected	Low
Vegetables and Ground Fruit	0.6	None Expected	Medium
Other Grains	0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 138. Prey risk hypothesis; Steelhead, Puget Sound DPS and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Alfalfa (pasture)	<0.1 (5.9)	Low / Low	Low
Right of Way	13.8	Low / Low	Medium
Developed	10.3	Low / Low	Medium

Fallow; CRP (cultivated)	<0.1; 1.4 (1.9)	Medium / Medium	Low
Other Crops	0.1	Low / Low	Low
Corn	0.5	Low / Low	Medium
Wheat	0.1	Low / Low	Low
Vegetables and Ground Fruit	0.6	Low / Low	Medium
Other Grains	0.1	Low / Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 139. Effects analysis summary table: Steelhead, Puget Sound DPS and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low		No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium		No

Effects analysis summary: Puget Sound Steelhead are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.24 Steelhead, Snake River Basin DPS (*Oncorhynchus mykiss*)

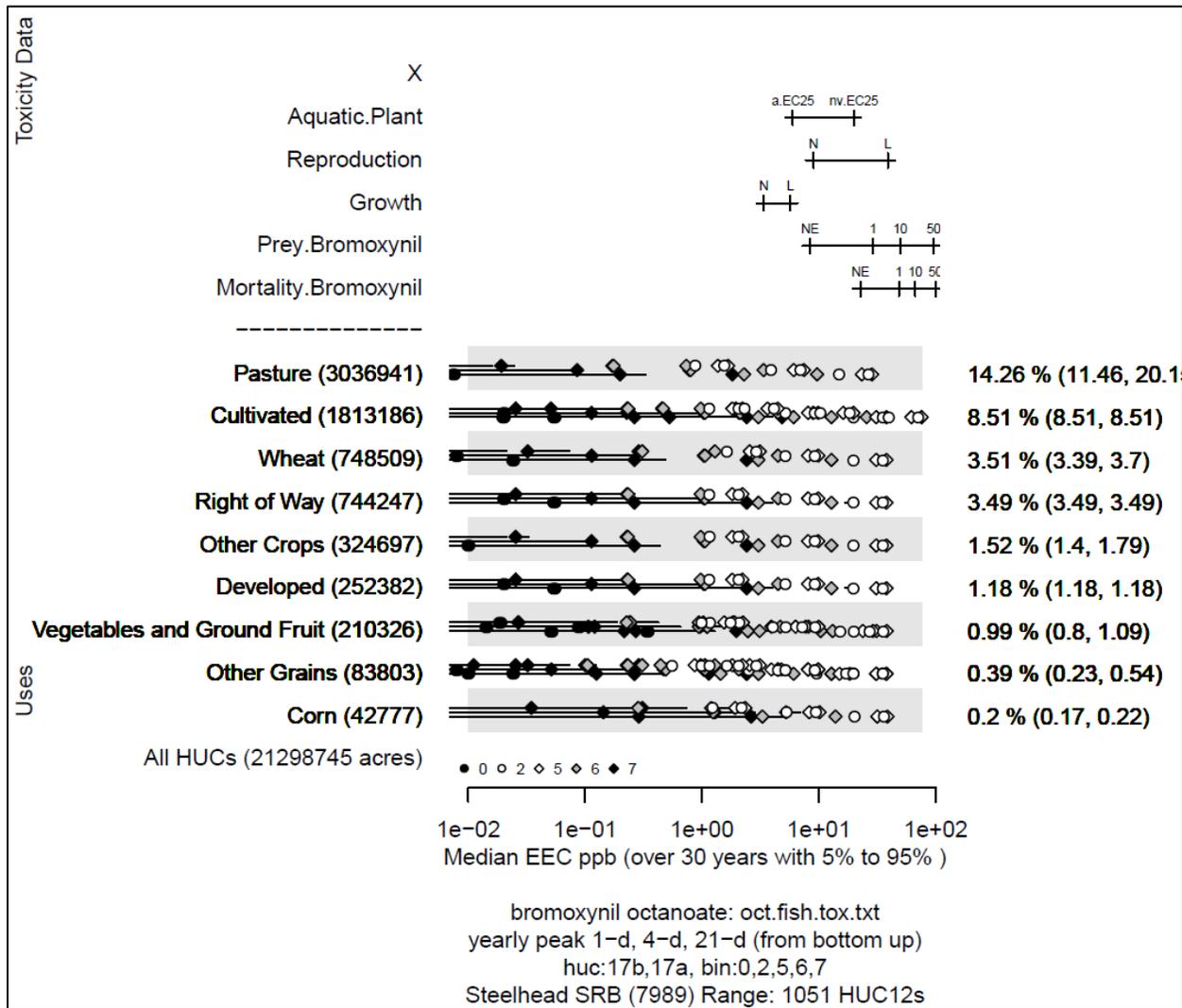


Figure 25. Effects analysis Risk-plot for Steelhead, Snake River Basin DPS and bromoxynil

Table 140. Likelihood of exposure determination for Steelhead, Snake River Basin DPS and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low
Right of Way	2	yes	no	no	NA	3	Medium
Developed	2	yes	no	no	NA	3	Medium
Cultivated	2	yes	no	no	NA	3	Medium
Other Crops	2	yes	no	no	NA	3	Medium
Corn	1	yes	no	no	yes	3	Medium
Wheat	2	yes	no	no	NA	3	Medium
Vegetables and Ground Fruit	1	yes	no	no	yes	3	Medium
Other Grains	1	yes	no	no	no	3	Low

Table 141. Direct mortality risk hypothesis; Steelhead, Snake River Basin DPS and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.9 (14.3)	Low	Low
Right of Way	3.5	Low	Medium
Developed	1.2	Low	Medium
Fallow; CRP (cultivated)	1.6; 9.8 (8.5)	Medium	Medium
Other Crops	1.5	Low	Medium
Corn	0.2	Low	Medium
Wheat	3.5	Low	Medium
Vegetables and Ground Fruit	1.0	Low	Medium
Other Grains	0.4	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 142. Reproduction risk hypothesis; Steelhead, Snake River Basin DPS and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.9 (14.3)	None Expected	Low
Right of Way	3.5	None Expected	Medium
Developed	1.2	None Expected	Medium

Fallow; CRP (cultivated)	1.6; 9.8 (8.5)	None Expected	Medium
Other Crops	1.5	None Expected	Medium
Corn	0.2	None Expected	Medium
Wheat	3.5	None Expected	Medium
Vegetables and Ground Fruit	1.0	None Expected	Medium
Other Grains	0.4	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 143. Growth risk hypothesis; Steelhead, Snake River Basin DPS and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.9 (14.3)	None Expected	Low
Right of Way	3.5	None Expected	Medium
Developed	1.2	None Expected	Medium
Fallow; CRP (cultivated)	1.6; 9.8 (8.5)	Low	Medium
Other Crops	1.5	None Expected	Medium
Corn	0.2	None Expected	Medium
Wheat	3.5	None Expected	Medium
Vegetables and Ground Fruit	1.0	None Expected	Medium
Other Grains	0.4	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 144. Prey risk hypothesis; Steelhead, Snake River Basin DPS and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Alfalfa (pasture)	0.9 (14.3)	Low / Low	Low
Right of Way	3.5	Low / Low	Medium
Developed	1.2	Low / Low	Medium
Fallow; CRP (cultivated)	1.6; 9.8 (8.5)	Medium / Medium	Medium

Other Crops	1.5	Low / Low	Medium
Corn	0.2	Low / Low	Medium
Wheat	3.5	Low / Low	Medium
Vegetables and Ground Fruit	1.0	Low / Low	Medium
Other Grains	0.4	Low / Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 145. Effects analysis summary table: Steelhead, Snake River Basin DPS and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low		No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium		No

Effects analysis summary: Snake River Basin Steelhead are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.25 Steelhead, South-Central California Coast DPS (*Oncorhynchus mykiss*)

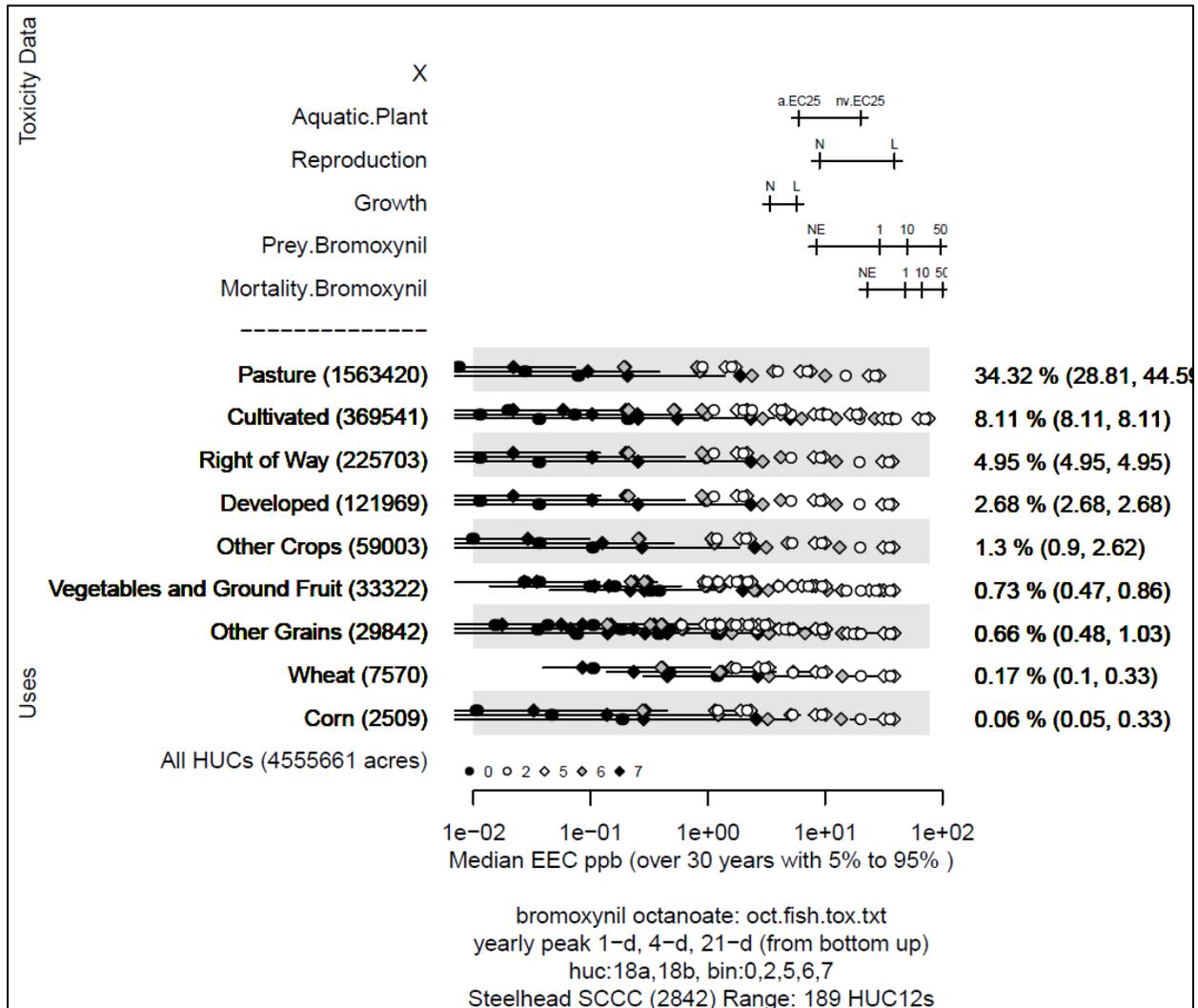


Figure 26. Effects analysis Risk-plot for Steelhead, South-Central California Coast DPS and bromoxynil

Table 146. Likelihood of exposure determination for Steelhead, South-Central California Coast DPS and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low
Right of Way	NA	NA	NA	NA	NA	NA	NA
Developed	2	yes	no	no	NA	3	Medium
Cultivated	NA	NA	NA	NA	NA	NA	NA
Other Crops	2	yes	no	no	NA	3	Medium
Corn	1	yes	no	no	yes	3	Medium
Wheat	1	yes	no	no	yes	3	Medium
Vegetables and Ground Fruit	1	yes	no	no	yes	3	Medium
Other Grains	1	yes	no	no	yes	3	Medium

Table 147. Direct mortality risk hypothesis; Steelhead, South-Central California Coast DPS and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (34.3)	Low	Low
Right of Way	NA	NA	NA
Developed	2.7	Low	Medium
Cultivated	NA	NA	NA
Other Crops	1.3	Low	Medium
Corn	0.1	Low	Medium
Wheat	0.2	Low	Medium
Vegetables and Ground Fruit	0.7	Low	Medium
Other Grains	0.7	Low	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence	High density of use sites proximal to the spawning streams of populations within the Salinas River watershed. All populations within the Salinas River watershed have been determined essential to the recovery of the DPS per the 2013 South-Central California Steelhead Recovery Plan.	
Medium	Low		

Table 148. Reproduction risk hypothesis; Steelhead, South-Central California Coast DPS and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (34.3)	None Expected	Low
Right of Way	NA	NA	NA
Developed	2.7	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	1.3	None Expected	Medium
Corn	0.1	None Expected	Medium
Wheat	0.2	None Expected	Medium
Vegetables and Ground Fruit	0.7	None Expected	Medium
Other Grains	0.7	None Expected	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence	High density of use sites proximal to the spawning streams of populations within the Salinas River watershed. All populations within the Salinas River watershed have been determined essential to the recovery of the DPS per the 2013 South-Central California Steelhead Recovery Plan.	
Low	Medium		

Table 149. Growth risk hypothesis; Steelhead, South-Central California Coast DPS and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.1 (34.3)	None Expected	Low
Right of Way	NA	NA	NA
Developed	2.7	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	1.3	None Expected	Medium
Corn	0.1	None Expected	Medium
Wheat	0.2	None Expected	Medium
Vegetables and Ground Fruit	0.7	None Expected	Medium
Other Grains	0.7	None Expected	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		

Low	Medium	High density of use sites proximal to the spawning streams of populations within the Salinas River watershed. All populations within the Salinas River watershed have been determined essential to the recovery of the DPS per the 2013 South-Central California Steelhead Recovery Plan.
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Table 150. Prey risk hypothesis; Steelhead, South-Central California Coast DPS and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Alfalfa (pasture)	0.1 (34.3)	Low / Low	Low
Right of Way	NA	NA	NA
Developed	2.7	Low / Low	Medium
Cultivated	NA	NA	NA
Other Crops	1.3	Low / Low	Medium
Corn	0.1	Low / Low	Medium
Wheat	0.2	Low / Low	Medium
Vegetables and Ground Fruit	0.7	Low / Low	Medium
Other Grains	0.7	Low / Low	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence	High density of use sites proximal to the spawning streams of populations within the Salinas River watershed. All populations within the Salinas River watershed have been determined essential to the recovery of the DPS per the 2013 South-Central California Steelhead Recovery Plan.	
Medium	Low		

Table 151. Effects analysis summary table: Steelhead, South-Central California Coast DPS and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No

Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low		No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium		No

Effects analysis summary: South-Central California Coast Steelhead are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.26 Steelhead, Southern California DPS (*Oncorhynchus mykiss*)

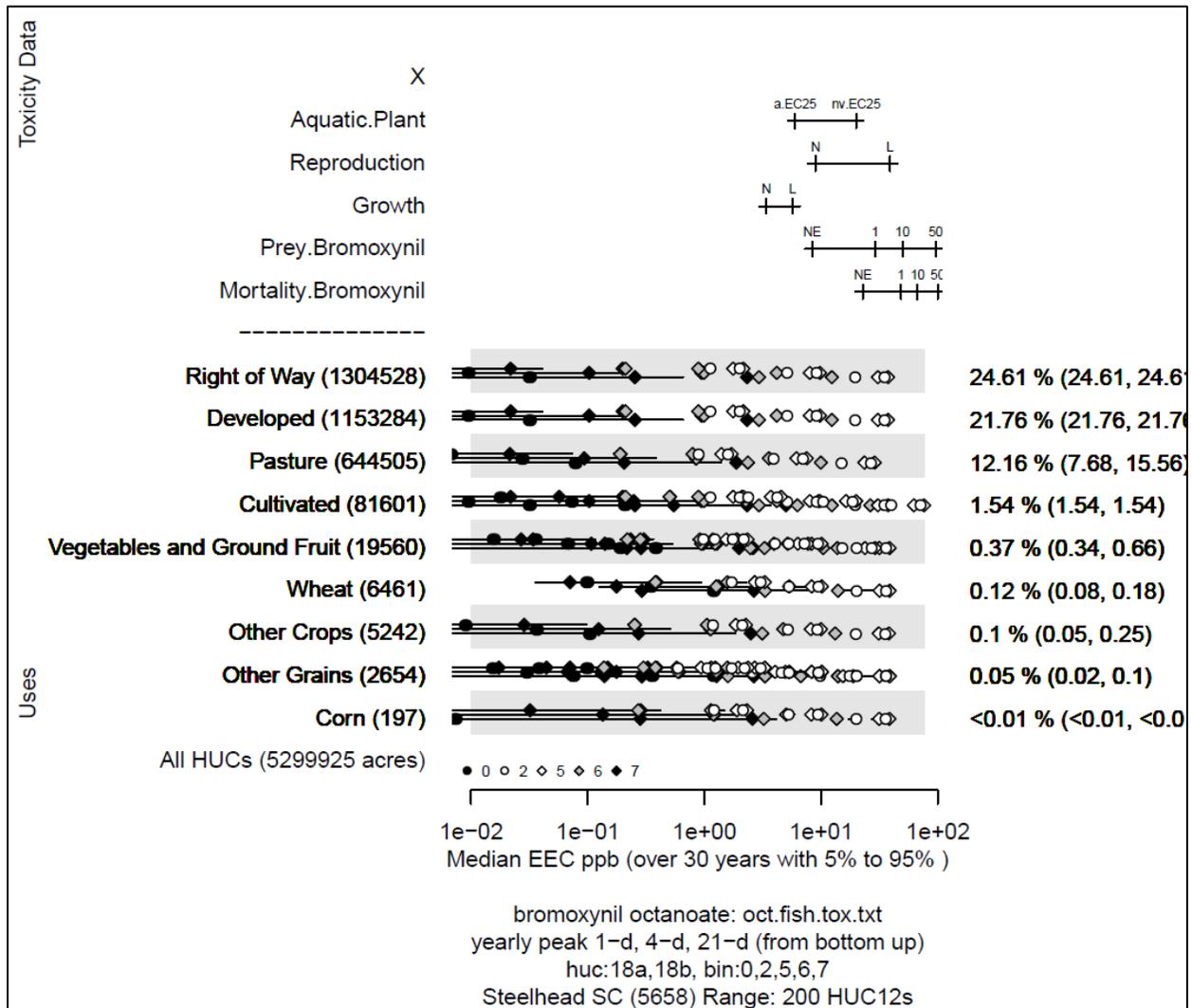


Figure 27. Effects analysis Risk-plot for Steelhead, Southern California DPS and bromoxynil

Table 152. Likelihood of exposure determination for Steelhead, Southern California DPS and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low
Right of Way	NA	NA	NA	NA	NA	NA	NA
Developed	3	yes	no	no	NA	3	Medium
Cultivated	NA	NA	NA	NA	NA	NA	NA
Other Crops	1	yes	no	no	no	3	Low
Corn	1	yes	no	no	no	3	Low
Wheat	1	yes	no	no	no	3	Low
Vegetables and Ground Fruit	1	yes	no	no	yes	3	Medium
Other Grains	1	yes	no	no	yes	3	Medium

Table 153. Direct mortality risk hypothesis; Steelhead, Southern California DPS and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.2 (12.2)	Low	Low
Right of Way	NA	NA	NA
Developed	21.8	Low	Medium
Cultivated	NA	NA	NA
Other Crops	0.1	Low	Low
Corn	<0.1	Low	Low
Wheat	0.1	Low	Low
Vegetables and Ground Fruit	0.4	Low	Medium
Other Grains	0.1	Low	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence	High density of use sites proximal to the spawning streams of the Monte Arido Highlands major population group. All populations within this population group have been determined essential to the recovery of the DPS per the 2012 Southern California Steelhead Recovery Plan.	
Medium	Low		

Table 154. Reproduction risk hypothesis; Steelhead, Southern California DPS and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.2 (12.2)	None Expected	Low
Right of Way	NA	NA	NA
Developed	21.8	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	0.1	None Expected	Low
Corn	<0.1	None Expected	Low
Wheat	0.1	None Expected	Low
Vegetables and Ground Fruit	0.4	None Expected	Medium
Other Grains	0.1	None Expected	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence	High density of use sites proximal to the spawning streams of the Monte Arido Highlands major population group. All populations within this population group have been determined essential to the recovery of the DPS per the 2012 Southern California Steelhead Recovery Plan.	
Low	Medium		

Table 155. Growth risk hypothesis; Steelhead, Southern California DPS and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.2 (12.2)	None Expected	Low
Right of Way	NA	NA	NA
Developed	21.8	None Expected	Medium
Cultivated	NA	NA	NA
Other Crops	0.1	None Expected	Low
Corn	<0.1	None Expected	Low
Wheat	0.1	None Expected	Low
Vegetables and Ground Fruit	0.4	None Expected	Medium
Other Grains	0.1	None Expected	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence	High density of use sites proximal to the spawning streams of the Monte Arido Highlands major population group. All	
Low	Medium		

		populations within this population group have been determined essential to the recovery of the DPS per the 2012 Southern California Steelhead Recovery Plan.
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Table 156. Prey risk hypothesis; Steelhead, Southern California DPS and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Alfalfa (pasture)	0.2 (12.2)	Low / Low	Low
Right of Way	NA	NA	NA
Developed	21.8	Low / Low	Medium
Cultivated	NA	NA	NA
Other Crops	0.1	Low / Low	Low
Corn	<0.1	Low / Low	Low
Wheat	0.1	Low / Low	Low
Vegetables and Ground Fruit	0.4	Low / Low	Medium
Other Grains	0.1	Low / Low	Medium
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence	High density of use sites proximal to the spawning streams of the Monte Arido Highlands major population group. All populations within this population group have been determined essential to the recovery of the DPS per the 2012 Southern California Steelhead Recovery Plan.	
Medium	Low		

Table 157. Effects analysis summary table: Steelhead, Southern California DPS and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low		No

Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium		No

Effects analysis summary: Southern California Steelhead are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.27 Steelhead, Upper Columbia River DPS (*Oncorhynchus mykiss*)

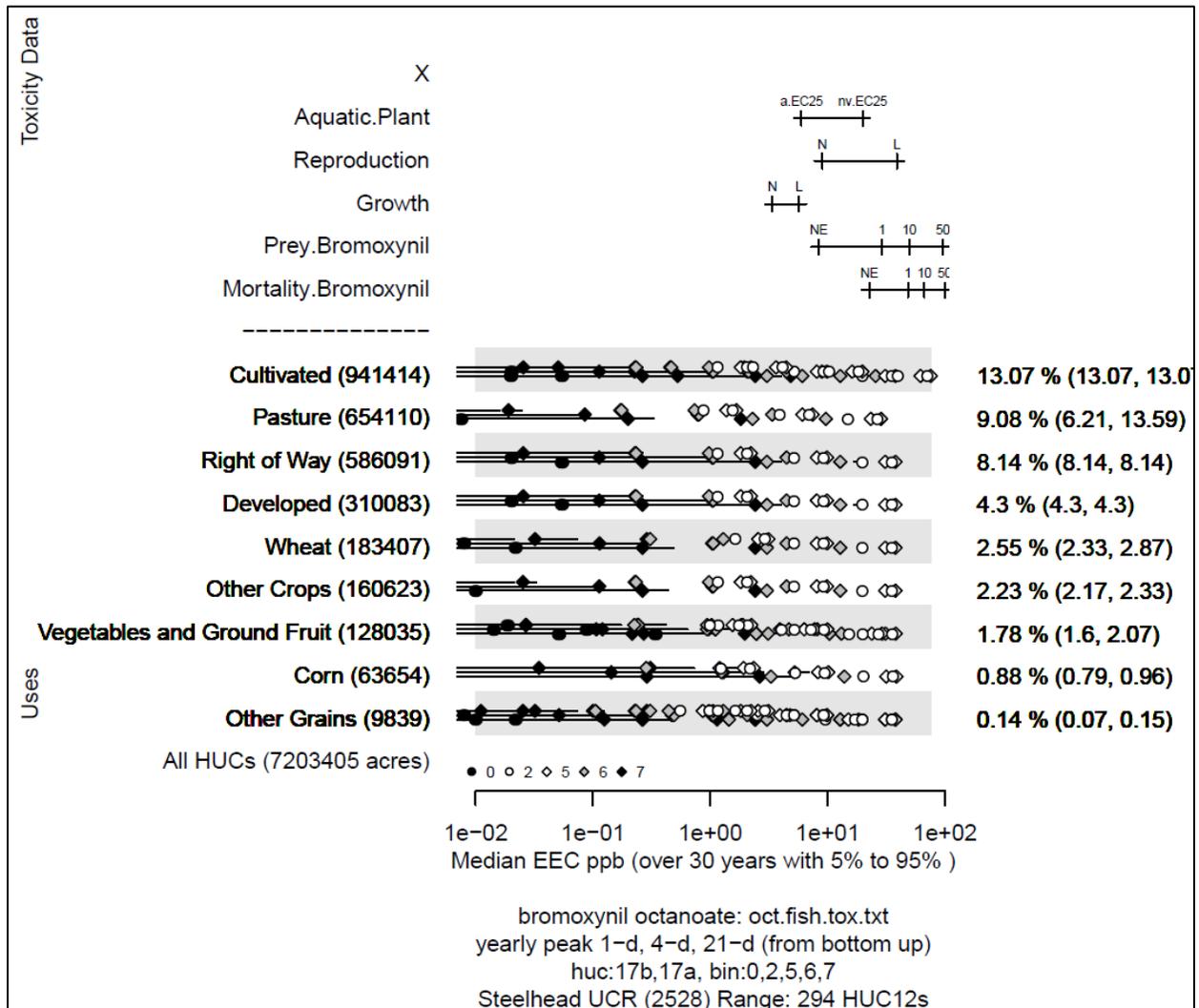


Figure 28. Effects analysis Risk-plot for Steelhead, Upper Columbia River DPS and bromoxynil

Table 158. Likelihood of exposure determination for Steelhead, Upper Columbia River DPS and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Medium
Right of Way	3	yes	no	no	NA	3	Medium
Developed	2	yes	no	no	NA	3	Medium
Cultivated	1	yes	no	no	NA	3	Medium
Other Crops	2	yes	no	no	NA	3	Medium
Corn	1	yes	no	no	yes	3	Medium
Wheat	2	yes	no	no	NA	3	Medium
Vegetables and Ground Fruit	2	yes	no	no	NA	3	Medium
Other Grains	1	yes	no	no	no	3	Low

Table 159. Direct mortality risk hypothesis; Steelhead, Upper Columbia River DPS and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.1 (9.1)	Low	Medium
Right of Way	8.1	Low	Medium
Developed	4.3	Low	Medium
Fallow; CRP (cultivated)	3.1; 10.8 (13.1)	Medium	Medium
Other Crops	2.2	Low	Medium
Corn	0.9	Low	Medium
Wheat	2.6	Low	Medium
Vegetables and Ground Fruit	1.8	Low	Medium
Other Grains	0.1	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 160. Reproduction risk hypothesis; Steelhead, Upper Columbia River DPS and bromoxynil

Endpoint: Reproduction

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.1 (9.1)	None Expected	Medium
Right of Way	8.1	None Expected	Medium
Developed	4.3	None Expected	Medium
Fallow; CRP (cultivated)	3.1; 10.8 (13.1)	None Expected	Medium
Other Crops	2.2	None Expected	Medium
Corn	0.9	None Expected	Medium
Wheat	2.6	None Expected	Medium
Vegetables and Ground Fruit	1.8	None Expected	Medium
Other Grains	0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk	Confidence		
Low	Medium		

Table 161. Growth risk hypothesis; Steelhead, Upper Columbia River DPS and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	1.1 (9.1)	None Expected	Medium
Right of Way	8.1	None Expected	Medium
Developed	4.3	None Expected	Medium
Fallow; CRP (cultivated)	3.1; 10.8 (13.1)	Low	Medium
Other Crops	2.2	None Expected	Medium
Corn	0.9	None Expected	Medium
Wheat	2.6	None Expected	Medium
Vegetables and Ground Fruit	1.8	None Expected	Medium
Other Grains	0.1	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 162. Prey risk hypothesis; Steelhead, Upper Columbia River DPS and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure

Alfalfa (pasture)	1.1 (9.1)	Low / Low	Medium
Right of Way	8.1	Low / Low	Medium
Developed	4.3	Low / Low	Medium
Fallow; CRP (cultivated)	3.1; 10.8 (13.1)	Medium / Medium	Medium
Other Crops	2.2	Low / Low	Medium
Corn	0.9	Low / Low	Medium
Wheat	2.6	Low / Low	Medium
Vegetables and Ground Fruit	1.8	Low / Low	Medium
Other Grains	0.1	Low / Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 163. Effects analysis summary table: Steelhead, Upper Columbia River DPS and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low		No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium		No

Effects analysis summary: Upper Columbia River Steelhead are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. Where formulated products and tank mixtures

containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.2.28 Steelhead, Upper Willamette River DPS (*Oncorhynchus mykiss*)

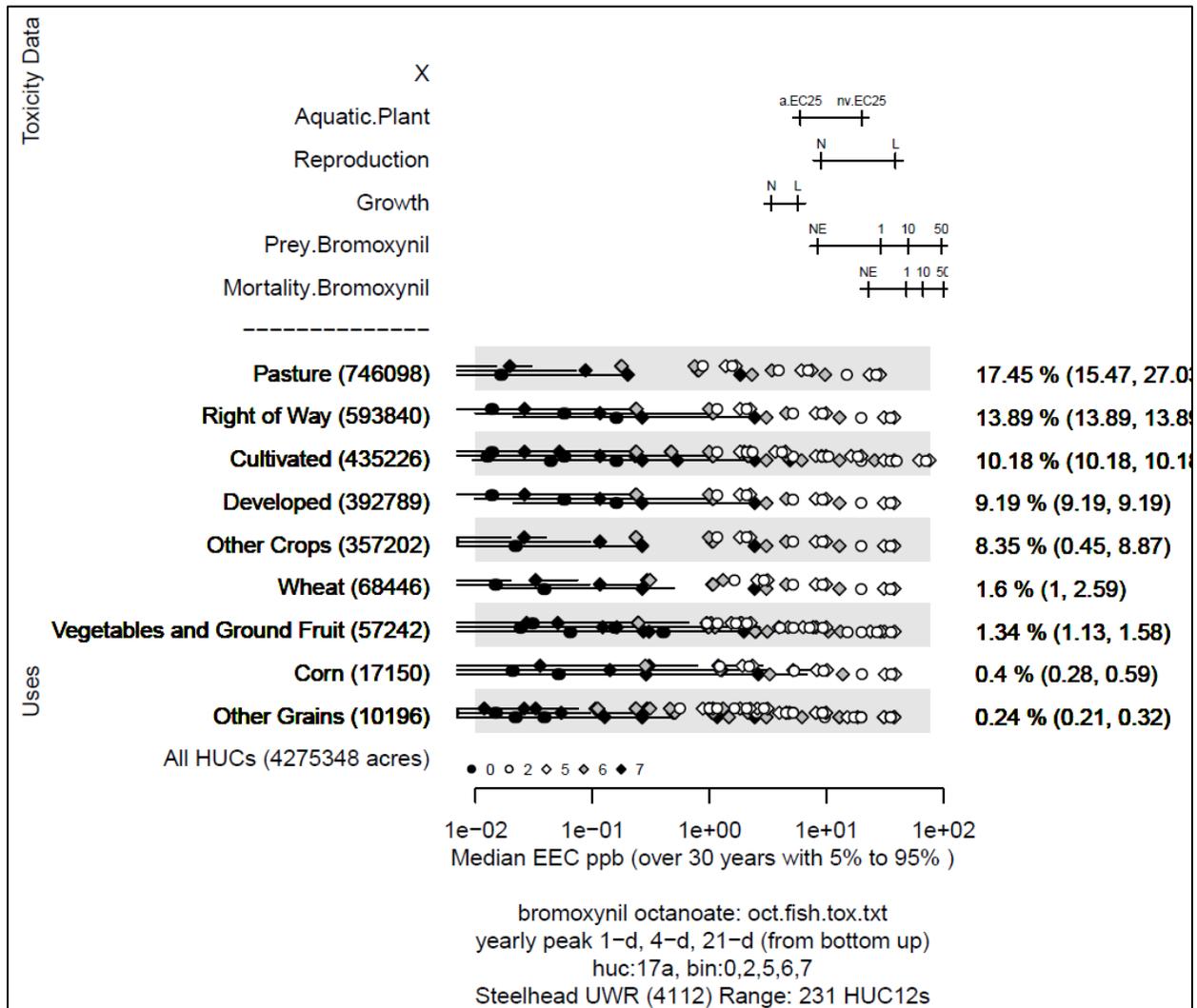


Figure 29. Effects analysis Risk-plot for Steelhead, Upper Willamette River DPS and bromoxynil

Table 164. Likelihood of exposure determination for Steelhead, Upper Willamette River DPS and bromoxynil

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Pasture	1	yes	no	no	NA	3	Low
Right of Way	3	yes	no	no	NA	3	Medium
Developed	3	yes	no	no	NA	3	Medium
Cultivated	1	yes	no	no	NA	3	Low
Other Crops	3	yes	no	no	NA	3	Medium
Corn	1	yes	no	no	no	3	Low
Wheat	2	yes	no	no	NA	3	Medium
Vegetables and Ground Fruit	2	yes	no	no	NA	3	Medium
Other Grains	1	yes	no	no	no	3	Low

Table 165. Direct mortality risk hypothesis; Steelhead, Upper Willamette River DPS and bromoxynil

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.2 (17.5)	Low	Low
Right of Way	13.9	Low	Medium
Developed	9.2	Low	Medium
Fallow; CRP (cultivated)	0.1; 0.6 (10.2)	Medium	Low
Other Crops	8.4	Low	Medium
Corn	0.4	Low	Low
Wheat	1.6	Low	Medium
Vegetables and Ground Fruit	1.3	Low	Medium
Other Grains	0.2	Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 166. Reproduction risk hypothesis; Steelhead, Upper Willamette River DPS and bromoxynil

Endpoint: Reproduction			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.2 (17.5)	None Expected	Low
Right of Way	13.9	None Expected	Medium
Developed	9.2	None Expected	Medium
Fallow; CRP (cultivated)	0.1; 0.6 (10.2)	None Expected	Low
Other Crops	8.4	None Expected	Medium
Corn	0.4	None Expected	Low
Wheat	1.6	None Expected	Medium
Vegetables and Ground Fruit	1.3	None Expected	Medium
Other Grains	0.2	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.			
Risk		Confidence	
Low		Medium	

Table 167. Growth risk hypothesis; Steelhead, Upper Willamette River DPS and bromoxynil

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Alfalfa (pasture)	0.2 (17.5)	None Expected	Low
Right of Way	13.9	None Expected	Medium
Developed	9.2	None Expected	Medium
Fallow; CRP (cultivated)	0.1; 0.6 (10.2)	Low	Low
Other Crops	8.4	None Expected	Medium
Corn	0.4	None Expected	Low
Wheat	1.6	None Expected	Medium
Vegetables and Ground Fruit	1.3	None Expected	Medium
Other Grains	0.2	None Expected	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk		Confidence	
Low		Medium	

Table 168. Prey risk hypothesis; Steelhead, Upper Willamette River DPS and bromoxynil

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Alfalfa (pasture)	0.2 (17.5)	Low / Low	Low
Right of Way	13.9	Low / Low	Medium
Developed	9.2	Low / Low	Medium
Fallow; CRP (cultivated)	0.1; 0.6 (10.2)	Medium / Medium	Low
Other Crops	8.4	Low / Low	Medium
Corn	0.4	Low / Low	Low
Wheat	1.6	Low / Low	Medium
Vegetables and Ground Fruit	1.3	Low / Low	Medium
Other Grains	0.2	Low / Low	Low
Risk Hypothesis: Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 169. Effects analysis summary table: Steelhead, Upper Willamette River DPS and bromoxynil

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to bromoxynil is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to bromoxynil is sufficient to reduce abundance via reduction in prey availability.	Medium	Low		No
Exposure to bromoxynil is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No
Exposure to bromoxynil is sufficient to reduce productivity via impairments to reproduction.	Low	Medium		No

Effects analysis summary: Upper Willamette River Steelhead are not anticipated to experience meaningful reductions in abundance, reproduction, or growth from exposure to bromoxynil. Given the factors evaluated above, we do not anticipate that these exposures will result in substantial reductions in prey availability. Where formulated products and tank mixtures containing bromoxynil occur in aquatic habitats, individuals may experience increased toxicity. NMFS has determined the overall risk to the species from the effects of the action is medium and the confidence associated with that risk is low. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3 Prometryn Effects Analysis

In evaluating the risk posed to listed species and their designated critical habitats we considered pesticide concentrations modeled for a variety of habitats ranging from shallow, low-flow side channels to high-volume static waterbodies (e.g. lakes and reservoirs). Although all habitats were

evaluated and considered, the species-specific risk characterization that follows is made in reference to bins 0 and 2. In other words, when making the explicit comparisons to toxicity response data, we evaluated the EECs associated with direct runoff and low-volume, low-flow habitats. Estimated environmental concentrations were generated for static waterbodies, however, the effect of exposure in these waterbodies was evaluated qualitatively, rather than in reference to the calculated EECs given a lack of confidence in these estimates.

A qualitative evaluation was deemed appropriate for static waterbodies (bins 5, 6 and 7) based on prometryn-specific inputs and model assumptions. Prometryn is expected to dissipate within an aquatic system via downstream transport, metabolic degradation, bioaccumulation, and indirect photolysis (USEPA 2017). However, prometryn is relatively soluble and is classified as stable in regards to the abiotic processes of hydrolysis and direct photolysis. The PWC modeling within a static system thus results in a stepwise build-up of prometryn over time. This build-up is further amplified by the practice of running the model over a 30-year period, which is done to account for meteorological variability. Figure 30 compares the 30-year PWS runs for two habitats; one flowing (bin 2) and one static (bin 7). Peak concentrations in the bin 2 model are associated with storm events and/or pesticide applications, whereas peak concentrations in the bin 7 model are simply those associated with the last iterations of the 30-year model run. Although prometryn is expected to accumulate over time, we do not expect prometryn concentrations to exist at levels associated with a 30-year accumulation within species habitats. Thus, in the species-by-species assessments that follow, Prometryn exposure in static waterbodies was considered qualitatively, rather than by direct comparison to EECs.

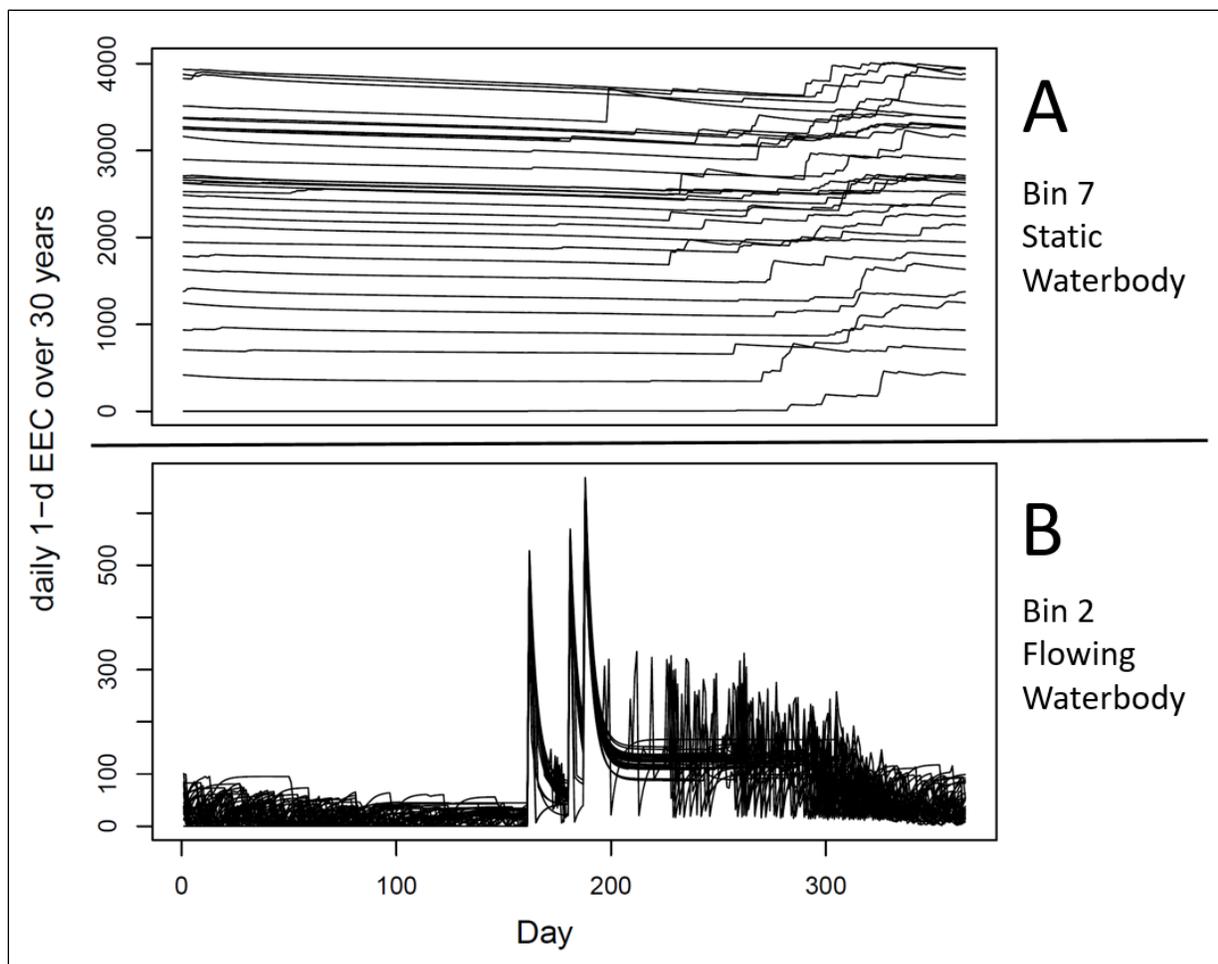


Figure 30. Pesticide in Water Calculator (PWC) exposure estimates for prometryn in static and flowing habitats. Panel A displays the model run for bin 7 (static, high-volume). Panel B displays the model run for bin 2 (low-flow, length of field). Each horizontal line represents the individual yearly run for the 30 successive years. Note that variability in the bin 7 runs represents the number of successive years modeled whereas variability in the bin 2 run represents year-to-year differences in meteorological conditions. The continued presence of prometryn in bin 7 produces a gradual increase in EECs with successive years.

12.3.1 Chum salmon, Columbia River ESU (*Oncorhynchus keta*)

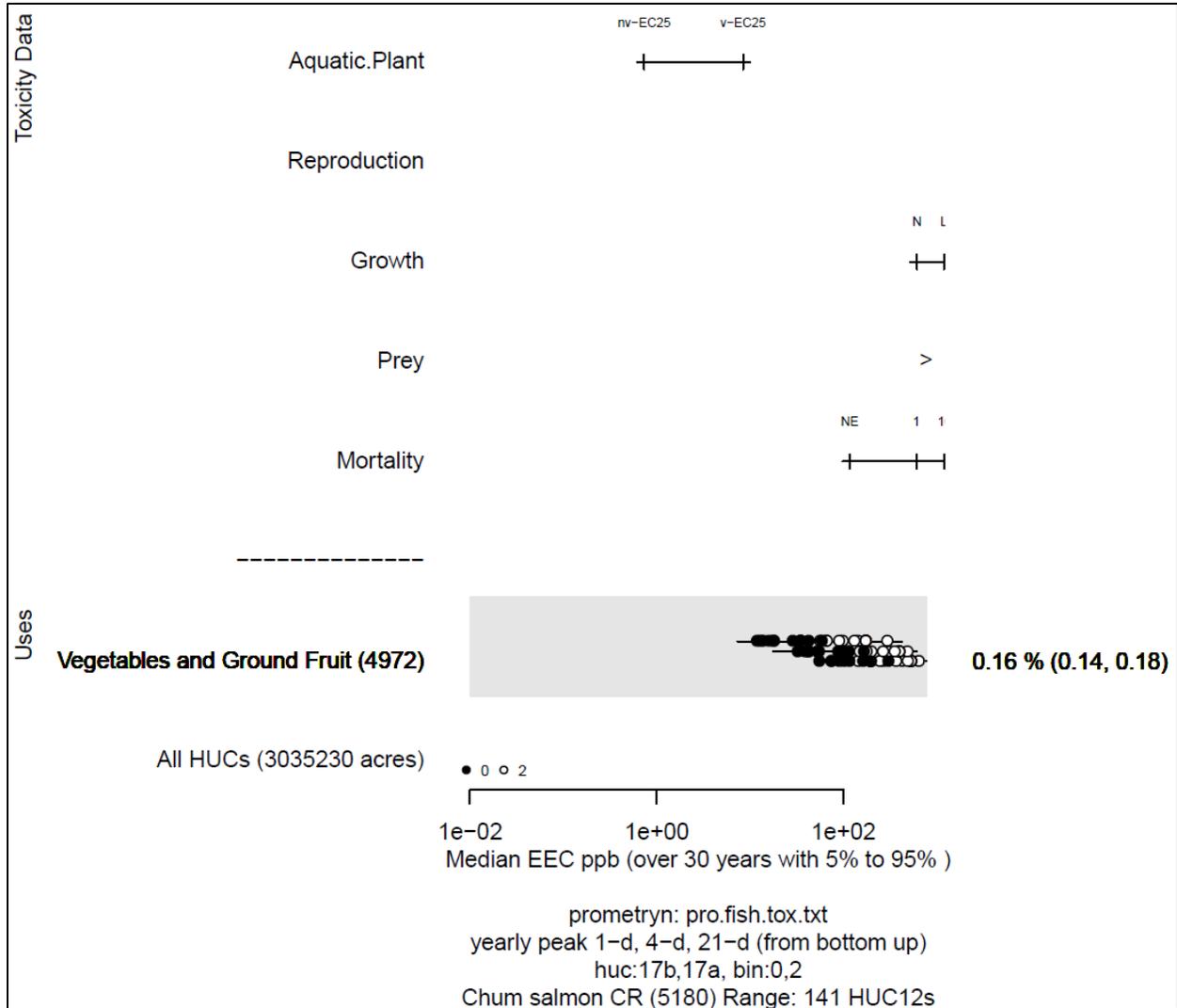


Figure 31. Effects analysis Risk-plot for Columbia River ESU chum salmon and prometryn

Table 170. Likelihood of exposure determination for Columbia River ESU chum salmon and prometryn

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	0	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	1	yes	yes	yes	no	2	NA	Low

Table 171. Direct mortality risk hypothesis; Columbia River ESU chum salmon and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	< 1.0	Medium	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk		Confidence	
Low		Medium	

Table 172. Prey risk hypothesis; Columbia River ESU chum salmon and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	< 1.0	None Expected	Low
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk		Confidence	
Low		Medium	

Table 173. Growth risk hypothesis; Columbia River ESU chum salmon and prometryn

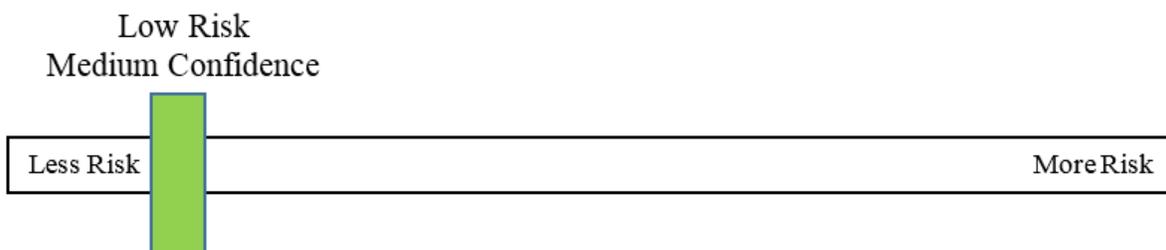
Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	< 1	None Expected	Low

Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).		
Risk	Confidence	
Low	Medium	

Table 174. Effects analysis summary table: Columbia River ESU chum salmon and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Low	Medium	Not Applicable	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium		No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No

Effects analysis summary: Columbia River ESU chum salmon are not anticipated to experience reductions in abundance from exposure to prometryn. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, chum may experience increased toxicity. NMFS has determined the overall risk to the Columbia River ESU chum salmon from the effects of the action is low and the confidence associated with that risk is medium.



12.3.2 Chum Salmon, Hood Canal summer-run ESU (*Oncorhynchus keta*)

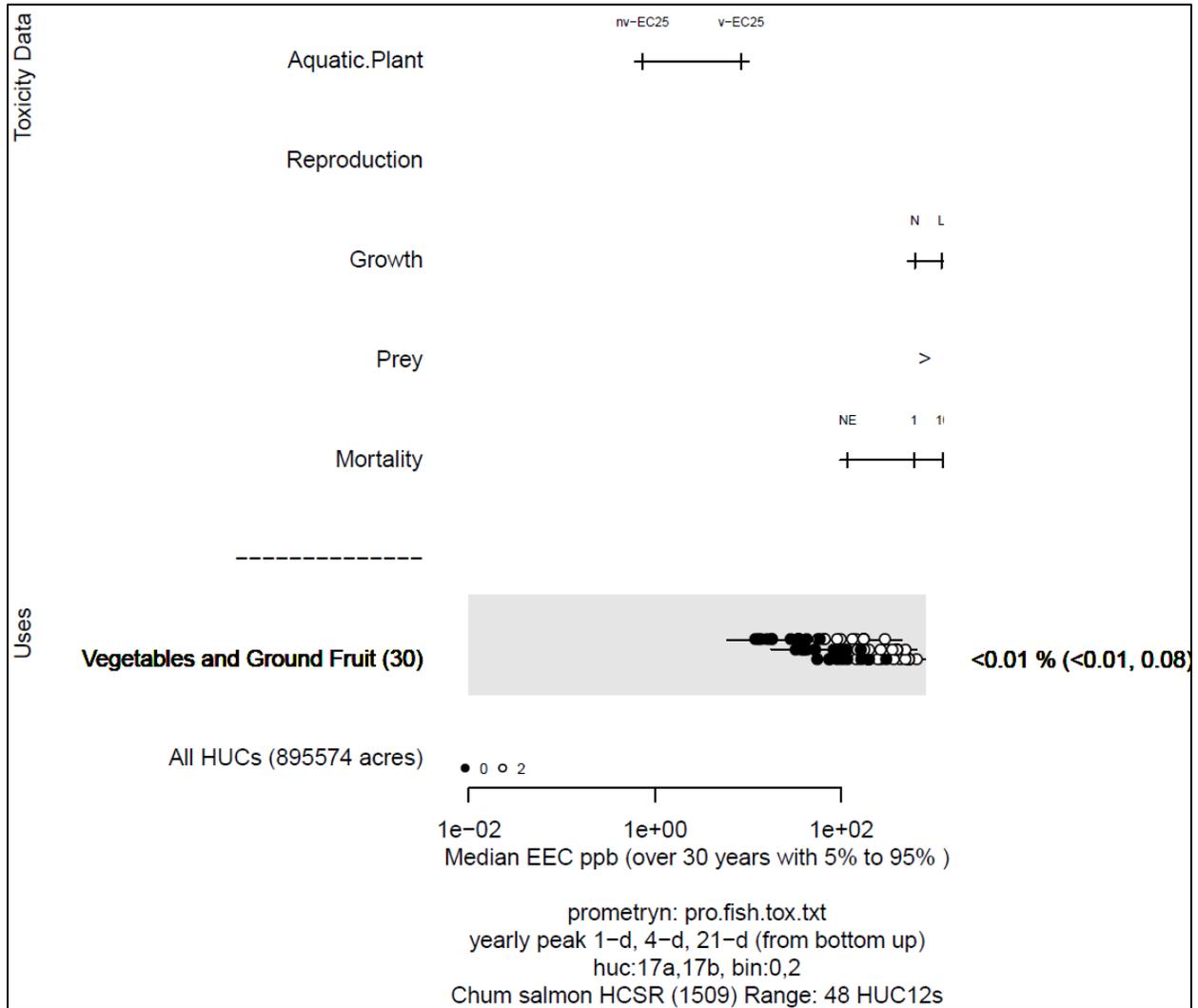


Figure 32. Effects analysis Risk-plot for Hood Canal summer-run ESU chum salmon and prometryn

Table 175. Likelihood of exposure determination for Hood Canal summer-run ESU chum salmon and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	1	yes	yes	yes	no	2	Low

Table 176. Direct mortality risk hypothesis; Hood Canal summer-run chum salmon and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Vegetables and Ground Fruit	< 0.01	Medium	Low
Cotton	0	-	-
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk		Confidence	
Low		Medium	

Table 177. Prey risk hypothesis; Hood Canal summer-run chum salmon and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Vegetables and Ground Fruit	< 0.01	None Expected	Low
Cotton	0	-	-
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk		Confidence	
Low		Medium	

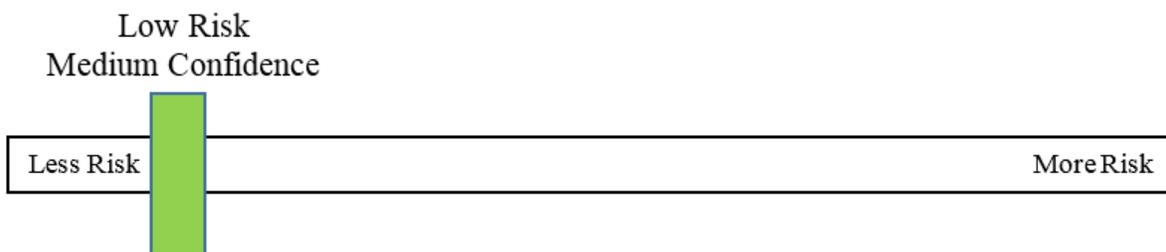
Table 178. Growth risk hypothesis; Hood Canal summer-run chum salmon and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Vegetables and Ground Fruit	< 0.01	None Expected	Low
Cotton	0		
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk		Confidence	
Low		Medium	

Table 179. Effects analysis summary table: Hood Canal summer-run ESU chum salmon and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Low	Medium	Not Applicable	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium		No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No

Effects analysis summary: Hood Canal summer-run chum salmon are not anticipated to experience reductions in abundance from exposure to prometryn. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, chum may experience increased toxicity. NMFS has determined the overall risk to Hood Canal summer-run chum from the effects of the action is low and the confidence associated with that risk is medium.



12.3.3 Chinook, California Coastal (*Oncorhynchus tshawytscha*)

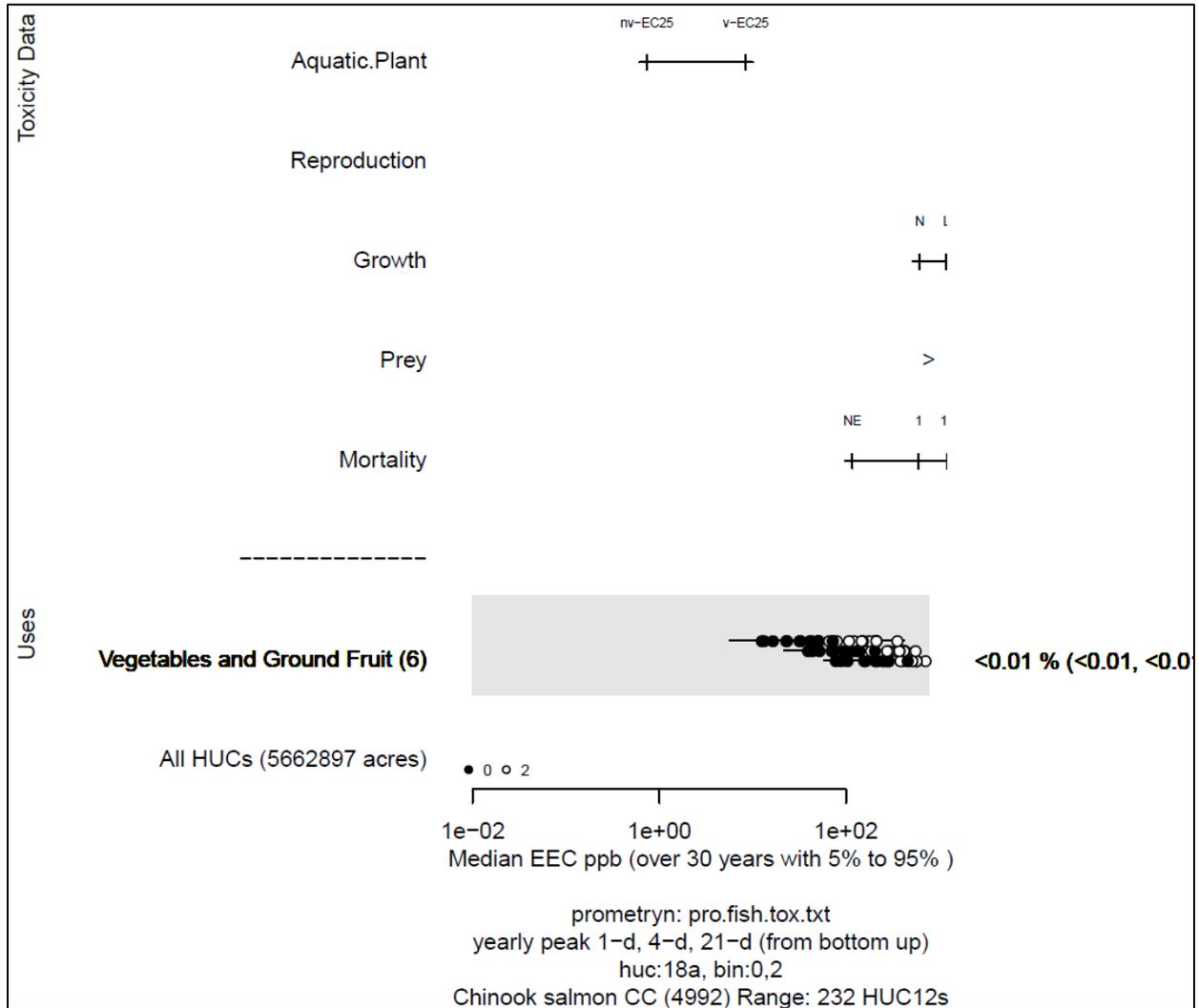


Figure 33. Effects analysis Risk-plot for California Coastal ESU chinook and prometryn

Table 180. Likelihood of exposure determination for California Coastal ESU Chinook salmon and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	1	yes	yes	no	3	NA	Low

Table 181. Direct mortality risk hypothesis; California Coastal Chinook salmon and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	< 0.01	Medium	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk		Confidence	
Low		Medium	

Table 182. Growth risk hypothesis; California Coastal Chinook salmon and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	< 0.01	None Expected	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk		Confidence	
Low		Medium	

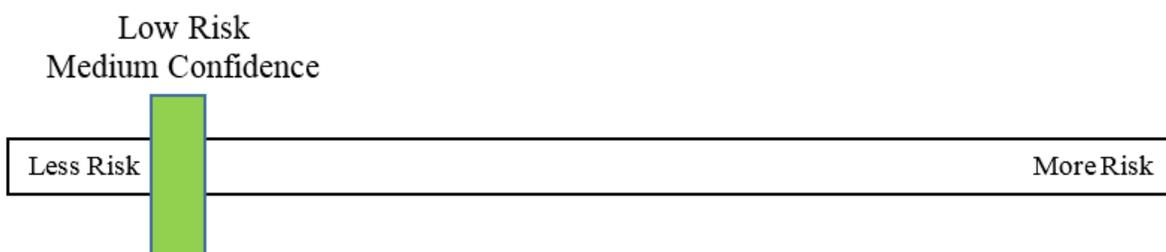
Table 183. Prey risk hypothesis; California Coastal Chinook salmon and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	< 0.01	None Expected	Low
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk		Confidence	
Low		Medium	

Table 184. Effects analysis summary table: California Coastal ESU Chinook salmon and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Low	Medium	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No

Effects analysis summary: California Coastal Chinook salmon are not anticipated to experience reductions in abundance from exposure to prometryn. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, chinook may experience increased toxicity. NMFS has determined the overall risk to California Coastal Chinook salmon from the effects of the action is low and the confidence associated with that risk is medium.



12.3.4 Chinook Salmon, Central Valley spring-run ESU (*Oncorhynchus tshawytscha*)

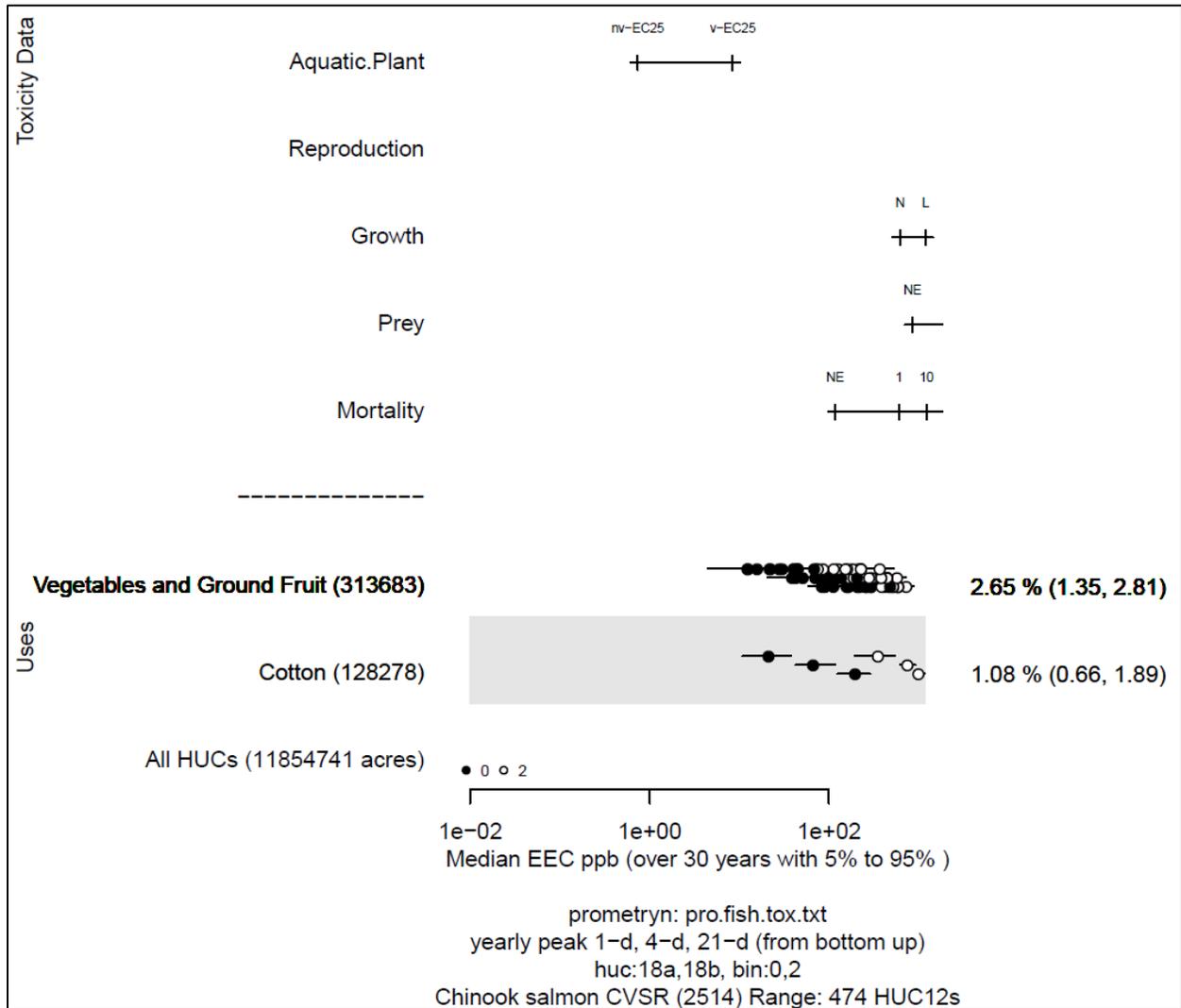


Figure 34. Effects analysis Risk-plot for Chinook salmon, Central Valley spring-run ESU and prometryn

Table 185. Likelihood of exposure determination for Chinook salmon, Central Valley spring-run ESU and prometryn

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	2	yes	yes	yes	NA	3	High	
Veg. & Ground Fruit	2	yes	yes	yes	NA	3	High	

Table 186. Direct mortality risk hypothesis; Chinook salmon, Central Valley spring-run ESU and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	1.08	Medium	High
Vegetables and Ground Fruit	2.65	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
High	Low		

Table 187. Growth risk hypothesis; Chinook salmon, Central Valley spring-run ESU and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	1.08	None Expected	High
Vegetables and Ground Fruit	2.65	None Expected	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	Medium		

Table 188. Prey risk hypothesis; Chinook salmon, Central Valley spring-run ESU and prometryn

Endpoint: Prey

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	1.08	Low	High
Vegetables and Ground Fruit	2.65	None Expected	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 189. Effects analysis summary table: Chinook salmon, Central Valley spring-run ESU and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	High	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Medium	Low	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No

Effects analysis summary:

Maximum environmental concentrations are anticipated to be lethal to some individuals of Central Valley spring-run Chinook salmon. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Reduced prey abundance, and impaired growth are not expected due to minimal exceedance of available prey toxicity data. Where formulated

products and tank mixtures containing prometryn occur in aquatic habitats, Chinook will likely experience more toxicity. NMFS has determined the overall risk to species from the effects of the action is medium and the confidence associated with that risk is low. Low confidence is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.5 Chinook Salmon, Lower Columbia River ESU (*Oncorhynchus tshawytscha*)

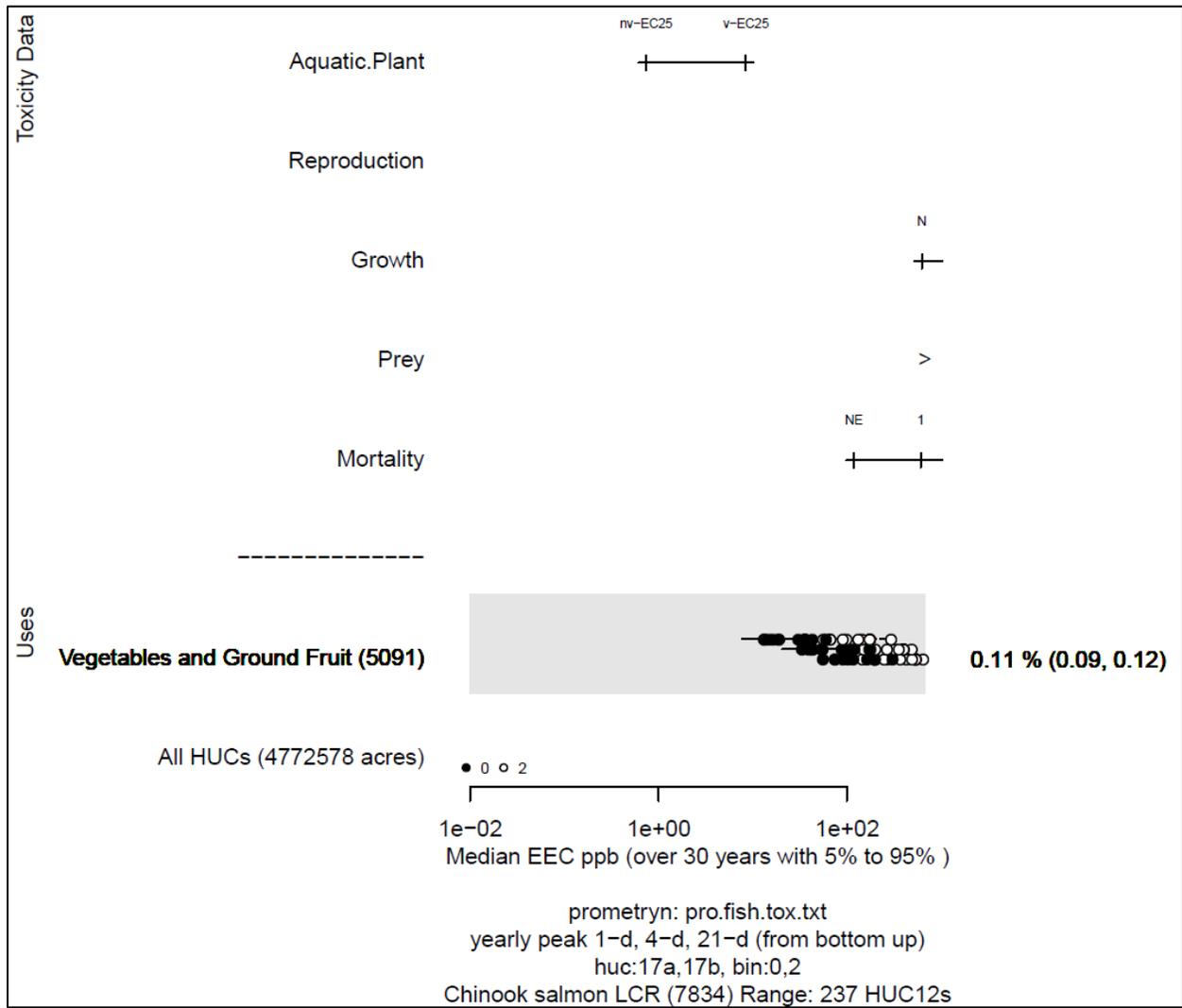


Figure 35. Effects analysis Risk-plot for Lower Columbia River ESU, Chinook salmon and prometryn

Table 190. Likelihood of exposure determination for Lower Columbia River ESU, Chinook salmon and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	0	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	1	yes	yes	yes	yes	3	High

Table 191. Direct mortality risk hypothesis; Chinook salmon, Lower Columbia River ESU and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.11	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence	High density of vegetables and ground fruit use sites proximal to the migration corridor at Sauvie Island, Oregon (all populations utilize this migratory corridor).	
Medium	Low		

Table 192. Growth risk hypothesis; Chinook salmon, Lower Columbia River ESU and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.11	None Expected	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence	High density of vegetables and ground fruit use sites proximal to the migration corridor at Sauvie Island, Oregon (all populations utilize this migratory corridor).	
Low	Medium		

Table 193. Prey risk hypothesis; Chinook salmon, Lower Columbia River ESU and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.11	None Expected	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence	High density of vegetables and ground fruit use sites proximal to the migration corridor at Sauvie Island, Oregon (all populations utilize this migratory corridor).	
Low	Medium		

Table 194. Effects analysis summary table: Chinook salmon, Lower Columbia River ESU and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No

Effects analysis summary: Maximum environmental concentrations are anticipated to be lethal to some individuals of Lower Columbia River Chinook salmon. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10%

mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Reduced prey abundance, and impaired growth are not expected based on concentrations and relevant toxicity values. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, Chinook will likely experience more toxicity. NMFS has determined the overall risk to species from the effects of the action is medium and the confidence associated with that risk is low. Medium risk is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.6 Chinook Salmon, Puget Sound ESU (*Oncorhynchus tshawytscha*)

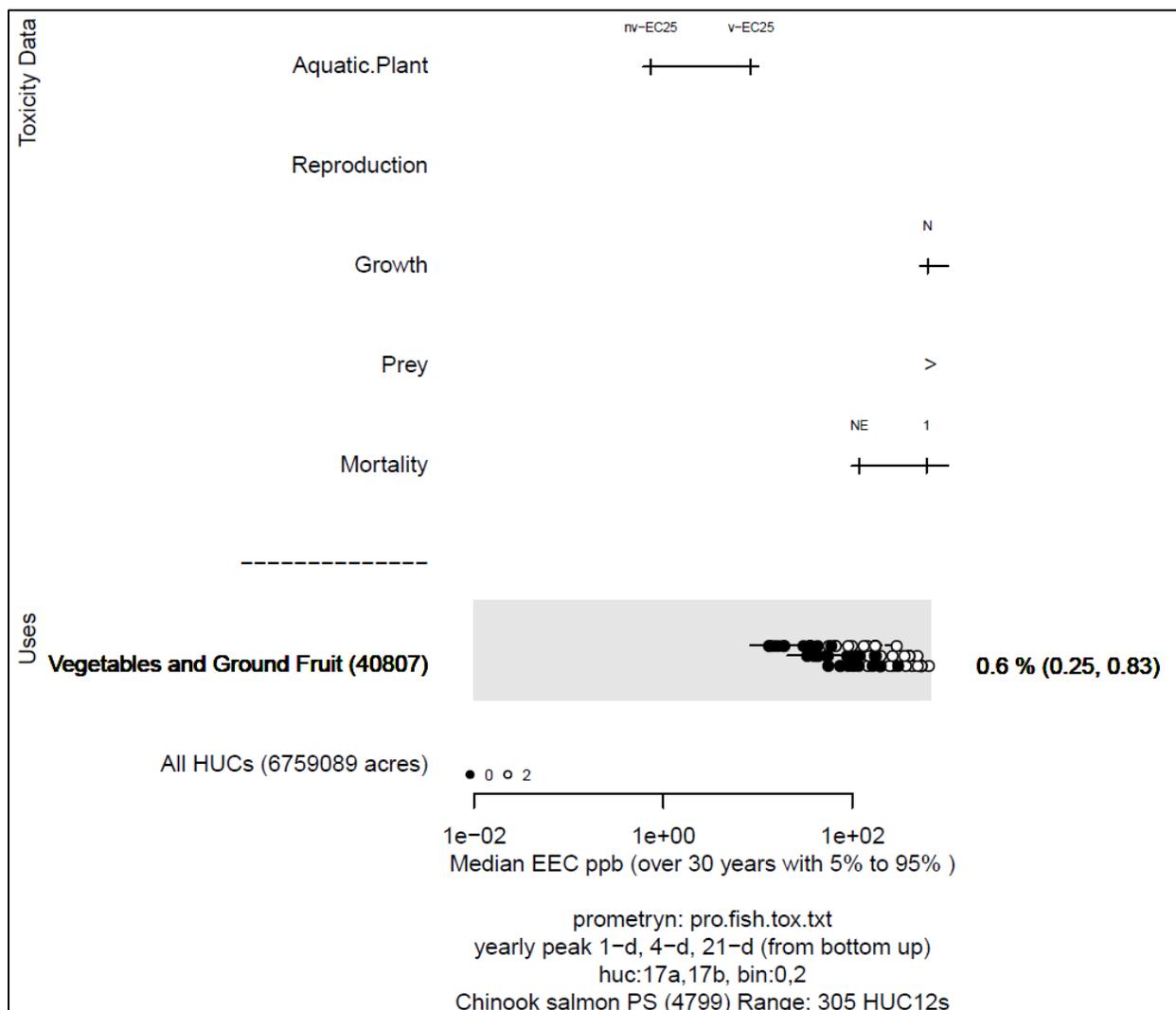


Figure 36. Effects analysis Risk-plot for Chinook salmon, Puget Sound ESU and prometryn

Table 195. Likelihood of exposure determination for Chinook salmon, Puget Sound ESU and prometryn

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	1	yes	yes	yes	yes	3	High	High

Table 196. Direct mortality risk hypothesis; Chinook salmon, Puget Sound ESU and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Vegetables and Ground Fruit	0.6	Medium	High
Cotton	0	-	-
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence	High density of vegetables and ground fruit use sites proximal to the Nooksack populations (middle fork, north fork, and south fork), the upper and lower Skagit populations, and the Sauk population. These populations have been determined essential to the recovery of the ESU per the 2007 Puget Sound Chinook Recovery Plan.	
Medium	Low		

Table 197. Growth risk hypothesis; Chinook salmon, Puget Sound ESU and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Vegetables and Ground Fruit	0.6	None Expected	High
Cotton	0	-	-
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence	High density of vegetables and ground fruit use sites proximal to the Nooksack populations (middle fork, north fork, and south fork), the upper and lower Skagit populations, and the Sauk population. These populations have been determined essential to the recovery of the ESU per the 2007 Puget Sound Chinook Recovery Plan.	
Low	Medium		

Table 198. Prey risk hypothesis; Chinook salmon, Puget Sound ESU and prometryn

Endpoint: Prey

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Vegetables and Ground Fruit	0.6	None Expected	High
Cotton	0	-	-
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence	High density of vegetables and ground fruit use sites proximal to the Nooksack populations (middle fork, north fork, and south fork), the upper and lower Skagit populations, and the Sauk population. These populations have been determined essential to the recovery of the ESU per the 2007 Puget Sound Chinook Recovery Plan.	
Low	Medium		

Table 199. Effects analysis summary table: Chinook salmon, Puget Sound ESU and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No

Effects analysis summary: Maximum environmental concentrations are anticipated to be lethal to some individuals of Chinook salmon, Puget Sound Chinook salmon. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed

the variability (1 standard deviation) of an unexposed population. Reduced prey abundance, and impaired growth are not expected based on concentrations and relevant toxicity values. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, Chinook will likely experience more toxicity. NMFS has determined the overall risk to species from the effects of the action is medium and the confidence associated with that risk is low. Medium risk is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.7 Chinook Salmon, Sacramento River winter-run (*Oncorhynchus tshawytscha*)

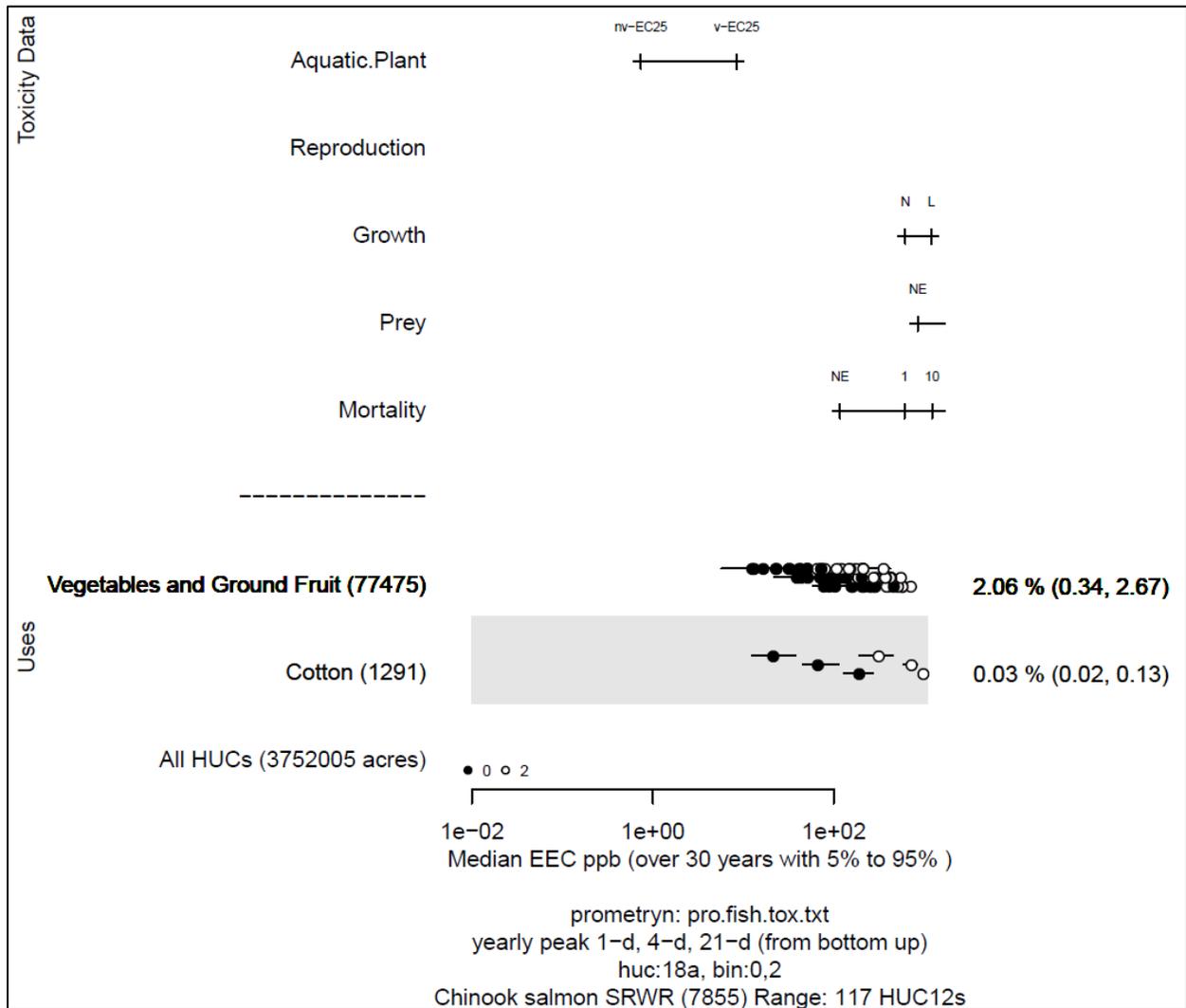


Figure 37. Effects analysis Risk-plot for Chinook salmon, Sacramento River winter-run ESU and prometryn

Table 200. Likelihood of exposure determination for Chinook salmon, Sacramento River winter-run ESU and prometryn

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	1	yes	yes	yes	no	3		Low
Veg. & Ground Fruit	2	yes	yes	yes	NA	3		High

Table 201. Direct mortality risk hypothesis; Chinook salmon, Sacramento River winter-run ESU and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0.03	Medium	Low
Vegetables and Ground Fruit	2.06	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 202. Growth risk hypothesis; Chinook salmon, Sacramento River winter-run ESU and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0.03	None Expected	Low
Vegetables and Ground Fruit	2.06	None Expected	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	Medium		

Table 203. Prey risk hypothesis; Chinook salmon, Sacramento River winter-run ESU and prometryn

Endpoint: Prey

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0.03	Low	Low
Vegetables and Ground Fruit	2.06	None Expected	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 204. Effects analysis summary table: Chinook salmon, Sacramento River winter-run ESU and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No

Effects analysis summary: Maximum environmental concentrations are anticipated to be lethal to some individuals of Sacramento River winter-run Chinook salmon. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Reduced prey abundance, and impaired growth are not expected based on concentrations and relevant toxicity values. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, Chinook will likely experience more toxicity. NMFS has determined the overall risk to species from the effects of the action is medium and the confidence associated with that risk is low. Medium risk

is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.8 Chinook Salmon, Snake River fall-run ESU (*Oncorhynchus tshawytscha*)

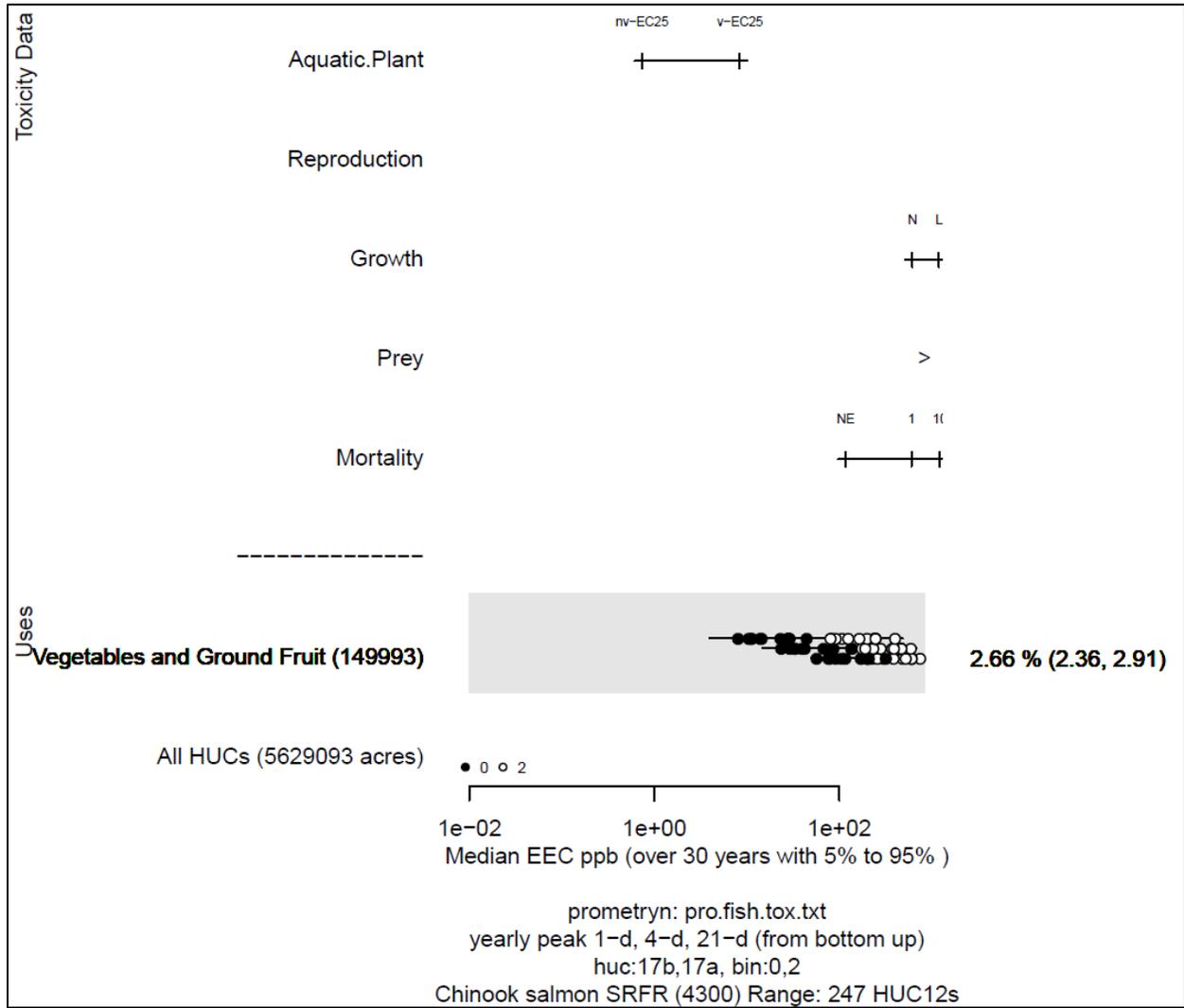


Figure 38. Effects analysis Risk-plot for Chinook salmon, Snake River fall-run ESU and prometryn

Table 205. Likelihood of exposure determination for Chinook salmon, Snake River fall-run ESU and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	2	yes	yes	yes	NA	3	High

Table 206. Direct mortality risk hypothesis; Chinook salmon, Snake River fall-run ESU and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	2.7	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 207. Growth risk hypothesis; Chinook salmon, Snake River fall-run ESU and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	2.7	None Expected	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).			
Risk	Confidence		
Low	Medium		

Table 208. Prey risk hypothesis; Chinook salmon, Snake River fall-run ESU and prometryn; Juveniles

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure

Cotton	0	-	-
Vegetables and Ground Fruit	2.7	None Expected	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 209. Effects analysis summary table: Chinook salmon, Snake River fall-run ESU and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No

Effects analysis summary: Maximum environmental concentrations are anticipated to be lethal to some individuals of Snake River fall-run Chinook salmon. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Reduced prey abundance, and impaired growth are not expected based on concentrations and relevant toxicity values. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, Chinook will likely experience more toxicity. NMFS has determined the overall risk to Chinook from the effects of the action is medium and the confidence associated with that risk is low. Medium risk is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality

sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.9 Chinook Salmon, Snake River spring/summer-run ESU (*Oncorhynchus tshawytscha*)

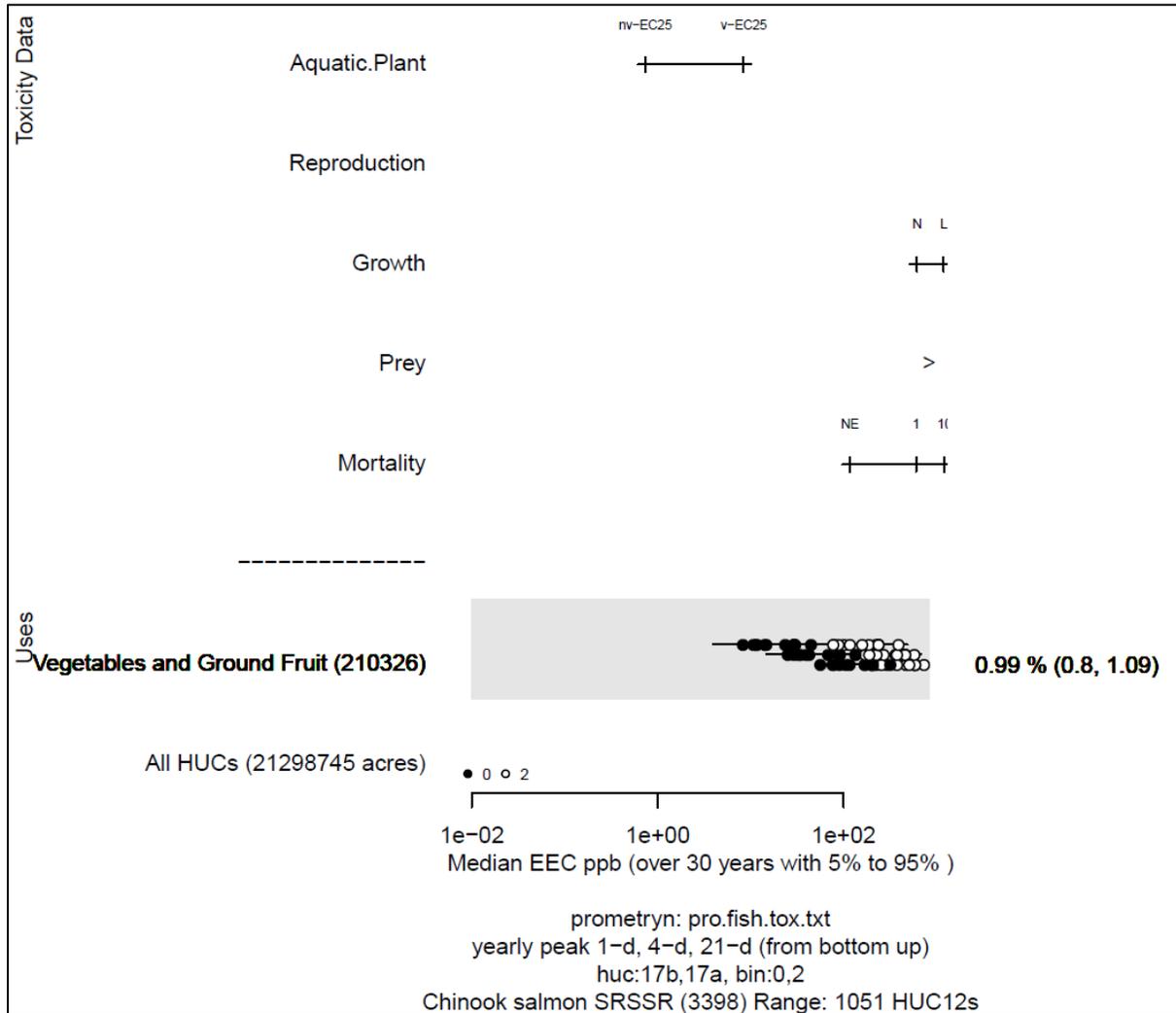


Figure 39. Effects analysis Risk-plot for Chinook salmon, Snake River spring/summer-run ESU and prometryn

Table 210. Likelihood of exposure determination for Chinook salmon, Snake River spring/summer-run ESU and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	0	NA	NA	NA	3	NA	
Veg. & Ground Fruit	1	yes	yes	yes	no	3	low

Table 211. Direct mortality risk hypothesis; Chinook salmon, Snake River spring/summer-run ESU and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.99	Medium	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Low	Medium		

Table 212. Growth risk hypothesis; Chinook salmon, Snake River spring/summer-run ESU and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.99	None Expected	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	Medium		

Table 213. Prey risk hypothesis; Chinook salmon, Snake River spring/summer-run ESU and prometryn

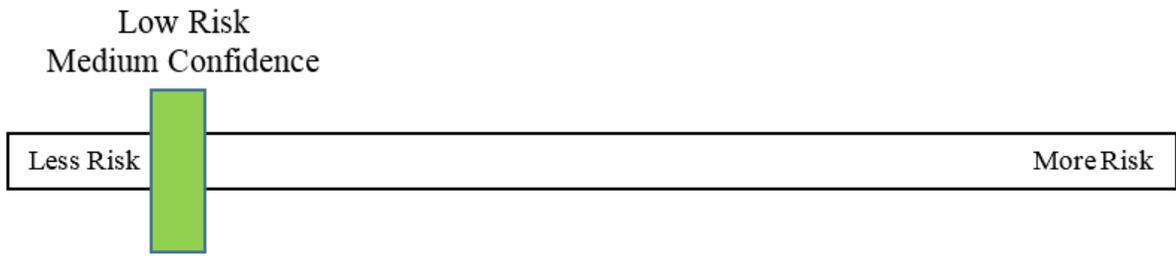
Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.99	None Expected	Low
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 214. Effects analysis summary table: Chinook salmon, Snake River spring/summer-run ESU and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Low	Medium	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No

Effects analysis summary:

Snake River spring/summer-run Chinook salmon are not anticipated to experience reductions in abundance from exposure to prometryn. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, chum may experience increased toxicity. NMFS has determined the overall risk to Chinook salmon, Snake River spring/summer-run ESU salmon from the effects of the action is low and the confidence associated with that risk is medium.



12.3.10 Chinook salmon, Upper Columbia River spring-run ESU (*Oncorhynchus tshawytscha*)

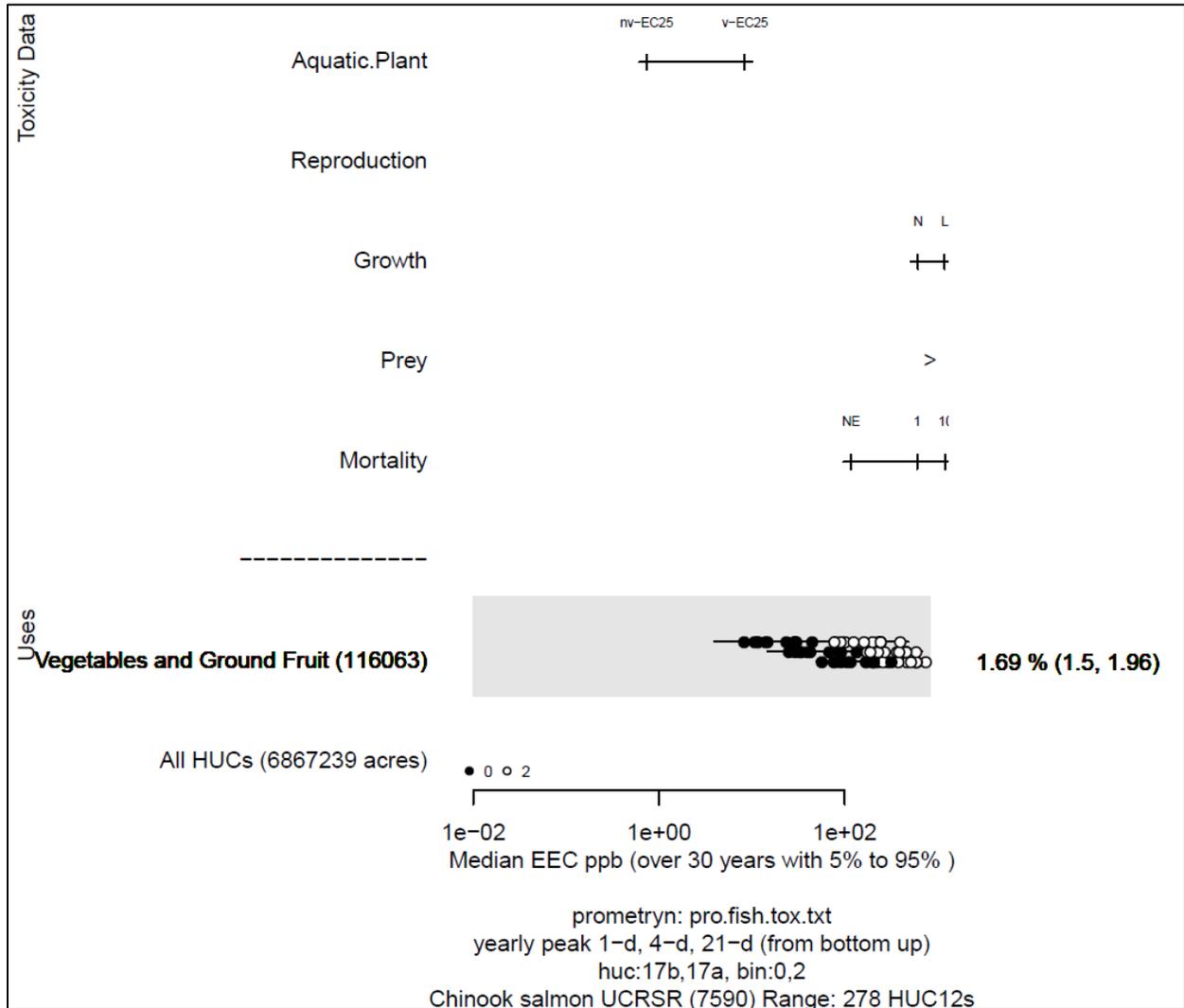


Figure 40. Effects analysis Risk-plot for Chinook salmon, upper Columbia spring-run ESU and prometryn

Table 215. Likelihood of exposure determination for Chinook salmon, upper Columbia spring-run ESU and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	2	yes	yes	yes	NA	3	High

Table 216. Direct mortality risk hypothesis; Chinook salmon, upper Columbia spring-run ESU and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.69	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 217. Growth risk hypothesis; Chinook salmon, upper Columbia spring-run ESU and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.69	None Expected	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	Medium		

Table 218. Prey risk hypothesis; Chinook salmon, upper Columbia spring-run ESU and prometryn

Endpoint: Prey

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.69	None Expected	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 219. Effects analysis summary table: Chinook salmon, upper Columbia spring-run ESU and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No

Effects analysis summary:

Maximum environmental concentrations are anticipated to be lethal to some individuals of Upper Columbia spring-run Chinook salmon. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Reduced prey abundance, and impaired growth are not expected based on concentrations and relevant toxicity values. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, Chinook will likely experience more toxicity. NMFS has determined the overall risk to species from the effects of the action is

medium and the confidence associated with that risk is low. Medium risk is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.11 Chinook Salmon, Upper Willamette River ESU (*Oncorhynchus tshawytscha*)

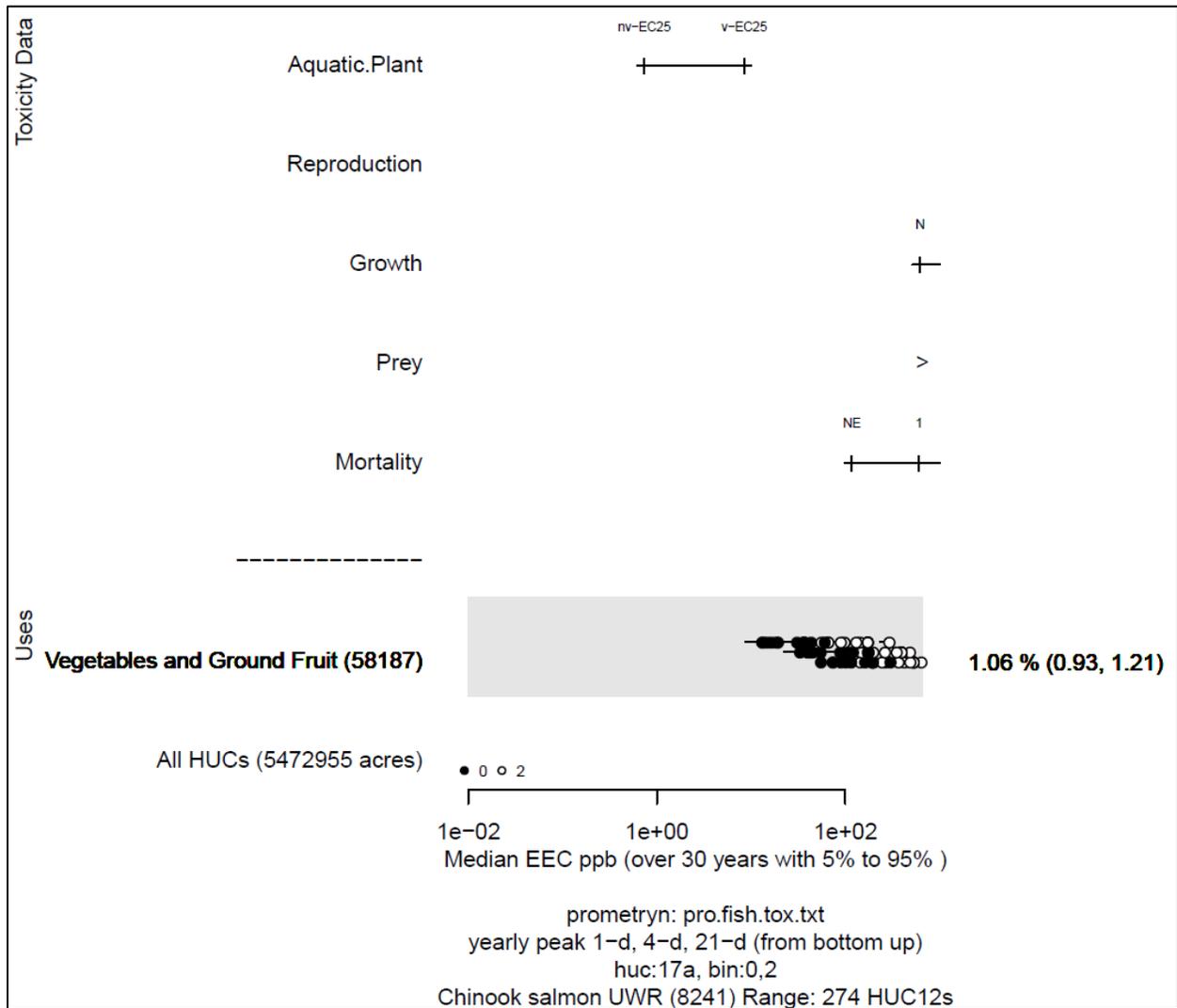


Figure 41. Effects analysis Risk-plot for Chinook salmon, upper Willamette River ESU and prometryn

Table 220. Likelihood of exposure determination for Chinook salmon, upper Willamette River ESU and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	2	yes	yes	yes	NA	3	High

Table 221. Direct mortality risk hypothesis; Chinook salmon, upper Willamette River ESU and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.06	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 222. Growth risk hypothesis; Chinook salmon, upper Willamette River ESU and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.06	None Expected	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	Medium		

Table 223. Prey risk hypothesis; Chinook salmon, upper Willamette River ESU and prometryn

Endpoint: Prey

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.06	None Expected	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 224. Effects analysis summary table: Chinook salmon, upper Willamette River ESU and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No

Effects analysis summary:

Maximum environmental concentrations are anticipated to be lethal to some individuals of Upper Willamette River Chinook salmon. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for Chinook salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Reduced prey abundance, and impaired growth are not expected based on concentrations and relevant toxicity values. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, Chinook will likely experience more toxicity. NMFS has determined the overall risk to species from the effects of the action is

medium and the confidence associated with that risk is low. Medium risk is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.12 Coho Salmon, Central California Coast ESU (*Oncorhynchus kisutch*)

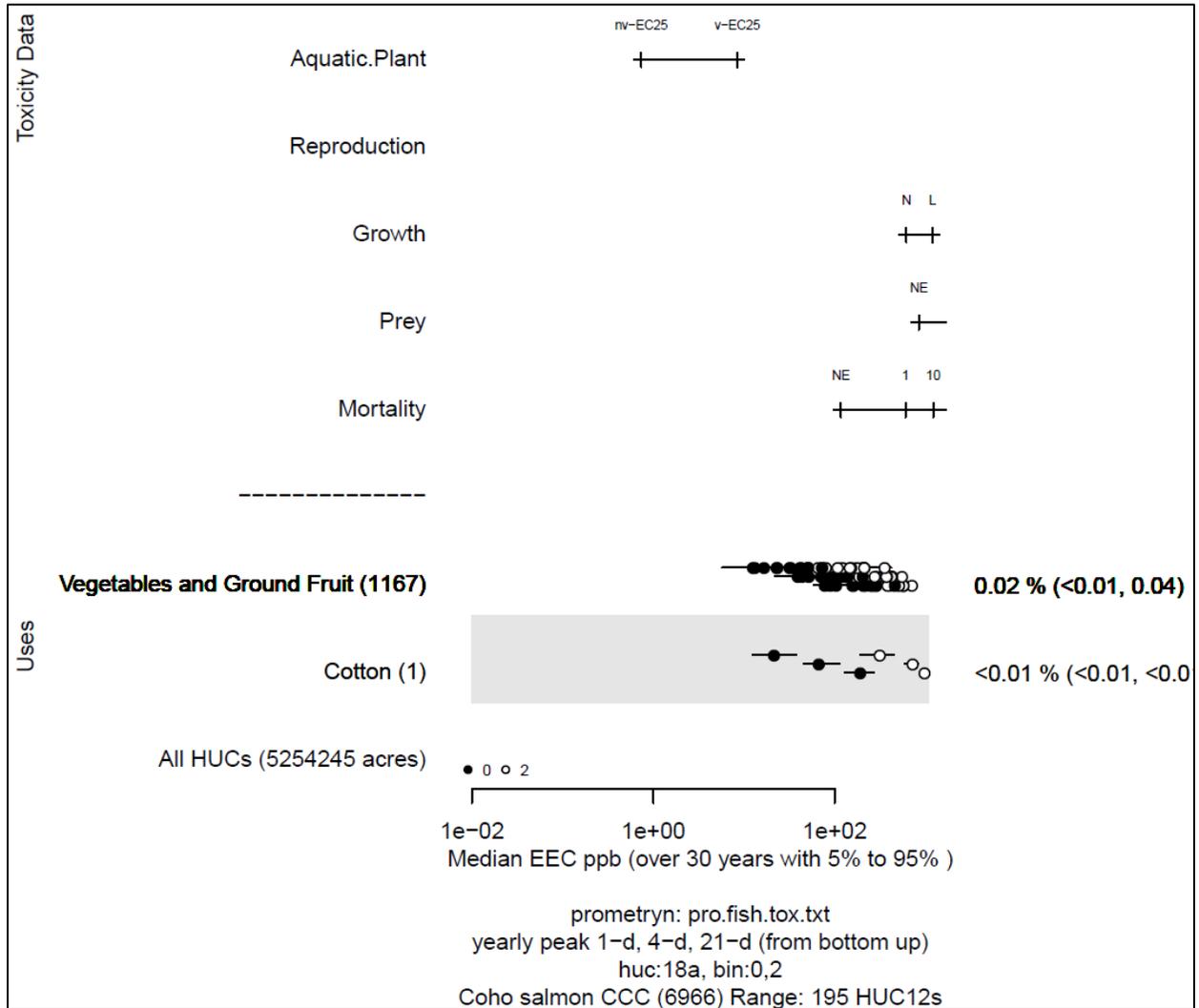


Figure 42. Effects analysis Risk-plot for Coho salmon, Central California Coast ESU and prometryn

Table 225. Likelihood of exposure determination for Coho salmon, Central California Coast ESU and prometryn

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	1	yes	yes	yes	no	3		Low
Veg. & Ground Fruit	1	yes	yes	yes	no	3		Low

Table 226. Direct mortality risk hypothesis; Coho salmon, Central California Coast ESU and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	< 0.01	Medium	Low
Vegetables and Ground Fruit	0.02	Medium	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Low	Medium		

Table 227. Growth risk hypothesis; Coho salmon, Central California Coast ESU and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	< 0.01	None Expected	Low
Vegetables and Ground Fruit	0.02	None Expected	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	Medium		

Table 228. Prey risk hypothesis; Coho salmon, Central California Coast ESU and prometryn

Endpoint: Prey

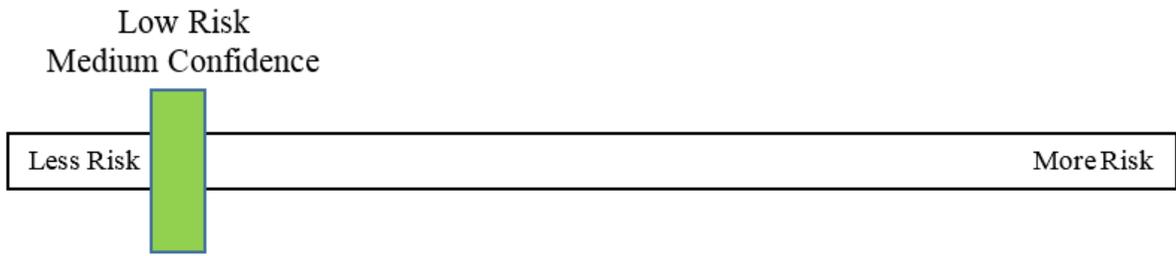
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	< 0.01	Low	Low
Vegetables and Ground Fruit	0.02	None Expected	Low
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 229. Effects analysis summary table: Coho salmon, Central California Coast ESU and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Low	Medium	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No

Effects analysis summary:

Central California Coast Coho salmon are not anticipated to experience reductions in abundance from exposure to prometryn. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, coho may experience increased toxicity. NMFS has determined the overall risk to Central California Coast Coho from the effects of the action is low and the confidence associated with that risk is medium.



12.3.13 Coho Salmon, Lower Columbia River ESU (*Oncorhynchus kisutch*)

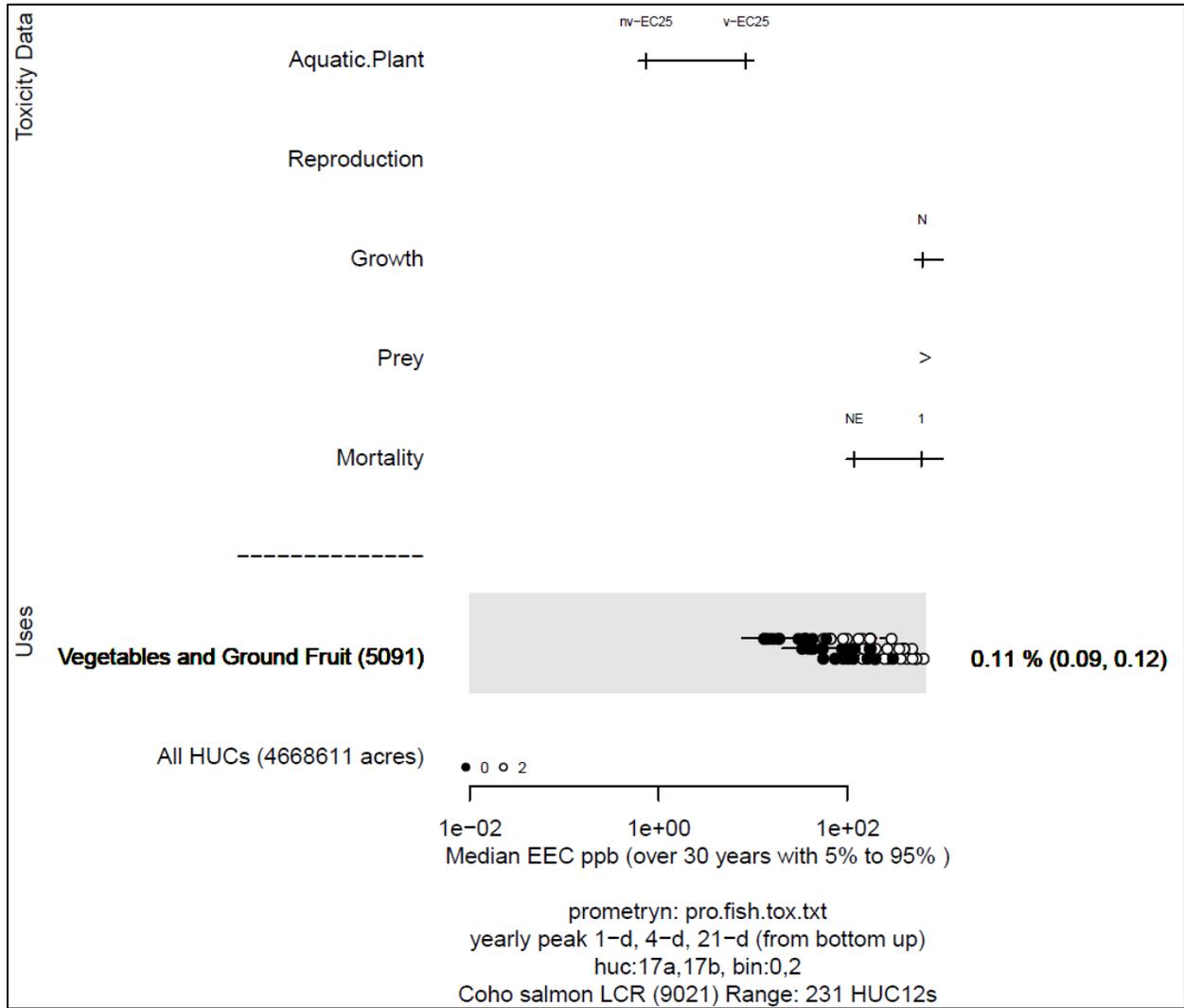


Figure 43. Effects analysis Risk-plot for Coho salmon, lower Columbia River ESU and prometryn

Table 230. Likelihood of exposure determination for Coho salmon, lower Columbia River ESU and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	0	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	1	yes	yes	yes	no	3	Low

Table 231. Direct mortality risk hypothesis; Coho salmon, lower Columbia River ESU and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.02	Medium	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Low	Medium		

Table 232. Growth risk hypothesis; Coho salmon, lower Columbia River ESU and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.02	None Expected	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	Medium		

Table 233. Prey risk hypothesis; Coho salmon, lower Columbia River ESU and prometryn

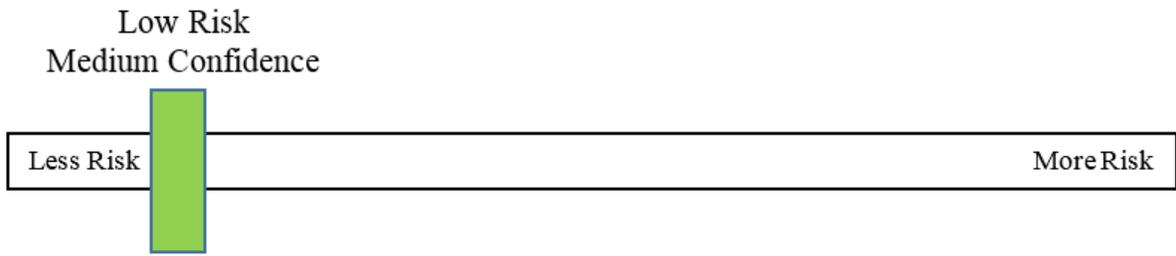
Endpoint: Prey

Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.02	None Expected	Low
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 234. Effects analysis summary table: Coho salmon, lower Columbia River ESU and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Low	Medium	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No

Effects analysis summary: Lower Columbia River Coho are not anticipated to experience reductions in abundance from exposure to prometryn. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, coho may experience increased toxicity. NMFS has determined the overall risk to Lower Columbia River Coho from the effects of the action is low and the confidence associated with that risk is medium.



12.3.14 Coho Salmon, Oregon Coast ESU (*Oncorhynchus kisutch*)

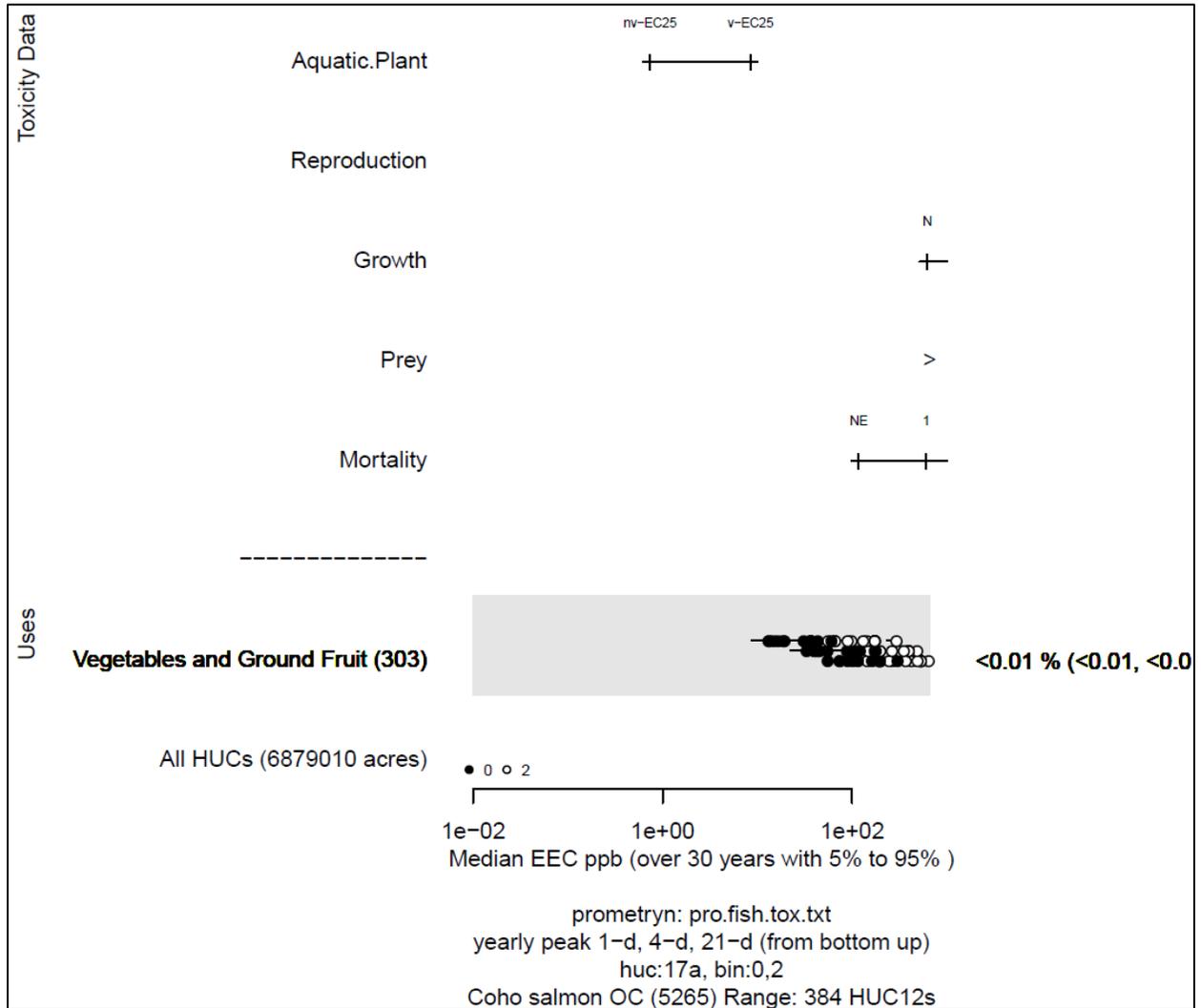


Figure 44. Effects analysis Risk-plot for Coho salmon, Oregon coast ESU and prometryn

Table 235. Likelihood of exposure determination for Coho salmon, Oregon coast ESU and prometryn

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	0	NA	NA	NA	NA	NA	NA	
Veg. & Ground Fruit	1	yes	yes	yes	yes	3	NA	Low

Table 236. Direct mortality risk hypothesis; Coho salmon, Oregon coast ESU and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	< 0.01	Medium	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk		Confidence	
Low		Medium	

Table 237. Growth risk hypothesis; Coho salmon, Oregon coast ESU and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	< 0.01	None Expected	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk		Confidence	
Low		Medium	

Table 238. Prey risk hypothesis; Coho salmon, Oregon coast ESU and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	< 0.01	None Expected	Low
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk		Confidence	
Low		Medium	

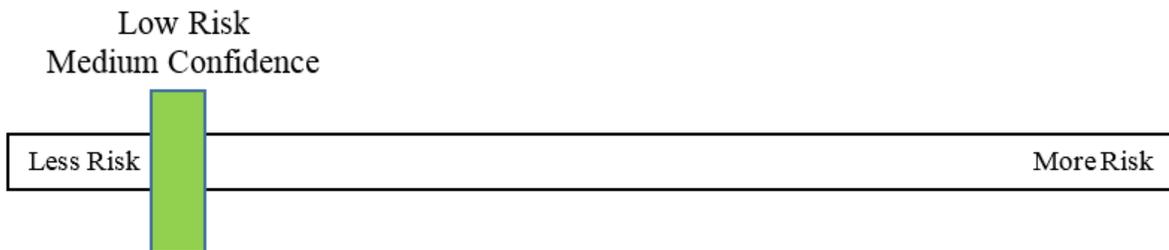
Table 239. Effects analysis summary table: Coho salmon, Oregon coast ESU and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		

Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Low	Medium	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No

Effects analysis summary:

Oregon Coast Coho are not anticipated to experience reductions in abundance from exposure to prometryn. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, coho may experience increased toxicity. NMFS has determined the overall risk to Oregon Coast Coho from the effects of the action is low and the confidence associated with that risk is medium.



12.3.15 Coho Salmon, Southern Oregon/Northern California Coast ESU (*Oncorhynchus kisutch*)

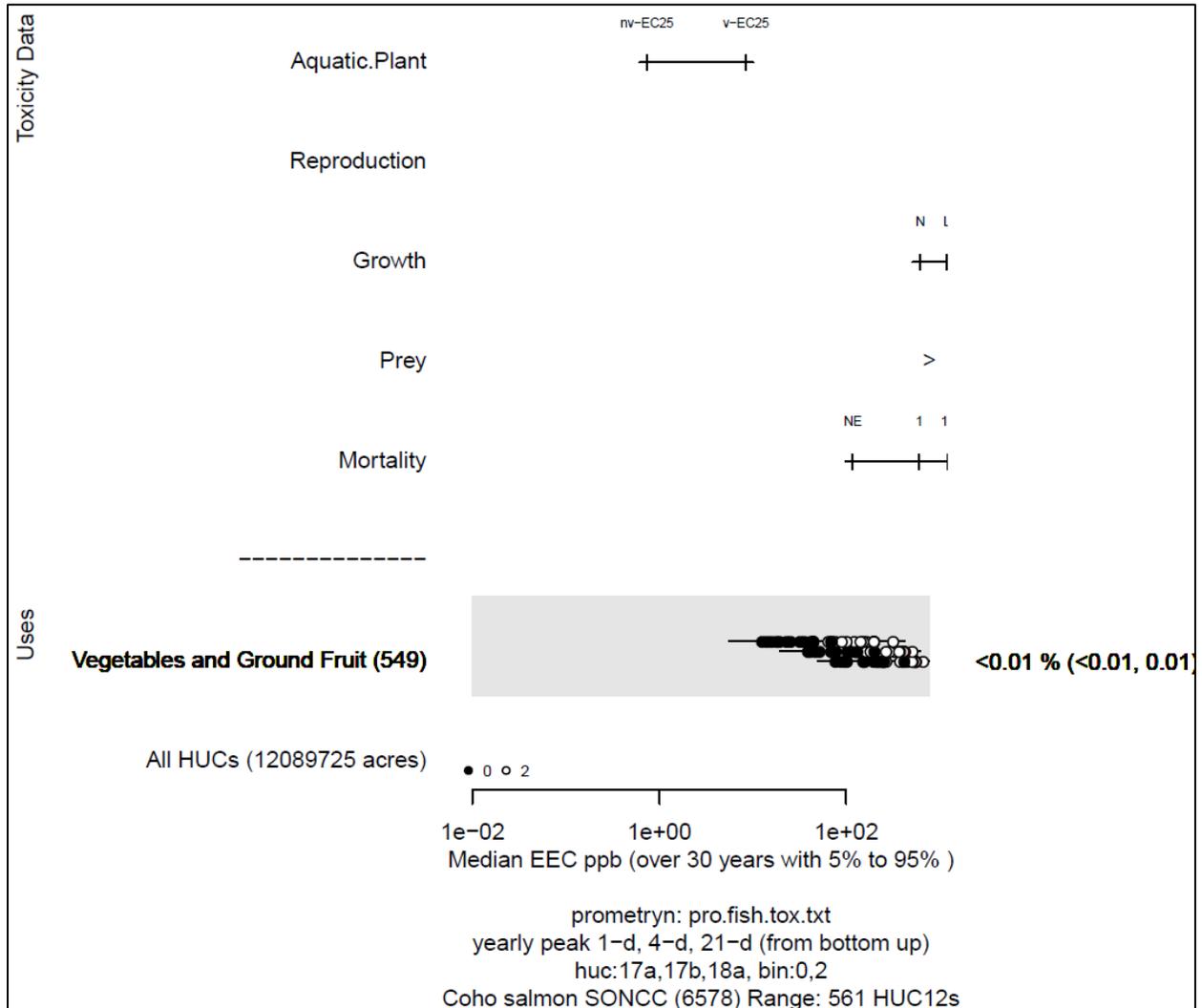


Figure 45. Effects analysis Risk-plot for Coho salmon, southern Oregon/northern California coast ESU and prometryn

Table 240. Likelihood of exposure determination for Coho salmon, southern Oregon/northern California coast ESU and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	1	yes	yes	yes	no	3	Low

Table 241. Direct mortality risk hypothesis; Coho salmon, southern Oregon/northern California coast ESU and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	< 0.01	Medium	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Low	Medium		

Table 242. Growth risk hypothesis; Coho salmon, southern Oregon/northern California coast ESU and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	< 0.01	None Expected	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	Medium		

Table 243. Prey risk hypothesis; Coho salmon, southern Oregon/northern California coast ESU and prometryn

Endpoint: Prey

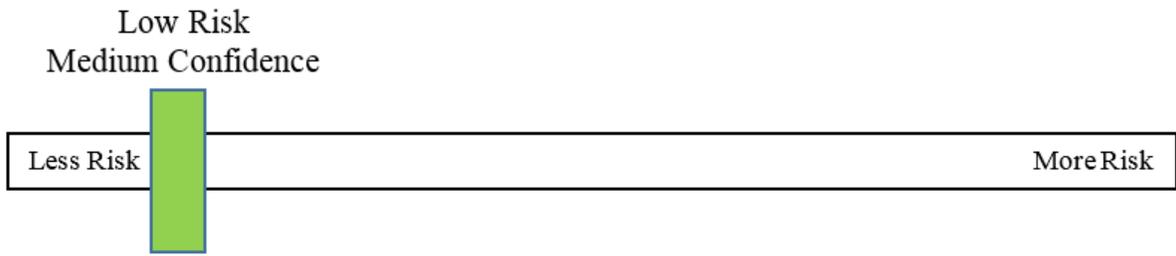
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	< 0.01	None Expected	Low
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 244. Effects analysis summary table: Coho salmon, southern Oregon/northern California coast ESU and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Low	Medium	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No

Effects analysis summary:

Southern Oregon/Northern California Coho are not anticipated to experience reductions in abundance from exposure to prometryn. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, coho may experience increased toxicity. NMFS has determined the overall risk to Southern Oregon/Northern California Coho from the effects of the action is low and the confidence associated with that risk is medium.



12.3.16 Sockeye Salmon, Ozette Lake ESU (*Oncorhynchus nerka*)

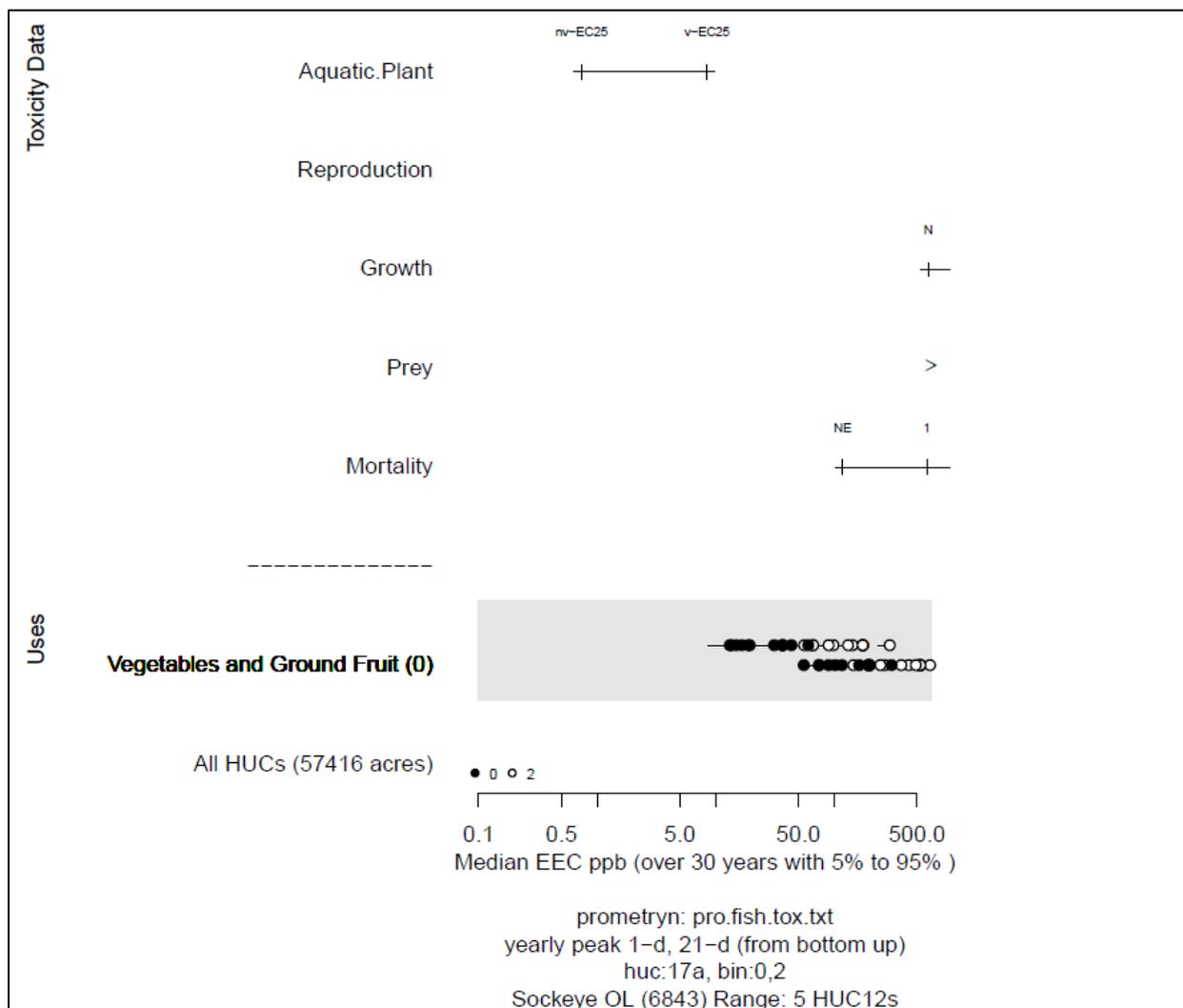


Figure 46. Effects analysis Risk-plot for Sockeye salmon, Ozette Lake ESU and prometryn

Table 245. Likelihood of exposure determination for Sockeye salmon, Ozette Lake ESU and prometryn

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	NA	NA	NA	NA	NA	NA	NA	NA

Table 246. Direct mortality risk hypothesis; Sockeye salmon, Ozette Lake ESU and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0	-	-
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk		Confidence	
Low		High	

Table 247. Growth risk hypothesis; Sockeye salmon, Ozette Lake ESU and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0	-	-
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk		Confidence	
Low		High	

Table 248. Prey risk hypothesis; Sockeye salmon, Ozette Lake ESU and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0	-	-
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk		Confidence	
Low		High	

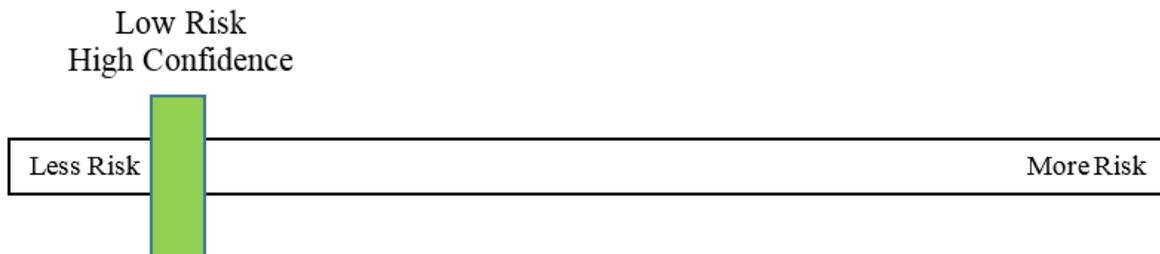
Table 249. Effects analysis summary table: Sockeye salmon, Ozette Lake ESU and prometryn

Risk Hypothesis	Risk-plot Derived		

	Risk	Confidence	Population Model Results	Risk Hypothesis Supported? Yes/No
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Low	High	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	High	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	High	Not modelled	No

Effects analysis summary:

We do not anticipate that the stressors of the action will negatively affect Ozette Lake Sockeye. Overall the risk is low and the confidence associated with that risk is high due to the lack of authorized use sites within the species range.



12.3.17 Sockeye Salmon, Snake River ESU (*Oncorhynchus nerka*)

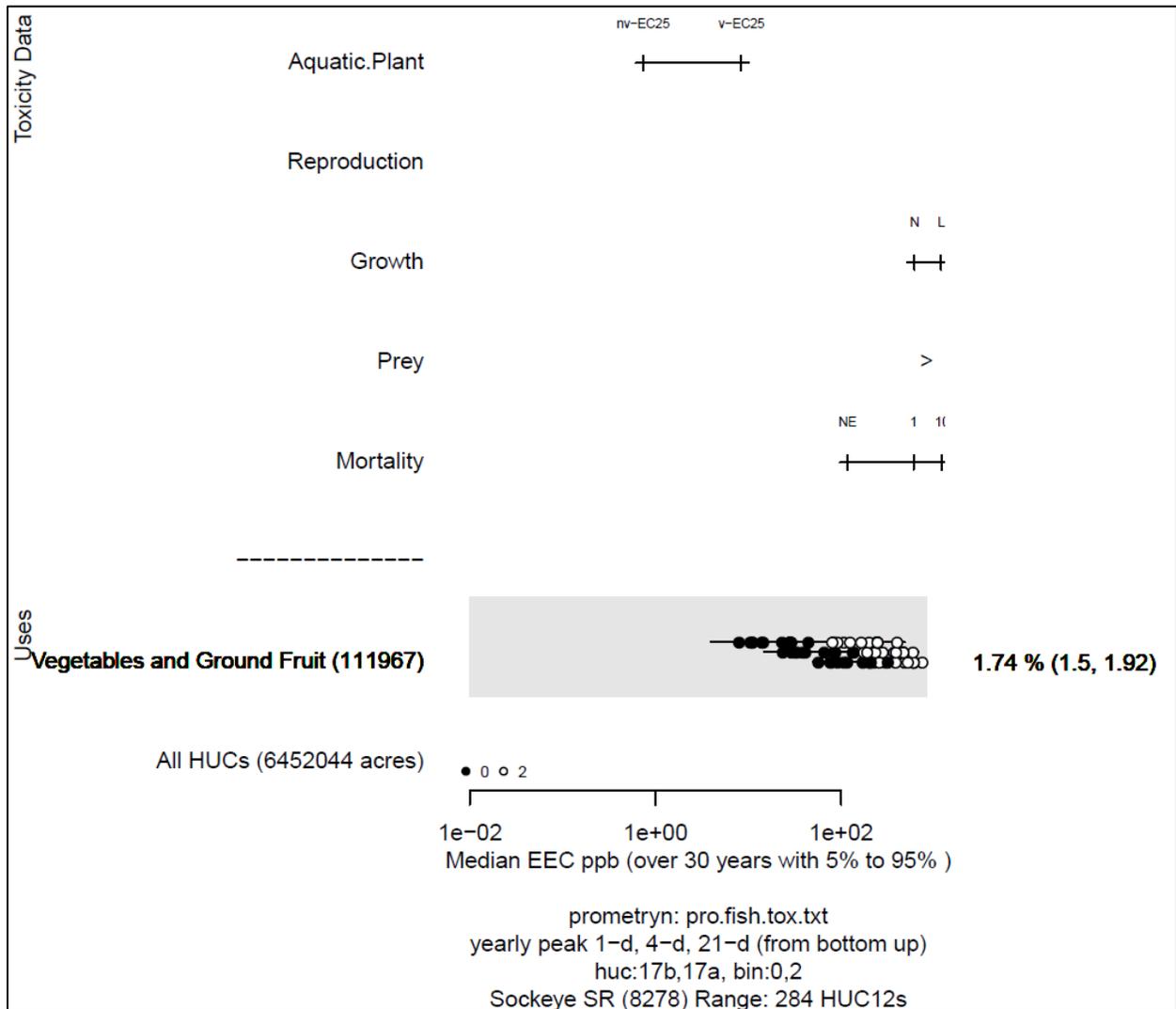


Figure 47. Effects analysis Risk-plot for Sockeye salmon, Snake River ESU and prometryn; full range

Table 250. Likelihood of exposure determination for Sockeye salmon, Snake River ESU and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	2	yes	yes	yes	NA	3	High

Table 251. Direct mortality risk hypothesis; Sockeye salmon, Snake River ESU and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.74	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 252. Prey risk hypothesis; Sockeye salmon, Snake River ESU and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.74	None Expected	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 253. Growth risk hypothesis; Sockeye salmon, Snake River ESU and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.74	None Expected	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			

Risk	Confidence	
Low	Medium	

Table 254. Effects analysis summary table: Sockeye salmon, Snake River ESU and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Medium	Low	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium	Not modelled	No

Effects analysis summary:

Maximum environmental concentrations are anticipated to be lethal to some individuals of Snake River Sockeye. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. No changes in population growth rate occurred at the 1% mortality level for any model runs. Slight shifts in population growth rate occurred for sockeye salmon modeled at 10% mortality levels and increased with the percentage of the population exposed, but did not exceed the variability (1 standard deviation) of an unexposed population. Reduced prey abundance, and impaired growth are not expected based on concentrations and relevant toxicity values. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, sockeye will likely experience more toxicity. There are no prometryn use sites within the portion of the species range associated with juvenile rearing and adult spawning (Redfish Lake; Sawtooth Lakes, Idaho). NMFS has determined the overall risk to species from the effects of the action is medium and the confidence associated with that risk is low. Medium risk is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.18 Steelhead, California Central Valley DPS (*Oncorhynchus mykiss*)

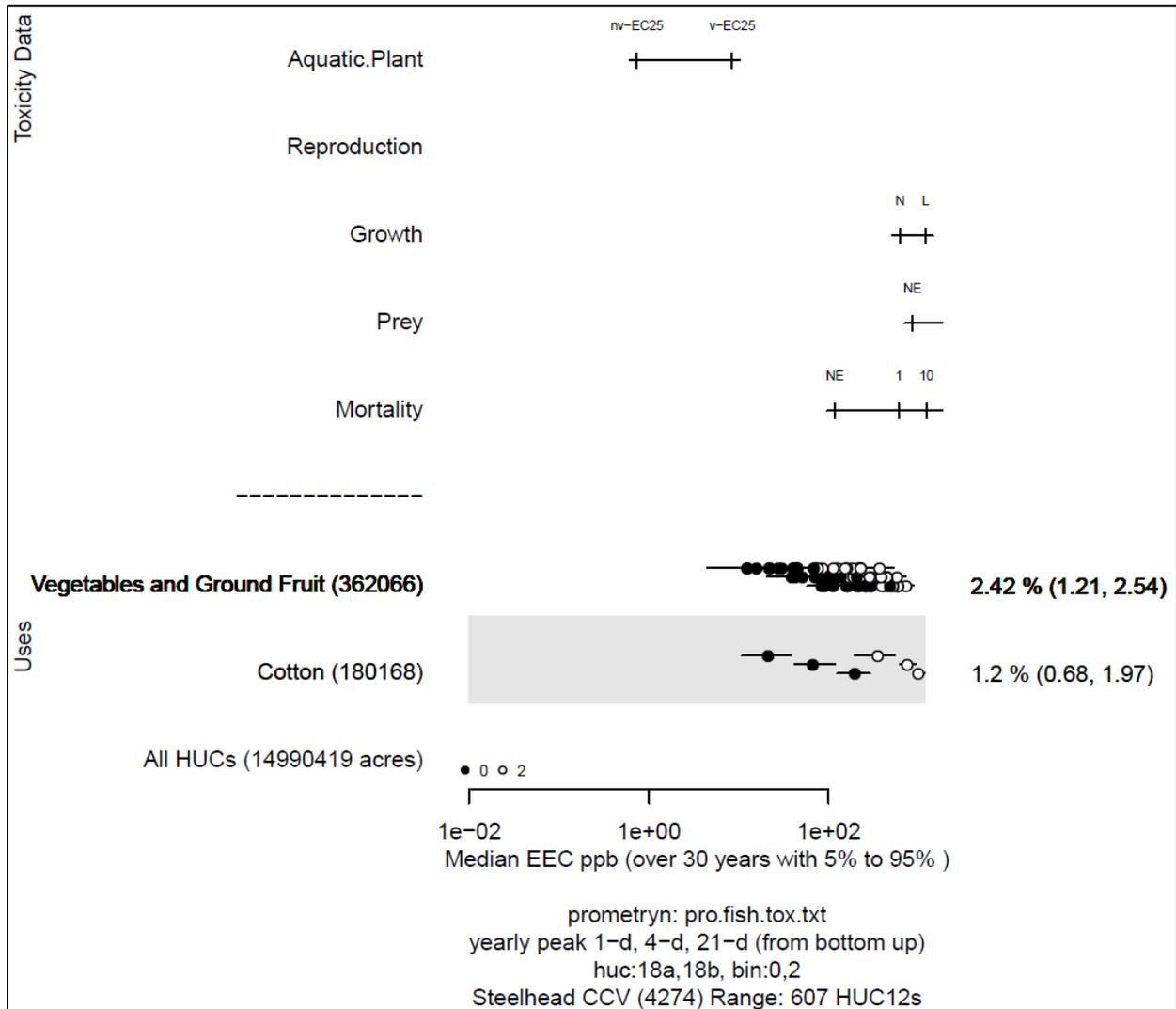


Figure 48. Effects analysis Risk-plot for Steelhead, California Central Valley DPS and prometryn

Table 255. Likelihood of exposure determination for Steelhead, California Central Valley DPS and prometryn

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	2	yes	yes	yes	yes	3	High	
Veg. & Ground Fruit	2	yes	yes	yes	yes	3	High	

Table 256. Direct mortality risk hypothesis; Steelhead, California Central Valley DPS and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	1.2	Medium	High
Vegetables and Ground Fruit	2.42	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
High	Low		

Table 257. Growth risk hypothesis; Steelhead, California Central Valley DPS and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	1.2	None Expected	High
Vegetables and Ground Fruit	2.42	None Expected	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	Medium		

Table 258. Prey risk hypothesis; Steelhead, California Central Valley DPS and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Cotton	1.2	Low / Low	High

Vegetables and Ground Fruit	2.42	None Expected / Low	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Medium	Low		

Table 259. Effects analysis summary table: Steelhead, California Central Valley DPS and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	High	Low	Not Applicable	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Medium	Low		No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No

Effects analysis summary:

Maximum environmental concentrations are anticipated to be lethal to some individuals of California Central Valley Steelhead. Given the factors evaluated above, we do anticipate that these exposures will result in reductions in abundance. Reduced prey abundance, and impaired growth are not expected due to minimal exceedance of available prey toxicity data. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, steelhead will likely experience more toxicity. NMFS has determined the overall risk to species from the effects of the action is medium and the confidence associated with that risk is low. Low confidence is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.19 Steelhead, Central California Coast DPS (*Oncorhynchus mykiss*)

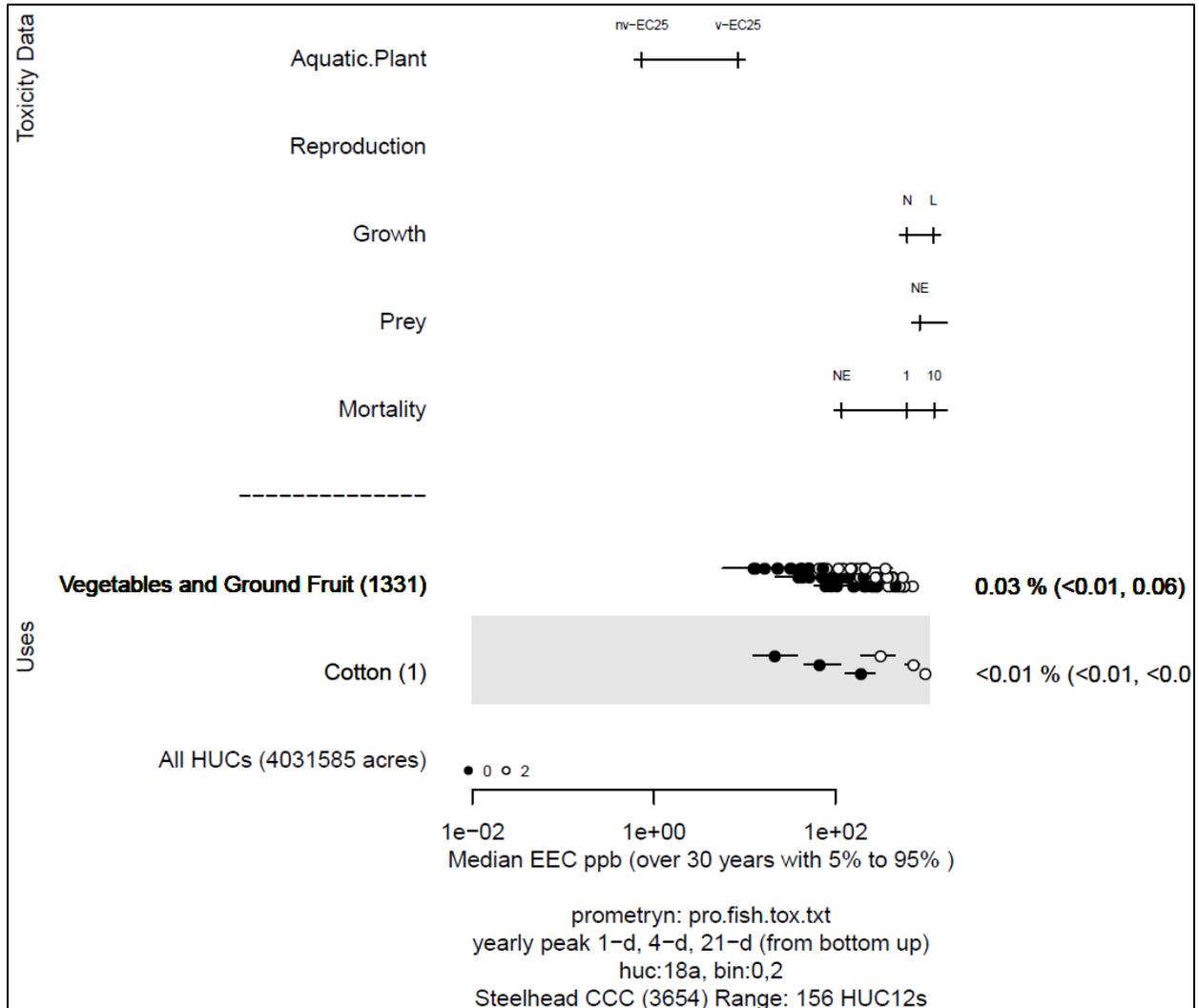


Figure 49. Effects analysis Risk-plot for Steelhead, Central California Coast DPS and prometryn

Table 260. Likelihood of exposure determination for Steelhead, Central California Coast DPS and prometryn

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	1	yes	yes	yes	no	3	Low	
Veg. & Ground Fruit	1	yes	yes	yes	no	3	Low	

Table 261. Direct mortality risk hypothesis; Steelhead, Central California Coast DPS and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	< 0.01	Medium	Low
Vegetables and Ground Fruit	0.03	Medium	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Low	Medium		

Table 262. Growth risk hypothesis; Steelhead, Central California Coast DPS and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	< 0.01	None Expected	Low
Vegetables and Ground Fruit	0.03	None Expected	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	Medium		

Table 263. Prey risk hypothesis; Steelhead, Central California Coast DPS and prometryn

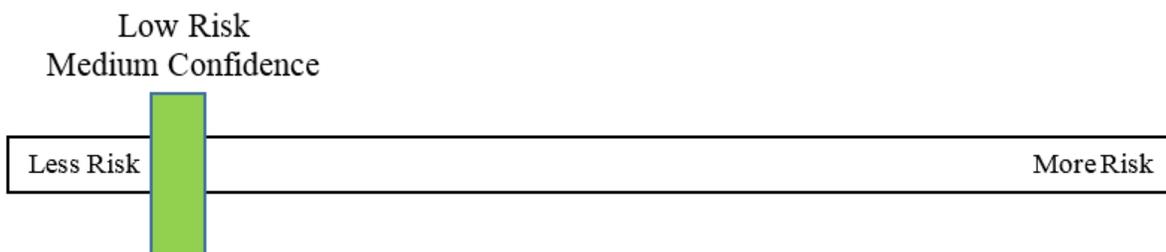
Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Cotton	< 0.01	Low / Low	Low
Vegetables and Ground Fruit	0.03	None Expected / Low	Low
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 264. Effects analysis summary table: Steelhead, Central California Coast DPS and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Low	Medium	Not Applicable	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium		No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No

Effects analysis summary:

Central California Coast Steelhead are not anticipated to experience reductions in abundance from exposure to prometryn. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, steelhead may experience increased toxicity. NMFS has determined the overall risk to Central California Coast Steelhead from the effects of the action is low and the confidence associated with that risk is medium.



12.3.20 Steelhead, Lower Columbia River DPS (*Oncorhynchus mykiss*)

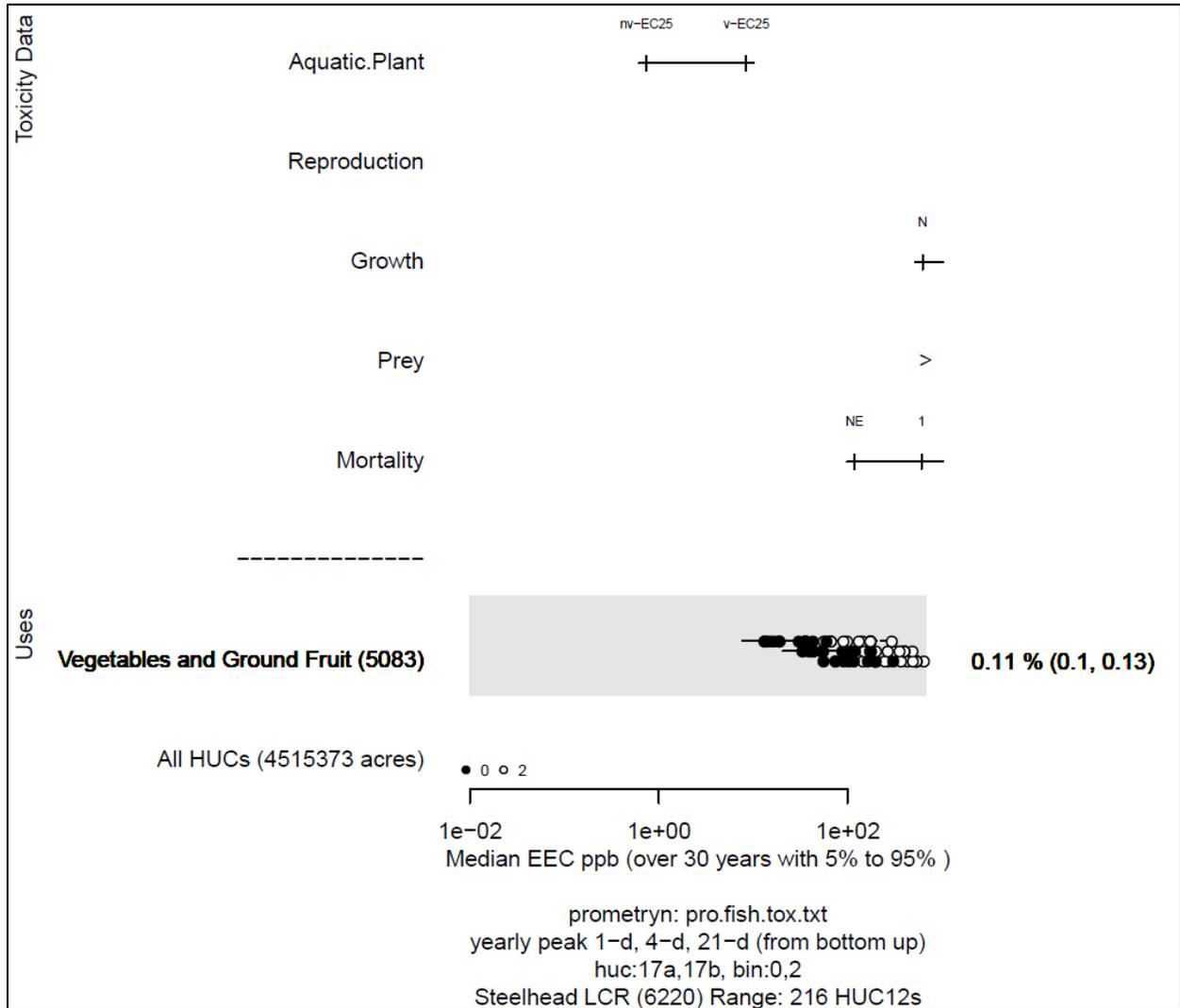


Figure 50. Effects analysis Risk-plot for Steelhead, Lower Columbia River DPS and prometryn

Table 265. Likelihood of exposure determination for Steelhead, Lower Columbia River DPS and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	0	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	1	yes	yes	yes	yes	3	High

Table 266. Direct mortality risk hypothesis; Steelhead, Lower Columbia River DPS and prometryn; Adults

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.11	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence	High density of vegetable and ground fruit use sites proximal to the migratory corridor at Sauvie Island.	
Medium	Low		

Table 267. Growth risk hypothesis; Steelhead, Lower Columbia River DPS and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.11	None Expected	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence	High density of vegetable and ground fruit use sites proximal to the migratory corridor at Sauvie Island.	
Low	Medium		

Table 268. Prey risk hypothesis; Steelhead, Lower Columbia River DPS and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.11	None Expected / Low	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence	High density of vegetable and ground fruit use sites proximal to the migratory corridor at Sauvie Island.	
Low	Medium		

Table 269. Effects analysis summary table: Steelhead, Lower Columbia River DPS and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium		No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No

Effects analysis summary:

Maximum environmental concentrations are anticipated to be lethal to some individuals of Lower Columbia River Steelhead. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. Reduced prey abundance, and impaired growth are not expected based on concentrations and relevant toxicity values. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, steelhead will likely experience more toxicity. NMFS has determined the overall risk to species from the effects of the action is medium and the confidence associated with that risk is low. Medium risk is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.21 Steelhead, Middle Columbia River DPS (*Oncorhynchus mykiss*)

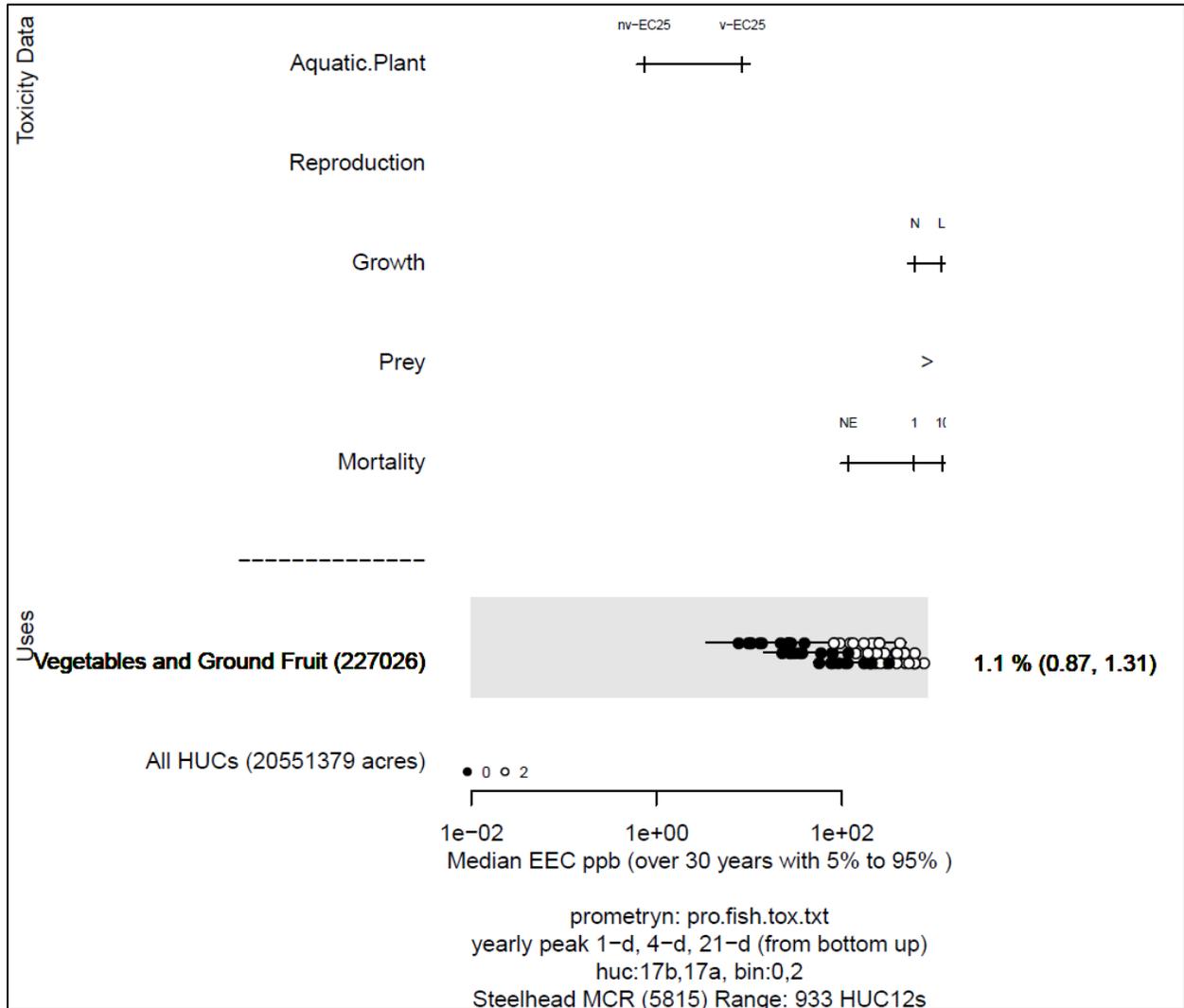


Figure 51. Effects analysis Risk-plot for Steelhead, Middle Columbia River DPS and prometryn

Table 270. Likelihood of exposure determination for Steelhead, Middle Columbia River DPS and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	2	yes	yes	yes	NA	3	High

Table 271. Direct mortality risk hypothesis; Steelhead, Middle Columbia River DPS and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.1	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 272. Growth risk hypothesis; Steelhead, Middle Columbia River DPS and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.1	None Expected	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	Medium		

Table 273. Prey risk hypothesis; Steelhead, Middle Columbia River DPS and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.1	None Expected / Low	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 274. Effects analysis summary table: Steelhead, Middle Columbia River DPS and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium		No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No

Effects analysis summary: Maximum environmental concentrations are anticipated to be lethal to some individuals of Middle Columbia River Steelhead. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. Reduced prey abundance, and impaired growth are not expected based on concentrations and relevant toxicity values. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, steelhead will likely experience more toxicity. NMFS has determined the overall risk to species from the effects of the action is medium and the confidence associated with that risk is low. Medium risk is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.22 Steelhead, Northern California DPS (*Oncorhynchus mykiss*)

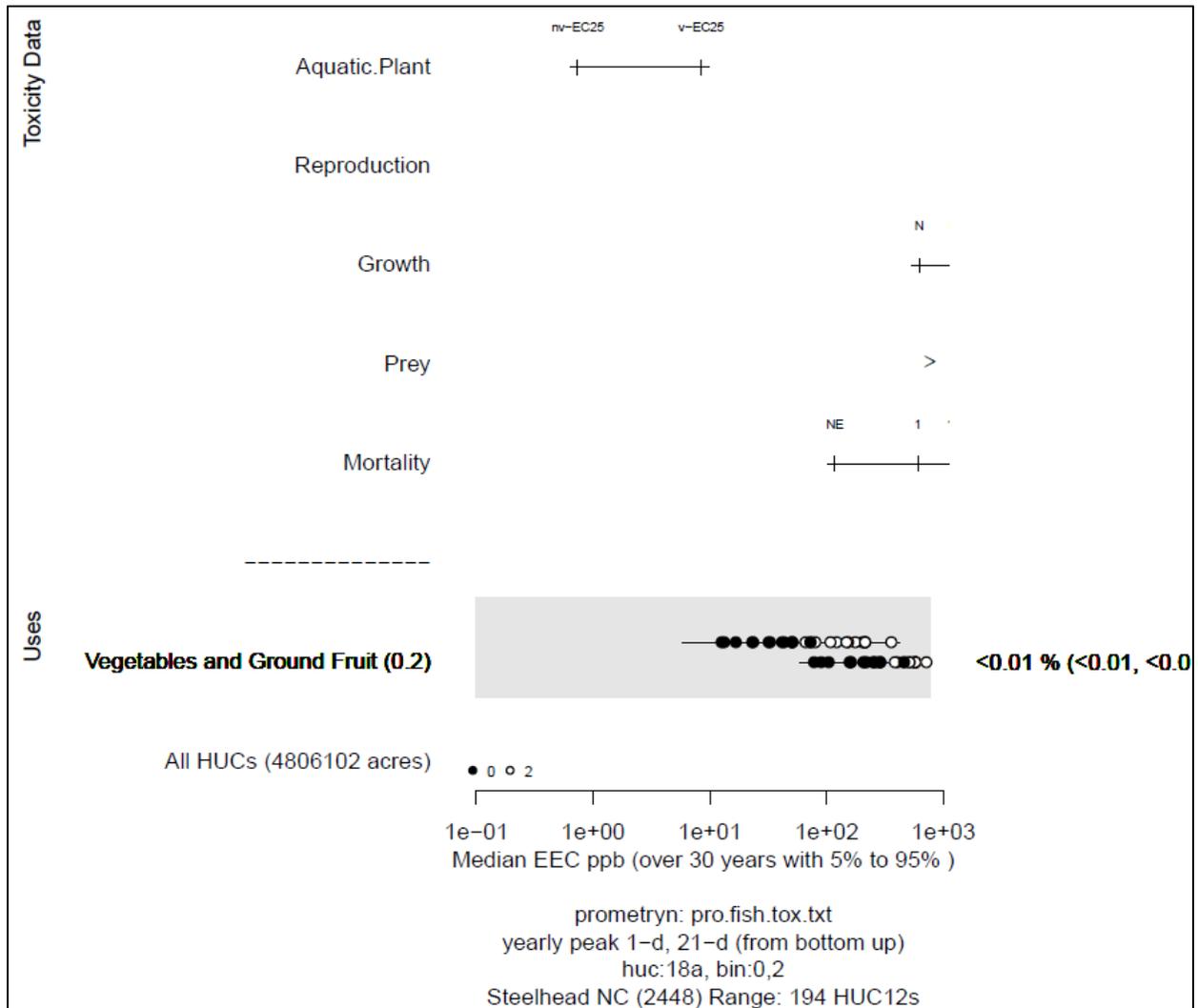


Figure 52. Effects analysis Risk-plot for Steelhead, Northern California DPS and prometryn

Table 275. Likelihood of exposure determination for Steelhead, Northern California DPS and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	1	yes	yes	yes	no	3	Low

Table 276. Direct mortality risk hypothesis; Steelhead, Northern California DPS and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	<0.01	Medium	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Low	High		

Table 277. Growth risk hypothesis; Steelhead, Northern California DPS and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	<0.01	None Expected	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	High		

Table 278. Prey risk hypothesis; Steelhead, Northern California DPS and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Cotton	0	-	-

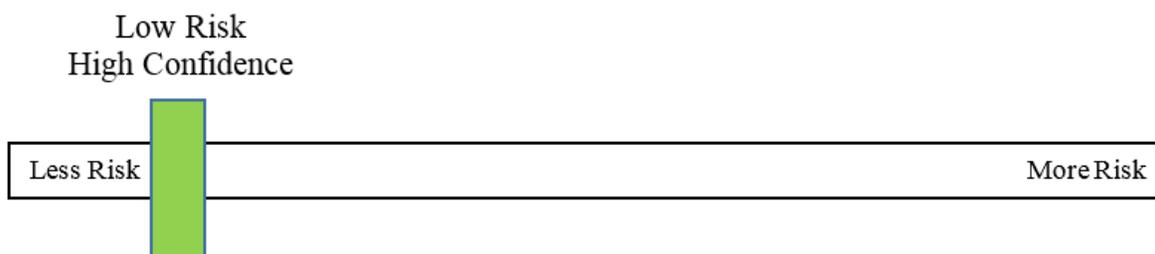
Vegetables and Ground Fruit	<0.01	None Expected / Low	Low
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	High		

Table 279. Effects analysis summary table: Steelhead, Northern California DPS and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Low	High	No significant reductions in population growth rate. See Appendix A for details.	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	High	Not modelled	No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	High	Not modelled	No

Effects analysis summary:

We do not anticipate that the stressors of the action will negatively affect Northern California Steelhead. Overall the risk is low and the confidence associated with that risk is high due to the lack of authorized use sites within the species range.



12.3.23 Steelhead, Puget Sound DPS (*Oncorhynchus mykiss*)

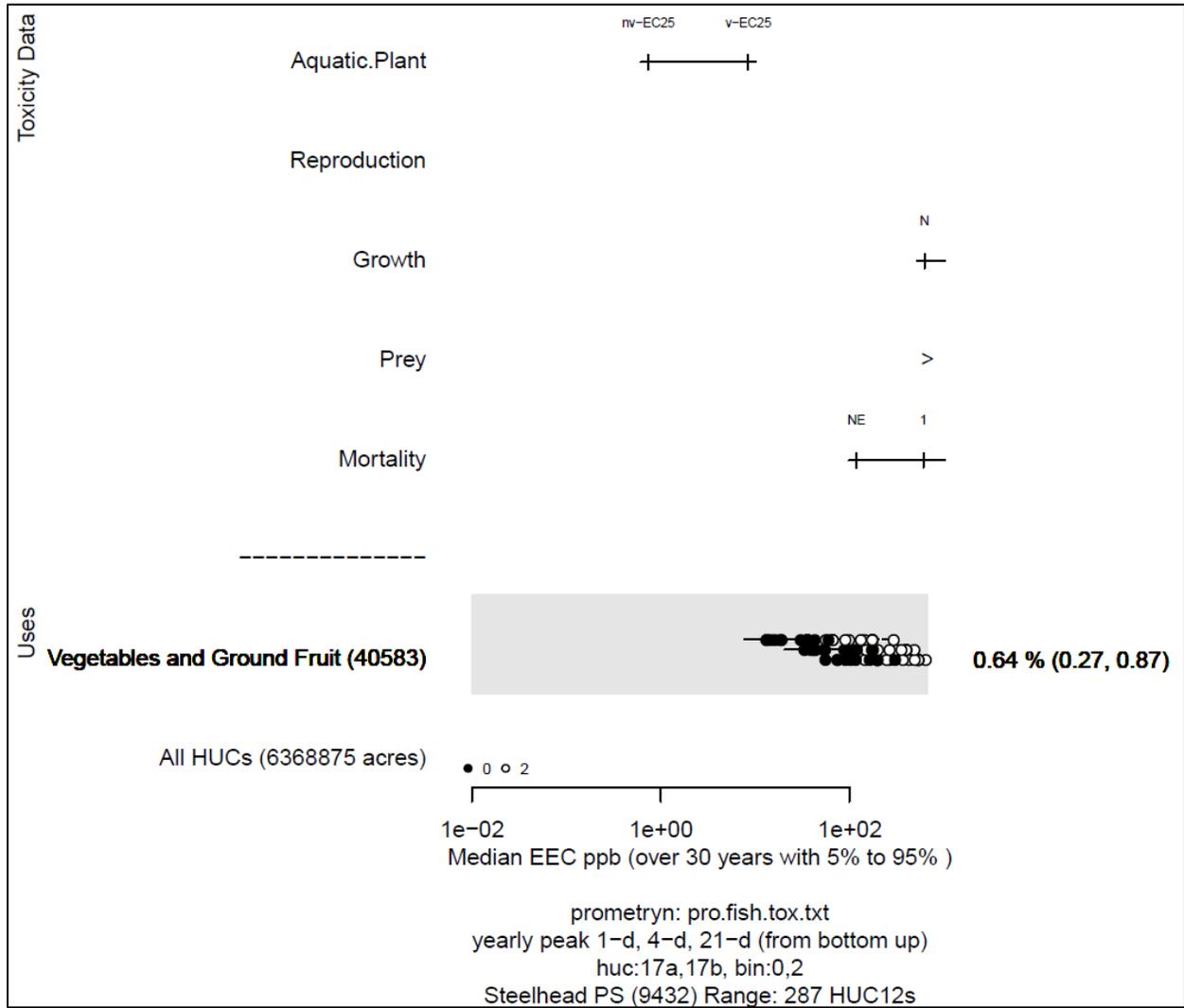


Figure 53. Effects analysis Risk-plot for Steelhead, Puget Sound DPS and prometryn

Table 280. Likelihood of exposure determination for Steelhead, Puget Sound DPS and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	1	yes	yes	yes	3	High	High

Table 281. Direct mortality risk hypothesis; Steelhead, Puget Sound DPS and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.64	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence	Vegetable use sites aggregated within proximity to the Nooksack and Skagit rivers. Within the North Cascade Major Population Group the Nooksack and Skagit (summer and winter runs) must be viable in order to meet the delisting criteria.	
Medium	Low		

Table 282. Growth risk hypothesis; Steelhead, Puget Sound DPS and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.64	None Expected	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence	Vegetable use sites aggregated within proximity to the Nooksack and Skagit rivers. Within the North Cascade Major Population Group the Nooksack and Skagit (summer and winter runs) must be viable in order to meet the delisting criteria.	
Low	Medium		

Table 283. Prey risk hypothesis; Steelhead, Puget Sound DPS and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.64	None Expected / Low	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		

Low	Medium	Vegetable use sites aggregated within proximity to the Nooksack and Skagit rivers. Within the North Cascade Major Population Group the Nooksack and Skagit (summer and winter runs) must be viable in order to meet the delisting criteria.
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Table 284. Effects analysis summary table: Steelhead, Puget Sound DPS and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium		No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No

Effects analysis summary: Maximum environmental concentrations are anticipated to be lethal to some individuals of Puget Sound Steelhead DPS. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. Reduced prey abundance, and impaired growth are not expected based on concentrations and relevant toxicity values. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, steelhead will likely experience more toxicity. NMFS has determined the overall risk to species from the effects of the action is medium and the confidence associated with that risk is low. Medium risk is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.24 Steelhead, Snake River Basin DPS (*Oncorhynchus mykiss*)

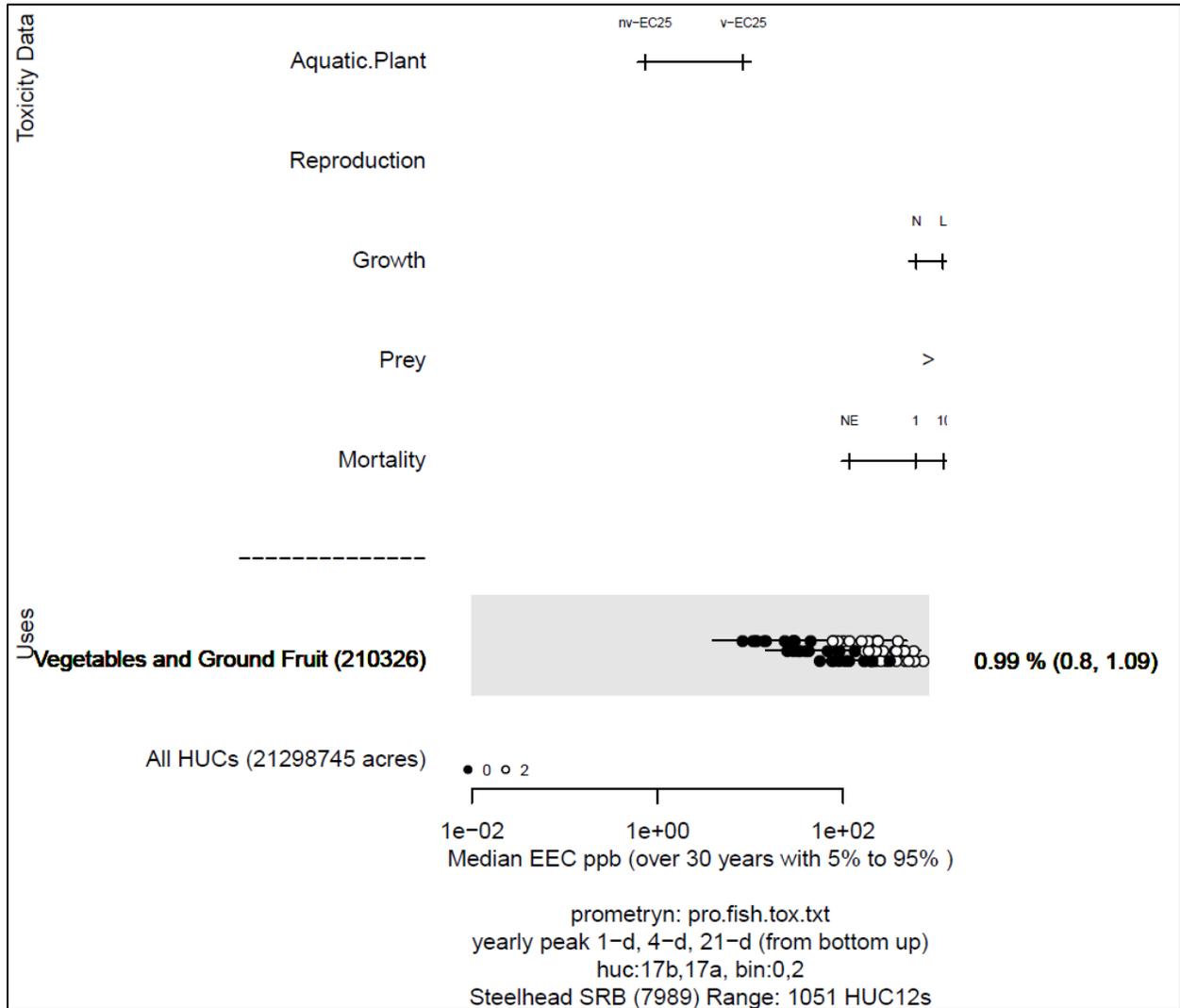


Figure 54. Effects analysis Risk-plot for Steelhead, Snake River Basin DPS and prometryn

Table 285. Likelihood of exposure determination for Steelhead, Snake River Basin DPS and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	1	yes	yes	yes	no	3	Low

Table 286. Direct mortality risk hypothesis; Steelhead, Snake River Basin DPS and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.99	Medium	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk		Confidence	
Low		Medium	

Table 287. Growth risk hypothesis; Steelhead, Snake River Basin DPS and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.99	None Expected	Low
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk		Confidence	
Low		Medium	

Table 288. Prey risk hypothesis; Steelhead, Snake River Basin DPS and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	0.99	None Expected / Low	Low
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk		Confidence	
Low		Medium	

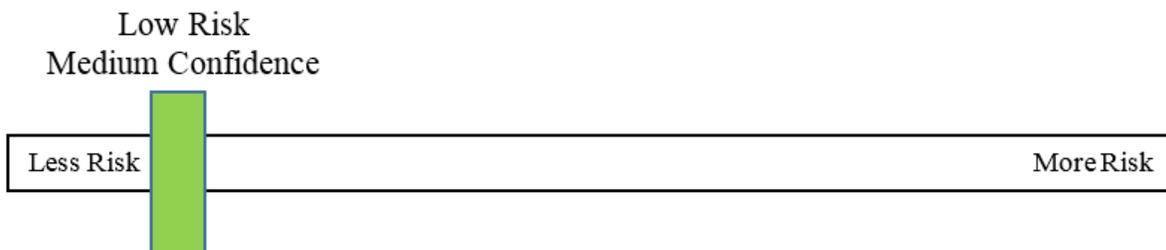
Table 289. Effects analysis summary table: Steelhead, Snake River Basin DPS and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		

Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Low	Medium	Not Applicable	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium		No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No

Effects analysis summary:

Snake River Basin Steelhead are not anticipated to experience reductions in abundance from exposure to prometryn. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, steelhead may experience increased toxicity. NMFS has determined the overall risk to Snake River Basin Steelhead from the effects of the action is low and the confidence associated with that risk is medium.



12.3.25 Steelhead, South-Central California Coast DPS (*Oncorhynchus mykiss*)

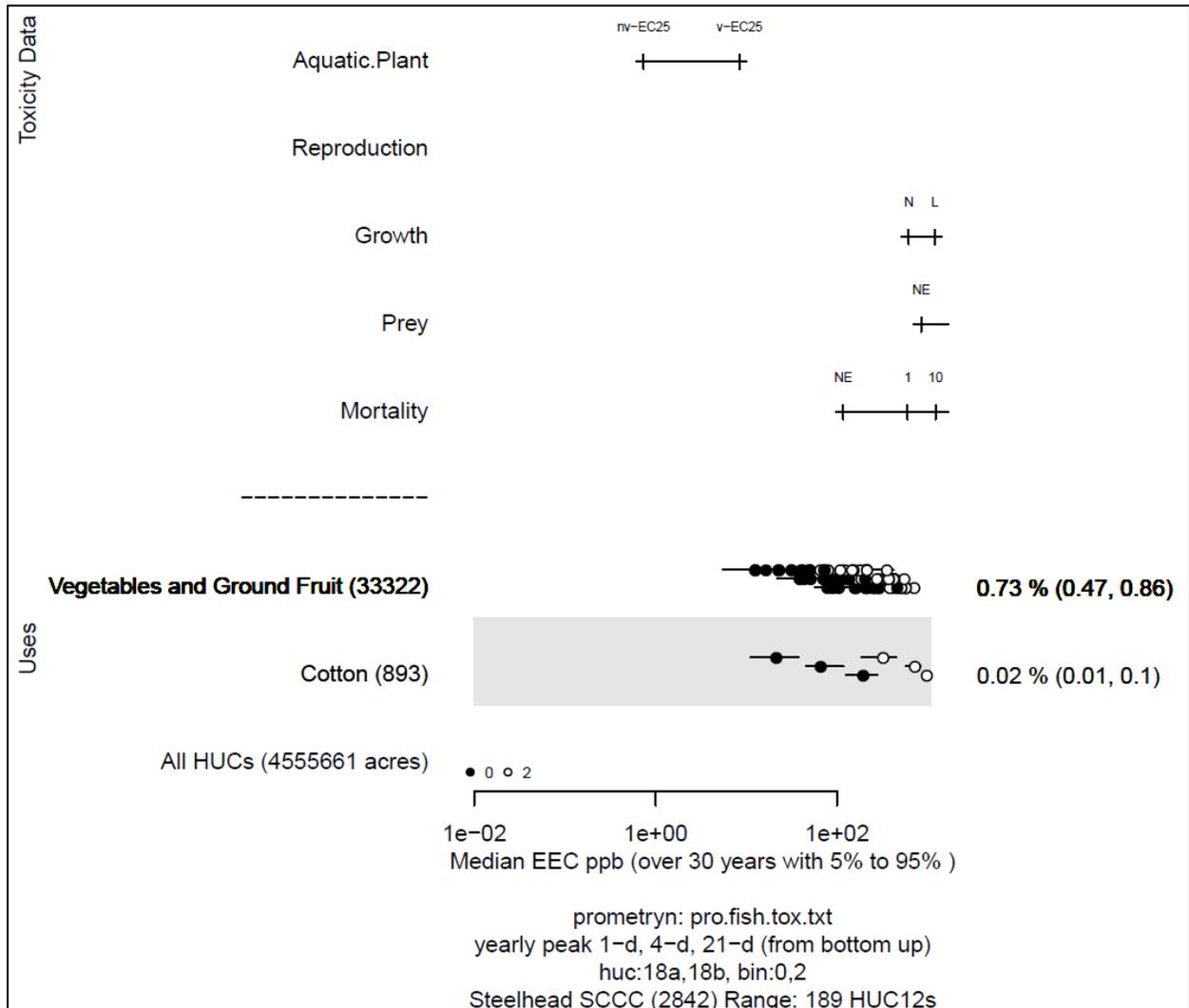


Figure 55. Effects analysis Risk-plot for Steelhead, South-Central California Coast DPS and prometryn

Table 290. Likelihood of exposure determination for Steelhead, South-Central California Coast DPS and prometryn

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	1	yes	yes	yes	no	3	Low	
Veg. & Ground Fruit	1	yes	yes	yes	yes	3	High	

Table 291. Direct mortality risk hypothesis; Steelhead, South-Central California Coast DPS and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0.02	Medium	Low
Vegetables and Ground Fruit	0.73	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence	High density of vegetables and ground fruit use sites proximal to the spawning streams of populations within the Salinas River watershed. All populations within the Salinas River watershed have been determined essential to the recovery of the DPS per the 2013 South-Central California Steelhead Recovery Plan.	
Medium	Low		

Table 292. Growth risk hypothesis; Steelhead, South-Central California Coast DPS and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0.02	None Expected	Low
Vegetables and Ground Fruit	0.73	None Expected	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	Medium		

Table 293. Prey risk hypothesis; Steelhead, South-Central California Coast DPS and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Cotton	0.02	Low / Low	Low
Vegetables and Ground Fruit	0.73	None Expected / Low	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 294. Effects analysis summary table: Steelhead, South-Central California Coast DPS and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium		No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No

Effects analysis summary: Maximum environmental concentrations are anticipated to be lethal to some individuals of South-Central California Coast Steelhead. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. Reduced prey abundance, and impaired growth are not expected based on concentrations and relevant toxicity values. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, steelhead will likely experience more toxicity. NMFS has determined the overall risk to species from the effects of the action is medium and the confidence associated with that risk is low. Medium risk is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution.

Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.26 Steelhead, Southern California DPS (*Oncorhynchus mykiss*)

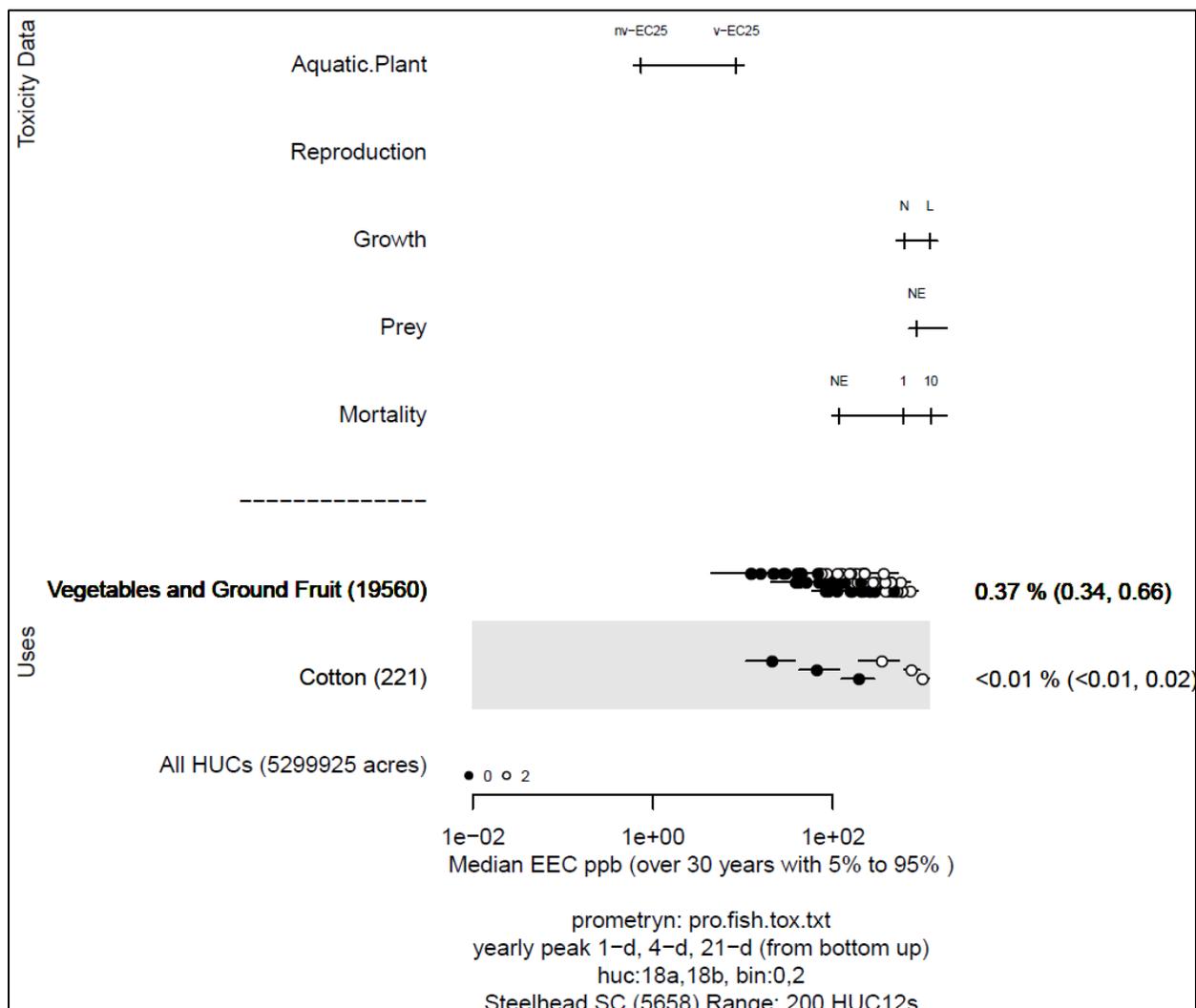


Figure 56. Effects analysis Risk-plot for Steelhead, Southern California DPS and prometryn

Table 295. Likelihood of exposure determination for Steelhead, Southern California DPS and prometryn

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	1	yes	yes	yes	no	3	Low	
Veg. & Ground Fruit	1	yes	yes	yes	yes	3	High	

Table 296. Direct mortality risk hypothesis; Steelhead, Southern California DPS and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	< 0.01	Medium	Low
Vegetables and Ground Fruit	0.37	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence	High density of vegetables and ground fruit use sites proximal to the spawning streams of the Monte Arido Highlands biogeographic population group. All populations within this population group have been determined essential to the recovery of the DPS per the 2012 Southern California Steelhead Recovery Plan.	
Medium	Low		

Table 297. Growth risk hypothesis; Steelhead, Southern California DPS and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	< 0.01	None Expected	Low
Vegetables and Ground Fruit	0.37	None Expected	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	Medium		

Table 298. Prey risk hypothesis; Steelhead, Southern California DPS and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Cotton	< 0.01	Low / Low	Low
Vegetables and Ground Fruit	0.37	None Expected / Low	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		

Low	Medium	
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Table 299. Effects analysis summary table: Steelhead, Southern California DPS and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium		No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No

Effects analysis summary: Maximum environmental concentrations are anticipated to be lethal to some individuals of Southern California Steelhead. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. Reduced prey abundance, and impaired growth are not expected based on concentrations and relevant toxicity values. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, steelhead will likely experience more toxicity. NMFS has determined the overall risk to species from the effects of the action is medium and the confidence associated with that risk is low. Medium risk is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.27 Steelhead, Upper Columbia River DPS (*Oncorhynchus mykiss*)

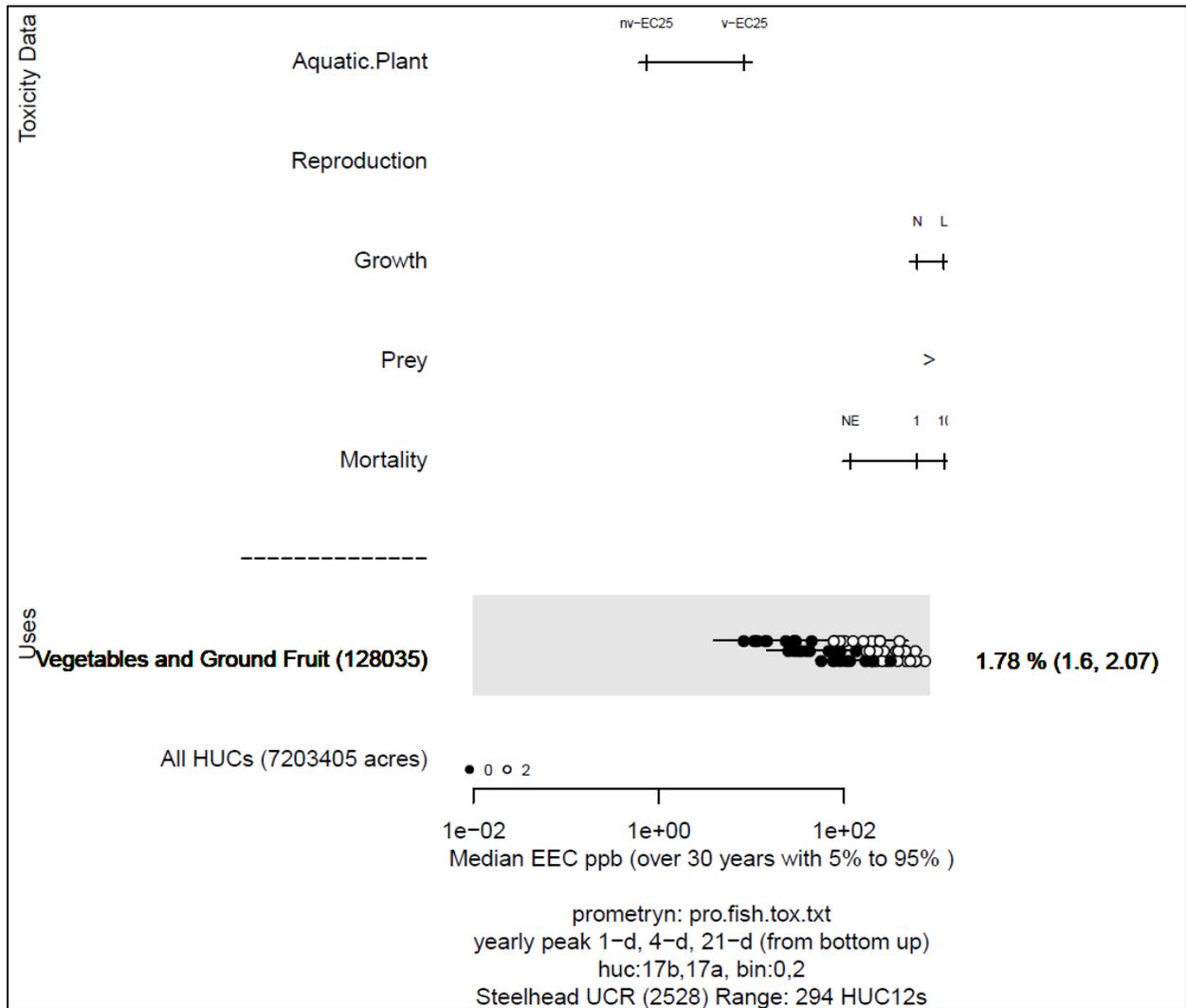


Figure 57. Effects analysis Risk-plot for Steelhead, Upper Columbia River DPS and prometryn

Table 300. Likelihood of exposure determination for Steelhead, Upper Columbia River DPS and prometryn

	Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	2	yes	yes	yes	NA	3	High

Table 301. Direct mortality risk hypothesis; Steelhead, Upper Columbia River DPS and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.78	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk	Confidence		
Medium	Low		

Table 302. Growth risk hypothesis; Steelhead, Upper Columbia River DPS and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.78	None Expected	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk	Confidence		
Low	Medium		

Table 303. Prey risk hypothesis; Steelhead, Upper Columbia River DPS and prometryn

Endpoint: Prey

Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.78	None Expected / Low	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk	Confidence		
Low	Medium		

Table 304. Effects analysis summary table: Steelhead, Upper Columbia River DPS and prometryn

Risk Hypothesis	Risk-plot Derived		Population Model Results	Risk Hypothesis Supported? Yes/No
	Risk	Confidence		
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium		No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No

Effects analysis summary: Maximum environmental concentrations are anticipated to be lethal to some individuals of Upper Columbia River Steelhead. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. Reduced prey abundance, and impaired growth are not expected based on concentrations and relevant toxicity values. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, steelhead will likely experience more toxicity. NMFS has determined the overall risk to species from the effects of the action is medium and the confidence associated with that risk is low. Medium risk is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



12.3.28 Steelhead, Upper Willamette River DPS (*Oncorhynchus mykiss*)

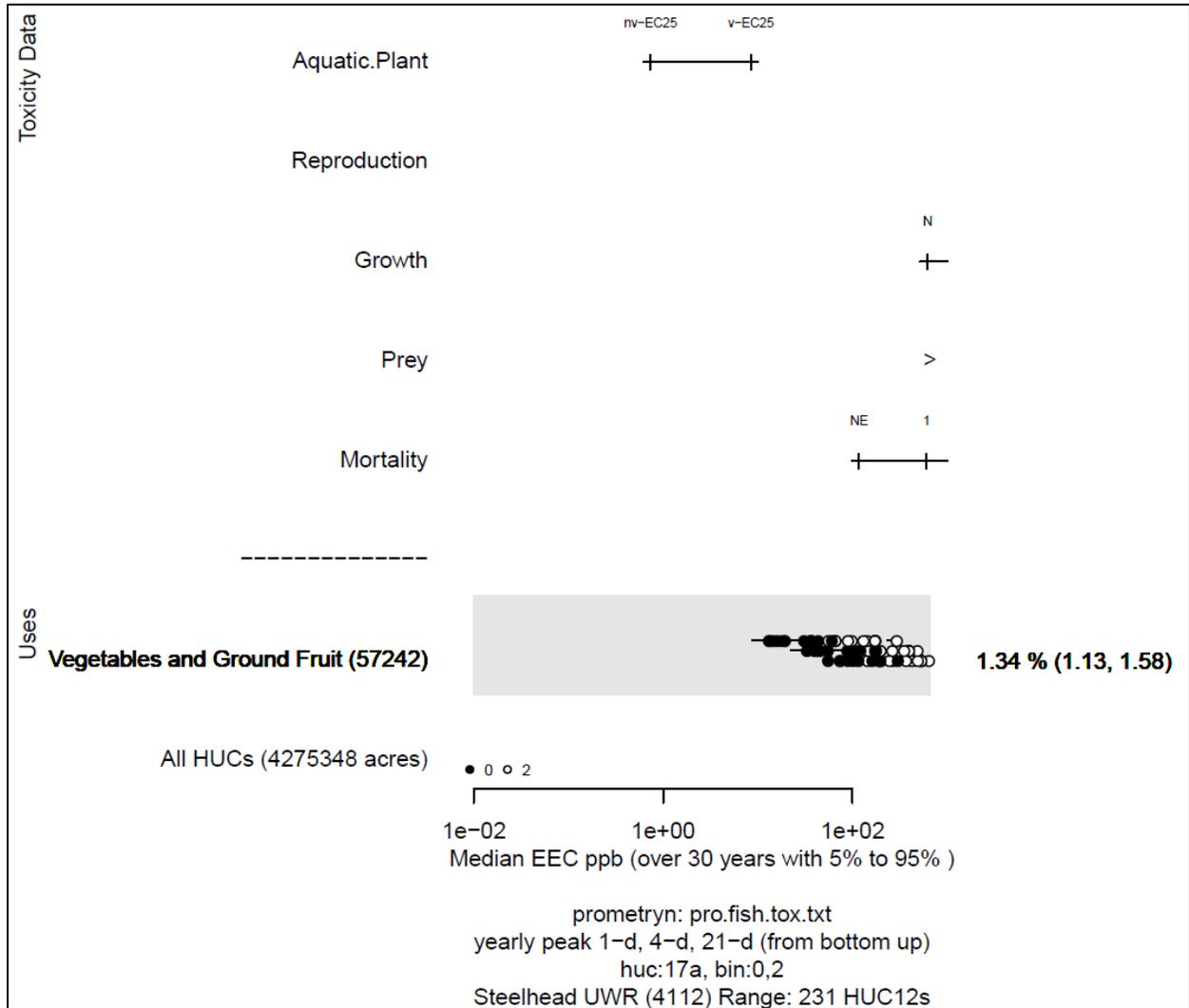


Figure 58. Effects analysis Risk-plot for Steelhead, Upper Willamette River DPS and prometryn

Table 305. Likelihood of exposure determination for Steelhead, Upper Willamette River DPS and prometryn

		Percent Overlap Category	Seasonal Analysis	Persistence	Multiple Applications	Proximity Analysis	Duration of migration/residency	Likelihood of Exposure
Cotton	NA	NA	NA	NA	NA	NA	NA	NA
Veg. & Ground Fruit	2	yes	yes	yes	NA	3	High	

Table 306. Direct mortality risk hypothesis; Steelhead, Upper Willamette River DPS and prometryn

Endpoint: Mortality			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.34	Medium	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via acute lethality.			
Risk		Confidence	
Medium		Low	

Table 307. Growth risk hypothesis; Steelhead, Upper Willamette River DPS and prometryn

Endpoint: Growth			
Use Category	% Overlap	Effect of Exposure	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.34	None Expected	High
Risk Hypothesis: Exposure to prometryn is sufficient to reduce abundance via impacts to growth (direct toxicity)			
Risk		Confidence	
Low		Medium	

Table 308. Prey risk hypothesis; Steelhead, Upper Willamette River DPS and prometryn

Endpoint: Prey			
Use Category	% Overlap	Effect of Exposure (Invertebrates/Fish)	Likelihood of Exposure
Cotton	0	-	-
Vegetables and Ground Fruit	1.34	None Expected / Low	High
Risk Hypothesis: Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.			
Risk		Confidence	
Low		Medium	

Table 309. Effects analysis summary table: Steelhead, Upper Willamette River DPS and prometryn

Risk Hypothesis	Risk-plot Derived		

	Risk	Confidence	Population Model Results	Risk Hypothesis Supported? Yes/No
Exposure to prometryn is sufficient to reduce abundance via acute lethality.	Medium	Low	Not Applicable	No
Exposure to the pesticide is sufficient to reduce abundance via reduction in prey availability.	Low	Medium		No
Exposure to the pesticide is sufficient to reduce abundance via impacts to growth (direct toxicity).	Low	Medium		No

Effects analysis summary: Maximum environmental concentrations are anticipated to be lethal to some individuals of Upper Willamette River Steelhead. Given the factors evaluated above, we do not anticipate that these exposures will result in meaningful reductions in abundance. Reduced prey abundance, and impaired growth are not expected based on concentrations and relevant toxicity values. Where formulated products and tank mixtures containing prometryn occur in aquatic habitats, steelhead will likely experience more toxicity. NMFS has determined the overall risk to species from the effects of the action is medium and the confidence associated with that risk is low. Medium risk is due to the marginal exceedance of maximum exposure values with the lower end of the acute lethality sensitivity distribution. Although some lethality is expected, it will be limited in both the extent of exposure and the magnitude of effect.



Table 310. Summary of risk and confidence determinations for bromoxynil and Pacific Salmonids.

Salmon Type	ESU/DPS	Risk	Confidence
Chum	Columbia River	Medium	Low
Chum	Hood Canal summer-run	Low	Medium
Chinook	California Coastal	Low	Medium
Chinook	CA Central Valley spring-run	Medium	Low
Chinook	Lower Columbia River	Medium	Low
Chinook	Puget Sound	Medium	Low
Chinook	Sacramento River winter-run	Medium	Low
Chinook	Snake River fall-run	Medium	Low
Chinook	Snake River spring/summer-run	Medium	Low
Chinook	Upper Columbia River spring-run	Medium	Low
Chinook	Upper Willamette River	Medium	Low
Coho	Central California Coast	Low	Medium
Coho	Lower Columbia River	Medium	Low
Coho	Oregon Coast	Low	Medium
Coho	S. Oregon N. California Coast	Low	Medium
Sockeye	Ozette Lake	Low	Medium
Sockeye	Snake River	Medium	Low
Steelhead	CA Central Valley	Medium	Low
Steelhead	Central California Coast	Low	Medium
Steelhead	Lower Columbia River	Medium	Low
Steelhead	Middle Columbia River	Medium	Low
Steelhead	Northern California	Low	Medium
Steelhead	Puget Sound	Medium	Low
Steelhead	Snake River Basin	Medium	Low
Steelhead	South-Central California Coast	Medium	Low
Steelhead	Southern California	Medium	Low
Steelhead	Upper Columbia River	Medium	Low
Steelhead	Upper Willamette River	Medium	Low

Table 311. Summary of risk and confidence determinations for prometryn and Pacific Salmonids.

Salmon Type	ESU/DPS	Risk	Confidence
Chum	Columbia River	Low	Medium
Chum	Hood Canal summer-run	Low	Medium
Chinook	California Coastal	Low	Medium
Chinook	CA Central Valley spring-run	Medium	Low
Chinook	Lower Columbia River	Medium	Low
Chinook	Puget Sound	Medium	Low
Chinook	Sacramento River winter-run	Medium	Low
Chinook	Snake River fall-run	Medium	Low
Chinook	Snake River spring/summer-run	Low	Medium
Chinook	Upper Columbia River spring-run	Medium	Low
Chinook	Upper Willamette River	Medium	Low
Coho	Central California Coast	Low	Medium
Coho	Lower Columbia River	Low	Medium

Coho	Oregon Coast	Low	Medium
Coho	S. Oregon N. California Coast	Low	Medium
Sockeye	Ozette Lake	Low	High
Sockeye	Snake River	Medium	Low
Steelhead	CA Central Valley	Medium	Low
Steelhead	Central California Coast	Low	Medium
Steelhead	Lower Columbia River	Medium	Low
Steelhead	Middle Columbia River	Medium	Low
Steelhead	Northern California	Low	High
Steelhead	Puget Sound	Medium	Low
Steelhead	Snake River Basin	Low	Medium
Steelhead	South-Central California Coast	Medium	Low
Steelhead	Southern California	Medium	Low
Steelhead	Upper Columbia River	Medium	Low
Steelhead	Upper Willamette River	Medium	Low