

Salmon-Safe List of High Hazard Pesticides

High hazard pesticides are a serious threat to salmon and other aquatic life. Pesticide formulations can also contain other ingredients that are potentially more toxic than the active ingredients, such as non-ionic surfactants. In addition to killing fish, high hazard pesticides at sublethal concentrations can stress juveniles, alter swimming ability, interrupt schooling behavior, cause salmon to seek suboptimal water temperatures, inhibit seaward migration and delay spawning. All of these behavioral changes ultimately affect survival rates.

The table below lists many of the pesticides known to cause problems for salmon and other aquatic life. Use this list to identify pesticides that require special consideration.

Note: This table lists only some of the currently available and commonly used pesticides.

SALMON-SAFE LIST OF HIGH HAZARD PESTICIDES			
INSECTICIDES			
abamectin*	dimethoate (3)	methamidophos (3)	propargite* (7)
acephate	esfenvalerate*	malathion* (1)	spirodiclofen*
bifenthrin*	ethoprop (3)	methidathion	spirotetramat
carbaryl (2)	fenamiphos* (3)	methomyl (2)	tefluthrin*
chlorantraniliprole	fenbutatin-oxide** (7)	methyl parathion	terbufos*
chlorpyrifos** (2)	fenpyroximate*	naled* (3)	thiacloprid
cyfluthrin*	fipronil*	novaluron	tralomethrin*
cypermethrin*	imidacloprid	permethrin*	zeta-cypermethrin
diazinon** (1)	indoxacarb	phorate** (3)	
diflubenzuron (7)	lambda-cyhalothrin*	phosmet* (3)	
FUNGICIDES			
azoxystrobin*	copper sulfate**	maneb*	thiram
bensulide	fenarimol	picoxystrobin*	trifloxystrobin*
captan	folpet*	propiconazole	triflumizole
carboxin	iprodione	pyraclostrobin*	
chlorothalonil* (4)	mancozeb	quintozene (PCNB)	
HERBICIDES			
2,4-D (4)	dithiopyr	norflurazon ⁺	thiobencarb
alachlor	diuron ⁺ (4)	oryzalin (5)	triallate
atrazine	fluazifop-p-butyl	oxadiazon ⁺	triclopyr BEE (4)
bromoxynil*	isoxaben	oxyfluorfen	trifluralin ⁺ (5)
copper sulfate**	linuron (4)	pendimethalin ⁺ (5)	paraquat dichloride
dichlobenil	metolachlor	pentachlorophenol (PCP)*	simazine
diclofop-methyl			
<p>Very Highly Acutely Toxic and/or Highly Acutely Toxic¹ to fish and/or aquatic invertebrates. Based on EPA's Aquatic Life Benchmarks².</p> <p>Pesticide names followed by a number in parentheses indicates the specific NOAA /NMFS Biological Opinion where it was assessed for jeopardy and/or habitat destruction/modification to endangered salmonids in accordance with the Endangered Species Act (https://www.epa.gov/endangered-species) regarding the 37 pesticides listed in the Washington Toxics Coalition (WTC) court settlement. Completed BiOps listed below³.</p> <p>* Active ingredients being Very Highly Acutely Toxic (LC50 or EC50 <100 ug/L) to BOTH fish and aquatic invertebrates</p> <p>+ Active ingredients determined to generally have very high potential for risk of off target movement through surface runoff, based on the pesticide's adsorption to soil/sediment and its field dissipation half-life (persistence) http://ccpestmanagement.ucanr.edu/files/237465.pdf</p> <p>**Salmon-Safe limited use restrictions apply to any copper containing pesticide, including copper hydroxide, copper ammonium hydroxide, copper carbonate, copper oxide and others.</p>			

Salmon-Safe High Hazard Pesticides List | List and Table References with Additional Notes

1. US EPA Toxicity Classification	Acute Aquatic LC50 or EC50 (ug/L)
Practically Nontoxic	> 100,000
Slightly Nontoxic	> 10,000; <= 100,000
Moderately Toxic	> 1,000; <= 10,000
Highly Toxic	> =100; <= 1,000
Very Highly Toxic	< 100

These ratings are based on acute toxicity and do not account for chronic and/or possible sub-lethal effects:

- Fish acute toxicity is generally the lowest 96-hour LC50 or EC50 in a standardized test, commonly using rainbow trout, fathead minnow or bluegill.
- Acute invertebrate toxicity values are usually the lowest 48 or 96-hour LC50 or EC50 in a standardized test commonly using midge, scud or daphnia.

2. Both EPA-established acute and chronic aquatic benchmarks are available on the EPA website:

<https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/aquatic-life-benchmarks-pesticide-registration>

In addition to inherent toxicity, the overall assessment of the risk of a specific pesticide to aquatic water quality should consider a number of other factors: Pesticide Properties (e.g., water solubility, soil adsorption, half-life), Environmental Properties (e.g., soil makeup, climate) and Management Practices (e.g., application methods, use rate, irrigation, no-till). These properties and their possible interactions are discussed in detail in the following UC publications: <http://anrcatalog.ucanr.edu/pdf/8119.pdf> and <http://ccpestmanagement.ucanr.edu/files/237465.pdf>

The 28 Threatened or Endangered species listed in the Biological Opinions (BiOps) are described as Evolutionarily Significant Units (ESU) and are species, location/habitat and temporally specific. For example, Chinook salmon are assessed as 9 separate ESU's in the BiOps: (1) Chinook salmon (Puget Sound); (2) Chinook salmon (Lower Columbia River); (3) Chinook salmon (Upper Columbia River Spring-run); (4) Chinook salmon (Snake River Fall-run); (5) Chinook salmon (Snake River Spring/Summer-run); (6) Chinook salmon (Upper Willamette River); (7) Chinook salmon (California Coastal); (8) Chinook salmon (Central Valley Spring-run); and (9) Chinook salmon (Sacramento River Winter-run).

Refer to the Biological Opinions for a detailed list and description of each ESU and their geographic range

<http://www.nmfs.noaa.gov/pr/consultation/pesticides.htm>

Refer to the NOAA/NMFS Biological Opinion Schedule on the NOAA Fisheries website

http://www.nmfs.noaa.gov/pr/consultation/pesticide_schedule.htm

Variations and Variance Requests

A farm using any of the pesticides indicated as "High Hazard" may be certified only if written documentation is provided that demonstrates a clear need for use of the pesticide, that no safer alternatives exist and that the method of application (such as timing, location and amount used) represents a negligible hazard to water quality and fish habitat. All variances must be approved in advance by Salmon-Safe.

For more information about the variance process, or to request a variance form, please contact Salmon-Safe at info@salmonsafe.org.

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