APPENDIX J.

Toxicity Data Bridging Analysis for Bifenthrin

Chronic toxicity data on the effects of bifenthrin on freshwater and estuarine/marine fish, considered acceptable for quantitative use in this risk assessment are not available. Therefore, various approaches were considered to bridge these data gaps.

Typically, chemical-specific acute-to-chronic ratios (ACRs) are used for bridging chronic toxicity data gaps. However, bifenthrin-specific ACR values could not be derived due to the absence of any chronic toxicity values for fish. A second approach was considered that involved derivation of "pyrethroid-specific" ACR values. However, the bifenthrin acute toxicity data for fish are considered uncertain due to concerns regarding the bioavailability of bifenthrin in these studies (*e.g.*, test concentrations greatly exceed its water solubility).

A third approach was therefore considered and adopted for bridging the chronic toxicity data gap for freshwater and estuarine/marine fish. This approach consisted of a "read across" method in which all available pyrethroid chronic NOAECs for fish as reported in the EFED Ecotoxicity Database[1] were identified and screened for application to this risk assessment. Specifically, only NOAEC values that were classified as acceptable or supplemental were used. A plot of these data is shown in **Figure J-1** where red-colored diamonds represent the lowest freshwater and estuarine/marine fish NOAECs among all pyrethroids. Data that support this figure are provided in **Table J-1.**

The NOAEC values vary by four orders of magnitude. This variability is likely due to differences in pyrethroid potency, fish species exposed, and test design. Within a species (fathead minnow), NOAECs vary by two orders of magnitude (from 0.004 to 0.18 µg a.i./L. The most sensitive chronic NOAEC available among the pyrethroids is 0.004 µg a.i./L obtained with tefluthrin from a full life cycle study with fathead minnow (*Pimephales promelas)*. The LOAEC from this study is 0.008 µg a.i./L based on adverse effects on survival. In absence of reliable data on the chronic toxicity of bifenthrin to fish, a conservative approach is taken by selecting the lowest available chronic NOAEC for fish (0.004 µg a.i./L) as a surrogate NOAEC for bifenthrin. This value is used as a surrogate for both freshwater and estuarine/marine NOAECs for bifenthrin because very limited data are available for estuarine/marine fish (only 5 NOAEC values). Further, no obvious or consistent trend in the sensitivity of freshwater fish vs. estuarine/marine fish is apparent when data are compared within the same chemical (*e.g.*, permethrin, resmethrin, cyfluthrin, fluvalinate).

[1] http://www.epa.gov/opp00001/science/efed_databasesdescription.htm#ecotoxicity

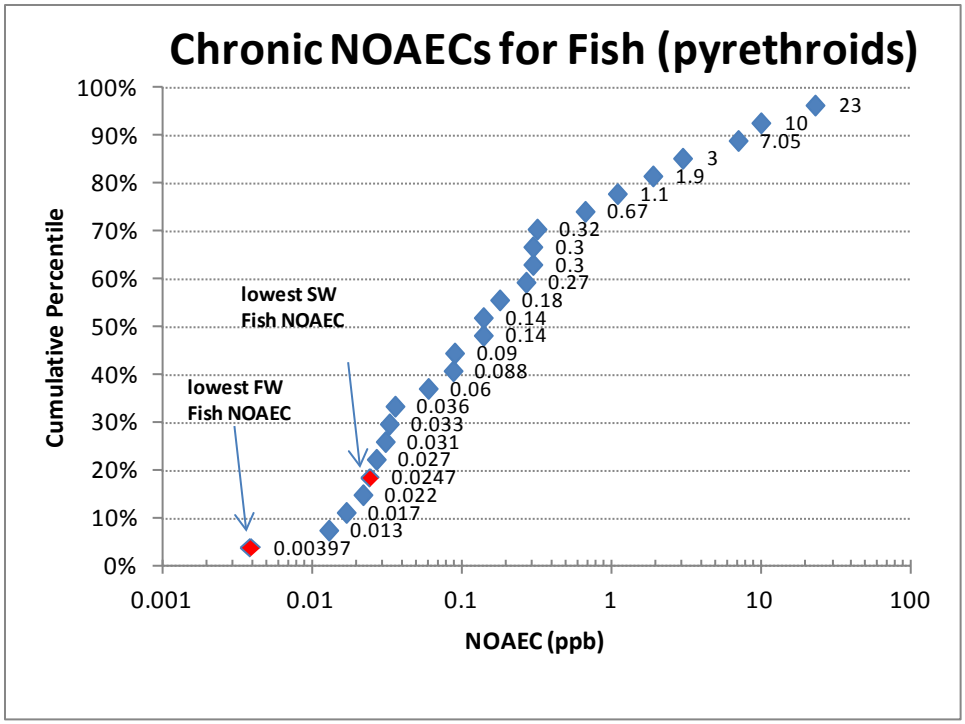

Figure J-1. Cumulative Probability Plot of Chronic NOAEC Values for Fish and Pyrethroids

Table J-1. Chronic toxicity data for Bifenthrin (Source: USEPA OPP Ecotoxicity Database)

Chemical	Species	MRID	Test Type	Duration	NOAEC (ppb)	Classificatior	Date	Lab
Tefluthrin	**Fathead minnow**	**41705101**	**ErlyLf**	**345 D**	**0.00397**	**C**	**1990**	**ICI**
Fenpropathrin	Fathead minnow	41525901	LifCyc	260 D	0.013	S	1990	SBI
Deltamethrin	Fathead minnow	42786821	LifCyc	280 D	0.017	C	1992	SBI
Deltamethrin	Fathead minnow	42114814	ErlyLf	36 D	0.022	C	1990	SBI
Cyfluthrin	**Sheepshead minnow**	**00158784**	**ErlyLf**	**39 D**	**0.0247**	**S**	**1986**	**ESE**
Tralomethrin	Fathead minnow	41860701	LifCyc	64 D	0.027	S	1990	SBI
Lambda-Cyhalothrin	Fathead minnow	41519001	LifCyc	300D	0.031	S	1989	BRI
Fluvalinate	Fathead minnow	00127996	ErlyLf	30 D	0.033	S	1982	ABL
Fluvalinate	Sheepshead minnow	43753501	LifCyc	227 D	0.036		1995	WLI
Cypermethrin	Fathead minnow	40641701	LifCyc	300 D	0.06	S	1998	BRI
Tralomethrin (HAG 107	Fathead minnow	40388602	LifCyc	435 D	0.088	S	1987	HAG
Fenvalerate	Fathead minnow	00074145	LifCyc	260D	0.09	C	1975	SCC
Cypermethrin	Fathead minnow	00089039	ErlyLf	30 D	0.14	C	1981	ICI
Cyfluthrin	Fathead minnow	41450401	LifCyc	307 D	0.14	C	1990	ABL
Tralomethrin	Fathead minnow	00132762	ErlyLf	35 D	0.18	C	1983	ABL
Cyfluthrin	Sheepshead minnow	00158781	ErlyLf	28 D	0.27	S	1986	ESE
Resmethrin	Fathead minnow	40991212	ErlyLf	30 D	0.3	S	1985	SBI
Permethrin	Fathead minnow	00161436, AC	LifCyc	246 D	0.3	S	1977	EGG
Resmethrin	Rainbow trout	40991223	ErlyLf	52 D	0.32	S	1985	SBI
Etofenprox	Rainbow trout	48280205	ErlyLf	90 D	0.67	S	2010	WLI
D-Phenothrin (Sumithri	Rainbow trout	44587002	ErlyLf	60 D	1.1	S	1998	SBI
Pyrethrins	Fathead minnow	43252701	ErlyLf	35 D	1.9	C	1994	SBI
Prallethrin	Rainbow trout	44729604	ErlyLf	61 D	3	S	1998	SBI
Resmethrin	Sheepshead minnow	43858304	ErlyLf	20 D	7.05	C	1995	TES
Permethrin	Sheepshead minnow	N.R.	ErlyLf	28 D	10	S	N.R.	EPA
Etofenprox MTI-500	Zebrafish	47132808	ErlyLf	40 D	23	S	2005	RCS

Bold values indicate most sensitive endpoint for freshwater and estuarine/marine fish.