Figure 4. Positions of standard test species on pyrethroid SSDs for all animals.

The estuarine mysid *Americamysis bahia* ● and the freshwater amphipod *Hyalalella azteca* ○ are similar in sensitivity and are always at the lower end of the SSD.
Hennessey et al. (2008 & 2015) Calanoid copepods and mysids are the most important food items for pelagic fish, including Delta smelt and Longfin smelt.
Figure 3 The fit of the log-logistic species sensitivity distribution to the acute data set. The median 5th percentile acute value with the lower 95% confidence limit and the median 1st percentile acute value with the lower 95% confidence limit are each displayed. The acute water quality criteria calculated with the median 5th percentile and median 1st percentile values are displayed as vertical lines.
Figure 3 The fit of the log-logistic distribution to the cyfluthrin acute data set. The median 5th percentile acute value and the median 1st percentile acute value are each displayed with their respective lower 95% confidence limit. The acute criteria calculated with the median 5th percentile value and the median 1st percentile value are each displayed as a vertical line for comparison.
Figure 3 The fit of Burr III distribution to the cypermethrin acute data set. The median 5th percentile and median 1st percentile acute values are each displayed. The acute water quality criteria calculated with the median 5th percentile and median 1st percentile values are displayed as vertical lines.
The fit of the log-logistic distribution to the acute aqueous data set. The median 5th percentile acute value with the lower 95% confidence limit and the median 1st percentile acute value are each displayed. The acute water quality criteria calculated with the median 5th percentile and median 1st percentile values are displayed as vertical lines.
Figure 3 The fit of the Burr Type III distribution to the lambda-cyhalothrin acute data set. The median 5th percentile acute value with the lower 95% confidence limit and the median 1st percentile acute value are each displayed. The acute criteria calculated with the median 5th percentile and median 1st percentile value are displayed as vertical lines.
Figure 3 The fit of the Burr Type III distribution to the permethrin acute data set. The acute water quality criterion calculated with the median 5th percentile value is displayed as a vertical line.
Feeding Ecology of Delta Smelt During a Seasonal Pulse of Turbidity
Hilton, Johnson & Kimmerer

Hammock et al. 2015: “...multiple stressors, including food limitation and contaminants, are contributing to the decline of Delta Smelt...”
Pyrethroid Levels Exhibiting Sublethal Effects

• Anthropogenically induced genetic modification is an environmental impact.
  – *Canis lupus* – Endangered 2014
  – *Canis lupus familiaris* – anecdotally the most widespread carnivore in the world
  – Genetic selection will be driven by pyrethroid resistance, which will reduce biodiversity and reduce population fitness and resilience.

• Acclimation comes at a cost
  – LMB exposed to pesticides compensated by increasing O₂ consumption, but at the cost of reduce growth (Beyers et al. 1999)
  – Killifish tolerance to cadmium resulted in reduced brood sizes, delayed reproduction, and shortened life-spans (Xie and Klerks 2004)
  – Reduced growth rates, size, and nutritional value at the bottom of the food web is transferred to higher trophic levels.

“All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.”