



**DEPARTMENT OF FISH AND WILDLIFE
WILDLIFE BRANCH
WILDLIFE INVESTIGATIONS LABORATORY
PESTICIDE INVESTIGATIONS
1701 NIMBUS ROAD
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**Lab Number P-3122
Necropsy Z16-749**

**Date of loss: July 6, 2016
Samples: Fish, crayfish, tadpoles,
water**

WPCL L-393-16

**To: Lt. Clint Garrett
CDFW North Coast Enforcement District**

Report Date: October 7, 2016

Remarks

Fish kill in Marsh Creek.

Background

On the morning of July 6, a fish kill was observed in Marsh Creek in Brentwood near the Wastewater Treatment Plant (WWTP). Hundreds of fish were reportedly dead. Water samples were collected at the source of the incident and at 3 locations upstream: 1) directly downstream of the effluent from the WWTP 2) directly downstream of where the irrigation discharge entered the creek, and 3) at a location downstream of both outfalls. The WWTP received water from upstream residential areas and the irrigation canal was downstream of corn fields. The corn fields may have recently been treated with methomyl (a carbamate insecticide) and lambda cyhalothrin (a pyrethroid insecticide) (pers. comm. Contra Costa County Agricultural Commissioner's Office). Crayfish, frogs and fish were collected from the site of the kill. A recent upstream fire and an algaecide application were both considered as possible causes of the kill. The algaecide application was found to have occurred after the start of the fish kill and several miles away, excluding it as a possible cause.

RESULTS OF EXAMINATION

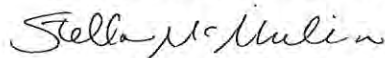
Dissolved oxygen readings collected at the site of the fish kill ranged from 6.59-8.62 mg/L and temperature ranged from 19.8 – 25.5 C, which are acceptable for aquatic life.

The water sample from the site of the kill was submitted to the CDFW Water Pollution Control Laboratory (WPCL) analyzed for organophosphates by GC/FPD and for carbamates by LC/MS/MS. These two classes of pesticides are relatively soluble in water as opposed to pyrethroid pesticides, which are not typically found in surface water and were not initially screened. No organophosphates or carbamates were detected in surface water.

Four largemouth bass, *Micropterus salmoides*, measuring from 12-24 cm were received. Two 8-cm bullfrog tadpoles, *Lithobates catesbeianus*, and one 14-cm crayfish, *Pacifastacus fortis*, were also received and stored either frozen or in formalin. Gill and liver tissue were extracted from the fish and submitted to

WPCL. One composite gill sample and one composite liver sample were analyzed for pyrethroids using GC-MS/MS-NCI. The only pyrethroid detected in either sample was bifenthrin at 4.01 ppb wet weight in gills and 2.95 ppb wet weight in livers. Bifenthrin is a synthetic pyrethroid insecticide with an LC50 of 0.35 ppb to bluegill sunfish (very highly toxic). While it is not possible to determine the concentration of bifenthrin in the water at the time of the fish kill, due to insufficient time for the contaminant to reach equilibrium in the fish and water, the presence of a very highly toxic material in both the gills and liver of fish that died acute death makes it possible that this loss was caused by exposure to bifenthrin. In Contra Costa County in 2014, the two most common uses of bifenthrin were on corn (27%) and structural pest control and landscape maintenance (68%) (California Department of Pesticide Regulation Use Report Database). Both residential areas (likely sites of structural pest control and landscape maintenance) and corn fields are present upstream of the fish kill. To determine the likely source of the bifenthrin, water samples previously collected from the location downstream of the irrigation outflow and downstream of the WWTP outflow were analyzed for pyrethroids. No bifenthrin (or any other pyrethroid) was detected in either sample. This may be due to bifenthrin having a low solubility in water. The source of the bifenthrin was not determined. It is more likely that the source of the bifenthrin was residential runoff since neither lambda cyhalothrin or methomyl (which would likely be present in runoff from corn fields) were present in any sample.

WILDLIFE INVESTIGATIONS LABORATORY



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