“Bad Actor” pesticides used on lily fields surrounding the Smith River estuary in 2012, and their effects

*In 2012 Easter lily farmers applied **298,093 pounds** of pesticides on bottomlands surrounding the Smith River estuary, in Del Norte County, California. Following are the most toxic pesticides used by Smith River lily farmers, the amounts used in 2012, and their toxicological effects. Seven of the pesticides (marked ☠) are found on the state of California’s Proposition 65 list of chemicals known to cause cancer. Three pesticides (marked with a ☒) are among those singled identified by the National Marine Fisheries Service as harmful to salmon. In addition to the dangers posed by these chemicals to humans and wildlife, when combined they can be equally or even more dangerous. Lily farmers sprayed pesticides nearly 2,500 times during the year.*

1) 1,3-Dichloropropene (Telone II) ☠
USE: nematicide, soil fumigant
AMOUNT USED: 115,930 pounds
TOXICOLOGICAL EFFECTS: Chest pains, respiratory problems, coughing, rashes. Single doses can cause lung damage and the kidney ailments. Most typical exposure is via inhalation, though ingesting it is most toxic.
CLASS: Probable human carcinogen & probable reproductive toxin.
ENVIRONMENTAL FATE: Highly soluble in water and does not evaporate readily, likely to contaminate groundwater. Aquatic organisms can be killed by concentrations of less than 10 parts per million.

2) Metam Sodium ☠
USE: soil fumigant, nematicide
AMOUNT USED: 131,913 pounds
TOXICOLOGICAL EFFECTS: Skin irritation, eye irritation, nervous system damage. Can cause allergies via sensitization, primary breakdown product is MITC (methylisothiocyanate) which can induce asthma.
CLASS: reproductive toxin, immune system toxicant, and probable human carcinogen.
ENVIRONMENTAL FATE: Highly toxic to fish; 1 part per trillion caused 100% mortality in tadpoles. MITC can catastrophically impair reproduction of invertebrates that salmonids feed on.

3) Chlorothalonil ☠
USE: fungicide
AMOUNT USED: 3,708 pounds
TOXICOLOGICAL EFFECTS: Irritating to the eyes and skin, can cause allergic rashes and swelling.
CLASS: probable human carcinogen, reproductive toxin.
ENVIRONMENTAL FATE: Chlorothalonil can contaminate the air traveling beyond the field and has been found in nearby residential neighborhoods. It is a potential groundwater contaminant, persistent in soils and acutely toxic to fish, crabs and frogs.

4) Diuron ☠
USE: herbicide
AMOUNT USED: 1,158 pounds
TOXICOLOGICAL EFFECTS: This chemical is slightly toxic by all routes.
CLASS: Carcinogen. At high doses Diuron can cause birth defects.
ENVIRONMENTAL FATE: Persistent in soils, can contaminate groundwater.
Highly toxic to aquatic invertebrates.

5) Disulfoton ☒
USE: Organophosphate insecticide
AMOUNT USED: 2,098 pounds
TOXICOLOGICAL EFFECTS: Highly toxic by all routes of exposure. Exposure can cause blurred vision, fatigue, nervous system affects, convulsions, and coma.
CLASS: cholinesterase inhibitor (can damage the central nervous system)
ENVIRONMENTAL FATE: Potential groundwater contaminant. Toxic to fish and zooplankton.

6) Phorate ☒
USE: Organophosphate insecticide, nematicide
AMOUNT USED: 1,963 pounds
TOXICOLOGICAL EFFECTS: Highly toxic through all routes of exposure. Exposure can cause convulsions, sweating, labored breathing, abdominal cramps, diarrhea, vomiting
ENVIRONMENTAL FATE: Groundwater contaminant. Extremely toxic to birds, fish and aquatic organisms. Kills rainbow trout at the minute concentration of just 13 parts per billion.

7) Captan ☠
USE: Fungicide
AMOUNT USED: 208 pounds
TOXICOLOGICAL EFFECTS: Mutagenic, carcinogenic. Skin and eye irritation, respiratory impacts. Can cause diarrhea and vomiting.
ENVIRONMENTAL FATE: Highly toxic to fish.

8) Ethoprop ☠
USE: Organophosphate insecticide, nematicide
AMOUNT USED: 1,531 pounds
TOXICOLOGICAL EFFECTS: Highly toxic through all routes of exposure.
CLASS: Carcinogen, cholinesterase inhibitor (can damage the central nervous system)
ENVIRONMENTAL FATE: Groundwater contaminant. Moderately toxic to fish, highly toxic to crustaceans and zooplankton.

9) Maneb ☠
USE: Fungicide
AMOUNT USED: 152 pounds
TOXICOLOGICAL EFFECTS: Respiratory, skin and eye irritant.
CLASS: Carcinogen and reproductive toxin.
ENVIRONMENTAL FATE: Toxic to aquatic species.

Copper

Lily bulb growers apply significant amounts of copper products as fungicides. Copper is less harmful to humans and wildlife than the above chemicals (though it can still have deleterious effects), but it is highly toxic to fish. In August 2010 the California North Coast Regional Water Quality Control Board discovered copper levels in Delilah Creek, a stream leading to the Smith River estuary, that were 28 times higher than allowed by state law. In 2012 Smith River lily farmers applied copper products 849 times for a total of **35,377** pounds used. According to Cornell University, "Copper … is highly toxic to fish. Even at recommended rates of application, this material may be poisonous to trout and other fish." As for human exposure, Cornell reports, "Vineyard sprayers experienced liver disease after 3 to 15 years of exposure to copper sulfate solution in Bordeaux mixture. … Copper sulfate has been shown to cause reproductive effects in test animals." (Lily growers applied 5,029 pounds of copper sulfate in 2012.)