

Seasonal Patterns And Factors Controlling The Occurrence Of Dissolved Pesticides In The Sacramento-San Joaquin Delta

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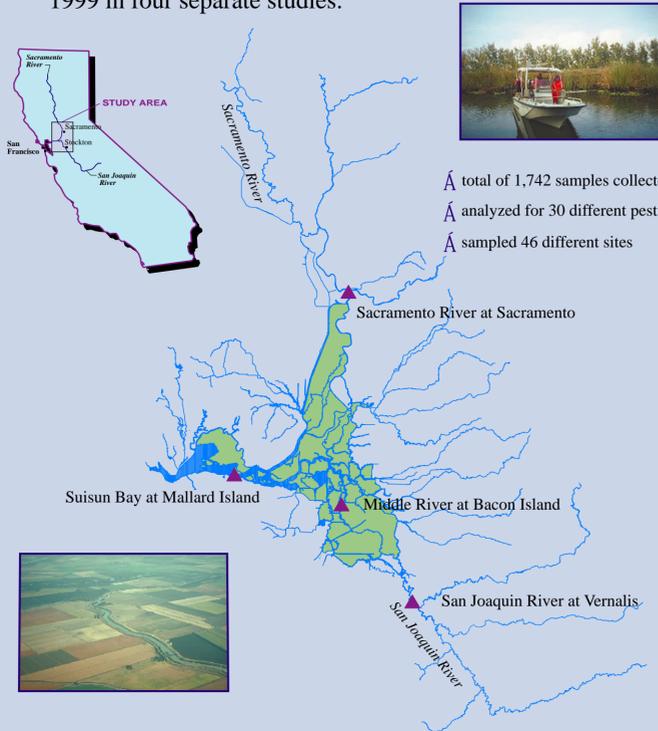
Synthesis of dissolved pesticide concentration data from the Sacramento-San Joaquin Delta :

- summary of data compiled for this analysis
- four major seasonal patterns of pesticide occurrence
- examination of factors controlling presence/absence

More than 150 pesticides are applied in the watershed of the Sacramento-San Joaquin Delta. These pesticides are transported by rivers and pose a potential threat to aquatic life.

Details of Data Compilation

Compilation of dissolved pesticide data collected by the USGS Toxic Substances Hydrology Project from 1991 to 1999 in four separate studies.



- total of 1,742 samples collected
- analyzed for 30 different pesticides
- sampled 46 different sites

Location of sampling sites in the Sacramento-San Joaquin Delta represented in this poster

Four Major Seasonal Patterns

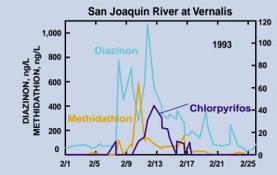
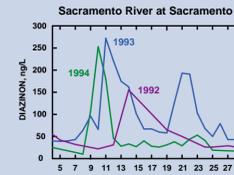
Winter



Pesticides : chlorpyrifos, diazinon, methidathion

Applied on stonefruit orchards in Sacramento and San Joaquin Valleys

Transported by first heavy rains



Detected in San Joaquin River, Sacramento River, and Delta

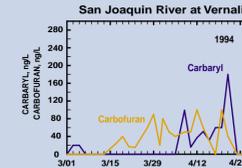
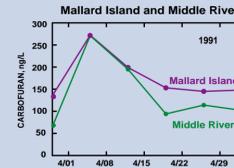
Spring



Pesticides : carbofuran, chlorpyrifos, diazinon

Applied on alfalfa in San Joaquin Valley and Delta

Transported by late rains



Detected in San Joaquin River and Delta

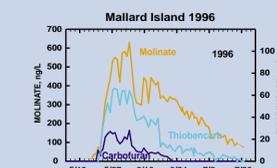
Late Spring Early Summer



Pesticides : carbofuran, molinate, thiobencarb

Applied on ricefields in the Sacramento Valley

Transported by release of rice field water



Detected in Sacramento River and Delta

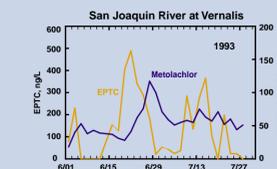
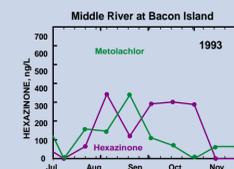
Summer



Pesticides : Variety of herbicides

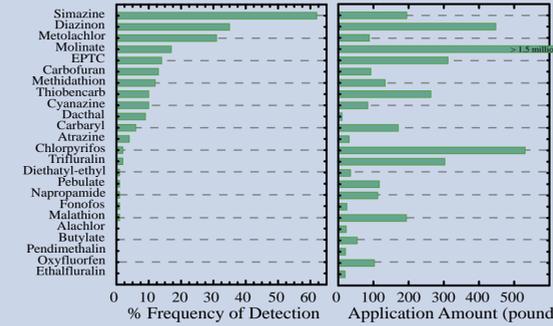
Applied on truck crops in San Joaquin Valley and Delta

Transported by irrigation return flow



Detected in San Joaquin River and Delta

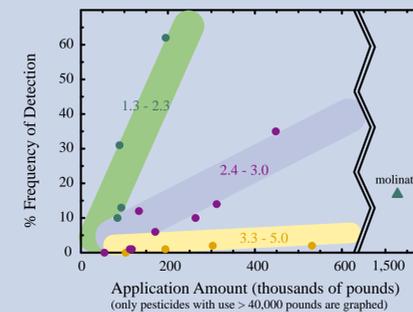
Presence or Absence of Dissolved Pesticides



The observed seasonal patterns of pesticide occurrence can generally be explained by timing, usage, and transport mechanism. However pesticide presence or absence cannot be fully explained by application patterns.

Chemical properties are important factors when considering pesticide presence or absence, (organic-carbon adsorption coefficient, water solubility, Henry's law coefficient, and degradation potential)

Frequency of detection as related to the organic-carbon adsorption coefficient (data is grouped by log Koc value)



Molinate: Despite a very high use and low log Koc value, molinate is only detected in 17% of the samples. Molinate is limited in geographic extent of use (98% in the Sacramento Valley) and likely to degrade since rice field water is held on the fields for extended periods of time.

Processes influencing rarely detected pesticides (< 7%)

Pesticide	Low Use	Adsorption	Volatilization	Degradation	Photolysis
Carbaryl					
Atrazine					
Chlorpyrifos					
Trifluralin					
Diethyl-ethyl					
Pebulate					
Napropamide					
Fonofos					
Malathion					
Alachlor					
Butylate*					
Oxyfluorfen					
Pendimethalin					
Ethalfuralin					

* Neither low use nor chemical properties can explain the low frequency of detection found for butylate.

Log Koc can explain the frequency of detection for many of the pesticides analyzed. However those compounds that could not be described by log Koc could mostly be explained by examining other chemical properties such as volatility and degradation potential.

SUMMARY

Dissolved pesticide occurrence in the Delta is characterized by four major seasonal patterns that are identified by usage and transport mechanism. The absence of some highly-used pesticides can be explained by their chemical properties, such as low water solubility, rapid degradation rate, or high vapor pressure. This analysis of patterns of pesticide occurrence can aid in the design of future monitoring studies.

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