Dow AgroSciences Comments on the 31 July 2008 Draft BiOp Specific to Chlorpyrifos

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Dow AgroSciences

Objective

- Provide illustrations of the points made in the general comments presentation that are specific to chlorpyrifos

Best Available Data – Information on Primary Chlorpyrifos Labels

- Products representative of all approved crops and use instructions
  - Lorsban-4E (62719-220)
  - Lorsban 15G (62719-34)
  - Dursban 50W in WSP (62719-72)
- Can be found at Dow AgroSciences website

http://www.dowagro.com/homepage/index.htm

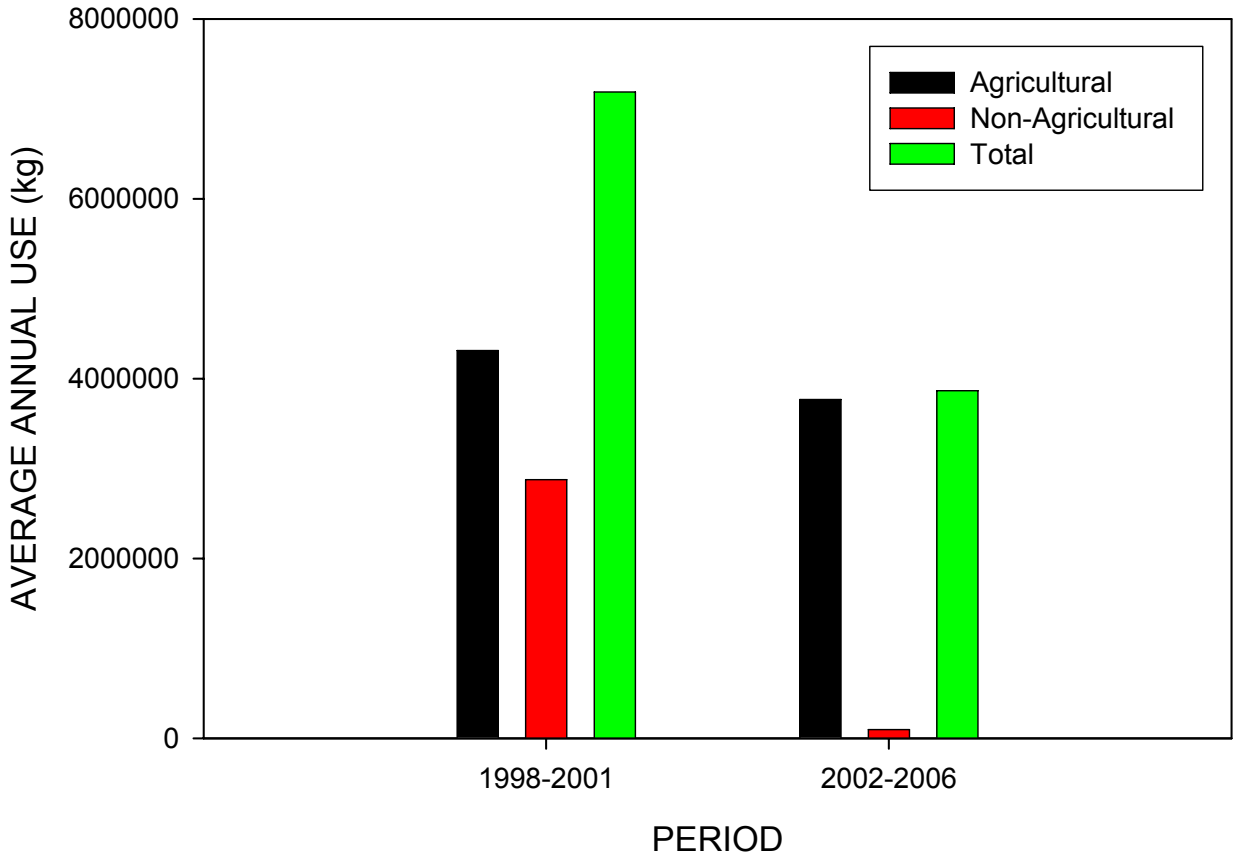
Best Available Data – Example of Dose-Response Data Available from Registrant

- Marino, T.A., McClymont, M.S., Yaroch, B.S. 2003. Chlorpyrifos: an acute toxicity study with the daphnid, *Daphnia magna*. Unpublished report of The Dow Chemical Company 031133.
  - 24 and 48-h EC50 value with 95% CI
  - 24 and 48-h probit slope with 95% CI
  - 48-h NOEC
- Used for EU reregistration dossiers

Best Available Data – Chlorpyrifos Uses Have Changed in Past Decade

- 2000 – Registrants agreed voluntary cancellation of most residential uses
- 2001 – Last year for retail sale of residential use products
- 2005 – Last year for termiticide use
- Conclusion: Federal Action excludes residential uses

Use Volume Reflects Changes in Chlorpyrifos Uses



Source: Doane, Phillips-McDougal, Klein

Best Available Data – Chlorpyrifos Uses Have Changed in Past Decade

1998-2001	2007
Corn	Soybean
Apple	Corn
Citrus	Citrus
Alfalfa	Almond
Pecan	Alfalfa
Cotton	Apple
Almond	Walnut
Walnut	Pecan
Peanut	Sugar Beet
Sugar Beet	Broccoli

Top 10 uses by product sold

Best Available Data – Old Monitoring Data Not Representative of Current Uses

- "The insecticides diazinon, chlorpyrifos, carbaryl, and malathion were common in mixtures found in urban streams (Gilliom et al. 2006)." (Page 235)
- Recommendation: exclude historical monitoring data, especially from locations with large contributions from non-crop use sites

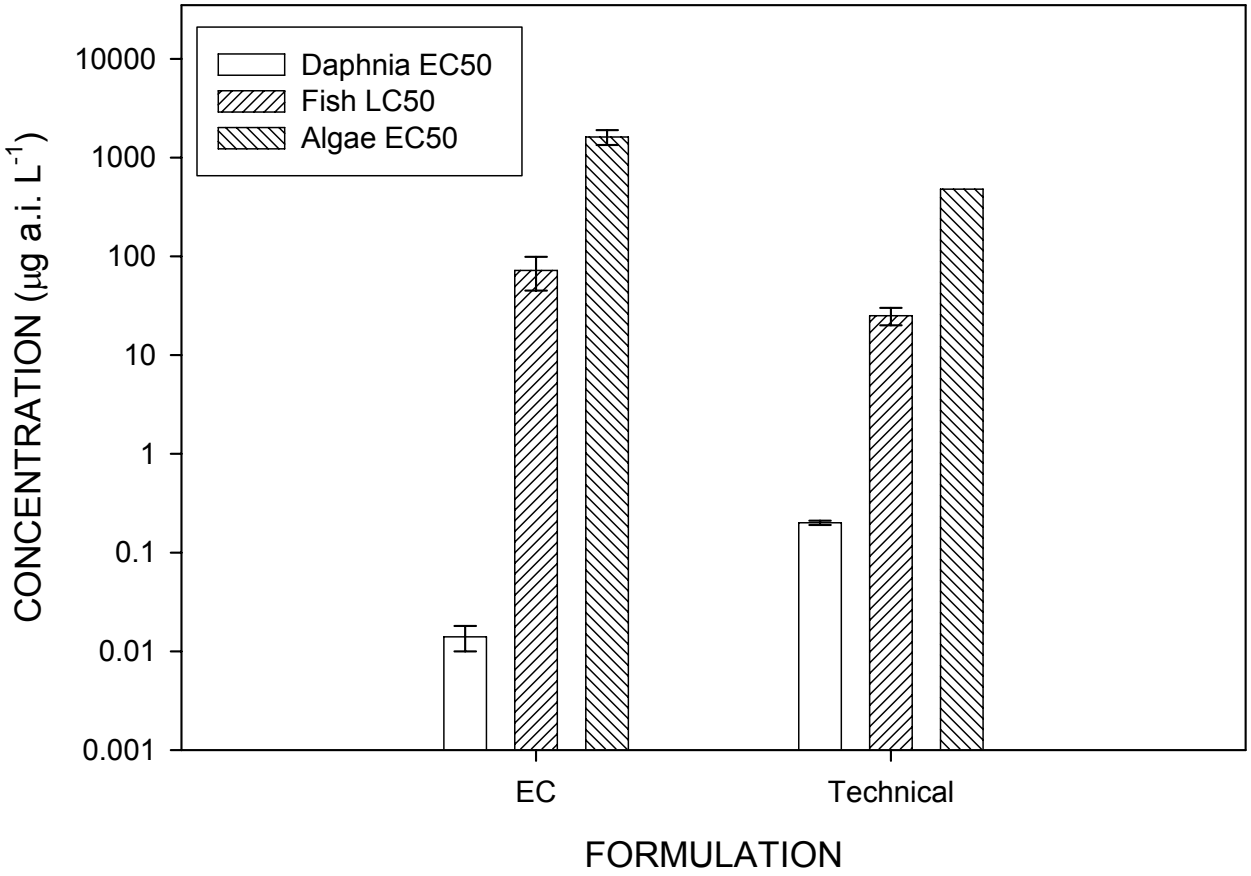
Best Available Data (Relevancy) – Misrepresentation of Incident Data/Field Studies

- "However, a California field study in citrus revealed a peak surface water concentration of 486 ppb following a single application at 6 lbs a.i./acre (EPA 2000a)." (Page 214)
- Registrant comments to EFED RED science chapter provided context (Dow AgroSciences 1999. Report GH-C 4873 MRID 44736901)
  - "Extremely high water concentrations were attributed to misapplication of chlorpyrifos, based upon labeled procedures, where chlorpyrifos was inadvertently applied directly to the surface of the pond."
  - Part of an experimental field study

Best Available Data – Other Ingredients

- Currently produced Lorsban-4E formulation has no nonylphenol or other non-ionic alkylphenol polyethoxylates
  - Can provide statement of formula as confidential business information
- Chlorpyrifos formulated products generally have the same biological activity as the a.i. in non-target toxicity tests
  - Acute testing routinely done for the EU
  - See also Giddings, J.M., Poletika, N.N., Havens, P.L., Hendrix, W.H., Woodburn, K.B. 2003. Chlorpyrifos analysis of risks to endangered and threatened salmon and steelhead. Unpublished DowAgroSciences report GH-C 5638, MRID 46025301.

Formulation Toxicity

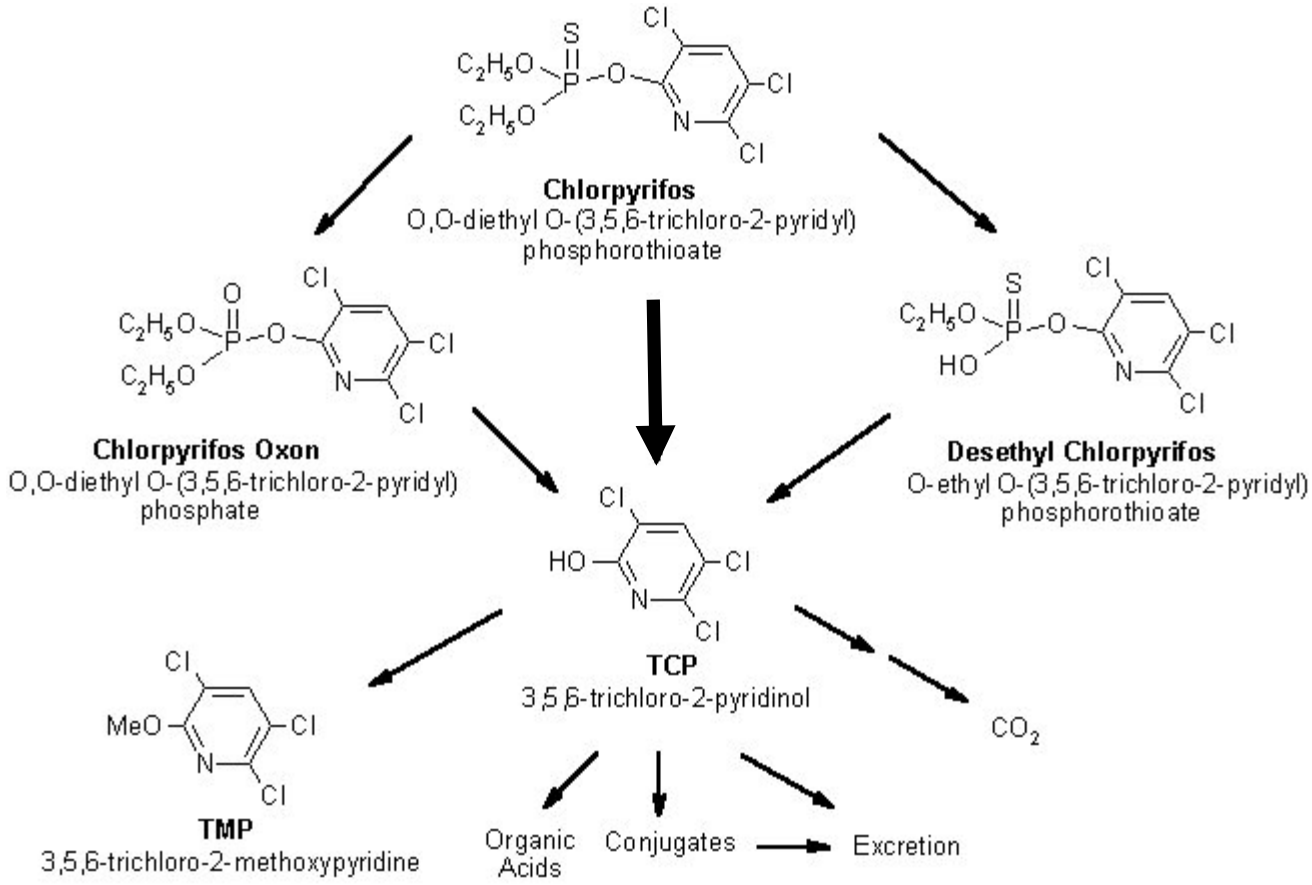


Error bars are 95% confidence limits (none reported for technical fish)

Best Available Data – Metabolites and Degradates

- Metabolites
  - Chlorpyrifos oxon is generally transitory in the environment (highly unstable)
  - Chlorpyrifos oxon is the metabolically activated toxic form that binds at target site
- Degradates
  - Chlorpyrifos degradates generally exhibit low toxicity

Generalized Chlorpyrifos Transformation Pathways in the Environment



Source: Racke, K.D. 1993. Environmental fate of chlorpyrifos. Rev Environ Contam Toxicol 131:1-150

Best Available Data – Exposure Model Inputs

- Table 32 PRZM-EXAMS exposure estimates do not reflect current chlorpyrifos label uses
  - Max. number of applications on cotton is 3 not 6
  - Max. rate on apples is 2 lb a.i./A
  - Aerial applications to Christmas trees (OR and WA only) require 150 foot buffer setbacks

Best Available Data – Misleading Integration and Evaluation of Exposure and Effect Information

- Ranges eliminate distribution information
- Generalized worst-case screening model predictions unrealistic
- Effects endpoints given equal weight

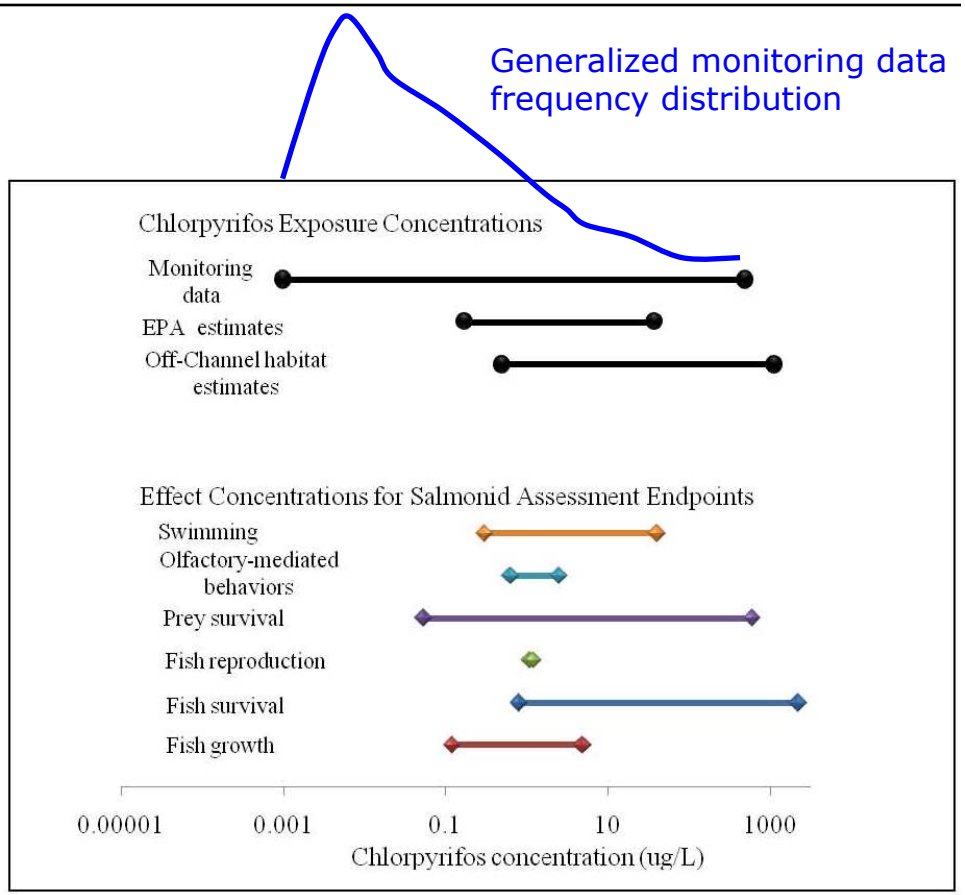


Figure 39. Chlorpyrifos exposure concentrations and salmonid assessment endpoints' effect concentrations in ug/L.

Probabilistic Risk Characterization Uses Best Available Data Applied to Specific Sites (1)

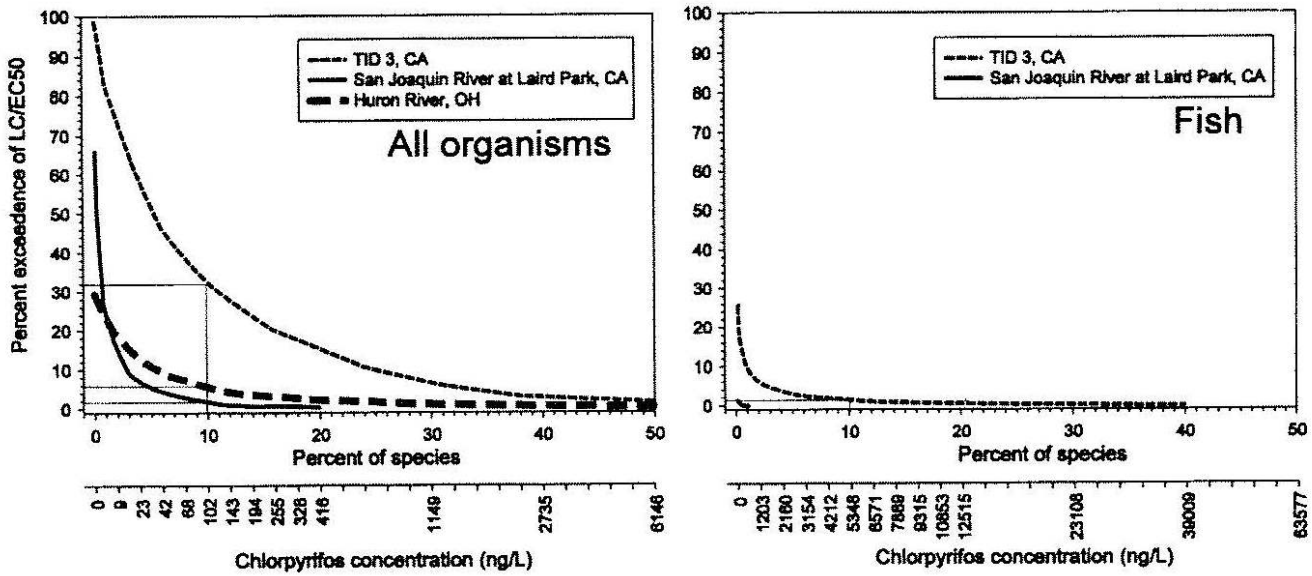


Fig. 28. Chlorpyrifos exceedence profiles for species distributions of all organisms at selected sites.

Source: J. P. Giesy, K. R. Solomon, J. R. Coats, K. Dixon, J. Giddings, E. E. Kenaga, "Ecological Risk Assessment of Chlorpyrifos in North American Aquatic Environments," *Rev. Environ. Contam. Toxicol.* **160**, 1-129 (1999). MRID for report GH-C 4660: 44696701

Important to Relate Monitoring Data to Specific ESUs

Table 54. Monitoring data reported from may effect ESUs.

ESU	HABITAT	NO. STATIONS	MAX. AVG. CONC. (ug/L)	MAX. MAX. CONC. (ug/L)	NO. SAMPLES	FIRST DATE	LAST DATE	MIN. MRL (ug/L)	MAX. MRL (ug/L)
A1 Southern California Steelhead	ESU	2	0.282	1.6	16	7/30/90	8/17/95	0.000	0.010
A2 South-Central California Coast Steelhead	ESU	3	0.004	0.12	65	8/1/94	8/1/95	0.050	0.050
A4 California Central Valley Steelhead	ESU	103	0.3	1.6	4487	5/1/90	5/22/02	0.004	0.050
A6 Upper Columbia River Steelhead	ESU	40	0.015	0.066	329	11/19/91	5/30/02	0.000	0.050
	SR	30	0.015	0.066	140	11/19/91	11/2/00	0.000	0.050
	C	10	0.01	0.046	189	10/26/92	5/30/02	0.000	0.050
A7 Snake River Basin Steelhead	ESU	26	0.01	0.046	367	10/26/92	5/30/02	0.000	0.050
	SR	16	0.004	0.011	178	3/25/93	5/6/02	0.004	0.004
	C	10	0.01	0.046	189	10/26/92	5/30/02	0.000	0.050
A10 Middle Columbia River Steelhead	ESU	94	0.012	0.046	459	4/11/90	5/30/02	0.004	0.140
	SR	86	0.012	0.02	276	4/11/90	5/14/02	0.004	0.140
	C	8	0.01	0.046	183	10/26/92	5/30/02	0.000	0.050
B1 Sacramento River Winter-Run Chinook	ESU	24	0.01	0.019	1092	5/1/90	5/22/02	0.004	0.050
	SR	23	0.01	0.019	1091	5/1/90	5/22/02	0.004	0.050
	C	1	0.000	0.000	1	2/10/92	2/10/92	0.050	0.050
B2 Snake River Fall-Run Chinook	ESU	10	0.004	0.005	39	4/11/90	11/2/00	0.004	0.140
	SR	8	0.004	0.005	33	4/11/90	11/2/00	0.004	0.140
	C	2	0.004	0.004	6	5/3/94	9/19/94	0.025	0.050
B4 Central Valley Spring-Run Chinook	ESU	24	0.01	0.019	1092	5/1/90	5/22/02	0.004	0.050
	SR	21	0.010	0.019	1072	5/1/90	5/22/02	0.004	0.050
	C	3	0	0	20	5/3/90	9/14/94	0.010	0.050
B5 California Coastal Chinook	ESU	2	0.000	0.000	51	8/16/94	8/8/95	0.050	0.050
B10 Central Valley Fall/Late Fall-Run Chinook	ESU	102	0.3	1.6	4486	5/1/90	5/22/02	0.004	0.050
C1 Central California Coast Coho	ESU	2	0.000	0.000	51	8/16/94	8/8/95	0.050	0.050

Source: Giddings et al. 2003. Table from available report presented as an example. Updating of monitoring data recommended.

Best Available Data – Olfactory-Mediated Behaviors and Actual Environmental Concentrations

- Summary of chlorpyrifos effects
  - "Juvenile coho salmon lost 25, 50, and 50 % of olfactory function following 7 d exposures to 0.625, 1.25, and 2.50 ug/L, respectively (Sandahl, et al. 2004)." (Page 260)
  - Decreased odor-evoked field potentials not related to a population assessment endpoint
  - There is no evidence in the draft BiOp that there has been a 7-d exposure of 0.625 ug/L in any ESU
- NMFS does not make a strong case for population impact of transitory olfactory effects in ESUs
- See also MANA comments regarding diazinon studies

Probabilistic Risk Characterization Uses Best Available Data Applied to Specific Sites (2)

- Conclusion of Giesy et al. 1999: "Overall, the data on concentrations in freshwater does not suggest ecologically significant risk, except in a few locations, primarily in California."
  - Subsequent large research and monitoring programs in CA
  - Regulatory actions by state regional water quality control boards and DPR
  - Increase in Dow AgroSciences stewardship activity
- Elimination of uses and reduction in application volume not considered in Giesy et al. 1999

California Research and Monitoring Uses Best Available Data (1)

- Orestimba Creek
  - Targeted monitoring and site-specific ecological risk assessment
    - Poletika, N.N., Woodburn, K.B., Henry, K.S. 2002. An ecological risk assessment for chlorpyrifos in an agriculturally dominated tributary of the San Joaquin River. Risk Anal 22:291-308. MRID for report GH-C 4854: 44711601
      - Conclusion: Fish population persistence and invertebrate community productivity were not adversely affected
      - Uncertainties: actual community status and potential, time-varying concentrations, contribution of other stressors

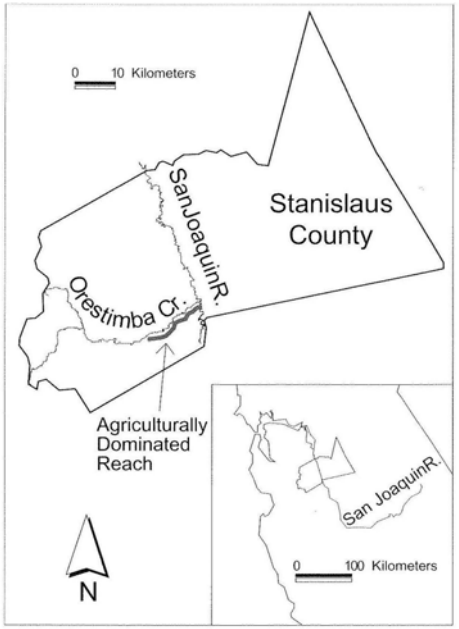


Fig. 1. Location of study area.

California Research and Monitoring Uses Best Available Data (2)

- Orestimba Creek
  - Multiple year biological monitoring and physical habitat assessment
    - Hall, Jr., L.W., Killen, W.D., Alden III, R.W. 2007. Relationship of farm level pesticide use and physical habitat on benthic community status in a California agricultural stream. HERA 13:843-869.
      - Conclusion: in general, both pesticide applications and physical habitat have a similar but modest statistical association with benthic communities. However, the relationship of both stressors appear to be insignificant compared to the magnitude of spatiotemporal patterns reported

Regulatory Actions

- Central Valley Regional Water Quality Control Board
  - 303(d) listings and TMDLS
    - Implementation plans underway in some watersheds such as Sacramento/Feather River
  - Irrigated Lands Program
    - Coalition monitoring and education
- Department of Pesticide Regulation
  - Chlorpyrifos re-evaluation of state registrations
    - Dow AgroSciences exceedence investigations and grower education

Stewardship

- Dow AgroSciences serves on the board of directors of the Coalition for Urban/Rural Environmental Stewardship (CURES) and provides support
  - CURES stewardship materials available at http://www.curesworks.org/home.asp
- Dow AgroSciences field scientists participate in grower educational meetings to raise awareness of water quality concerns and recommend practices to reduce exposure

Recent Risk Mitigation Measures (1)

- Chlorpyrifos IRED (2002)
  - In order to be eligible for reregistration, all product labels must be amended to incorporate the risk mitigation measures outlined in Section IV. Table 35 describes how language on the labels should be amended.
  - Applies to all registered products containing chlorpyrifos as an a.i.

Recent Risk Mitigation Measures (2)

- Implementation of mitigation language on chlorpyrifos labels
  - Spray drift management
    - Buffer zones
    - Best management practices
  - Specific use restrictions by crop
    - Total amount of a.i. applied per season
    - Number of applications
    - Re-treatment intervals
    - Maximum single application rate

Recent Risk Mitigation Measures (3)

- Spray drift buffer zones

Application Method	**Required Setback (Buffer zone)(feet)**
ground boom	25
chemigation	25
orchard airblast	50
aerial (fixed wing or helicopter)	150

Recent Risk Mitigation Measures (4)

- Best management practices
  - Aerial application
  - Aerial drift reduction advisory
    - Information on droplet size
    - Controlling droplet size
    - Boom length
    - Application height
    - Swath adjustment
    - Wind
    - Temperature and humidity
    - Temperature inversions
    - Sensitive areas

Source: Marlin E. Rice, Iowa State U.

Recent Risk Mitigation Measures (5)

- Best management practices
  - Ground boom application
    - Droplet size
    - Nozzle height
    - Wind speed
  - Orchard airblast application
    - Canopy height
    - Wind speed
    - Turning corners with outside nozzles off
    - Adjustment of airblast equipment
    - Nozzle orientation
    - Passing gaps in crop canopy with sprayer off
    - Spraying outside rows outside in with outside nozzles off
    - Spraying smaller crops with top nozzles off

Source: CURES

Recent Risk Mitigation Measures (6)

- Examples of specific use restrictions by crop
  - Alfalfa
    - Reduced allowed applications from 8 to 4
    - 10-d interval, max. 1 lb a.i./A per application
  - Citrus
    - Reduced maximum rate from 6 to 4 lb a.i./A
    - Highest rate limited to 5 CA counties
    - Limit of 2 applications, 30-d interval
    - Aerial application eliminated
  - Corn
    - Reduced seasonal limit from 7.5 to 3 lb a.i./A
    - Limited to 3 applications, 10-d interval

Recent Risk Mitigation Measures (7)

- Examples of specific use restrictions by crop
  - Tree nuts
    - Seasonal limit reduced from 8 to 4 lb a.i./A
  - Tree fruits
    - Total of 2 lb a.i./dormant-delayed dormant season, 1 dormant application, 10-d interval between dormant and foliar
    - Only post-bloom apple use allowed is a directed trunk spray;
    - Reduction from 2 to 1 applications per season for any use on apples

Conclusion

- The draft BiOp fails to reflect current understanding of expected risk in specific ESUs in combination with existing regulatory and stewardship programs