

## New & Updated Presentations/Publications on Delta and SJR Water Quality Issues

Drs. G. Fred Lee and Anne Jones-Lee continue to update, and disseminate, technical information on water quality issues in the Sacramento/San Joaquin Delta and San Joaquin River. They have been invited to discuss their findings on Delta and San Joaquin River water quality at two upcoming professional conferences: the CA/NV American Water Works Association (AWWA) Fall 2007 Conference in Sacramento, CA on October 24, 2007, and the Central Coast Agricultural Water Quality Coalition's *Agriculture and the Environment - 2007* Conference in Monterey, CA on November 7, 2007. In addition, they are taking the lead with the California Water and Environmental Modeling Forum (CWEMF) to develop and organize a one-day workshop devoted to aquatic plant nutrient-related water quality issues in the Delta. Key topic areas, and references to their recent work in them, are summarized below.

### Delta Water Quality

In the CA/NV AWWA conference session devoted to Bay Delta Water Quality, they will present:

Lee, G. F., and Jones-Lee, A., "Overview—Sacramento/San Joaquin Delta Water Quality," Presented at CA/NV AWWA Fall Conference, Sacramento, CA, PowerPoint Slides, G. Fred Lee & Associates, El Macero, CA, October (2007). [Slides available on their website at <http://www.members.aol.com/GFLEnviroQual/DeltaWQCANVAWWAOct07.pdf>].

That report includes a summary of the CVRWQCB/SWRCB/USEPA June 2007 updated CWA Section 303(d)-listed areas of the Delta for which TMDLs will need to be developed as a result of the area's containing one or more constituents in concentrations that exceed water quality objectives. A summary of that listing is presented in Table 1.

**Table 1**

2006 CWA 303(d) List of "Impaired" Delta Waterbodies (SWRCB, June 2007)																		
Pollutant*/Stressor	Location (see key below)													Potential Sources (see key below)				
	CD	ED	SE	ND	NW	SD	SC	WD	SJ	MS	OR	MR	MDR	Ag	R/S	SU	AM	Other
Chlorpyrifos	X	X	X	X	X	X	X	X						X	X			
Diazinon	X	X	X	X	X	X	X	X						X	X			
DDT	X	X	X	X	X	X	X	X	X					X				
Group A Pesticides (legacy)	X	X	X	X	X	X	X	X	X					X				Formerly-used pesticides
EC/TDS			X		X	X		X	X					X				
Exotic Species	X	X	X	X	X	X	X	X								X		
Mercury	X	X	X	X	X	X	X	X	X								X	
Unknown Toxicity	X	X	X	X	X	X	X	X	X					X		X		
Dioxin/Furan							X											Point source; McCormick/Baxter; Contaminated sediment
Pathogens							X			X					X			Non-boating recreation; tourism
PCBs				X			X									X		Point source
Low DO							X									X		Hydromodification
										X						X		WWTP ammonia
Copper																		X
Zinc																		X
Boron									X					X				
Toxaphene									X							X	X	

<b>Location Designations</b> CD - Central Delta ED - Eastern Delta SE - South Delta export area ND - North Delta NW - Northwestern Delta SD - Southern Delta SC - Stockton Ship Channel WD - Western Delta SJ - Lower San Joaquin River MS - Mormon Slough OR - Old River - South Delta MR - Lower Mokelumne River MDR - Middle River	<b>Group A Pesticides</b> aldrin                    heptachlor epoxide dieldrin                hexachlorocyclohexane chlordane                (incl. lindane) endrin                    endosulfan heptachlor                toxaphene	<b>Source Designations</b> Ag - Agriculture R/S - Urban runoff/Storm sewers SU - Source unknown AM - Abandon mine WWTP - Domestic wastewaters
<b>Pyrethroids</b> bifenthrin lambda cyhalothrin efenvalerate/fevalerate permethrin		

CWA - Clean Water Act  
 \* Violates water quality objective

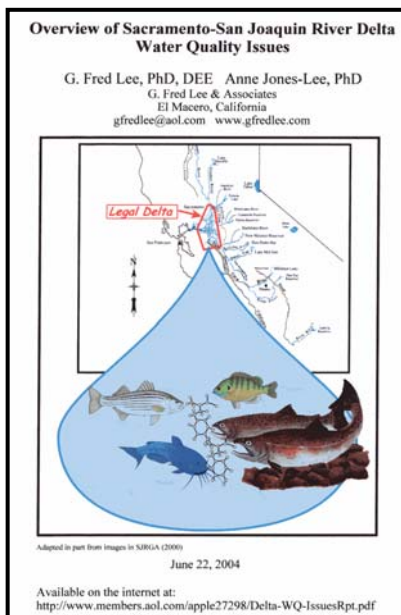
Table 2 lists those Delta water quality issues that they report to be impairing the beneficial uses of the Delta but that are not listed by the regulatory agencies as impairments.

**Table 2**

**Delta Impaired Waters Not Listed on CWA 303(d)**

<b>Should Be Listed</b>	<b>Known Impairments</b>
Nutrients - N & P	Excessive growth of algae & macrophytes
TOC/DOC	Trihalomethanes formed in water treatment
Pyrethroid pesticides used in agriculture & urban areas	Watercolumn & sediment toxicity
<b>Could Be Listed - Need Investigation for Potential Impacts</b>	
	<b>Sources</b>
PBDE - polybrominated diphenylethers	Domestic wastewater discharges
PPCP - pharmaceutical & personal care products	Domestic wastewater discharges
Pharmaceuticals & hormones	Dairy & animal husbandry operations
Other unregulated chemicals	Various

Lee and Jones-Lee's October 2007 AWWA conference presentation updates their 2004 comprehensive report on Delta Water Quality Issues:



Lee, G. F. and Jones-Lee, A., "Overview of Sacramento-San Joaquin River Delta Water Quality Issues," Report of G. Fred Lee & Associates, El Macero, CA, June (2004). [Available at: <http://www.members.aol.com/apple27298/Delta-WQ-IssuesRpt.pdf>],

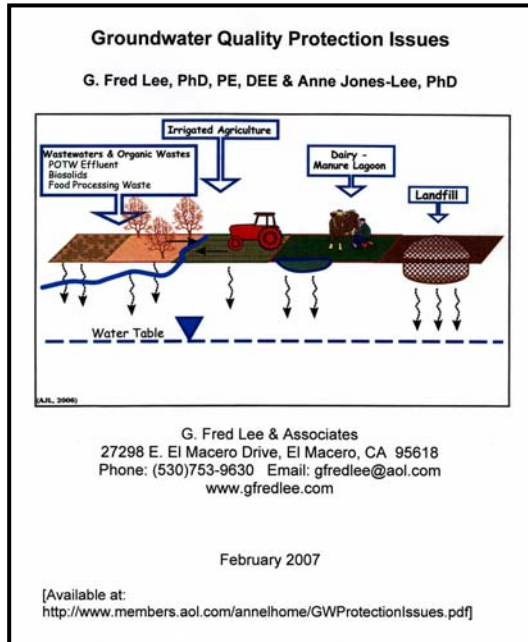
An updated report is being prepared based on the AWWA conference presentation.

## Groundwater Quality Protection

At the October 2007 CA/NV AWWA conference, Lee and Jones-Lee will also present a discussion of groundwater quality protection issues that are pertinent to the utilization of the Central Valley water resources. Their presentation:

Lee, G. F., and Jones-Lee, A., "Groundwater Quality Protection Issues," Presented in part at CA/NV AWWA Fall Conference, Sacramento, CA, PowerPoint Slides, G. Fred Lee & Associates, El Macero, CA, October (2007). [Available on their website at <http://www.members.aol.com/annejlee/GWProtectionIssues-sli.pdf>].

is an overview of information in a report they prepared in the winter of 2007.



Lee, G. F. and Jones-Lee, A., "Groundwater Quality Protection Issues," Report of G. Fred Lee & Associates, El Macero, CA, February (2007) [Available at: <http://www.members.aol.com/annelhome/GWProtectionIssues.pdf>]

Additional information about the Bay Delta Water Quality sessions at the CA/NV AWWA Fall 2007 Conference is available at: <http://ca-nv-awwa.org/CA-NV/conferences/fall/baydelta.pdf>

## San Joaquin River Water Quality Issues

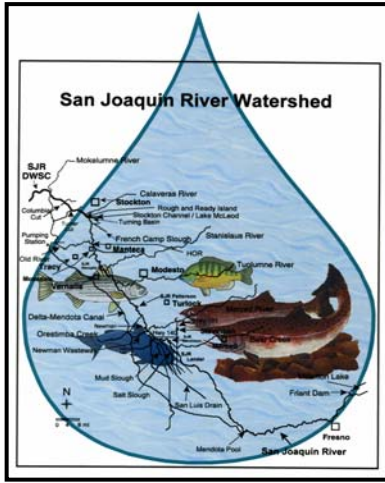
At the Central Coast Agricultural Water Quality Coalition's *Agriculture and the Environment - 2007* Conference that will be held in Monterey, CA, November 7, 2007, Drs. Lee and Jones-Lee will present the paper,

Lee, G. F., and Jones-Lee, A., "Water Quality Issues of Irrigated Agricultural Runoff/Discharges—San Joaquin River, Central Valley, California," Presented at Agriculture and the Environment - 2007 Conference, Central Coast Agricultural Water Quality Coalition, Monterey, CA, November (2007). [Available at <http://www.members.aol.com/GFLEnviroQual/SJR-WQ-Ag-Monterey.pdf>].

The PowerPoint slides for that presentation are available on their website:

Lee, G. F., and Jones-Lee, A., "Potential Water Quality Impacts of Agriculture Runoff/Discharges in the Central Valley of California," Presented at Central Coast Agricultural Water Quality Coalition's 2007 National Conference on Agriculture & the Environment, Monterey, CA, PowerPoint Slides, G. Fred Lee & Associates, El Macero, CA, November (2007). [Available at <http://www.members.aol.com/GFLEnviroQual/SJRAGImpactsMontereyNov2007.pdf>]

Their paper and presentation at the Central Coast Agricultural Water Quality Coalition's Conference updates the report on San Joaquin River water quality issues they developed in the summer of 2006.



Lee, G. F. and Jones-Lee, A., "San Joaquin River Water Quality Issues," Report of G. Fred Lee & Associates, El Macero, CA, June (2006). [Available at: <http://www.members.aol.com/annejlee/sjr-WQIssues.pdf>]

Table 3 presents a summary of the current CWA 303(d) listings of impaired water quality in the San Joaquin River that will be discussed in their presentation.

**Table 3**

**2006 CWA 303(d) List of Water Quality Limited ("Impaired") Reaches of San Joaquin River (SWRCB, June 2007)**

Pollutant*/Stressor	River Reach (see key below)							Potential Sources (see key below)		
	FMP	MPB	BMS	MSM	MTR	TRS	SDB	Ag	SU	RE
DDT		X	X	X	X	X	X	X		
Group A Pesticides (legacy)		X	X	X	X	X	X	X		
EC/TDS		X	X	X				X		
Exotic Species	X								X	
Mercury			X	X	X	X	X			X
Unknown Toxicity		X	X	X	X				X	
Boron		X	X	X				X		
Toxaphene							X		X	
Selenium				X				X		

River Reach Designations
FMP - Friant Dam to Mendota Pool
MPB - Mendota Pool to Bear Creek
BMS - Bear Creek to Mud Slough
MSM - Mud Slough to Merced River
MTR - Merced River to Tuolumne River
TRS - Tuolumne River to Stanislaus River
SDB - Stanislaus River to Delta Boundary

Group A Pesticides	
aldrin	heptachlor epoxide
dieldrin	hexachlorocyclohexane
chlordane	(incl. lindane)
endrin	endosulfan
heptachlor	toxaphene

Source Designations
Ag - Agriculture
SU - Source unknown
RE - Resource Extraction

CWA - Clean Water Act  
 \* Violates water quality objective

Table 4 lists constituents that Drs. Lee and Jones-Lee find should or could be listed as causes of SJR water quality impairment, and will be discussed at the conference.

**Table 4**

**SJR & Downstream Downstream of Vernalis  
Impaired Waters Not Listed on CWA 303(d)**

<b>Should Be Listed</b>	<b>Known Impairments</b>
PCBs	Excessive bioaccumulation in edible fish
Pathogen-indicator organisms — <i>E. coli</i> , fecal coliforms	Contact recreation
Nutrients (nitrogen & phosphorus compounds)	Excessive fertilization High pH (photosynthesis/respiration) Low DO in Delta (algal decomposition)
Alternatives to OP pesticides (including pyrethroid-based pesticides)	Watercolumn toxicity Sediment toxicity
Total organic carbon & other chemicals such as bromide	Disinfection byproducts (trihalomethanes) developed in treatment of downstream waters for domestic water supply
Excessive sediment	Erosion, turbidity
<b>Could Be Listed - Need Investigation for Potential Impacts</b>	
Herbicides	Toxicity to algae
Sulfate	Impact on bioaccumulation of mercury
PBDEs	Bioaccumulation
Aquatic sediment toxicity (pesticides, nutrients/algae/sediment ammonia, heavy metals, PAHs, other chemicals)	Toxicity
Unrecognized pollutants (pharmaceuticals & other unregulated chemicals dischargd by confined-animal facilities - dairies, feedlots, etc. - & domestic wastewaters	
<b>Pyrethroids</b>	
bifenthrin lambda cyhalothrin efenvalerate/fedvalerate permethrin	

Additional information about the Central Coast Agricultural Water Quality Coalition's 2007 National Conference on Agriculture & the Environment is available at:  
<http://www.agwaterquality.org/2007conference>.



organizing this workshop, Drs. Lee and Jones-Lee prepared a discussion of key issues that need to be reviewed and investigated in addressing Delta nutrient-related water quality issues.

Lee, G. F., and Jones-Lee, A., "Delta Nutrient Water Quality Modeling Workshop — Background Information," Report of G. Fred Lee & Associates, El Macero, CA, September (2007). [Available at <http://www.members.aol.com/GFLEnviroQual/NutrWorkshopRev4.pdf>].

Also, as part of developing background information for the CWEMF Delta Nutrient Water Quality Workshop, they developed a separate report.

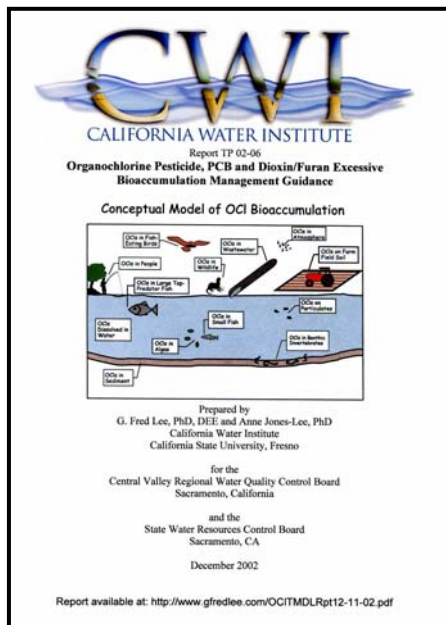


Lee, G. F., and Jones-Lee, A., "Managing Nutrient (N & P) Water Quality Impacts in the Central Valley, CA," [Excerpts from: Lee, G. F. and Jones-Lee, A., "Review of Management Practices for Controlling the Water Quality Impacts of Potential Pollutants in Irrigated Agriculture Stormwater Runoff and Tailwater Discharges," California Water Institute Report TP 02-05 to California Water Resources Control Board/Central Valley Regional Water Quality Control Board, 128 pp, California State University Fresno, Fresno, CA, December (2002)], Report of G. Fred Lee & Associates, El Macero, CA (2002). [Available at: <http://www.members.aol.com/GFLEnviroQual/CentralValleyNutrientMgt.pdf>]

Information on CWEMF activities and its other workshops is available at <http://cwemf.org/>.

## Excessive Bioaccumulation of Organochlorine Legacy Pesticides in Central Valley Fish

The State Water Resources Control Board (SWRCB) has been collecting data on the bioaccumulation of organochlorine (OCI) "legacy" pesticides (such as DDT, dieldrin, chlordane, and toxaphene) in fish in Central Valley waterbodies since the late 1970s. In the late 1990s the CVRWQCB, DeltaKeeper, and others collected additional data on OCIs in fish tissue. In 2002, under contract with the SWRCB through CSU Fresno Water Institute, Lee and Jones-Lee developed a comprehensive report discussing those data.



Lee, G. F. and Jones-Lee, A., "Organochlorine Pesticide, PCB and Dioxin/Furan Excessive Bioaccumulation Management Guidance," California Water Institute Report TP 02-06 to the California Water Resources Control Board/Central Valley Regional Water Quality Control Board, 170 pp, California State University Fresno, Fresno, CA, December (2002). [Available at: <http://www.gfredlee.com/OCITMDLRpt12-11-02.pdf>]

Their work involved gathering a complete database of body burden data for OCl's that existed as of about 2000; the Excel spreadsheet of those data measured approximately 6-ft by 9-ft. (That database is available electronically from G. F. Lee upon request by emailing [gfredlee@aol.com](mailto:gfredlee@aol.com).)

A set of PowerPoint slides covering the key information in that report is available at:

Lee, G. F. and Jones-Lee, A., "Excessive Bioaccumulation of Organochlorine Legacy Pesticides and PCBs in California Central Valley Fish," Made available at US EPA, California OEHHA and ATSDR 2004 National Forum on Contaminants in Fish, Report of G. Fred Lee & Associates, El Macero, CA, January (2004). <http://www.members.aol.com/duklee2307/OCl-slides-SanDiego.pdf>

### **Bioaccumulation in the Food Web**

Beginning in the spring of 2007 Lee and Jones-Lee initiated an unsupported review of the 2005 data on the body burden of OCl's in the approximately 400 fish collected by the CVRWQCB (C. Foe) from Central Valley locations; about half of those fish were collected in the Delta. Lee and Jones-Lee are in the process of updating their 2002 report to incorporate those data. They are developing a report,

Lee, G. F., and Jones-Lee, A. "Update of Organochlorine (OCl) "Legacy" Pesticide and PCB Concentrations in Delta and the Central Valley Fish" Report of G. Fred Lee & Associates, El Macero, CA (in preparation)

in which those data will be discussed. They are also reviewing the CVRWQCB Irrigated Lands Ag Waiver water column monitoring data for the Delta; they have found that the concentrations of some of the legacy pesticides in some samples are sufficient to bioaccumulate to excessive concentrations in edible fish.

### **Water Quality Modeling**

Drs. Lee and Jones-Lee have addressed current issues of modeling water quality impacts of stormwater runoff-associated pollutants in the most recent issue [Volume 10(9)] of their Stormwater Runoff Water Quality Newsletter [<http://www.gfredlee.com/newsindex.htm>]. They have also made that discussion available in report form available as:

Jones-Lee, A. and Lee, G. F., "Modeling Water Quality Impacts of Stormwater Runoff-Associated Pollutants," Report of G. Fred Lee & Associates, El Macero, CA, September (2007). [Available at: <http://www.members.aol.com/GFLEnviroQual/StormwaterWQModeling.pdf>].

### **Additional Information**

Additional information on water quality issues pertaining to the Delta and SJR is available on Lee and Jones-Lee's website, [www.gfredlee.com](http://www.gfredlee.com). It is located in the "Watershed Studies – San Joaquin River Watershed Program and Delta - CALFED Programs" section, [<http://www.gfredlee.com/psjriv2.htm>]. Also available on that website is information on Drs. Lee and Jones-Lee's experience in Delta water quality issues over the past 18 years [<http://www.members.aol.com/annejlee/Delta-SJR-exp.pdf>].

Address any questions or comments on any of these papers, reports, or presentations to G. Fred Lee at [gfredlee@aol.com](mailto:gfredlee@aol.com).

G. Fred Lee