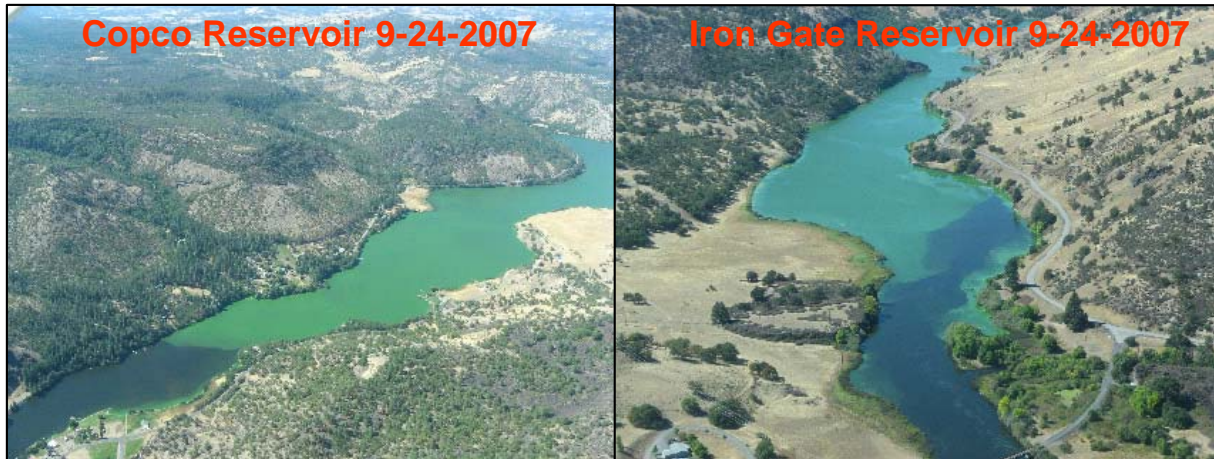


Technical Memorandum

Microcystin Bioaccumulation in Klamath River Fish and Freshwater Mussel Tissue: Preliminary 2007 Results



PREPARED BY

JACOB KANN, PH.D.

AQUATIC ECOSYSTEM SCIENCES LLC

295 EAST MAIN ST., SUITE 7
ASHLAND, OR 97520
Email: jacobkann@aol.com

PREPARED FOR

KARUK TRIBE OF CALIFORNIA

ORLEANS, CALIFORNIA

APRIL 2008

Microcystin Bioaccumulation in Klamath River Fish and Freshwater Mussel Tissue: Preliminary 2007 Results

Although the presence of *Microcystis aeruginosa* and the hepatotoxin toxin microcystin is well established in the Klamath River system (e.g., Kann and Corum 2006 and 2007), only minimal data collection efforts regarding bioaccumulation of this cyanotoxin have previously been reported. For example, trace concentrations of microcystin were found in Klamath River steelhead livers in 2005 (Fetcho 2006). The following memorandum provides a preliminary presentation of microcystin tissue analyses performed by the California Department of Fish and Game, under contract to the State Water Resources Control Board (SWRCB) on Klamath River fish and freshwater mussels in 2007; these analyses were funded through a grant to the SWRCB from US EPA Region 9. The SWRCB provided the results (shown in Appendix I) to the Karuk Tribe. Fish samples were collected by the California Department of Fish and Game (CDFG) and freshwater mussel samples were provided by the Karuk Tribe. All tissue samples were extracted and analyzed for microcystin by the CDFG Fish and Wildlife Water Pollution Control Laboratory in Rancho Cordova, CA using LC/MS/MS methodology (see Appendix I for detection limits and QA description).

Microcystin analyses were performed on composite (consisting of 6 yearling fall Chinook) liver, stomach, and fillet samples collected from the Iron Gate Hatchery on July 13th, a composite mussel sample (analyzed in triplicate and comprised of 13 whole *Gonidea angulata*) collected from the Klamath River in the Seiad Valley area on July 20th (note that the lab report in Appendix I incorrectly identifies the composite mussel sample as being from Copco Reservoir); individual Klamath River mussel samples collected on July 20th, July 24th, and November 5-6th; and yellow perch (both individual fillets and liver composites) collected from Copco and Iron Gate Reservoirs on September 6-7th (Table 1). A variety of known microcystin (MCYST) congeners were analyzed, including MCYST-RR, -LR, -YR, -LA, -LW, -LF, and the demethylated analogues of -RR, and -LR denoted RR-DM and LR-DM (results reported in ng/g fresh weight or ppb; Table 1).

Microcystin Tissue Data

Results for tissue concentration of various MCYST congeners showed some level of bioaccumulation in the majority (85%) of samples tested in July and September (Table 1). The lack of MCYST detection in any of the mussels collected in November (Table 1), along with survey data showing that *Microcystis* and microcystin had declined substantially by late October (Kann 2007), indicates that depuration (clearing of toxin) occurred (Table 1). Differential uptake of the MCYST congeners occurred both between organisms (fish vs. freshwater mussels) and between fish liver vs. fish fillets (Figure 1). Of the tissue types from IG Hatchery, only the liver composite showed a detectable MCYST level with 301 ng/g of MCYST-LA (Table 1; Figure 1). Freshwater mussel composites and individual whole mussels showed elevated concentrations of

MCYST-RR, MCYST-LR MCYST-LR-DM, and MCYST-LA, with MCYST-LR and –LA being the most dominant congeners (Figure 1). Yellow perch fillets were dominated by the demethylated version of MCYST-LR (MCYST-LR-DM) with MCYST-YR also detected (Figure 1). In contrast, yellow perch livers showed concentrations of both demethylated –LR and –RR, as well as MCYST-LA (Figure 1). Such differential organ/tissue distribution among MCYST congeners has been shown in other studies (Xie et al. 2005; Dietrich et al. 2007) and is likely due to a combination of differential degradation and transport of congeners (Xie et al. 2004).

Analysis with Respect to Public Health Guideline Values

Although the MCYST concentrations in fish livers from both IG Hatchery and yellow perch from Copco and IG reservoirs (Figure 1) may have negative sublethal effects on survival, growth, and population development of those fish (e.g., Ibelings and Havens 2007), because the livers are generally removed prior to human consumption, this section will focus only on perch fillets from the reservoirs and mussels from the Klamath River which are generally eaten whole. Thus, although the main site of MCYST accumulation in mussels may be the hepatopancreas (e.g., Chen and Xie 2005), measured concentrations in Table 1 reflect exposure expected from ingestion of whole mussels.

The following comparison of Klamath River microcystin tissue concentrations to public health guideline values is based on a recent comprehensive review of cyanobacterial toxin accumulation by Ibelings and Chorus (2007). Table 2 from Ibelings and Chorus (2007) entitled “*Tolerable doses to microcystin-LR in relation to frequency and duration of exposure*” is reproduced here:

Temporal pattern of exposure and ensuing Tolerable Intake (TI)	Assumptions	Tolerable Intake per kg	Tolerable Intake for a 10 kg child	Tolerable Intake for a 75 kg adult	Guideline value for food ($\mu\text{g kg}^{-1}$)	
					AF = 1	AF = 0.2
Acute TI	NOAEL ¹ of 250 $\mu\text{g/kg}$ and day, extrapolation factors of 100	2.5 $\mu\text{g per kg}$ and single exposure	25 $\mu\text{g per single exposure}$	190 $\mu\text{g per single exposure}$	Adult: 1900, Child: 250	Adult: 380, Child: 50
Seasonal TDI	NOAEL of 0.4 $\mu\text{g/kg}$ and day, extrapolation factors of 100 (Chorus and Bartram, 1999, adapted)	0.4 $\mu\text{g per kg}$ and day	4 $\mu\text{g per day}$	30 $\mu\text{g per day}$	Adult: 300, Child: 40	Adult: 60, Child: 8
Lifetime TDI	NOAEL of 0.4 $\mu\text{g/kg}$ and day, extrapolation factors of 100 and uncertainty factor of 10 (Chorus and Bartram, 1999)	0.04 $\mu\text{g per kg}$ and day	0.4 $\mu\text{g per day}$	3 $\mu\text{g per day}$	Adult: 30, Child: 4.0 ²	Adult: 6, Child: 0.8 ²

Tolerable doses in seafood related to the frequency and duration of the exposure. A distinction is made between intake by small children and adults, and a further distinction between an Allocation Factor (AF) of 1 (toxins present in food only) and – following the derivation of the provisional WHO GV for Drinking-water – an AF of 0.2 (80% of the dose is taken in—mainly—via drinking water, only 20% via food). For calculating guideline values, following eq. (2) in Section 3 a consumption (C) of 100 g fish (per day) is assumed. Acute TI: single exposure event (e.g. week-end fishing trip). Seasonal TDI: ongoing, “daily” exposure for several weeks during the cyanobacterial season. Lifetime TDI: ongoing “daily” exposure for many months in settings where microcystin-producing cyanobacteria proliferate perennially. ¹NOAEL= no observed adverse effect level. ²Original values in Ibelings and Chorus contained a typo and were listed incorrectly as 0.4 and 0.08 $\mu\text{g/kg}$; correct values are as shown above.

Although at least 80 different MCYST congeners are known to date, risk assessment determinations such as those in the above table are based largely on MCYST-LR (Dietrich et al. 2007; Ibelings and Chorus 2007), and as noted by Ibelings and Havens (2007) more research is needed on toxic effects of MCYST congeners other than MCYST-LR. However, as reviewed in Sivonen and Jones (1999), most of the known congeners are highly toxic within a comparatively narrow range, and as Dietrich et al. (2007) note, current risk extrapolation from rodents as well as synergistic or antagonistic effects of the various MCYST congeners may cause underestimation of overall potential risk to humans.

Höger (2003) provides an LD₅₀ range of 50-300 µg/kg (i.p. mouse) for a demethylated -LR variant (D-Asp3) and both Höger (2003) and Sivonen and Jones (1999) show that both MCYST-LR and MCYST-LA have LD₅₀'s of 50 µg/kg. Other MCYST congeners detected in tissue of Klamath River organisms have been shown to have higher LD₅₀ values than does MCYST-LR (meaning they are less toxic). For example, MCYST-RR has an LD₅₀ of 600 µg/kg, while a demethylated-RR variant had an LD₅₀ of 250 µg/kg (Sivonen and Jones 1999), and are therefore not directly comparable to guideline values in Table 2 from Ibelings and Chorus (2007). It should be noted however, that MCYST-YR was present in 41% of yellow perch fillets at values exceeding 2 ng/g (Figure 1) and that the LD₅₀ of 70 µg/kg for MCYST-YR is only slightly higher than the MCYST-LR LD₅₀ of 50 µg/kg (Sivonen and Jones 1999).

Variability in MCYST congener toxicity notwithstanding, evaluation of the three variants (-LR, LR-DM, and -LA) that have similar LD₅₀ values (using the lower range for demethylated -LR) provides for the best comparison to the guideline values derived by Ibelings and Chorus (2007) that are based on toxicity work for MCYST-LR. It should be noted that this approach likely underestimates toxicity due to the exclusion of several of the congeners. Although a more conservative approach with respect to public health would be to use the sum of all MCYST congeners, for the comparison below individual concentrations as well as the sum of MCYST-LR, LR-DM, and -LA were evaluated.

For the following comparisons to Ibelings and Chorus (2007) it is assumed that the only exposure is through ingestion; therefore guideline values were evaluated for Allocation Factor=1 (see reproduced Table 2 above for AF description as well as assumptions regarding frequency and quantity of tissue consumed). Concentration of the three MCYST congeners in freshwater mussels collected in July shows that MCYST-LR and MCYST-LA levels exceeded all three guideline TDI levels for children (Lifetime, Seasonal, and Acute), and that the concentration of MCYST-LR-DM often exceeded the Lifetime TDI guideline level (Figure 2). For yellow perch fillets, only MCYST-LR-DM exceeded the various TDI values, with a majority of samples exceeding the Seasonal TDI (Figure 2). The sum of MCYST-LR, LR-DM, and -LA in mussels exceeded the Lifetime TDI guideline for children by 8 to 663x, the Seasonal TDI by 0.8 to 66x, and the Acute TDI by 0.1 to 10.6x (including a sample at Big Bar approximately 140 miles downstream of Iron Gate Dam that was over 2x the acute TDI threshold; Figure 3a; Table 2). For yellow perch filets, 66% of the samples were greater than 10x (up to 100x) the Lifetime TDI and 1-10x greater than the seasonal TDI, with several samples exceeding the Acute TDI (Figure 3a; Table 2). In addition, numerous exceedances of the adult Lifetime TDI were also observed for both mussels and yellow perch fillets, as well as several exceedances of both Seasonal and Acute TDI levels (Figure 3b; Table 2).

Summary

Tissue concentration results for various MCYST congeners showed some level of bioaccumulation in the majority (85%) of samples tested in July and September. Differential uptake of the MCYST congeners occurred both between organisms (fish vs. freshwater mussels) and between fish liver vs. fish fillets (fish muscle tissue). Evaluation of bioaccumulation in yellow perch fillets and freshwater mussels with respect to public health guidelines indicates that all TDI guideline levels as defined by Ibelings and Chorus (2007) were exceeded to varying degrees in tested Klamath River organisms, including several observations of values exceeding Acute TDI thresholds. Current public health advisories for toxic cyanobacteria in the Klamath River system are primarily for recreational contact and do not warn against ingestion of fish or freshwater mussels. In light of these bioaccumulation data, public health advisories should include warnings for ingestion of fish and freshwater mussels.

Literature Cited

- Dietrich, D., A. Fischer, C. Michel, and S.J. Hoeger. 2007. Toxin mixture in cyanobacterial blooms – a critical comparison of reality with current procedures employed in human health risk assessment. Chapter 39 in: H Kenneth Hudnell (ed.): *Proceedings of the Interagency, International Symposium on Cyanobacterial Harmful Algal Blooms* Advances in Experimental Medicine & Biology: 885-912.
- Fetcho, K. 2006. Klamath River Blue-Green Algae Bloom Report. Yurok Tribe Environmental Program, January 2006. <http://www.yuroktribe.org/departments/ytep/Water.htm>
- Höger S.J. 2003. Problems during drinking water treatment of cyanobacterial loaded surface waters: consequences for human health. Doctoral Thesis Constance: Universität Konstanz.
- Ibelings, B.W., and I. Chorus. 2007. Accumulation of cyanobacterial toxins in freshwater “seafood” and its consequences for public health: A review. *Environ. Pollut.* 150: 177-192.
- Ibelings, B.W, and K.H. Havens. 2007. Cyanobacterial toxins: a qualitative meta-analysis of concentrations, dosage and effects in freshwater, estuarine and marine biota. Chapter 32 in: H Kenneth Hudnell (ed.): *Proceedings of the Interagency, International Symposium on Cyanobacterial Harmful Algal Blooms* Advances in Experimental Medicine & Biology: 685-744.
- Kann, J. 2007. Toxic cyanobacteria results for Copco/Iron gate Reservoirs: October 29-30, 2007. Technical Memorandum Prepared for the Karuk Tribe of California, November, 2007.
- Kann, J. and S. Corum. 2006. Summary of 2005 Toxic *Microcystin aeruginosa* Trends in Copco and Iron Gate Reservoirs on the Klamath River, CA Technical Memorandum Prepared for the Karuk Tribe of California, March, 2006.
- Kann, J. and S. Corum. 2007. Summary of 2006 Toxic *Microcystin aeruginosa* Trends in Copco and Iron Gate Reservoirs, CA Technical Memorandum Prepared for the Karuk Tribe of California, June, 2007.
- Sivonen K, G. Jones. 1999 Cyanobacterial Toxins. In *Toxic Cyanobacteria in Water: A Guide to Their Public Health Consequences, Monitoring and Management*, eds. Chorus, I, and Bartram, J, London: E & FN Spon. 41–111.
- Xie L.Q., P. Xie P, L.G. Guo, L. Li, and Y. Miyabara. 2005. Organ distribution and bioaccumulation of microcystins in freshwater fish at different trophic levels from the eutrophic Lake Chaohu, China. *Environ Toxicol* 20(3): 293–300
- Xie L.Q, P. Xie, K. Ozawa, T. Honma, and A. Yokoyama . 2004. Dynamics of microcystins–LR and –RR in the phytoplanktivorous silver carp in a sub–chronic toxicity experiment. *Environ Pollut* 127(3): 431–439

Table 1. Concentration of microcystin (MCYST) congeners in fish (liver and fillets) and whole freshwater mussel samples from the Klamath River in 2007.

Lab Sample-Id	Location	Date Collected	Organism	Type	MCYST-RR (ng/g)	MCYST-RR-DM (ng/g)	MCYST-LR (ng/g)	MCYST-LR-DM (ng/g)	MCYST-YR (ng/g)	MCYST-LA (ng/g)	MCYST-LW (ng/g)	MCYST-LF (ng/g)	TOTAL-MCYST (ng/g)
L-463-07-1	IG Hatchery	7/13	fish_liver	composite	ND	ND	ND	ND	ND	301.00	ND	ND	301.00
L-463-07-2	IG Hatchery	7/13	fish_stomach	composite	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-463-07-3	IG Hatchery	7/13	fish_fillet	composite	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-475-07-13	KR	7/20	mussel	composite	ND	ND	ND	ND	ND	57.00	ND	ND	57.00
L-475-07-13Dup	KR	7/20	mussel	composite	ND	ND	ND	ND	ND	32.30	ND	ND	32.30
L-475-07-13Trip	KR	7/20	mussel	composite	ND	ND	ND	ND	ND	34.20	ND	ND	34.20
L-405-07-1	KR near I5	7/11	mussel	individual	136.00	ND	396.00	36.60	ND	2220.00	ND	14.50	2803.10
L-405-07-2	KR near Seiad	7/20	mussel	individual	5.09	ND	90.90	5.55	ND	311.00	ND	ND	412.54
L-405-07-2Dup	KR near Seiad	7/20	mussel	individual	6.17	ND	91.40	5.78	ND	280.00	ND	ND	383.35
L-405-07-3A	KR at Big Bar	7/24	mussel	individual	ND	ND	68.40	6.05	ND	432.00	ND	ND	506.45
L-405-07-3B	KR at Big Bar	7/24	mussel	individual	ND	ND	58.10	5.10	ND	138.00	ND	ND	201.20
L-524-07-1	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-524-07-2	IronGate	9/6	perch-fillet	individual	ND	ND	ND	63.69	ND	ND	ND	ND	63.69
L-524-07-3	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	2.23	ND	ND	ND	2.23
L-524-07-4	IronGate	9/6	perch-fillet	individual	ND	ND	ND	57.03	2.01	ND	ND	ND	59.04
L-524-07-5	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	3.09	ND	ND	ND	3.09
L-524-07-6	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	2.27	ND	ND	ND	2.27
L-524-07-7	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	2.54	ND	ND	ND	2.54
L-524-07-7Dup	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-524-07-8	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	3.01	ND	ND	ND	3.01
L-524-07-9	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	2.02	ND	ND	ND	2.02
L-524-07-10	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	2.68	ND	ND	ND	2.68
L-524-07-11	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	2.18	ND	ND	ND	2.18
L-524-07-12	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-524-07-13	IronGate	9/6	perch-fillet	individual	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-524-07-14	IronGate	9/6	perch-fillet	individual	ND	ND	ND	227.14	2.23	ND	ND	ND	229.37
L-524-07-15	IronGate	9/6	perch-fillet	individual	ND	ND	ND	106.40	ND	ND	ND	ND	106.40
L-524-07-16	IronGate	9/6	perch-fillet	individual	ND	ND	ND	73.01	ND	ND	ND	ND	73.01
L-524-07-17	IronGate	9/6	perch-fillet	individual	ND	ND	ND	79.79	2.24	ND	ND	ND	82.03
L-524-07-18	IronGate	9/6	perch-fillet	individual	ND	ND	ND	153.10	4.23	ND	ND	ND	157.33

Lab Sample-Id	Location	Date Collected	Organism	Type	MCYST-RR (ng/g)	MCYST-RR-DM (ng/g)	MCYST-LR (ng/g)	MCYST-LR-DM (ng/g)	MCYST-YR (ng/g)	MCYST-LA (ng/g)	MCYST-LW (ng/g)	MCYST-LF (ng/g)	TOTAL-MCYST (ng/g)
L-524-07-19	Copco	9/7	perch-fillet	individual	ND	ND	ND	77.67	ND	ND	ND	ND	77.67
L-524-07-20	Copco	9/7	perch-fillet	individual	ND	ND	ND	95.17	2.17	ND	ND	ND	97.34
L-524-07-21	Copco	9/7	perch-fillet	individual	ND	ND	ND	82.09	ND	ND	ND	ND	82.09
L-524-07-22	Copco	9/7	perch-fillet	individual	ND	ND	ND	58.42	3.16	ND	ND	ND	61.59
L-524-07-23	Copco	9/7	perch-fillet	individual	ND	ND	ND	181.03	2.47	ND	ND	ND	183.49
L-524-07-24	Copco	9/7	perch-fillet	individual	ND	ND	ND	171.03	ND	ND	ND	ND	171.03
L-524-07-25	Copco	9/7	perch-fillet	individual	ND	ND	ND	78.82	2.12	ND	ND	ND	80.94
L-524-07-26	Copco	9/7	perch-fillet	individual	ND	ND	ND	147.28	ND	ND	ND	ND	147.28
L-524-07-27	Copco	9/7	perch-fillet	individual	ND	ND	ND	349.87	ND	ND	ND	ND	349.87
L-524-07-28	Copco	9/7	perch-fillet	individual	ND	ND	ND	404.89	ND	ND	ND	ND	404.89
L-524-07-29	Copco	9/7	perch-fillet	individual	ND	ND	ND	422.13	ND	ND	ND	ND	422.13
L-524-07-30	Copco	9/7	perch-fillet	individual	ND	ND	ND	240.21	ND	ND	ND	ND	240.21
L-524-07-31	Copco	9/7	perch-fillet	individual	ND	ND	ND	181.21	ND	ND	ND	ND	181.21
L-524-07-32	Copco	9/7	perch-fillet	individual	ND	ND	ND	251.05	ND	ND	ND	ND	251.05
L-524-07-33	Copco	9/7	perch-fillet	individual	ND	ND	ND	124.91	ND	ND	ND	ND	124.91
L-524-07-33Dup	Copco	9/7	perch-fillet	individual	ND	ND	ND	140.98	ND	ND	ND	ND	140.98
L-524-07-34	Copco	9/7	perch-fillet	individual	ND	ND	ND	100.98	ND	ND	ND	ND	100.98
L-524-07-35	Copco	9/7	perch-fillet	individual	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-524-07-36	Copco	9/7	perch-fillet	individual	ND	ND	ND	86.30	ND	ND	ND	ND	86.30
L-524-07-37	IronGate	9/7	perch-liver	individual	ND	ND	ND	ND	ND	ND	ND	ND	0.00
L-524-07-38	IronGate	9/7	perch-liver	individual	ND	37.40	ND	ND	ND	12.66	ND	ND	50.06
L-524-07-39	IronGate	9/7	perch-liver	individual	15.69	42.16	ND	ND	ND	12.71	ND	ND	70.57
L-524-07-40	Copco	9/7	perch-liver	individual	ND	25.01	ND	137.95	ND	14.67	ND	ND	177.63
L-524-07-41	Copco	9/7	perch-liver	individual	ND	33.55	ND	426.16	ND	13.68	ND	ND	473.39
L-524-07-42	Copco	9/7	perch-liver	individual	ND	61.64	ND	159.04	ND	7.88	ND	ND	228.55
L-665-07-01	KR at China Flat	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-02	KR at China Flat	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-03	KR at China Flat	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-04	KR at Br. Bear	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-05	KR at Br. Bear	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND

Lab Sample-Id	Location	Date Collected	Organism	Type	MCYST-RR (ng/g)	MCYST-RR-DM (ng/g)	MCYST-LR (ng/g)	MCYST-LR-DM (ng/g)	MCYST-YR (ng/g)	MCYST-LA (ng/g)	MCYST-LW (ng/g)	MCYST-LF (ng/g)	TOTAL-MCYST (ng/g)
L-665-07-06	KR at Br. Bear	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-07	KR at Seiad V.	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-08	KR at Seiad V.	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-09	KR at Seiad V.	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-10	KR at Below I5	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-11	KR at Below I5	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-11Dup	KR at Below I5	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-12	KR at Below I5	11/5	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-13	KR at Orleans	11/6	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-14	KR at Orleans	11/6	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-665-07-15	KR at Orleans	11/6	mussel	individual	ND	ND	ND	ND	ND	ND	ND	ND	ND

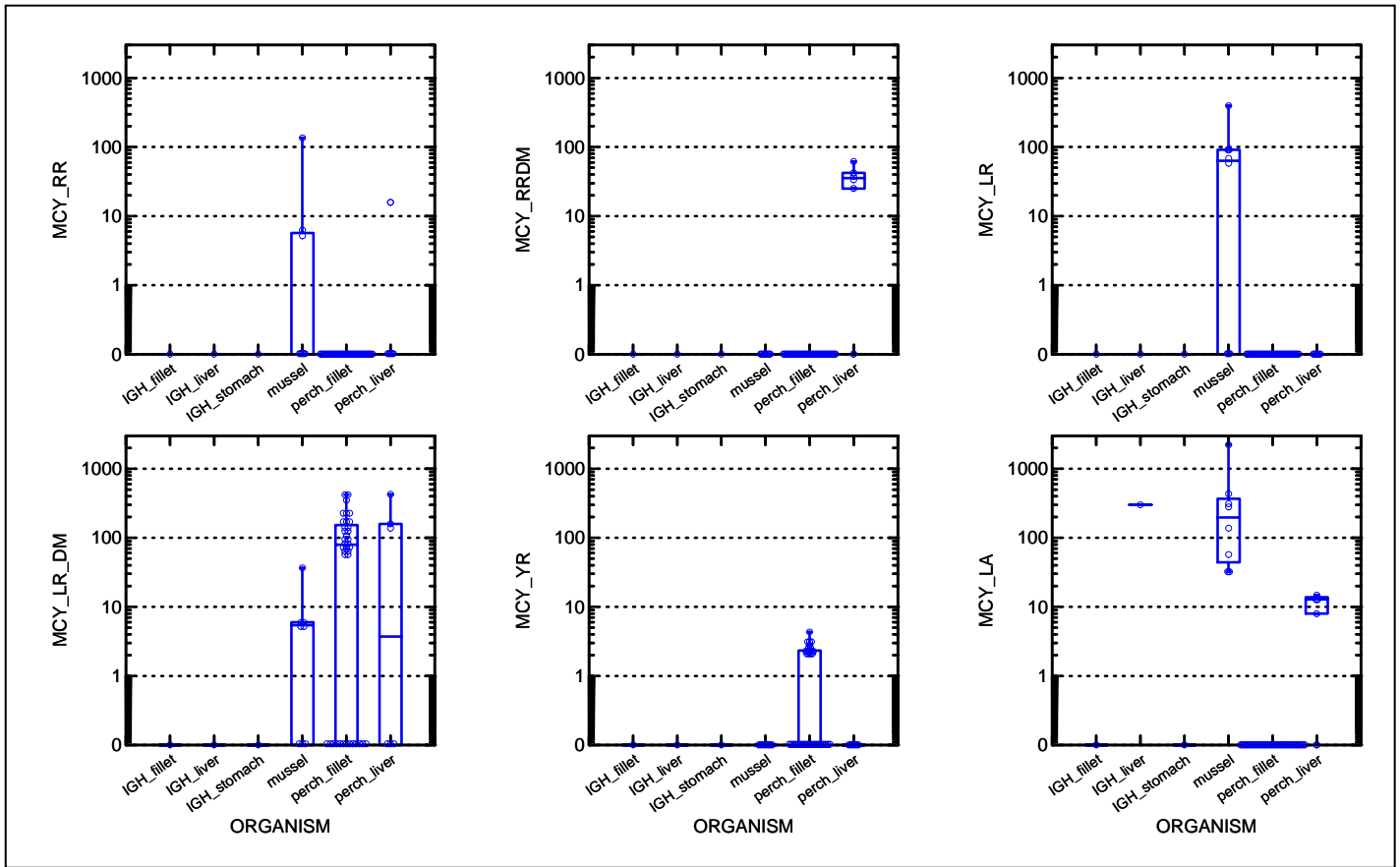


Figure 1. Concentration of microcystin congeners (ng/g or ppb) in fish (liver and fillet) and whole freshwater mussel samples from the Klamath River system in 2007.

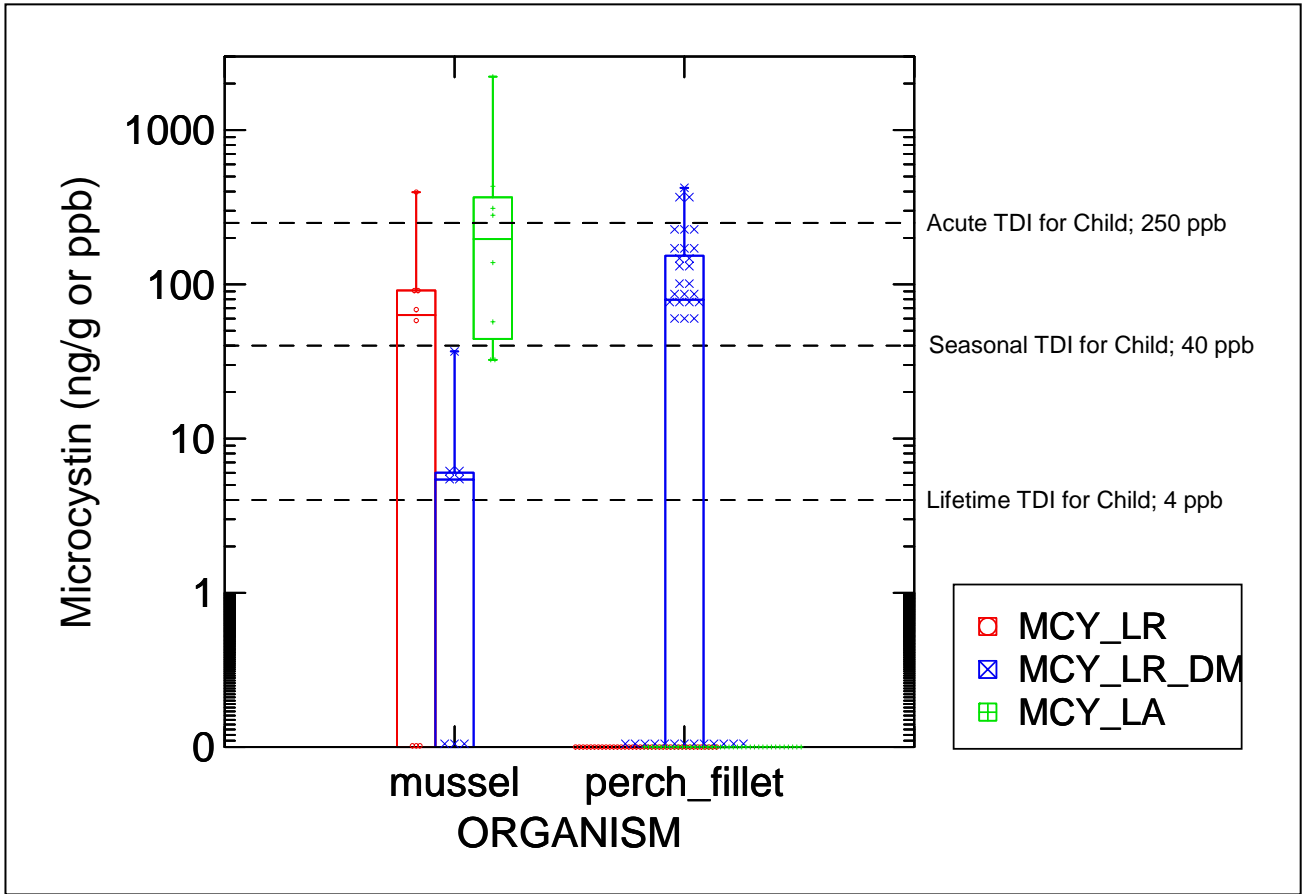


Figure 2. Concentration of microcystin-LR, LR-DM, and LA (ng/g or ppb) in whole freshwater mussels and yellow perch fillets collected from the Klamath River system in 2007. TDI values are as described in Ibelings and Chorus (2007; Table 2 reproduced above).

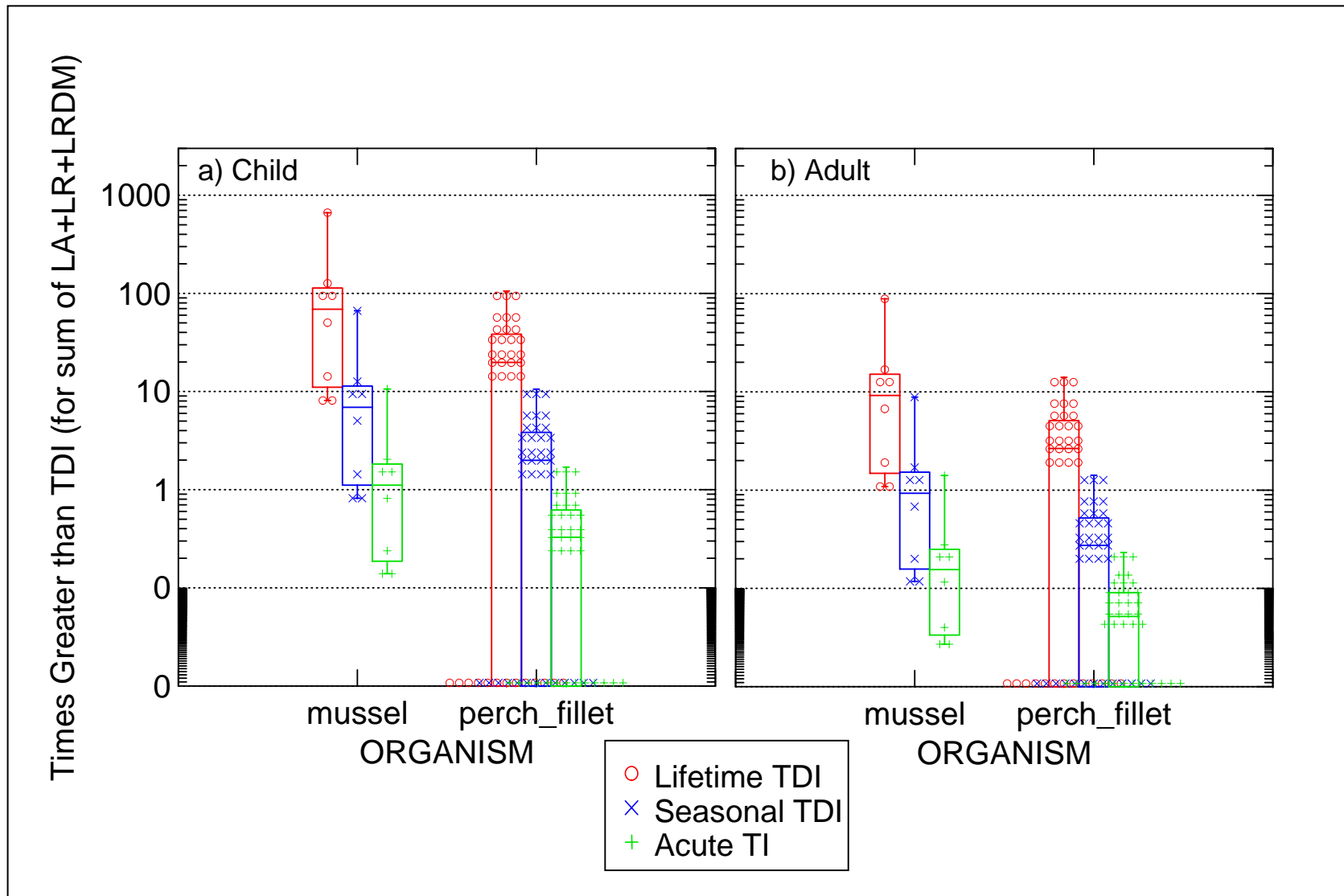


Figure 3. Exceedance of Child (a) and Adult (b) Lifetime, Seasonal, and Acute TDI for the sum of microcystin-LR, LR-DM, and LA in whole freshwater mussels and yellow perch fillets collected from the Klamath River system in 2007. TDI values are as described in Ibelings and Chorus (2007; Table 2 reproduced above).

Sample-Id	Location	Date Collected	Organism	Type	Total MCYST	Total LA+LR+LR_DM	Computed for total of LA+LR+LR_DM					
							x greater than lifetime TDI for child	x greater than seasonal TDI for child	x greater than acute TDI for child	x greater than lifetime TDI for adult	x greater than seasonal TDI for adult	x greater than acute TDI for adult
L-524-07-12	IronGate	9/6/2007	perch fillet	individual	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L-524-07-13	IronGate	9/6/2007	perch fillet	individual	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L-524-07-14	IronGate	9/6/2007	perch fillet	individual	229.37	227.14	56.79	5.68	0.91	7.57	0.76	0.12
L-524-07-15	IronGate	9/6/2007	perch fillet	individual	106.40	106.40	26.60	2.66	0.43	3.55	0.35	0.06
L-524-07-16	IronGate	9/6/2007	perch fillet	individual	73.01	73.01	18.25	1.83	0.29	2.43	0.24	0.04
L-524-07-17	IronGate	9/6/2007	perch fillet	individual	82.03	79.79	19.95	1.99	0.32	2.66	0.27	0.04
L-524-07-18	IronGate	9/6/2007	perch fillet	individual	157.33	153.10	38.27	3.83	0.61	5.10	0.51	0.08
L-524-07-19	Copco	9/7/2007	perch fillet	individual	77.67	77.67	19.42	1.94	0.31	2.59	0.26	0.04
L-524-07-20	Copco	9/7/2007	perch fillet	individual	97.34	95.17	23.79	2.38	0.38	3.17	0.32	0.05
L-524-07-21	Copco	9/7/2007	perch fillet	individual	82.09	82.09	20.52	2.05	0.33	2.74	0.27	0.04
L-524-07-22	Copco	9/7/2007	perch fillet	individual	61.59	58.42	14.61	1.46	0.23	1.95	0.19	0.03
L-524-07-23	Copco	9/7/2007	perch fillet	individual	183.49	181.03	45.26	4.53	0.72	6.03	0.60	0.10
L-524-07-24	Copco	9/7/2007	perch fillet	individual	171.03	171.03	42.76	4.28	0.68	5.70	0.57	0.09
L-524-07-25	Copco	9/7/2007	perch fillet	individual	80.94	78.82	19.70	1.97	0.32	2.63	0.26	0.04
L-524-07-26	Copco	9/7/2007	perch fillet	individual	147.28	147.28	36.82	3.68	0.59	4.91	0.49	0.08
L-524-07-27	Copco	9/7/2007	perch fillet	individual	349.87	349.87	87.47	8.75	1.40	11.66	1.17	0.18
L-524-07-28	Copco	9/7/2007	perch fillet	individual	404.89	404.89	101.22	10.12	1.62	13.50	1.35	0.21
L-524-07-29	Copco	9/7/2007	perch fillet	individual	422.13	422.13	105.53	10.55	1.69	14.07	1.41	0.22
L-524-07-30	Copco	9/7/2007	perch fillet	individual	240.21	240.21	60.05	6.01	0.96	8.01	0.80	0.13
L-524-07-31	Copco	9/7/2007	perch fillet	individual	181.21	181.21	45.30	4.53	0.72	6.04	0.60	0.10
L-524-07-32	Copco	9/7/2007	perch fillet	individual	251.05	251.05	62.76	6.28	1.00	8.37	0.84	0.13
L-524-07-33	Copco	9/7/2007	perch fillet	individual	124.91	124.91	31.23	3.12	0.50	4.16	0.42	0.07
L-524-07-33Dup	Copco	9/7/2007	perch fillet	individual	140.98	140.98	35.24	3.52	0.56	4.70	0.47	0.07
L-524-07-34	Copco	9/7/2007	perch fillet	individual	100.98	100.98	25.24	2.52	0.40	3.37	0.34	0.05
L-524-07-35	Copco	9/7/2007	perch fillet	individual	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L-524-07-36	Copco	9/7/2007	perch fillet	individual	86.30	86.30	21.57	2.16	0.35	2.88	0.29	0.05

Appendix I: CDFG Fish and Wildlife Water Pollution Control Laboratory Microcystin Results



**DEPARTMENT OF FISH AND GAME
FISH AND WILDLIFE
WATER POLLUTION CONTROL LABORATORY**

STATE WATER RESOURCES
CONTROL BOARD

2005 NIMBUS ROAD
RANCHO CORDOVA, CA 95670
PHONE (916) 358-2858 ATSS 8-434-2858 FAX (916) 985-4301

2007 AUG 30 PM 12:00

SACRAMENTO

LABORATORY REPORT

Name:	Russ J. Kanz	Lab Number:	L-463-07
Agency:	State Water Resource Control Board	Other Number:	
Address:	P. O. Box 2000	Date Sampled:	8/13/07
City:	Sacramento, CA 95812-2000	Date Received:	8/14/07
		Date Completed:	8/21/07
		Index-PCA Code:	


RE: Microcystin analysis in tissue

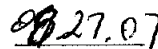
RESULTS OF CHEMICAL ANALYSIS:

Three fish sample composites (liver, stomach and fillet) from the Irongate Hatchery were extracted and analyzed by LC/MS/MS for microcystins. See attached sheets for results.

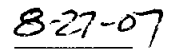
NA	Not Applicable
ND	Not Detected
MDL	Method Detection Limit
RL	Reporting Limit
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate

Cost: To be invoiced per contract.


Lead Pesticide Chemist


Date 8-27-07


Laboratory Director


Date 8-27-07



DFG REQUEST FOR ANALYSIS AND CHAIN OF CUSTODY RECORD

Sampler: Iron Gate Hatchery
 Address: 8638 Lakeview Rd.
 City: 96044
 State: CA
 Zip: 96044
 Date Required/Reason: Horn Brook CA Ct.

Send Results To: Ross SWRCB
 Address: Iron Gate Hatchery
 City: CA
 Zip:

Lab Number: L463.07
 Field Number:

Shipped Via: FedEx
 Region:

Fish & Wildlife Loss Date: Region:

DFG Code Violation:

Suspected or Potential Problem

Routine Analysis

Analysis Requested >>>

Sample Identification/Location <small>(Draw map on separate sheet if necessary)</small>	Collection		Petroleum Fingerprint	Trace Elements <small>(Specify Below)</small>	Pesticides <small>(Specify Below)</small>	For C	pH:	DO:	mg/L Conductivity:	umhos/cm
	Date	Time								
L-3 → 6 Fish composite for microanalysis	8/13/07	-			liver ✓	stomach ✓	fillet ✓			
L-9 → 6 Fish to be analyzed individually										
L-43-07-1 liver										
2 stomach										
3 tissue										

Problem Description:

Suspect/Incident Location:

Comments/Special Instructions: Microanalysis Analysis

Samples Relinquished By (Signature):
 Print Name: Hada Mokeba
 Date: 8/14/07

Received By (Signature):
 Print Name: Hada Mokeba
 Date: 8/14/07

Pollution Action Kit: Yes No
 Glove Size: Large Medium
 Hazmat Shipper Requested: Yes No

Water Pollution Control Lab
 2005 Nimbus Road
 Rancho Cordova, CA 95670
 (916) 358-2858

Petroleum Chemistry Lab
 1995 Nimbus Road
 Rancho Cordova, CA 95670
 (916) 358-2803

Pesticide Investigations Lab
 1701 Nimbus Road
 Rancho Cordova, CA 95670
 (916) 358-2950

RK



DEPARTMENT OF FISH AND GAME
FISH AND WILDLIFE
WATER POLLUTION CONTROL LABORATORY

STATE WATER RESOURCES
CONTROL BOARD

2005 NIMBUS ROAD
RANCHO CORDOVA, CA 95670
PHONE (916) 358-2858 ATSS 8-434-2858 FAX (916) 985-4301

2007 AUG 30 PM 12:00

STATE WATER RIGHTS

LABORATORY REPORT

Name: Russ J. Kanz
Agency: State Water Resource Control Board
Address: P. O. Box 2000
City: Sacramento, CA 95812-2000

Lab Number: L-475-07
Other Number:
Date Sampled: 7/20/07
Date Received: 8/20/07
Date Completed: 8/22/07
Index-PCA Code:

RE: Microcystin analysis in mussels

RESULTS OF CHEMICAL ANALYSIS:

One mussel composite sample from the Copco Reservoir was extracted and analyzed by LC/MS/MS for microcystins. See attached sheets for results.

- NA Not Applicable
- ND Not Detected
- MDL Method Detection Limit
- RL Reporting Limit
- LCS Laboratory Control Spike
- LCSD Laboratory Control Spike Duplicate

Cost: To be invoiced per contract.

358-C317

Abdu Mule
Lead Pesticide Chemist

08-27-07
Date

DB
Laboratory Director

8-27-07
Date

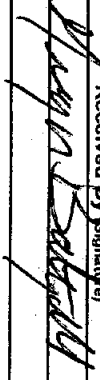
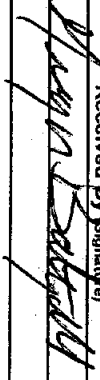
Mekebrif

SWRCB L-475-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-475-07-13 mussels	L-475-07-13Dup mussels	L-475-07-13TriP mussels	L-405-07-Blank WPCL Oyster
Sample Identification			20/Jul/2007	20/Jul/2007	20/Jul/2007	
Date Collected						
Time Collected			20/Aug/2007	20/Aug/2007	20/Aug/2007	
Date Received			20/Aug/2007	20/Aug/2007	20/Aug/2007	07/Aug/2007
Date Extracted			21/Aug/2007	21/Aug/2007	21/Aug/2007	08/Aug/2007
Date Analyzed						
	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.
Microcystin Analytes	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)
MCY-RR	0.500	1.00	ND	ND	ND	ND
MCY-Demethyl-RR*	0.500	1.00	ND	ND	ND	ND
MCY-LR	0.500	1.00	ND	ND	ND	ND
MCY-Demethyl-LR*	0.500	1.00	ND	ND	ND	ND
MCY-YR	0.500	1.00	ND	ND	ND	ND
MCY-LA	0.500	1.00	57.0	32.3	34.2	ND
MCY-LW	0.500	1.00	ND	ND	ND	ND
MCY-LF	0.500	1.00	ND	ND	ND	ND
* Demethyl analog quantified as parent compound.						
QA/QC Samples						



DFG REQUEST FOR ANALYSIS AND CHAIN OF CUSTODY RECORD

Sampler COPCO RESERVOIR	Ph #	Send Results To SWPCB	Lab Number L-475-07
Address	Address	Field Number	
City	City	Lab Storage	
State CA	State CA	Spill Title	
Date Required/Reason	Address	Suspect	
Shipped Via	City	Index-PCA	
<input type="checkbox"/> Fish & Wildlife Loss Date: _____ Region: _____ <input type="checkbox"/> DFG Code Violation: _____ <input type="checkbox"/> Suspected or Potential Problem <input type="checkbox"/> Routine Analysis	Analysis Requested >>> Sample Identification/Location (Draw map on separate sheet if necessary) -12 Yellow Perch 13 MUSSELS	Water Temp: Trace Elements (Specify Below) Pesticides (Specify Below)	F or C pH: DO: mg/L Conductivity: umhos/cm
	Collection Date 7-20-07	Petroleum Fingerprint Trace Elements (Specify Below) Pesticides (Specify Below)	Sample Type Water Filtered Water Soil Tissue Plastic Glass VOA Vial Temp Acid
Problem Description Suspect/Incident Location Comments/Special Instructions	Pollution Action Kit: Yes <input type="checkbox"/> No <input type="checkbox"/> Glove Size: Large <input type="checkbox"/> Medium <input type="checkbox"/> Hazmat Shipper Requested: Yes <input type="checkbox"/> No <input type="checkbox"/>		
Samples Relinquished By (Signature) 	Print Name GREGOR BARTZEL	Received By (Signature) 	Date 8-20-07

LAB COPIES: WHITE, CANARY, PINK SUBMITTER: GOLDENROD FG 1000 (Rev. 9/01)

Water Pollution Control Lab 2005 Nimbus Road Rancho Cordova, CA 95670 (916) 358-2858

Petroleum Chemistry Lab 1995 Nimbus Road Rancho Cordova, CA 95670 (916) 358-2803

Pesticide Investigations Lab 1701 Nimbus Road Rancho Cordova, CA 95670 (916) 358-2950



**DEPARTMENT OF FISH AND GAME
FISH AND WILDLIFE
WATER POLLUTION CONTROL LABORATORY**

2005 NIMBUS ROAD
RANCHO CORDOVA, CA 95670
PHONE (916) 358-2858 ATSS 8-434-2858 FAX (916) 985-4301

STATE WATER RESOURCE CONTROL BOARD

2007 AUG 30 PM 12:00

SACRAMENTO

LABORATORY REPORT

Name:	Russ J. Kanz	Lab Number:	L-405-07
Agency:	State Water Resource Control Board	Other Number:	
Address:	P. O. Box 2000	Date Sampled:	7/11, 20, 24/07
City:	Sacramento, CA 95812-2000	Date Received:	7/25/07
		Date Completed:	8/20/07
		Index-PCA Code:	

RE: Microcystin analysis in tissue


RESULTS OF CHEMICAL ANALYSIS:

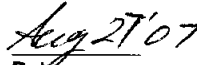
Four tissue samples from the Klamath River were extracted and analyzed by LC/MS/MS for microcystins. See attached sheets for results.

- NA Not Applicable
- ND Not Detected
- MDL Method Detection Limit
- RL Reporting Limit
- LCS Laboratory Control Spike
- LCSD Laboratory Control Spike Duplicate

Cost: To be invoiced per contract.

CC: Susan Corum
P. O. Box 282
Orleans, CA 95556

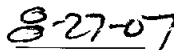

Project Chemist


Date


Lead Pesticide Chemist


Date


Laboratory Director


Date

SWRCB L-405-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-405-07-1	L-405-07-2	L-405-07-2Dup	L-405-07-3A	L-405-07-3B
Sample Identification			Gonedia angulata Kiamath R. near IS	G. angulata Kiamath River near Selad Valley	G. angulata Kiamath River near Selad Valley	G. angulata Kiamath River at Big Bar River access	Different Species Kiamath River at Big Bar River access
Location							
Date Collected			11/Jul/2007	20/Jul/2007	20/Jul/2007	24/Jul/2007	24/Jul/2007
Time Collected			PM	PM	PM	AM	AM
Date Received			25/Jul/2007	25/Jul/2007	25/Jul/2007	25/Jul/2007	25/Jul/2007
Date Extracted			07/Aug/2007	07/Aug/2007	07/Aug/2007	07/Aug/2007	07/Aug/2007
Date Analyzed			08/Aug/2007	08/Aug/2007	08/Aug/2007	08/Aug/2007	08/Aug/2007
	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.	Fresh Wt.
Microcystin Analytes	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)
MCY-RR	0.500	1.00	136	5.09	6.17	ND	ND
MCY-Demethyl-RR*	0.500	1.00	ND	ND	ND	ND	ND
MCY-LR	0.500	1.00	396	90.9	91.4	68.4	58.1
MCY-Demethyl-LR*	0.500	1.00	36.6	5.55	5.78	6.05	5.10
MCY-YR	0.500	1.00	ND	ND	ND	ND	ND
MCY-LA	0.500	1.00	2,220	311	280	432	138
MCY-LW	0.500	1.00	ND	ND	ND	ND	ND
MCY-LF	0.500	1.00	14.5	ND	ND	ND	ND
* Demethyl analog quantified as parent compound.							

SWRCB L-405-07

WPCL Lab#	Estimated MDL	Reporting Limit	QA/QC Samples					
Sample Identification			L-405-07-Blank WPCL Oyster	Spike Level	L-405-07-LCS WPCL Oyster	L-405-07-LCS WPCL Oyster	L-405-07-LCSD WPCL Oyster	L-405-07-LCSD WPCL Oyster
Location								
Date Collected								
Time Collected								
Date Received								
Date Analyzed								
	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Expected value ppb (ng/g)	Amount Recovered ppb (ng/g)	% Recovery	Amount Recovered ppb (ng/g)	% Recovery
Microcystin Analytes								
MCY-RR	0.500	1.00	ND	25.0	26.5	106	25.8	103
MCY-Demethyl-RR*	0.500	1.00	ND	NA	NA	NA	NA	NA
MCY-LR	0.500	1.00	ND	25.0	19.8	79.1	18.7	74.8
MCY-Demethyl-LR*	0.500	1.00	ND	NA	NA	NA	NA	NA
MCY-YR	0.500	1.00	ND	25.0	20.0	80.1	19.8	79.0
MCY-LA	0.500	1.00	ND	25.0	25.5	102	25.3	101
MCY-LW	0.500	1.00	ND	25.0	29.5	118	29.0	116
MCY-LF	0.500	1.00	ND	25.0	30.0	120	29.5	118

* Demethyl analog quantified as parent compound.



DFG REQUEST FOR ANALYSIS AND CHAIN OF CUSTODY RECORD

Sampler **KARI NORGAARD** Ph # **509 540 9351**

Send Results To **Russ J. Kranz State Water Resources Control Board**

Lab Number

L-405-07

Address **511 Bryant Ave Whitman College**

Address **PO Box 2000**

City

Sacramento CA Zip 95812-2000

Field Number

TSMR1 Freezer

City **Walla Walla WA Zip 99362**

City **Sacramento CA**

Zip **95556**

Lab Storage

Suspect

Date Required/Reason **When possible 2007**

Address **PO Box 282**

City

Orleans CA Zip 95556

Index-PCA

Region: _____

Water Temp: _____

F or C

pH: _____

DO: _____

mgl Conductivity: _____

u/mhos/cm

Suspected or Potential Problem
 Routine Analysis

Analysis Requested >>>

Sample Identification/Location
(Draw map on separate sheet if necessary)

Collection Date Time

Petroleum Fingerprint Trace Elements (Specify Below) Pesticides (Specify Below)

Mycrocytin

Sample Type Water Filtered Water

Soil Tissue

Number of Containers Plastic Glass VOA Vial

Preservation Temp Acid

- ① **Gonedia angulata Klamath R. 7-11-07 PM**
- ② **G. angulata Klamath River near 7-20-07 PM**
- ③ **G. angulata Klamath River at 7-24-07 AM**
- ④ **Different Species - Same location AS # 3 7-24-07 AM**

Problem Description

Suspect/Incident Location

Comments/Special Instructions

Pollution Action Kit: Yes No
Glove Size: Large Medium
Hazard Shipper Requested: Yes No

Samples Relinquished By (Signature)

Print Name

Date

Received By (Signature)

Print Name

Date

Kari Norgaard

KARI NORGAARD

7-24-07

Marcia Martin

MARCIA MARTIN

7-25-07



LK

**DEPARTMENT OF FISH AND GAME
FISH AND WILDLIFE
WATER POLLUTION CONTROL LABORATORY**

2005 NIMBUS ROAD
RANCHO CORDOVA, CA 95670
PHONE (916) 358-2858 ATSS 8-434-2858 FAX (916) 985-4301

LABORATORY REPORT

Name:	Russ J. Kanz	Lab Number:	L-524-07
Agency:	State Water Resource Control Board	Other Number:	
Address:	P. O. Box 2000	Date Sampled:	09/06-07/07
City:	Sacramento, CA 95812-2000	Date Received:	09/11/07
		Date Completed:	11/14/07
		Index-PCA Code:	

RE: Microcystin analysis

RESULTS OF CHEMICAL ANALYSIS:

Forty-two tissue samples from the Copco and Irongate Reservoirs was extracted and analyzed by LC/MS/MS for microcystins. See attached sheets for results.

NA	Not Applicable
ND	Not Detected
MDL	Method Detection Limit
RL	Reporting Limit
MBik	Method Blank
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate
MS	Matrix Spike
MSD	Matrix Spike Duplicate

09/11/07 12:48
 09/11/07 12:48
 09/11/07 12:48

Cost: To be invoiced per contract.

[Signature]
Project Chemist

Nov-15-07
Date

[Signature] 11.15.07
Lead Pesticide Chemist Date

[Signature]
Laboratory Director

11-15-07
Date

Klamath
L-524-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-1	L-524-07-2	L-524-07-3	L-524-07-4	L-524-07-5
Sample Identification			IG-1	IG-2	IG-3	IG-4	IG-5
Date Collected			09/06-07/07 all day	09/06-07/07 all day	09/06-07/07 all day	09/06-07/07 all day	09/06-07/07 all day
Time Collected			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Received			08/Oct/2007	08/Oct/2007	08/Oct/2007	08/Oct/2007	08/Oct/2007
Date Extracted			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Date Analyzed			Tissue	Tissue	Tissue	Tissue	Tissue
Matrix							
Microcystin Analytes	ppb	ppb	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)
MCY-RR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-LR	2.00	5.00	ND	63.7	ND	57.0	ND
MCY-Demethyl-LR*	2.00	5.00	ND	ND	2.23	2.01	3.09
MCY-YR	2.00	5.00	ND	ND	ND	ND	ND
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND

* Demethyl analog quantified as parent compound.

Klamath
L-524-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-6	L-524-07-7	L-524-07-7Dup	L-524-07-8	L-524-07-9
Sample Identification			IG-6	IG-7	IG-7	IG-8	IG-9
Date Collected			09/06-07/07	09/06-07/07	09/06-07/07	09/06-07/07	09/06-07/07
Time Collected			all day	all day	all day	all day	all day
Date Received			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Extracted			08/Oct/2007	08/Oct/2007	08/Oct/2007	08/Oct/2007	08/Oct/2007
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Tissue	Tissue	Tissue	Tissue	Tissue
Microcystin Analytes	ppb	ppb	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)
MCY-RR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-YR	2.00	5.00	2.27	2.54	ND	3.01	2.02
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND
* Demethyl analog quantified as parent compound.							

Klamath
L-524-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-10	L-524-07-11	L-524-07-12	L-524-07-13	L-524-07-14
Sample Identification			IG-10	IG-11	IG-12	IG-13	IG-14
Date Collected			09/06-07/07 all day	09/06-07/07 all day	09/06-07/07 all day	09/06-07/07 all day	09/06-07/07 all day
Time Collected							
Date Received			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Extracted			08/Oct/2007	08/Oct/2007	08/Oct/2007	08/Oct/2007	08/Oct/2007
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Tissue	Tissue	Tissue	Tissue	Tissue
Microcystin Analytes	ppb	ppb	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)
MCY-RR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	ND	ND	ND	ND	227
MCY-YR	2.00	5.00	2.68	2.18	ND	ND	2.23
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND
* Demethyl analog quantified as parent compound.							

Klamath
L-524-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-15	L-524-07-16	L-524-07-17	L-524-07-18	L-524-07-19
Sample Identification			IG-15	IG-16	IG-17	IG-18	CP-1
Date Collected			09/06-07/07	09/06-07/07	09/06-07/07	09/06-07/07	09/07-08/07
Time Collected			all day	all day	all day	all day	all day
Date Received			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Extracted			08/Oct/2007	08/Oct/2007	08/Oct/2007	08/Oct/2007	09/Oct/2007
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Tissue	Tissue	Tissue	Tissue	Tissue
Microcystin Analytes	ppb	ppb	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)
MCY-RR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	106	73.0	79.8	153	77.7
MCY-YR	2.00	5.00	ND	ND	2.24	4.23	ND
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND
* Demethyl analog quantified as parent compound.							

Klamath
L-524-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-20	L-524-07-21	L-524-07-22	L-524-07-23	L-524-07-24
Sample Identification			CP-2	CP-3	CP-4	CP-5	CP-6
Date Collected			09/07-08/07	09/07-08/07	09/07-08/07	09/07-08/07	09/07-08/07
Time Collected			all day	all day	all day	all day	all day
Date Received			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Extracted			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Tissue	Tissue	Tissue	Tissue	Tissue
Microcystin Analytes	ppb	ppb	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)
MCY-RR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	95.2	82.1	58.4	181	171
MCY-YR	2.00	5.00	2.17	ND	3.16	2.47	ND
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND
* Demethyl analog quantified as parent compound.							

Klamath
L-524-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-25	L-524-07-26	L-524-07-27	L-524-07-28	L-524-07-29
Sample Identification			CP-7	CP-8	CP-9	CP-10	CP-11
Date Collected			09/07-08/07	09/07-08/07	09/07-08/07	09/07-08/07	09/07-08/07
Time Collected			all day	all day	all day	all day	all day
Date Received			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Extracted			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Tissue	Tissue	Tissue	Tissue	Tissue
Microcystin Analytes	ppb	ppb	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)
MCY-RR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	78.8	147	350	405	422
MCY-YR	2.00	5.00	2.12	ND	ND	ND	ND
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND
* Demethyl analog quantified as parent compound.							

Klamath
L-524-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-30	L-524-07-31	L-524-07-32	L-524-07-33	L-524-07-33Dup
Sample Identification			CP-12	CP-13	CP-14	CP-15	CP-16
Date Collected			09/07-08/07	09/07-08/07	09/07-08/07	09/07-08/07	09/07-08/07
Time Collected			all day	all day	all day	all day	all day
Date Received			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Extracted			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Tissue	Tissue	Tissue	Tissue	Tissue
Microcystin Analytes	ppb	ppb	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)
MCY-RR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	240	181	251	125	141
MCY-YR	2.00	5.00	ND	ND	ND	ND	ND
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND
* Demethyl analog quantified as parent compound.							

Klamath
L-524-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-34	L-524-07-35	L-524-07-36	L-524-07-37	L-524-07-38
Sample Identification			CP-17	CP-18	CP-19	IG-37	IG-38
Date Collected			09/07-08/07	09/07-08/07	09/07-08/07	09/06-08/07	09/06-08/07
Time Collected			all day	all day	all day	all day	all day
Date Received			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Extracted			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Tissue	Tissue	Tissue	Liver	Liver
Microcystin Analytes	ppb	ppb	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)
MCY-RR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	37.4
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	101	ND	86.3	ND	ND
MCY-YR	2.00	5.00	ND	ND	ND	ND	ND
MCY-LA	2.00	5.00	ND	ND	ND	ND	12.7
MCY-LW	2.00	5.00	ND	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND
* Demethyl analog quantified as parent compound.							

Klamath
L-524-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-39	L-524-07-40	L-524-07-41	L-524-07-42
Sample Identification			IG-39	CP-40	CP-41	CP-42
Date Collected			09/06-08/07	09/06-08/07	09/06-08/07	09/06-08/07
Time Collected			all day	all day	all day	all day
Date Received			11/Sep/2007	11/Sep/2007	11/Sep/2007	11/Sep/2007
Date Extracted			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Date Analyzed			09/Oct/2007	09/Oct/2007	09/Oct/2007	09/Oct/2007
Matrix			Liver	Liver	Liver	Liver
Microcystin Analytes	ppb	ppb	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)
MCY-RR	2.00	5.00	15.7	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	42.2	25.0	33.5	61.6
MCY-LR	2.00	5.00	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	ND	138	426	159
MCY-YR	2.00	5.00	ND	ND	ND	ND
MCY-LA	2.00	5.00	12.7	14.7	13.7	7.88
MCY-LW	2.00	5.00	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND
* Demethyl analog quantified as parent compound.						
QA/QC Samples						

Klamath
L-524-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-MBlank Solvent Blank	L-524-07-LCS American River Trout	L-524-07-3MS IG-3	L-524-07-3MSD IG-3
Sample Identification						
Date Collected					09/06-07/07	09/06-07/07
Time Collected					all day	all day
Date Received					11/Sep/2007	11/Sep/2007
Date Extracted			09/09/07	09/08/07	09/08/07	09/08/07
Date Analyzed			09/09/07	09/09/07	09/09/07	09/09/07
Matrix				Tissue	Tissue	Tissue
Microcystin Analytes	ppb	ppb	ppb (ug/L)	Fresh Wt. Recovery (%)	Fresh Wt. Recovery (%)	Fresh Wt. Recovery (%)
MCY-RR	2.00	5.00	ND	105	112	115
MCY-Demethyl-RR*	2.00	5.00	ND	NA	NA	NA
MCY-LR	2.00	5.00	ND	107	82.9	77.5
MCY-Demethyl-LR*	2.00	5.00	ND	NA	NA	NA
MCY-YR	2.00	5.00	ND	115	72.0	87.3
MCY-LA	2.00	5.00	ND	103	73.5	72.9
MCY-LW	2.00	5.00	ND	101	75.4	74.3
MCY-LF	2.00	5.00	ND	103	82.8	80.7
* Demethyl analog quantified as parent compound.						

Klamath
L-524-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-524-07-26MS	L-524-07-26MSD
Sample Identification			CP-8	CP-8
Date Collected			09/07-08/07	09/07-08/07
Time Collected			all day	all day
Date Received			11/Sep/2007	11/Sep/2007
Date Extracted			09/09/07	09/09/07
Date Analyzed			09/09/07	09/09/07
Matrix			Tissue	Tissue
Microcystin Analytes	ppb	ppb	Fresh Wt. Recovery (%)	Fresh Wt. Recovery (%)
MCY-RR	2.00	5.00	125	118
MCY-Demethyl-RR*	2.00	5.00	NA	NA
MCY-LR	2.00	5.00	81.8	114
MCY-Demethyl-LR*	2.00	5.00	NA	NA
MCY-YR	2.00	5.00	97.9	116
MCY-LA	2.00	5.00	73.6	80.3
MCY-LW	2.00	5.00	83.8	92.0
MCY-LF	2.00	5.00	89.1	96.1
* Demethyl analog quantified as parent compound.				

L-524-07

TISSUE SAMPLING FIELD SHEET

Sheet 1 of 1

Project: Klamath Algal Toxins

Lab Code: _____

Date: 9/07/07

Station: _____

Time: all day

Station name: Copco Res.

Station Description: 3 sites: upper, middle, lower lake

Directions to Station: _____

County: _____ USGS Map: _____

Lower
Middle
Upper

Lat: 41.96884 Lon: 122.37634 Projection: NAD 83

use photos
41.97255 122.27907 - not the site of fish, but marker

Method	Effort	Species	Number	Size	Package #	Notes
<u>Fishing</u>	<u>12 markers</u>	<u>Yardli</u>	<u>18+</u>		<u>18</u>	<u>grouped by site</u>

Species Length/Weight

Species: <u>Yardli</u>				Species: _____				Species: _____			
Total Number: _____				Total Number: _____				Total Number: _____			
ID #	FL	TL	WT	ID #	FL	TL	WT	ID #	FL	TL	WT
<u>CP1</u>	<u>231</u>	<u>241</u>	<u>174</u>	<u>CP13</u>	<u>200</u>	<u>210</u>	<u>107</u>				
<u>CP2</u>	<u>221</u>	<u>282</u>	<u>150</u>	<u>CP14</u>	<u>192</u>	<u>200</u>	<u>83</u>				
<u>CP3</u>	<u>230</u>	<u>239</u>	<u>151</u>	<u>CP15</u>	<u>231</u>	<u>241</u>	<u>149</u>				
<u>CP4</u>	<u>213</u>	<u>225</u>	<u>136</u>	<u>CP16</u>	<u>227</u>	<u>239</u>	<u>140</u>				
<u>CP5</u>	<u>206</u>	<u>217</u>	<u>114</u>	<u>CP17</u>	<u>202</u>	<u>211</u>	<u>100</u>				
<u>CP6</u>	<u>211</u>	<u>221</u>	<u>122</u>	<u>CP18</u>	<u>179</u>	<u>188</u>	<u>72</u>				
<u>CP7</u>	<u>215</u>	<u>224</u>	<u>119</u>								
<u>CP8</u>	<u>253</u>	<u>264</u>	<u>221</u>								
<u>CP9</u>	<u>225</u>	<u>235</u>	<u>145</u>								
<u>CP10</u>	<u>202</u>	<u>211</u>	<u>98</u>								
<u>CP11</u>	<u>205</u>	<u>217</u>	<u>121</u>								
<u>CP12</u>	<u>204</u>	<u>214</u>	<u>114</u>								

Additional Species: Crappie

Comments: windy

Organics _____ Metals _____ Archive _____ Other _____

TISSUE SAMPLING FIELD SHEET

Sheet 1 of 1

Project: Klamath Algal Toxins Lab Code: _____

Date: 9/6-7/07 Statnum: _____
 Time: all day Statname: Trougate Res.

Station Description: 3 sites: upper, middle, lower lake

Directions to Station: _____

County: _____ USGS Map: _____

lower
middle
upper

Lat: 41.94408 Lon: 122.43002 Projection: NAD 83
41.97065 122.41750
41.96880 122.37637

Method	Effort	Species	Number	Size	Package #	Notes
<u>Fishing</u>	<u>2 minutes</u>	<u>Yw Pch</u>	<u>18</u>		<u>18</u>	<u>grouped by site</u>

Species Length/Weight

Species: <u>Yw Pch</u>				Species: <u>Yw Pch</u>				Species:			
Total Number: <u>12</u>				Total Number: <u>6</u>				Total Number:			
ID #	FL	TL	WT	ID #	FL	TL	WT	ID #	FL	TL	WT
<u>1</u>	<u>IG1</u>	<u>245</u>	<u>253</u>	<u>185</u>	<u>IG13</u>	<u>207</u>	<u>216</u>	<u>111</u>			
<u>2</u>	<u>IG2</u>	<u>221</u>	<u>231</u>	<u>171</u>	<u>IG14</u>	<u>194</u>	<u>205</u>	<u>102</u>			
<u>3</u>	<u>IG3</u>	<u>241</u>	<u>254</u>	<u>191</u>	<u>IG15</u>	<u>192</u>	<u>201</u>	<u>95</u>	<u>Upper</u>		
<u>4</u>	<u>IG4</u>	<u>227</u>	<u>231</u>	<u>167</u>	<u>IG16</u>	<u>187</u>	<u>197</u>	<u>83</u>			
<u>5</u>	<u>IG5</u>	<u>242</u>	<u>253</u>	<u>222</u>	<u>IG17</u>	<u>179</u>	<u>189</u>	<u>75</u>			
<u>6</u>	<u>IG6</u>	<u>207</u>	<u>212</u>	<u>116</u>	<u>IG18</u>	<u>183</u>	<u>191</u>	<u>82</u>			
<u>7</u>	<u>IG7</u>	<u>246</u>	<u>259</u>	<u>195</u>							
<u>8</u>	<u>IG8</u>	<u>222</u>	<u>231</u>	<u>159</u>							
<u>9</u>	<u>IG9</u>	<u>223</u>	<u>232</u>	<u>146</u>							
<u>10</u>	<u>IG10</u>	<u>204</u>	<u>215</u>	<u>119</u>							
<u>11</u>	<u>IG11</u>	<u>209</u>	<u>216</u>	<u>116</u>							
<u>12</u>	<u>IG12</u>	<u>198</u>	<u>207</u>	<u>106</u>							

Additional Species: LMB, Pumpkinseed Sunfish, Craypie

Comments: windy

Organics _____ Metals _____ Archive _____ Other _____



RK

**DEPARTMENT OF FISH AND GAME
FISH AND WILDLIFE
WATER POLLUTION CONTROL LABORATORY**

2005 NIMBUS ROAD
RANCHO CORDOVA, CA 95670
PHONE (916) 358-2858 ATSS 8-434-2858 FAX (916) 985-4301

LABORATORY REPORT

Name:	Russ J. Kanz	Lab Number:	L-665-07
Agency:	State Water Resource Control Board	Other Number:	
Address:	P.O. Box 2000	Date Sampled:	11/05/07
City:	Sacramento, CA 95812-2000	Date Received:	11/15/07
		Date Completed:	02/14/08
		Index-PCA Code:	

RE: Microcystin analysis in mussels

RESULTS OF CHEMICAL ANALYSIS:

Fifteen mussel samples from the Klamath River Reservoir was extracted and analyzed by LC/MS/MS for microcystins. See attached sheets for results.

NA	Not Applicable
ND	Not Detected
MDL	Method Detection Limit
RL	Reporting Limit
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate

RECEIVED
 11/15/07
 11:00 AM
 11/15/07

Cost: To be invoiced per contract.

Cc: Susan Corum
 Department of Natural Resources
 P. O. Box 282
 Orleans, CA 95556

Abdel M. Hefele
 Lead Pesticide Chemist

02/15/08
 Date

DB Corum
 Laboratory Director

2/15/08
 Date

Klamath
L-665-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-665-07-1	L-665-07-2	L-665-07-3	L-665-07-4	L-665-07-5
Sample Identification			CH110507-A	CH110507-B	CH110507-C	BR110507-A	BR110507-B
Date Collected			05/Nov/2007 16:00	05/Nov/2007 16:00	05/Nov/2007 16:00	05/Nov/2007 13:00	05/Nov/2007 13:00
Date Received			15/Nov/2007	15/Nov/2007	15/Nov/2007	15/Nov/2007	15/Nov/2007
Date Extracted			06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007
Date Analyzed			07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007
Matrix			Mussel	Mussel	Mussel	Mussel	Mussel
Microcystin Analytes	ppb	ppb	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)
MCY-RR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-YR	2.00	5.00	ND	ND	ND	ND	ND
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND
* Demethyl analog quantified as parent compound.							

Klamath
L-665-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-665-07-6	L-665-07-7	L-665-07-8	L-665-07-9	L-665-07-10
Sample Identification			BR110507-C	SV110507-A	SV110507-B	SV110507-C	IS110507-A
Date Collected			05/Nov/2007	05/Nov/2007	05/Nov/2007	05/Nov/2007	05/Nov/2007
Time Collected			13:00	15:00	15:00	15:00	12:00
Date Received			15/Nov/2007	15/Nov/2007	15/Nov/2007	15/Nov/2007	15/Nov/2007
Date Extracted			06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007
Date Analyzed			07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007
Matrix			Mussel	Mussel	Mussel	Mussel	Mussel
Microcystin Analytes	ppb	ppb	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)
MCY-RR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-YR	2.00	5.00	ND	ND	ND	ND	ND
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND

* Demethyl analog quantified as parent compound.

Klamath
L-665-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-665-07-11	L-665-07-11Dup	L-665-07-12	L-665-07-13	L-665-07-14
Sample Identification			IS110507-B	IS110507-B	IS110507-C	OR110607-A	OR110607-B
Date Collected			05/Nov/2007	05/Nov/2007	05/Nov/2007	06/Nov/2007	06/Nov/2007
Time Collected			12:00	12:00	12:00		
Date Received			15/Nov/2007	15/Nov/2007	15/Nov/2007	15/Nov/2007	15/Nov/2007
Date Extracted			06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007
Date Analyzed			07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007
Matrix			Mussel	Mussel	Mussel	Mussel	Mussel
Microcystin Analytes	ppb	ppb	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)	Fresh Wt. ppb (ng/g)
MCY-RR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-RR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-LR	2.00	5.00	ND	ND	ND	ND	ND
MCY-Demethyl-LR*	2.00	5.00	ND	ND	ND	ND	ND
MCY-YR	2.00	5.00	ND	ND	ND	ND	ND
MCY-LA	2.00	5.00	ND	ND	ND	ND	ND
MCY-LW	2.00	5.00	ND	ND	ND	ND	ND
MCY-LF	2.00	5.00	ND	ND	ND	ND	ND

* Demethyl analog quantified as parent compound.

Klamath
L-665-07

WPCL Lab#	Estimated MDL	Reporting Limit	L-665-07-15	QA/QC Samples			
Sample Identification			OR110607-C	L-665-07-MBIK	L-665-07-LCS	L-665-07-10MS	L-665-07-10MSD
Date Collected			06/Nov/2007	Solvent Blank	WPCL mussel	IS110507-A	IS110507-A
Time Collected						05/Nov/2007	05/Nov/2007
Date Received			15/Nov/2007			12:00	12:00
Date Extracted			06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007	06/Dec/2007
Date Analyzed			07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007	07/Dec/2007
Matrix			Mussel	Mussel	Mussel	Mussel	Mussel
Microcystin Analytes	ppb	ppb	Fresh Wt.				
MCY-RR	2.00	5.00	ppb (ng/g)	ppb (ug/L)	Fresh Wt. Recovery (%)	Fresh Wt. Recovery (%)	Fresh Wt. Recovery (%)
MCY-Demethyl-RR*	2.00	5.00	ND	ND	85.4	92.5	94.0
MCY-LR	2.00	5.00	ND	ND	NA	NA	NA
MCY-Demethyl-LR*	2.00	5.00	ND	ND	114	107	115
MCY-YR	2.00	5.00	ND	ND	NA	NA	NA
MCY-LA	2.00	5.00	ND	ND	109	117	121
MCY-LW	2.00	5.00	ND	ND	82.5	74.5	75.6
MCY-LF	2.00	5.00	ND	ND	81.9	74.3	79.0
				ND	85.9	71.5	78.1

* Demethyl analog quantified as parent compound.

L665-07
1/2

Chain of Custody for Klamath River Reservoir Nutrient Loading Study

Karuk DNR	39051 Hwy 96
PHONE 530-469-3456	Orleans, CA 95556
CONTACT Susan Corum	EMAIL scorum@karuk.us
Collected By <u>SC</u>	SIGNATURE <u>[Signature]</u>

Sample ID	Date	Time	Lab ID	Sample Description		
1 CH110507-A	11/12/07	1000		China Flat Klamath River Down Right across from Happy Camp	X	Mussel Tissue
2 CH110507-B				"		
3 CH110507-C				"		
4 BR110507-A	11/5/07	1300		Brown Bear blw Scott + Shasta		
5 BR110507-B				"	X	
6 BR110507-C				"		
7 SV110507-A		1500		About 1/2 mile upstream Seiad Valley	X	
8 SV110507-B				"		
9 SV0110507-C				"	X	
10 IS110507-A		1200		Below I-5 Bridge Klamath River		
11 IS110507-B				"	X	
12 IS110507-C				"		

Date Shipped: 11/14/07 Carrier/ Shipping # FedEx

Date Received _____

Received by _____
Notes DO NOT Process Samples until you talk to Russ Kanz 11-15-07

Received - Gregor Baltzell

Ship to:

Dave Crane
CDFG Water Pollution Control Laboratory
2005 Nimbus Road
Rancho Cordova, CA 95670
(916) 358-2858
fax: (916) 985-4301

Bill and Send Results To:

Russ J. Kanz
State Water Resources Control Board
PO Box 2000
Sacramento, CA 95812-2000
(916) 341-5341

Also, please
save mussel shells for aging
+ id confirmation

Please put mussel shells back in labeled bags
+ return to Susan Corum

L-665-07
2/2

Chain of Custody for Klamath River Reservoir Nutrient Loading Study

Karuk DNR	39051 Hwy 96
PHONE 530-469-3456	Orleans, CA 95556
CONTACT Susan Corum	EMAIL scorum@karuk.us
Collected By <i>SC</i>	SIGNATURE <i>[Signature]</i>

	Sample ID	Date	Time	Lab ID	Sample Description	Filter	Tissue/Water Sample
1	OR110607-A	11/6/07			Under Orleans Bridge Klamath River	X	Mussel tissue
2	OR110607-B					X	
3	OR110607-C	✓				X	✓
4							
5							
6							
7							
8							
9							
10							
11							
12							

Date Shipped: 11/14/07 Carrier/ Shipping # _____

Date Received _____

Received by _____

Notes Please keep mussel shells w/ appropriate bags so we can ID + use @ later date
THANKS!

Ship to:

Dave Crane
CDFG Water Pollution Control Laboratory
2005 Nimbus Road
Rancho Cordova, CA 95670
(916) 358-2858
fax: (916) 985-4301

Russ J. Kanz
State Water Resources Control Board
PO Box 2000
Sacramento, CA 95812-2000
(916) 341-5341

Received
Gregor Baltzell 11-15-07