Regional Water Quality NEWSLETTER

DATE: Report for May 2009

Sampling conducted May 4 & 5 (lakes) 2009

A Phoenix, Tempe, Glendale, Peoria, CAP, SRP – ASU Regional Water Quality Partnership

http://enpub.fulton.asu.edu/pwest/tasteandodor.htm

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SUMMARY: EVALUATION AND RECOMMENDATIONS

1. T&O levels are low, but detectable. Bartlett Lake on the Verde River shows 4 to 6 ng/L.
2. SRP will be using a near 50%/50% blend of Salt River / Verde River water through the end of May and then use nearly 100% Salt River water thereafter.
3. We sampled DOC levels in the Salt River from Roosevelt Reservoir through Saguaro Lake. Now that runoff into Roosevelt Lake is nearly over, the DOC profiles represent the levels we can expect throughout the summer. The data show a decrease of DOC downriver through the reservoirs, and we compare the data to earlier this year and profiles from a few years ago.
4. Susanne Neuer's group at ASU provides a report on Golden Alga, an algae that can lead to fish kills in the Salt River reservoirs.

Table 1 Summary of WTP Operations

	Verde WTP	Union Hills	24th Street WTP	N.Tempe J.G. Martinez	Deer Valley	Glendale Cholla WTP [3]	Peoria Greenway WTP	Val Vista	South Tempe
	Verde River	CAP Canal	Arizona Canal					South Canal	
PAC Type and Dose		None	15 ppm Calgon WPH	20 ppm Norit HDO	12 ppm Calgon	None			10 ppm
Copper Sulfate		None	0.5 ppm	None	None	None			None
PreOxidation		None	None	None	None	None			None
Alum Dose Alkalinity pH		12.2 [1] 128 7.4	50 178/147 7.0	25 176 7.9	50 176/136 6.9	40 ppm 170 ppm 6.6			30 160 7.5
Finished water DOC DOC removal[2]									
Average turbidity over last 7 days		0.9	8 to 13	8	17 to 22	8.2			6
Recommendations	Off line			Down from Jan 6 thru April 2		Down until April 15th		Down until April 15th	

[1] Ferric chloride instead of alum; plus ppm sulfuric acid
[2] Calculated based upon influent and filtered water DOC (note that DOC – not TOC – is used in this calculation)
[3] Sample from finished water includes a blend of surface and ground water sources

Table 1
SRP/CAP OPERATIONS - Values in cfs, for May 4, 2009

System	SRP Diversions	CAP
Arizona Canal	647	0
South Canal	496	0
Pumping	87	0
Total	1230	0

- **SRP is releasing water from both Verde and Salt River Systems**. Salt River release from Saguaro Lake: 884 cfs; it is unusual to be releasing Salt River water this time of year. Verde River release from Bartlett Lake: 398 cfs.

- SRP is changing the source water during May. In late April SRP canals contained roughly 50% Verde River water plus 50% Salt River water. The Verde will continue to be ramped up to around 1200 to 1300 cfs (depending on water order demands) and the Salt will be reduced to no less than minimum generation plus 100 cfs or so until mid to late May 2009.

Table 2 - Water Treatment Plants – May 4, 2009

Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
24th Street WTP Inlet	2.3	2.7	<2.0
24th Street WTP Treated	<2.0	<2.0	<2.0
Deer Valley Inlet	2.2	3.0	<2.0
Deer Valley WTP Treated	<2.0	2.3	<2.0
Val Vista Inlet	2.2	3.0	<2.0
Val Vista WTP Treated –East			
Val Vista WTP Treated -West			
Union Hills Inlet	<2.0	2.1	<2.0
Union Hills Treated	<2.0	<2.0	<2.0
Tempe North Inlet			
Tempe North Plant Treated			
Tempe South WTP	<2.0	<2.0	<2.0
Tempe South Plant Treated	<2.0	<2.0	<2.0
Greenway WTP Inlet	<2.0	2.3	<2.0
Greenway WTP Treated	<2.0	<2.0	<2.0
Glendale WTP Inlet	2.2	3.0	<2.0
Glendale WTP Treated	<2.0	<2.0	<2.0

Table 3 - Canal Sampling – May 4, 2009

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
CAP	Waddell Canal	<2.0	<2.0	<2.0
	Union Hills Inlet	<2.0	2.1	<2.0
	CAP Canal at Cross-connect			
	Salt River @ Blue Pt Bridge	2.2	2.7	2.0
	Verde River @ Beeline	2.2	2.5	<2.0
AZ	AZ Canal above CAP Cross-connect	<2.0	2.5	<2.0
Canal	AZ Canal below CAP Cross-connect	3.3	2.7	<2.0
	AZ Canal at Highway 87	2.5	2.5	<2.0
	AZ Canal at Pima Rd.	2.7	2.8	<2.0
	AZ Canal at 56th St.	<2.0	2.7	<2.0
	AZ Canal - Inlet to 24th Street WTP	2.3	2.7	<2.0
	AZ Canal - Central Avenue	<2.0	2.8	<2.0
	AZ Canal - Inlet to Deer Valley WTP	2.2	3.0	<2.0
	AZ Canal - Inlet to Glendale WTP	2.2	3.0	<2.0
South	South Canal below CAP Cross-connect	2.3	2.5	<2.0
and	South Canal at Val Vista WTP	2.2	3.0	<2.0
Tempe	Head of the Tempe Canal	2.6	3.0	<2.0
Canals	Tempe Canal - Inlet to Tempe's South Plant	<2.0	<2.0	<2.0

Table 4 - Reservoir Samples – May 5, 2009

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Lake Pleasant (4/09)	Eplimnion	2.5	<2.0	<2.0
Lake Pleasant (4/09)	Hypolimnion	2.9	<2.0	<2.0
Verde River @ Beeline		2.2	2.5	<2.0
Bartlett Reservoir	Epilimnion	6.4	<2.0	<2.0
Bartlett Reservoir	Epi-near dock	4.6	<2.0	<2.0
Bartlett Reservoir	Hypolimnion	<2.0	<2.0	<2.0
Salt River @ BluePt Bridge		2.2	2.7	2.0
Saguaro Lake	Epilimnion	<2.0	3.0	<2.0
Saguaro Lake	Epi - Duplicate	<2.0	2.8	<2.0
Saguaro Lake	Epi-near dock	<2.0	2.8	<2.0
Saguaro Lake	Hypolimnion	<2.0	2.6	<2.0
Havasu (4/09)		<2.0	<2.0	<2.0

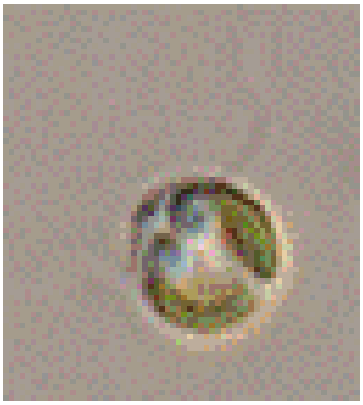
Golden alga update (Susanne Neuer's group at ASU)

Golden alga are toxic organisms. Details of the effects to fish and people are available on the Arizona Game and Fish Department website (http://www.azgfd.gov/temp/golden_alga_faqs.shtml):

- Golden alga releases unique toxins that affect gill-breathing aquatic organisms (mainly fish and clams).
- Golden alga toxins have no apparent lethal or harmful effects on animals that do not breathe through gills. Therefore, Golden alga blooms are not a public health threat. The golden alga produces a unique toxin that damages gill functions and causes fish to suffocate because they can't obtain oxygen from the water.
- We provide data here to inform utilities about potential customer or media questions that may arise to this form of toxic algae and that fish kills in the lakes do not necessary mean a public health warning exists.

This update focuses on the Golden Algae (*Prymnesium sp;* see microscope image below) occurrences seen this spring in the various lakes.

1. In Roosevelt lake we have not observed bloom conditions for this alga this year, on April 14 (our most recent sampling date) we observed it at ca 3000 cells/ml, not nearly the bloom concentrations we have seen in other years during this season (higher than 30,000 cells/ml last April).
2. In Saguaro Lake, where Golden Alga blooms are much more prevalent, we observed this alga on March 9 with more than 20,000 cells /ml, but on the April 14 sampling date it was down to 5,500 cells/ml. According to its bloom behavior we have seen last year (highest numbers in February/March), we expect it to be done for this year. We will have an update on this by mid of next week when we sample Saguaro Lake again.
3. In Bartlett lake, Golden Algae bloomed in March (14,000 cells/ml; sampling date March 3) but they were much reduced in numbers by April 7 (700 cells/ml). First investigation of the sample from this month (May 5) showed even fewer cells.
4. Lake Pleasant: No Golden Algae bloom. Highest numbers observed were in Feb/March this year with ca. 600-700 cells/ml, none observed this month.



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Organic Matter Status In the Treatment Plants

Table 2 - Water Treatment Plants – May 04, 2009						
Sample Description	**DOC (mg/L)**	**UV254 (1/cm)**	**SUVA (L/mg-m)**	**TDN**		**DOC removal (%)**
24th Street WTP Inlet	**3.92**	**0.095**	**2.42**	**0.41**		
24th Street WTP Treated	**2.75**	**0.043**	**1.56**	**0.38**		**30**
Deer Valley Inlet	**3.96**	**0.097**	**2.46**	**0.38**		
Deer Valley WTP Treated	**2.66**	**0.043**	**1.63**	**0.32**		**33**
Val Vista Inlet	**4.05**	**0.103**	**2.55**	**0.41**		
Val Vista WTP Treated –East						
Val Vista WTP Treated -West						
Union Hills Inlet	**2.80**	**0.042**	**1.48**	**0.78**		
Union Hills Treated	**2.18**	**0.021**	**0.96**	**0.02**		**22**
Tempe North Inlet						
Tempe North Plant Treated						
Tempe South WTP	**3.91**	**0.092**	**2.35**	**0.40**		
Tempe South Plant Treated	**3.03**	**0.056**	**1.84**	**0.32**		**23**
Greenway WTP Inlet	**3.88**	**0.091**	**2.36**	**1.02**		
Greenway WTP Treated	**2.32**	**0.018**	**0.76**	**0.77**		**40**
Glendale WTP Inlet	**4.16**	**0.098**	**2.36**	**0.38**		
Glendale WTP Treated	**2.49**	**0.027**	**1.07**	**0.27**		**40**

DOC = Dissolved organic carbon
UV254 = ultraviolet absorbance at 254 nm (an indicator of aromatic carbon content)
SUVA = UV254/DOC
TDN = Total dissolved nitrogen (mgN/L)

Organic Matter Status In the Canals

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Waddell Canal	2.73	0.041	1.49	0.75
Union Hills Inlet	2.80	0.042	1.48	0.78
CAP Canal at Cross-connect				
Salt River @ Blue Pt Bridge	5.08	0.114	2.25	0.46
Verde River @ Beeline	3.28	0.089	2.71	0.37
AZ Canal above CAP Cross-connect	3.82	0.096	2.52	0.41
AZ Canal below CAP Cross-connect	3.88	0.096	2.46	0.41
AZ Canal at Highway 87	4.05	0.097	2.40	0.38
AZ Canal at Pima Rd.	4.00	0.096	2.39	0.42
AZ Canal at 56th St.	4.02	0.094	2.35	0.44
AZ Canal - Inlet to 24th Street WTP	3.92	0.095	2.42	0.41
AZ Canal - Central Avenue	3.99	0.096	2.40	0.37
AZ Canal - Inlet to Deer Valley WTP	3.96	0.097	2.46	0.38
AZ Canal - Inlet to Glendale WTP	4.16	0.098	2.36	0.38
AZ Canal - Inlet to Greenway WTP	3.88	0.091	2.36	1.02
South Canal below CAP Cross-connect	3.76	0.097	2.58	0.44
South Canal at Val Vista WTP	4.05	0.103	2.55	0.41
Head of the Tempe Canal	3.98	0.097	2.43	0.36
Tempe Canal - Inlet to Tempe's South Plant	3.91	0.092	2.35	0.40
Chandler WTP – Inlet				

Table 4 - Reservoir Samples – May 04, 2009

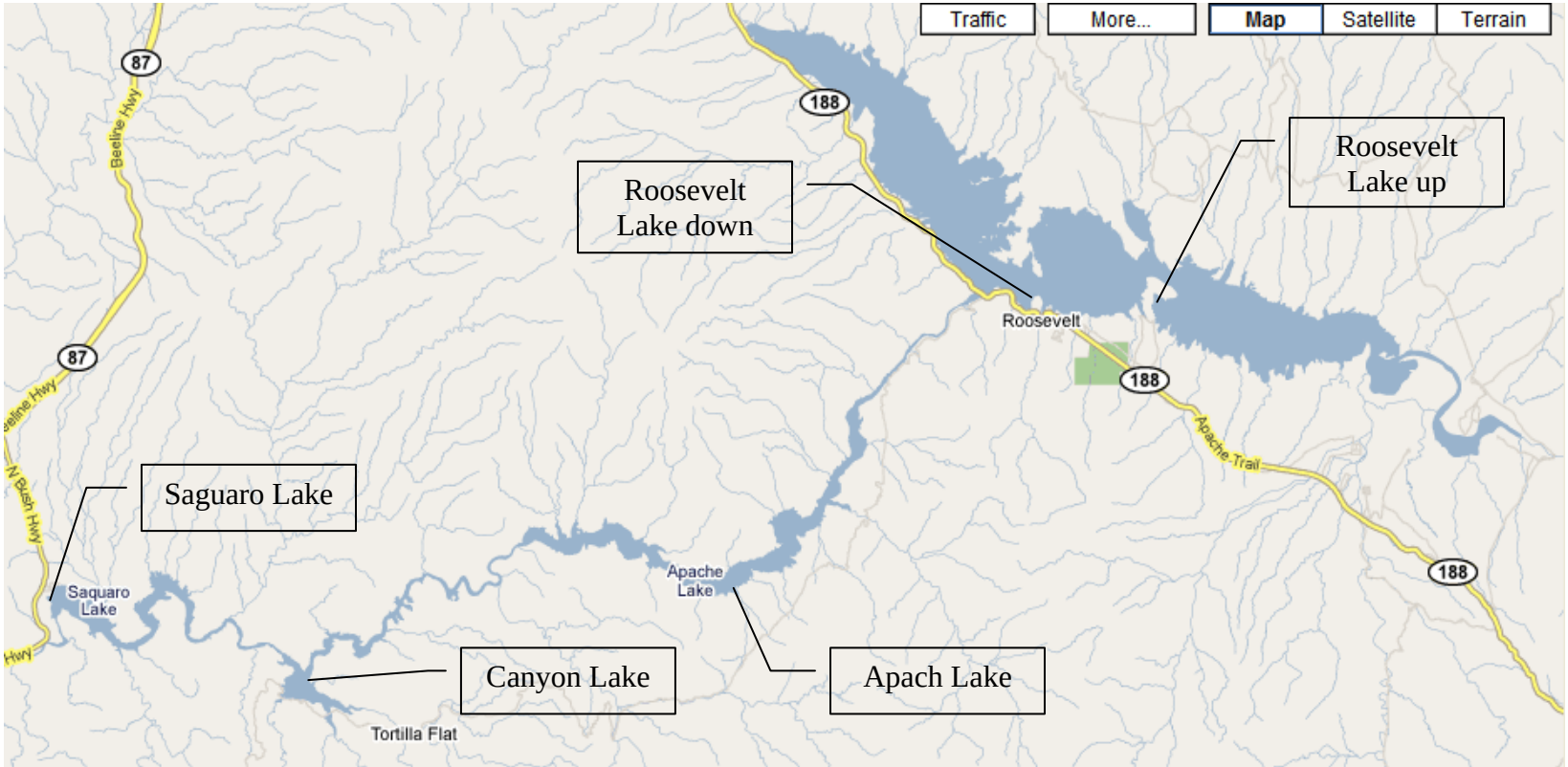
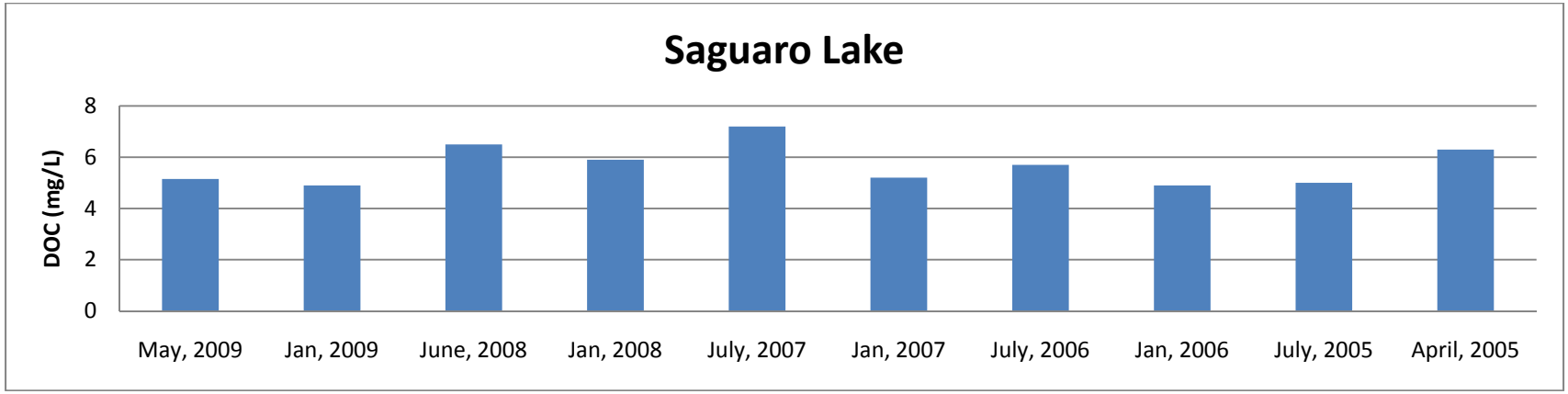
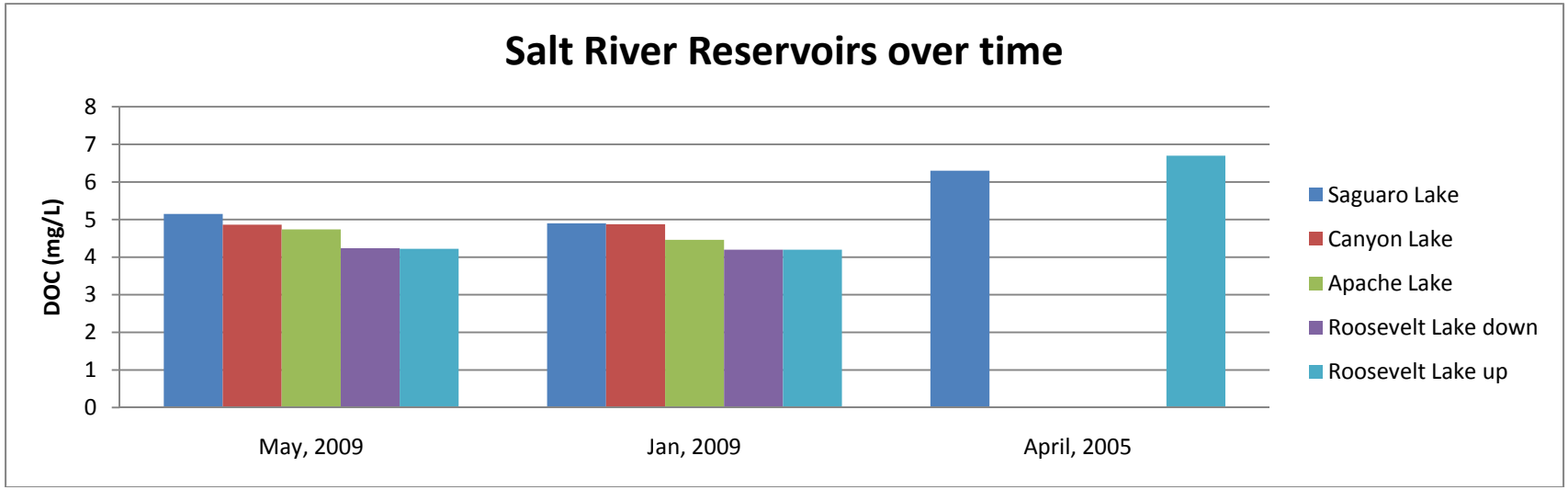
Reservoir sampling will be conducted only monthly. CAP is sampling Lake Pleasant on slightly different days than the other reservoirs.

Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Lake Pleasant (April 2009)	Eplimnion	3.23	0.047	1.46	0.54
Lake Pleasant (April 2009)	Hypolimnion	3.25	0.048	1.48	0.52
Verde River @ Beeline		3.28	0.089	2.71	0.37
Bartlett Reservoir	Epilimnion	4.12	0.108	2.61	0.44
Bartlett Reservoir	Epi-near dock				
Bartlett Reservoir	Hypolimnion	3.69	0.097	2.64	0.48
Salt River @ BluePt Bridge		5.08	0.114	2.25	0.46
Saguaro Lake	Epilimnion	5.51	0.115	2.08	0.88
Saguaro Lake	Epi - Duplicate	5.42	0.116	2.14	0.70
Saguaro Lake	Epi-near doc				
Saguaro Lake	Hypolimnion	5.10	0.114	2.23	0.64
Verde River at Tangle					
Havasu (April 2009)		2.63	0.043	1.63	0.83

Data from Salt River Reservoirs

The data below is for May 2009

	pH	Temp (C)	Cond. (mS)	Turbidity (NTU)	DOC (mg-C/L)	TDN (mg-N/L)	UV254	sampling location
Saguaro Lake	8.58	23.0	1.097	4	5.15	0.36	0.114	N 33.57419, W 111.53761, Elevation 500yd
Canyon Lake	8.65	21.3	1.089	6	4.86	0.33	0.113	N 33.53731, W 111.43135, Elevation 553yd
Apache Lake	8.58	20.7	1.094	4	4.74	0.33	0.111	N 33.57971, W 111.25181, Elevation 636yd
Roosevelt Lake down	8.46	23.5	0.971	3	4.24	0.30	0.096	N 33.67209, W 111.13484, Elevation 704yd
Roosevelt Lake up	8.5	23.2	0.950	3	4.22	0.29	0.092	N 33.66646, W 111.08668, Elevation 718yd



We also have sampled these same locations in the past. The graph belows that DOC in Saguaro Lake has fluctuated between 5 and 7 mg/L. The second plot shows that compared again data in 2005, DOC in Roosevelt and Saguaro Lakes are lower in 2009. This is good news in terms of disinfection by-product precursors.