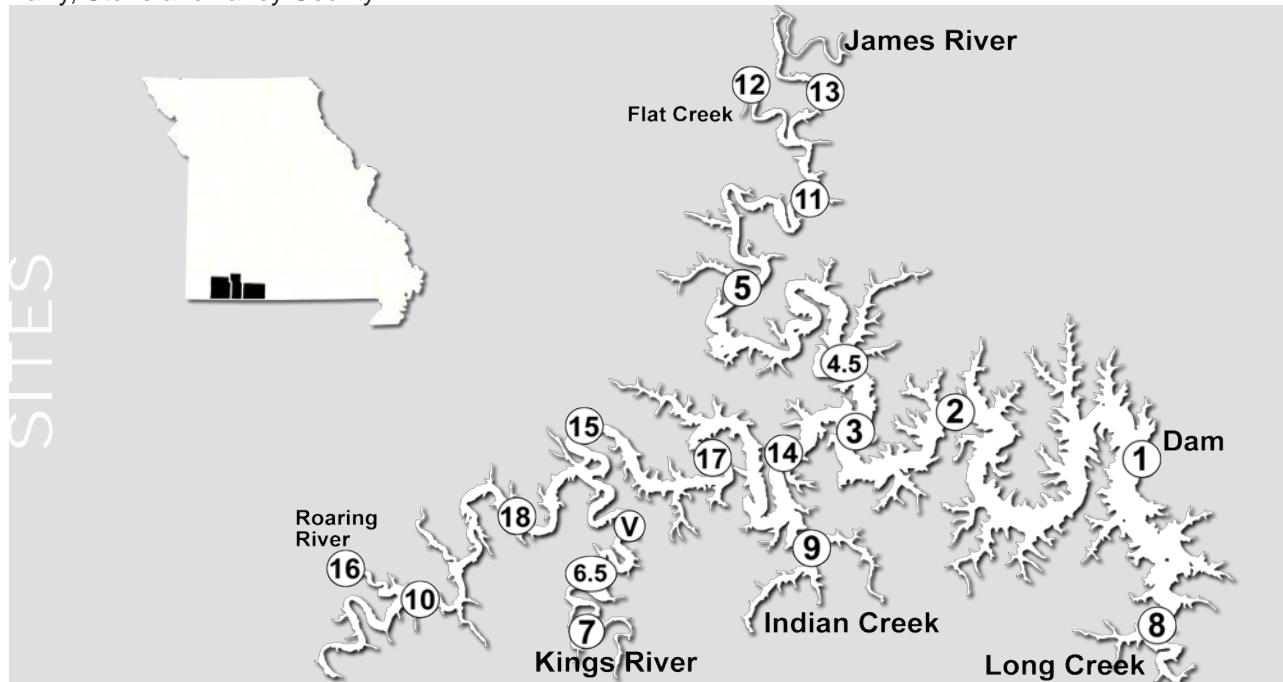


Table Rock Lake

Barry, Stone and Taney County



Nineteen sites were monitored at Table Rock Lake in 2007. Eight sites were in the main channel, four in the James River arm, three in the King's River arm and one in Roaring River, Indian Creek, Flat Creek and Long Creek.

Water quality was similar at all main channel sites. Mean Secchi transparency values ranged from 122 inches to 152 inches and mean phosphorus concentrations varied by only 4 $\mu\text{g/L}$ in the main channel. Mean nitrogen concentrations varied more than phosphorus, but were quite low. Annual mean chlorophyll concentrations in the main channel ranged from the oligotrophic 2.4 $\mu\text{g/L}$ at Site 18 to the mesotrophic 5.8 $\mu\text{g/L}$ at Site 3.

Sites 4.5, 5, 11 and 13 in the James River Arm varied considerably more than the main channel sites. Mean Secchi values in 2007 ranged from 90 to 40 inches, phosphorus concentrations ranged five-fold, nitrogen nearly doubled and chlorophyll varied four-fold from Aunt's Creek to above Flat Creek.

The King's River Arm had two full sites, and one measuring only Secchi transparency. King's River phosphorus concentrations were at least double the main channel sites, but nitrogen concentrations were quite similar to the main channel sites. Chlorophyll was twice

that found in the main lake sites, resulting in Secchi transparency values (at sites 6.5 and 7) that were roughly half that found in the main channel. The Viola access (Site V) Secchi transparency was roughly 2/3 that found in the main lake.

Of the remaining tributary sites, Indian Creek (Site 9) and Long Creek (Site 8) were very similar to the main channel. The Indian Creek Secchi was lower than found in the main channel, but all other parameters at both sites were comparable to the main channel.

The Roaring River (Site 16) had phosphorus concentrations roughly four times the main channel. Nitrogen and chlorophyll concentrations were roughly double those found in the main channel, and water clarity was roughly one third of that measured in the main channel.

Site 12 is located in Flat Creek, a tributary in the James River Arm. This site had the lowest (0.7 $\mu\text{g/L}$) and highest (157.1 $\mu\text{g/L}$) individual chlorophyll concentration observed at Table Rock Lake in 2007. These values are indicative of the dynamic nature of this site. This site also had the highest mean nitrogen concentration of any Table Rock site in 2007.

2006 SUMMARY

Summary Data Table

Table Rock Lake 2007

2007 Table Rock Summary Data

TP = Total Phosphorus;
 TN = Total Nitrogen;
 CHL = Chlorophyll

Main Lake Sites	James River Arm								Kings River Arm			Indian Creek	Flat Creek	Roaring River	Long Creek
	10	18	15	17	14	3	2	1	7	6.5	Viola				
# of samples	6	2	8	8	7	5	8	8	8	8	7	7	8	8	6
Secchi (inches)	123	126	148	152	122	138	116	149	123	108	135	123	123	123	123
Mean	87	93	99	89	86	120	91	123	87	93	99	89	86	120	123
Min	192	172	227	232	174	174	182	185	192	172	227	232	174	174	182
Max	7	8	7	7	7	5	7	4	7	8	7	7	7	5	7
TP (µg/L)	5	7	6	6	4	4	5	3	5	7	6	6	4	4	5
Mean	8	10	10	8	11	6	9	7	8	10	10	8	11	6	9
Min	270	350	320	380	420	400	480	390	270	350	320	380	420	400	480
Max	220	260	240	270	280	340	380	200	220	260	240	270	280	340	380
TN (µg/L)	340	460	580	640	660	620	650	1210	340	460	580	640	660	620	650
Mean	4.4	2.4	4.6	4.6	4.7	5.8	5.3	3.3	4.4	2.4	4.6	4.6	4.7	5.8	5.3
Min	2.1	2.3	2.0	1.5	2.0	2.5	3.8	1.7	2.1	2.3	2.0	1.5	2.0	2.5	3.8
Max	8.4	2.5	8.7	11.9	9.0	11.4	9.0	7.5	8.4	2.5	8.7	11.9	9.0	11.4	9.0
CHL (µg/L)															

Tributary Sites	James River Arm			Kings River Arm			Indian Creek	Flat Creek	Roaring River	Long Creek	
	13	11	5	4.5	7	6.5					Viola
# of samples	8	7	8	8	8	8	7	8	8	8	6
Secchi	43	40	58	90	41	74	95	111	48	47	123
Mean	34	34	44	74	34	63	60	66	31	63	108
Min	57	50	93	107	53	97	138	162	92	39	135
Max	64	46	26	11	28	17	17	8	47	33	8
TP (µg/L)	52	27	18	8	20	14	6	6	13	21	7
Mean	112	70	39	17	37	30	11	11	158	149	9
Min	1020	630	880	560	380	340	420	420	1310	640	340
Max	640	420	470	410	320	260	280	280	780	350	270
TN (µg/L)	1870	1500	1750	830	560	510	570	570	2230	1700	500
Mean	40.5	39.3	22.5	9.5	15.8	11.2	4.8	4.8	15.3	11.0	6.3
Min	27.1	23.1	10.4	5.4	7.0	7.1	1.8	1.8	0.7	2.3	4.4
Max	78.9	71.3	53.4	20.4	31.4	21.1	10.5	10.5	157.1	25.1	10.8
CHL (µg/L)											

Main Lake Relative Rank Graphs

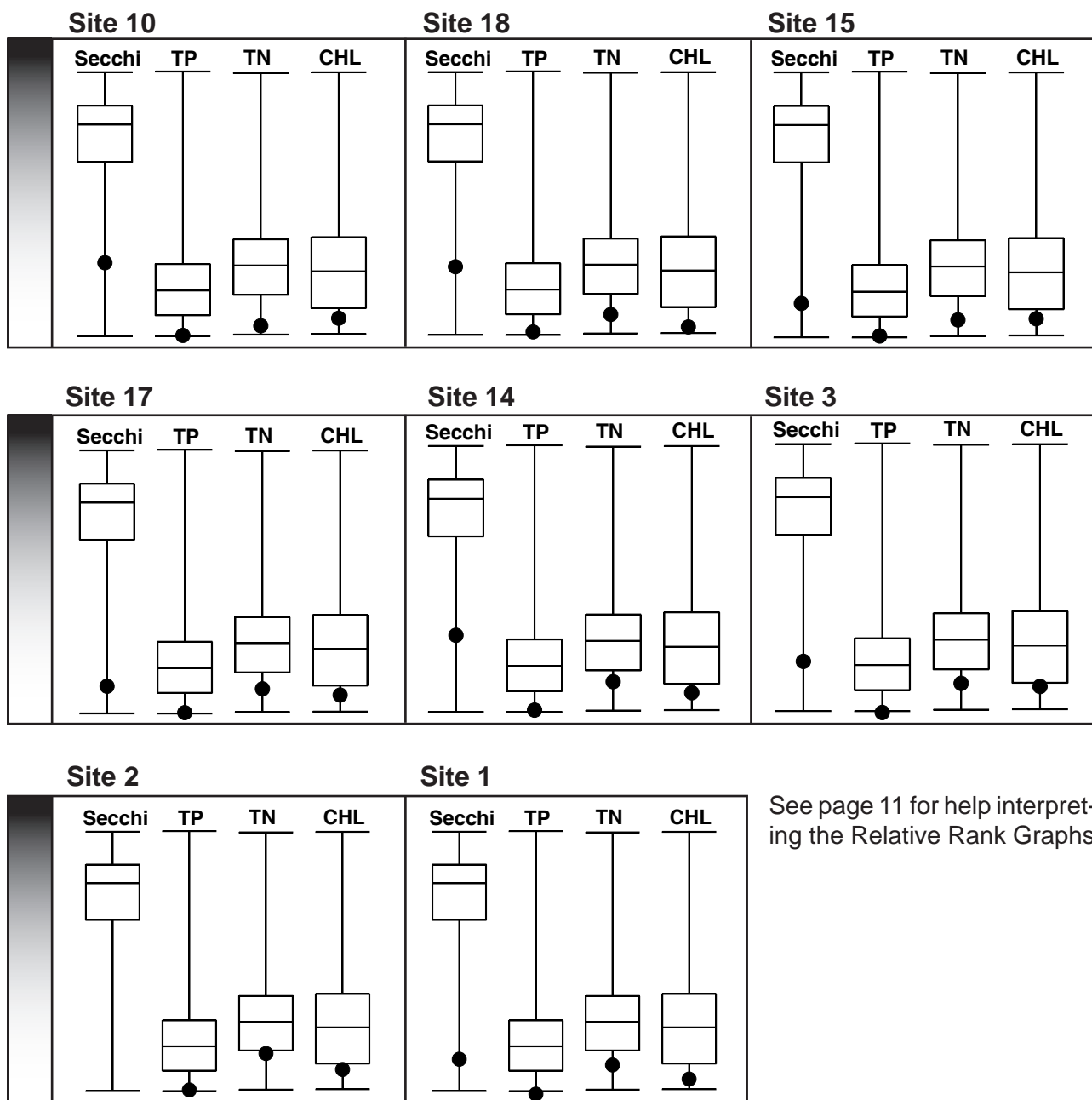
Table Rock Lake 2007

The eight main channel sites traditionally have very similar water quality, and 2007 is no exception. The relative rank graphs show that nutrient and chlorophyll concentrations at these sites are lower than found in 75% of Missouri lakes, and Secchi transparency is greater than found in 75% of Missouri lakes.

Nitrogen concentrations appear to be higher in the area from Indian Creek (Site 14) to Kimberling

City (Site 2), though the difference is quite small. These sites are also where the chlorophyll concentrations are the highest, but again the difference is quite small.

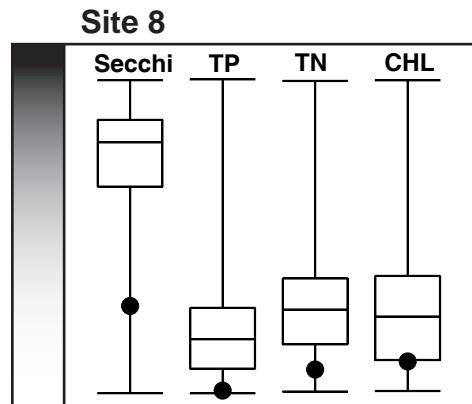
Water clarity was high in the main channel, and the maximum individual Secchi measurements were 227 and 232 inches at Site 15 and Site 17, respectively.



See page 11 for help interpreting the Relative Rank Graphs

Tributary Sites Relative Rank Graphs

Table Rock Lake 2007



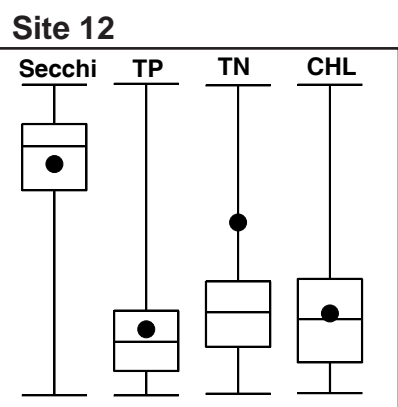
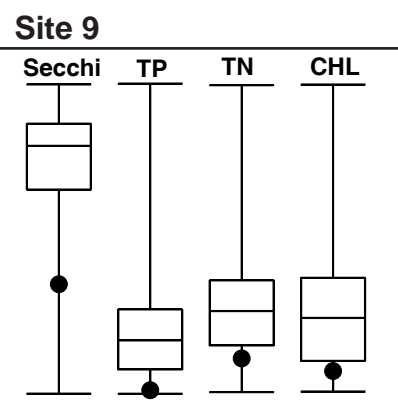
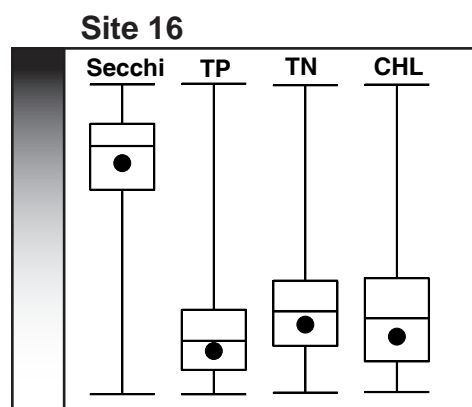
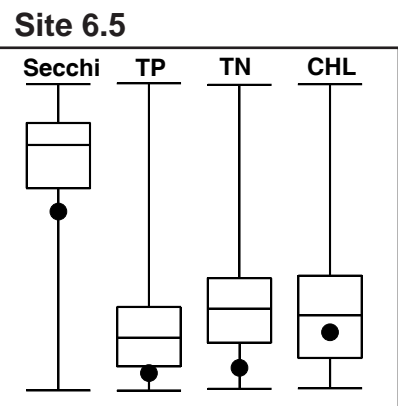
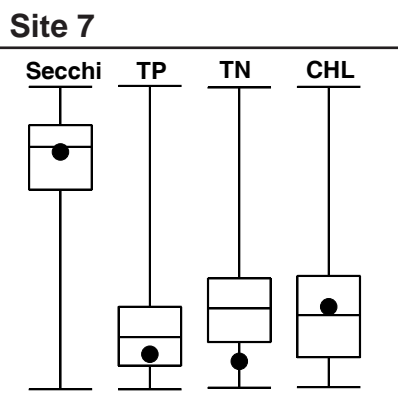
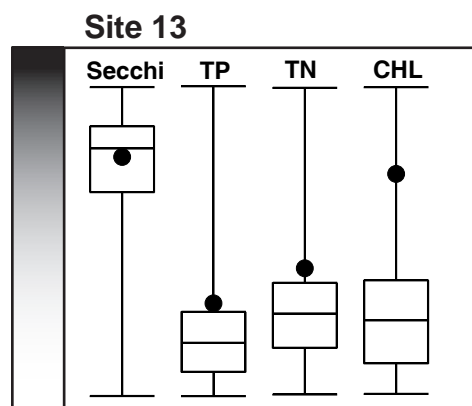
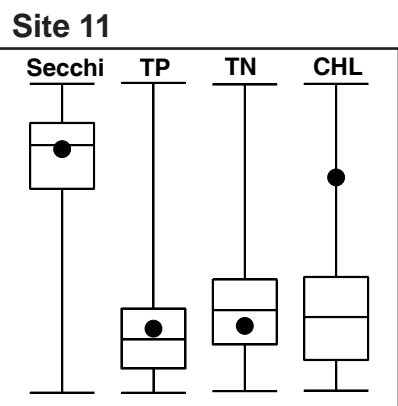
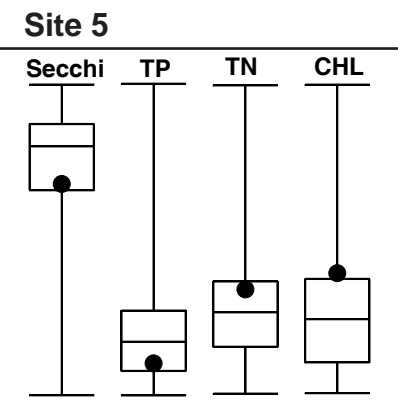
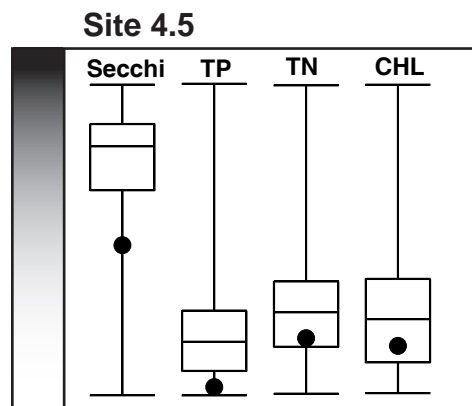
Relative Rank graphs for the tributary sites show at a glance which sites had higher concentrations of algal chlorophyll and nutrients.

Long Creek (Site 8) was very similar to the main channel, as was Indian Creek (Site 9).

The James River sites (4.5, 5, 11, 13) show increasing chlorophyll and phosphorus concentrations, and decreasing water clarity as the sites

move up the arm. Nitrogen concentrations were lower just below the 76 bridge near Cape Fair (Site 11) than they were at sites above (Site 13) and below (Site 5).

While Roaring River and Flat Creek (Sites 16 & 12) had water quality similar to most Missouri Lakes, Flat Creek nitrogen concentrations averaged higher than 75% of Missouri lakes.



Long Term Trends - Lower Main Lake

These four sites represent the main channel from the dam to Indian Creek.

As noted in previous years' data reports, phosphorus concentrations have been decreasing the Table Rock Lake for several years. These data show that trend very well, especially at the confluence with the James River Arm (Site 3).

Nitrogen concentrations have not decreased accordingly (graphs not shown),

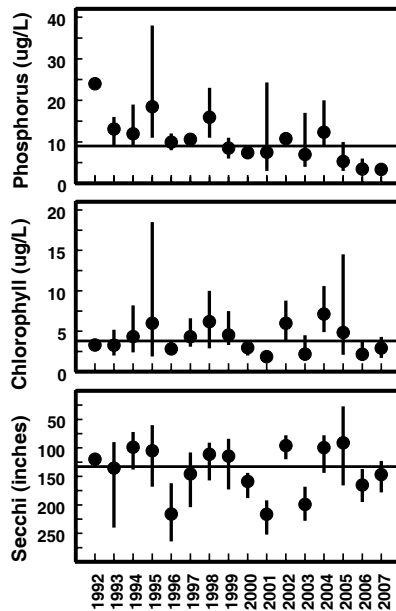
Table Rock Lake 2007

which provides further evidence that phosphorus reductions in effluent from wastewater treatment facilities is responsible for the observed decrease in phosphorus concentrations in Table Rock Lake.

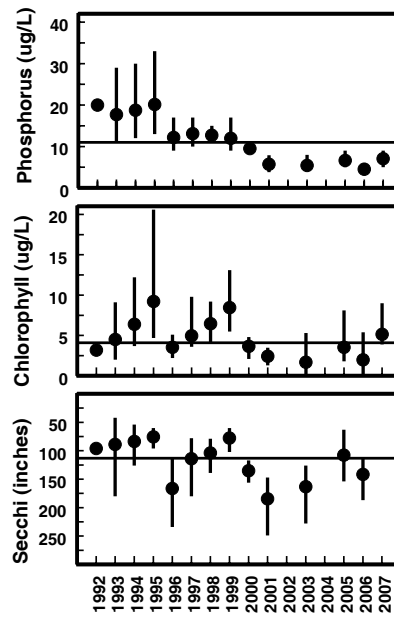
Algal biomass (chlorophyll concentration) is largely unchanged despite phosphorus decreases. However, 6 of the 7 lowest annual mean chlorophyll concentrations at Site 3 have occurred since 2000, indicating a possible trend.

TABLE ROCK TRENDS

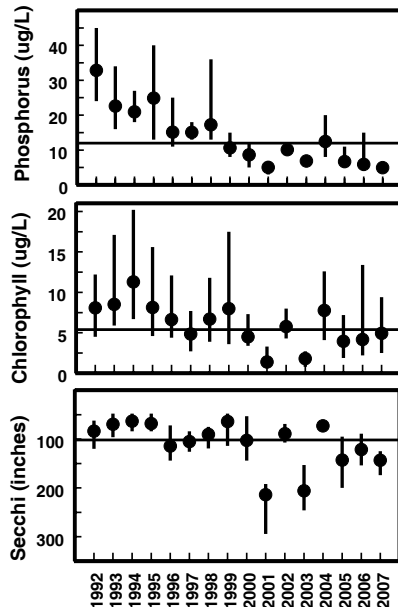
Site 1



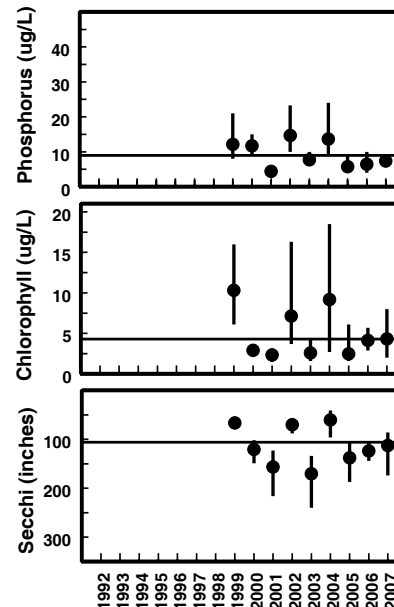
Site 2



Site 3



Site 14



Long Term Trends - Upper Main Lake

The decreasing phosphorus trend is evident at Site 10, which has been monitored since 1994. The sampling history for the remaining main channel sites above Indian Creek is less than 10 years and thus those sites do not show the trend.

These sites show higher concentrations of nutrients and algae, and lower secchi transparency values in 2002 and 2004 relative to other years. This phenomenon was observed in the lower James River

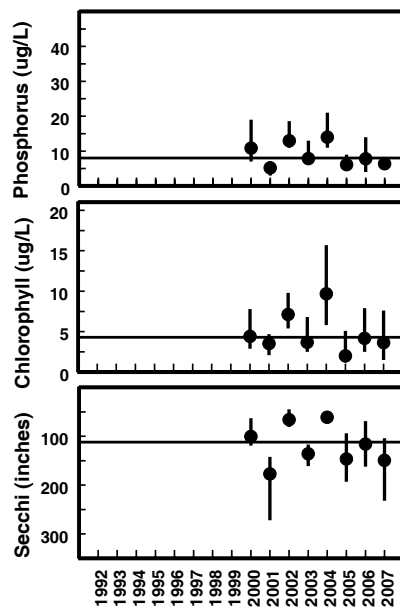
Table Rock Lake 2007

arm sites, Long Creek and Indian Creek, but not in the King's River, Roaring River or the upper James River Arm. This is likely a climate related phenomenon and not specifically related to increased human activity during those years.

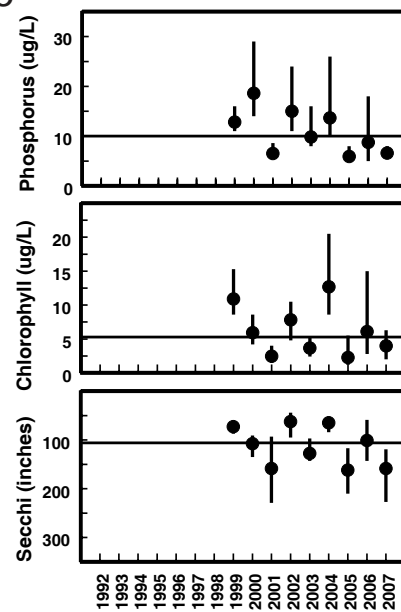
Each of these upper-lake main channel sites had lower than average phosphorus and chlorophyll concentrations, and higher than average Secchi transparency values in 2007.

TABLE ROCK TRENDS

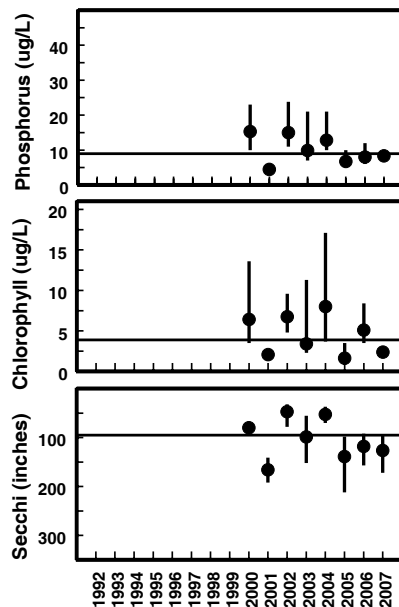
Site 17



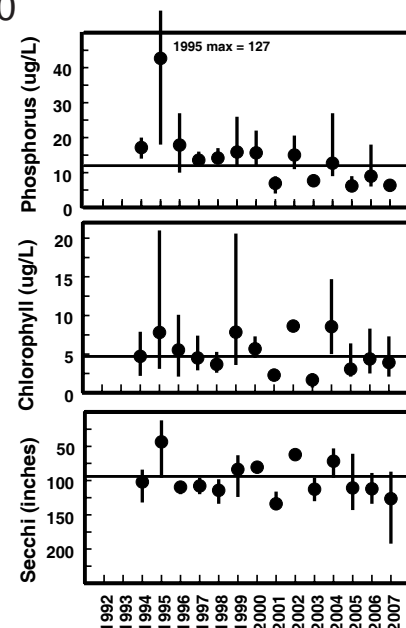
Site 15



Site 18



Site 10



Long Term Trends - James River Arm

Throughout the James River Arm, both chlorophyll and phosphorus were higher in 2007 than in 2006. Chlorophyll concentrations tended to be greater than the long-term mean during 2007, while phosphorus concentrations tended to be below the long-term mean.

The James River Arm of Table Rock lake has historically had higher concentrations of nutrients and algae than the main channel, with concentrations increasing with distance up-lake.

Table Rock Lake 2007

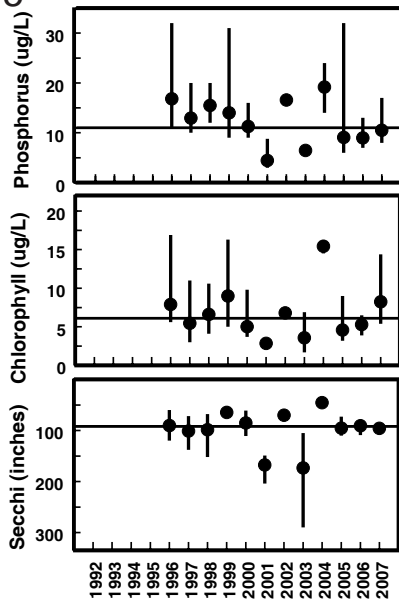
Site 4.5 (at Aunt's Creek) shows the elevated 2002 and 2004 nutrient/chlorophyll concentrations discussed on the previous page, which masks the trend of decreasing phosphorus concentrations seen at the other James River and main channel sites.

Secchi transparency values at Site 13 appear to be increasing over the years, with all transparency values since 2001 greater than the site's long-term mean.

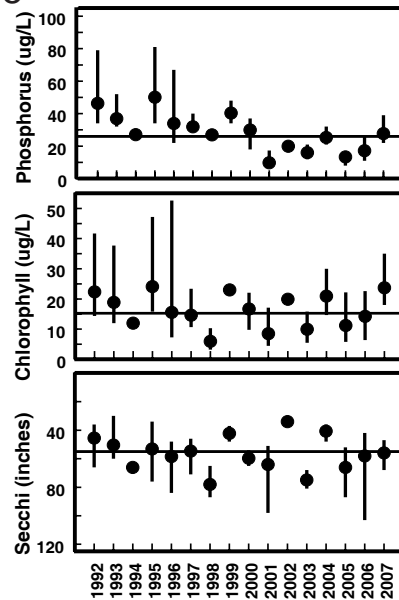
Note that the scales of these graphs may vary widely!

TABLE ROCK TRENDS

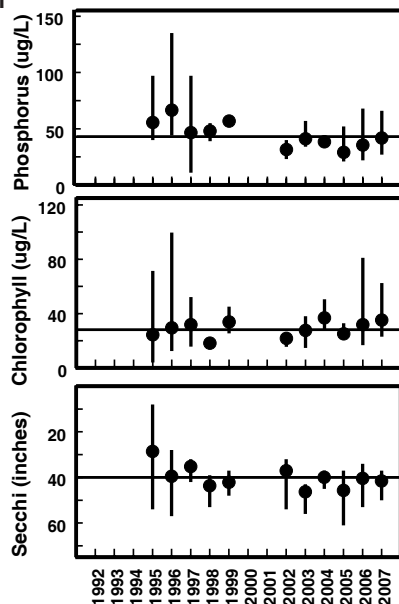
Site 4.5



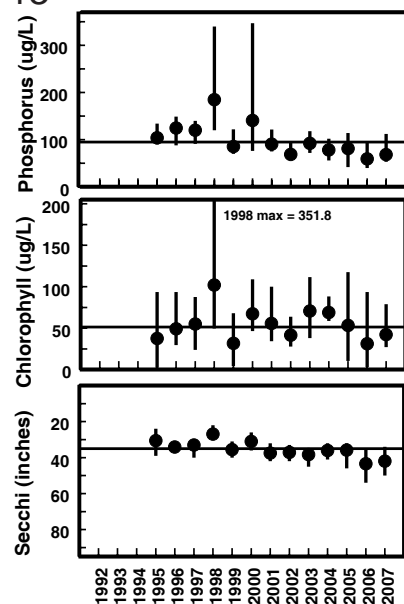
Site 5



Site 11



Site 13



Long Term Trends - King's River Arm

Table Rock Lake 2007

Site 6.5 in the King's River Arm has been monitored since 1992. For several years the concentrations of phosphorus and chlorophyll appeared to be increasing. This led to a reduction in water clarity (Secchi). This trend was not observed at Site 7, since monitoring at that site did not begin until several years later.

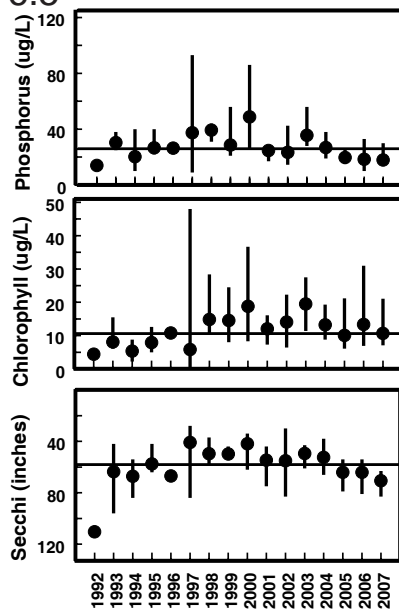
Since 2001, however, concentrations of nutrients and chlorophyll appear to be de-

creasing. As a result, for the past three years the water clarity at Site 6.5 has been at a 10-year high, and Site 7 had its highest clarity ever during the last two years (as measured by the LMVP).

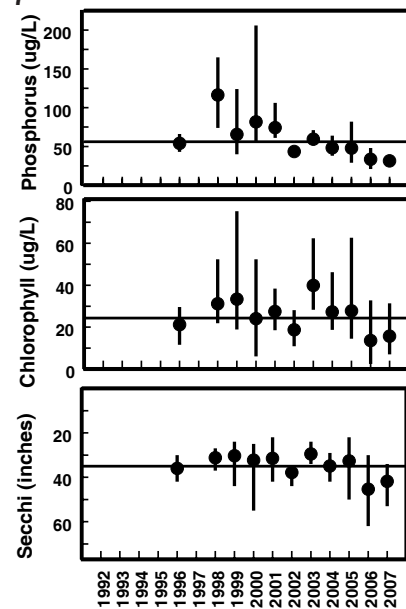
The Viola access, where only Secchi transparency is measured, shows no trends, with water clarity remaining in the range of 80 inches.

TABLE ROCK TRENDS

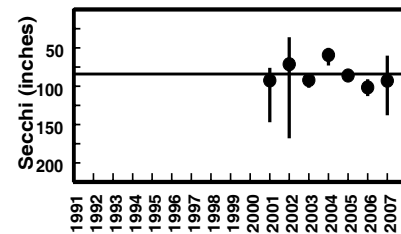
Site 6.5



Site 7



Viola Access



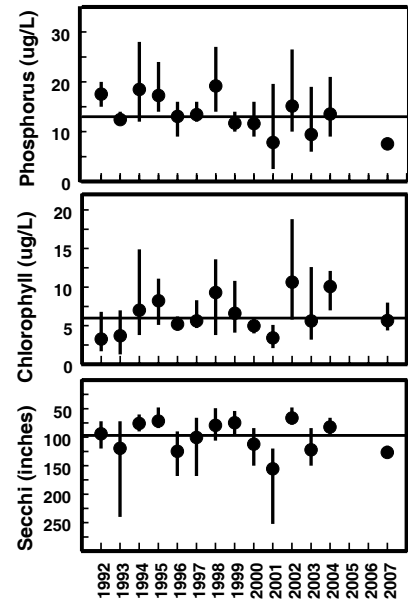
Long Term Trends - Other Tributaries

Table Rock Lake 2007

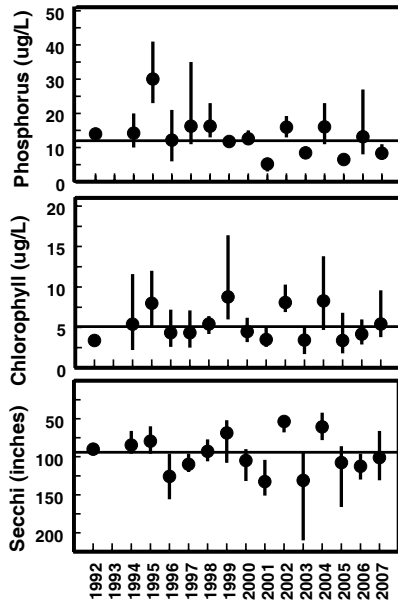
2007 phosphorus concentrations in Long Creek (Site 8) varied little and were among the lowest observed at that site. Although chlorophyll concentrations were comparable to the long-term mean, the Secchi transparency was slightly deeper than average.

This site is being monitored again after a few years of inactivity.

Site 8



Site 9

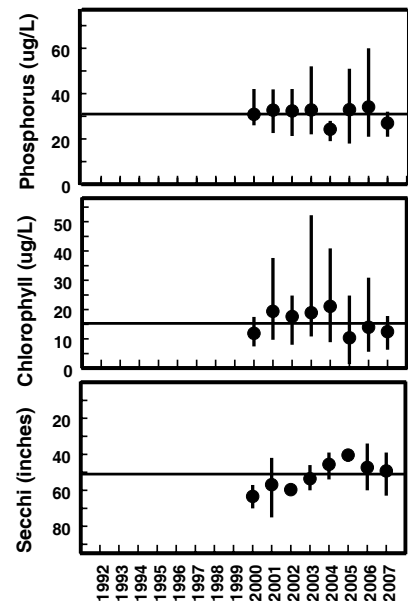


Indian Creek (Site 9) has had higher year to year variability for the last several seasons, though average concentrations of phosphorus appear to be trending downward.

Chlorophyll concentrations were higher in 2007 than in the previous two years, but were still comparable to the long-term mean.

Elevated nutrient and chlorophyll concentrations of 2002 and 2004 are apparent at Indian Creek, resulting in decreased water clarity for those years.

Site 16



Roaring River (Site 16) has been monitored since 2000. This site has had phosphorus concentrations consistently in the 30 $\mu\text{g/L}$ range each year.

Chlorophyll concentrations have been below the long-term mean for the last three years, yet Secchi transparency appears to be declining. As mentioned last year, this may be the result of sediment particles negatively influencing water clarity.

2007 Trends

The graphs to the right show the 2007 Secchi transparency values at several Table Rock Lake Sites.

The top graph shows four main channel sites. All sites tended to vary together, with water clarity decreasing after June. Of note is the dotted line at 100 inches. Only three times throughout 2007 did the Secchi at these sites fall below 100 inches.

The next graph shows the four James River sites. Water clarity did not vary much at each site during the 2007 sampling season. Clarity did vary from site to site, however. This graph has the same dotted line at 100 inches seen in the previous graph. On only one occasion at Site 4.5 does the Secchi transparency reach this line.

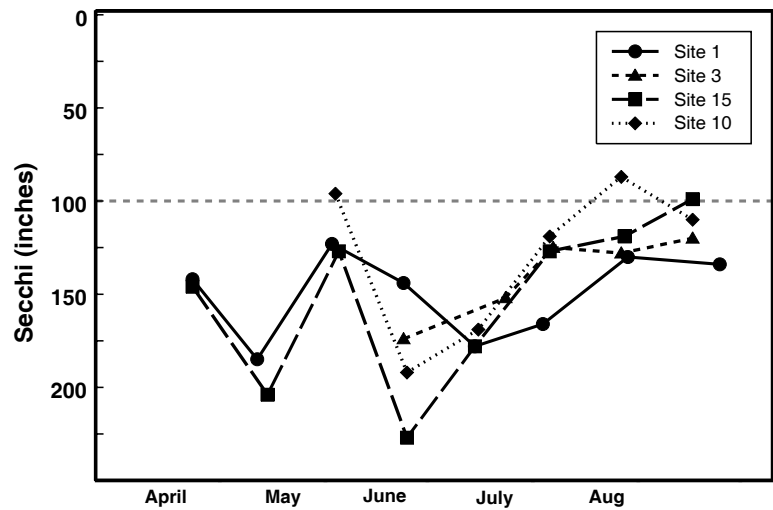
The next graph shows two King's River sites (Sites 6.5 & 7) as well as Long Creek (Site 8) and Indian Creek (Site 9). Like the James River Arm, the two King's River sites had rather consistent Secchi values throughout the season. The Indian and Long Creek sites were more variable than the King's River sites, but not as variable as those in the main channel.

Neither Flat Creek or the Roaring River reached the 100 inch Secchi mark during 2007. Secchi in Flat Creek decreased as the season progressed, while Roaring River's Secchi values showed little change all summer.

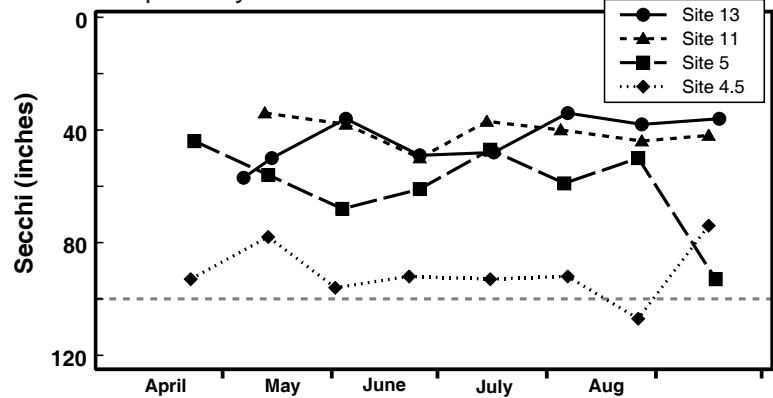
TABLE ROCK TRENDS

Table Rock Lake 2007

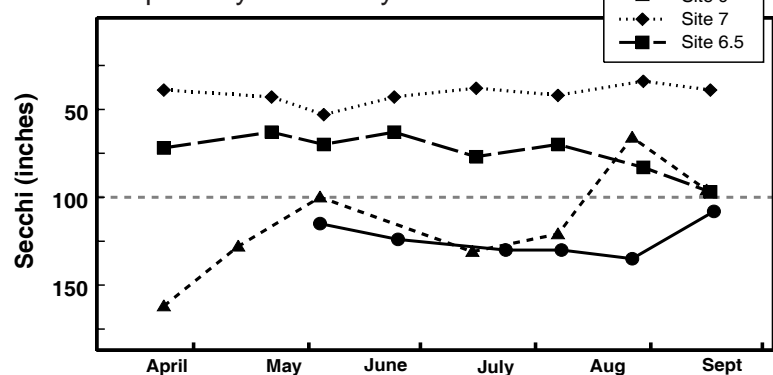
Secchi transparency in the main channel



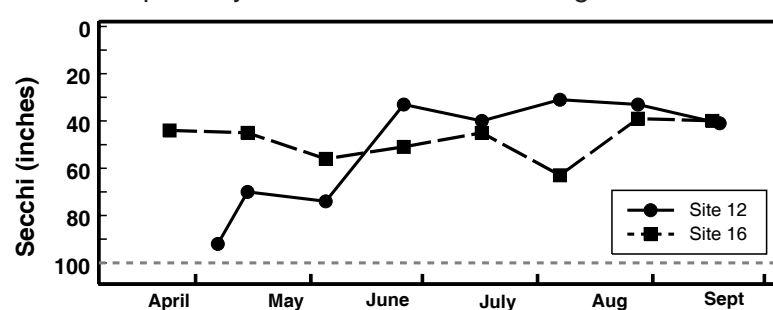
Secchi transparency in the James River Arm



Secchi transparency in tributary sites



Secchi transparency in Flat Creek and Roaring River



2007 Trends

Table Rock Lake 2007

TABLE ROCK TRENDS

Like the Secchi graphs on the previous page, these graphs show 2007 phosphorus concentrations at various Table Rock Lake sites. For these graphs, the dotted line represents 15 $\mu\text{g/L}$.

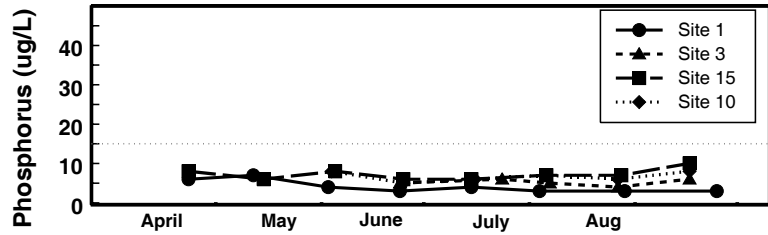
The first graph shows the sites in the main channel. The maximum main channel phosphorus concentration during 2007 was 11 $\mu\text{g/L}$, well below the dotted line. Phosphorus concentrations within the main lake typically varied only 5 $\mu\text{g/L}$ throughout the season.

The next graph shows the James River sites. Notice that the scale of the vertical axis is more than double that of the main channel sites, extending to 120 $\mu\text{g/L}$. All phosphorus values from all sites were greater than 15 $\mu\text{g/L}$ (dotted line). Phosphorus concentrations at the two upstream sites varied considerably more than at the two sites nearer the main channel.

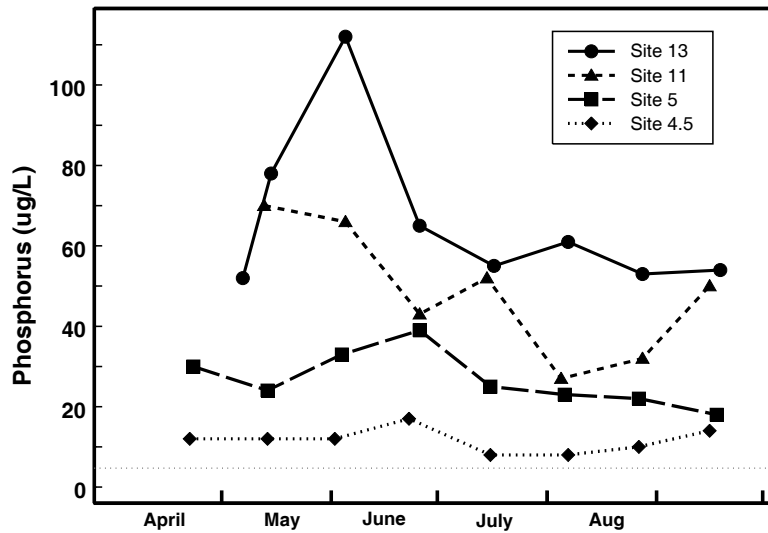
Note the scale change in the next graph, showing data from Long Creek, Indian Creek and the King's River. Phosphorus concentrations at Site 7 increased as the season progressed, while at Site 6.5, they did not. The Long and Indian Creek sites behaved very much like the main channel.

Flat Creek and Roaring River had similar phosphorus concentrations in 2007, with the exception of some very high values at Flat Creek in late June and mid July.

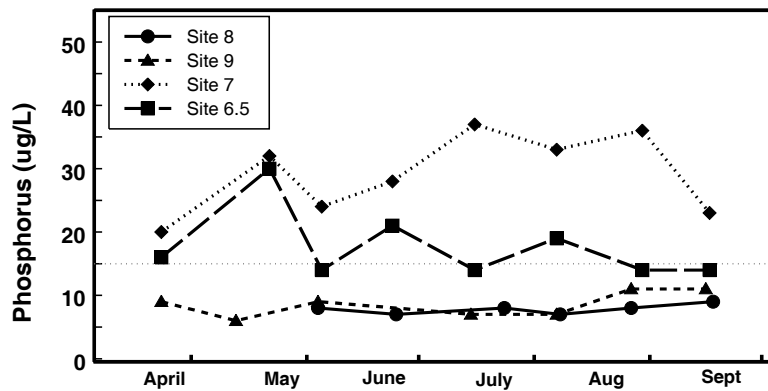
Phosphorus concentrations in the main channel



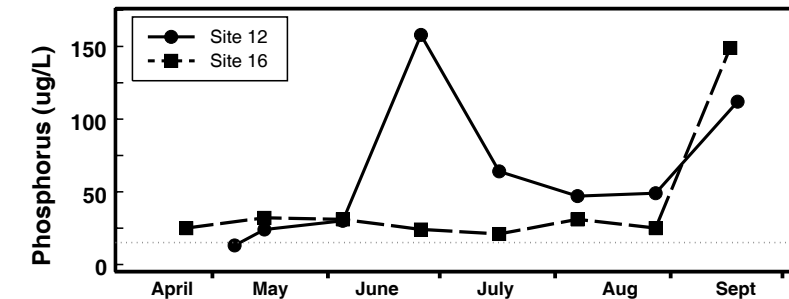
Phosphorus concentrations in the James River Arm



Phosphorus concentrations in tributaries



Phosphorus concentrations in Flat Creek and Roaring River



Additional monitoring sites: Roaring River

Two Roaring River sites were added in response to community concern about newly constructed chicken houses in the watershed. One site is located above the stream that runs through the property with the Concentrated Animal Feeding Operation (CAFO), and the other site is just below. The two sites are approximately 1.4 miles apart, with the stream that drains the property approximately in the center of the stretch.

From September 21, 2007 through February 10, 2008, the nitrogen concentrations at the two sites were very similar, with concentrations slightly higher above the stream which drains the property. Phosphorus concentrations were also higher above the stream which drains the property.

So far it appears that the new chicken houses are having no negative impact on water quality.

Monitoring will continue.

