Utah Lake Watch Final Report Summer 2003

Introduction

This annual report on the Utah Lake Watch program contains a description of the volunteer monitoring program's activities during the summer of 2003, as well as a summary of results from each of the lakes monitored (Table 1).

The Utah Lake Watch program enlists volunteers to take Secchi disk readings in lakes and reservoirs throughout Utah. Secchi disk depths measure the water clarity and are useful to scientists and lake managers in tracking the health of a lake. Utah Lake Watch volunteers are able to collect more data than would be collected otherwise. These data provide information on lake dynamics throughout a summer and from year to year.

All volunteers were trained in the use of a Secchi disk, which is a simple device originally designed for use by volunteers. Table 2 contains a list of volunteers for each lake or reservoir sampled during the summer of 2003. Volunteers were provided with data sheets, educational materials, and a Secchi disk. Each lake also received an updated lake poster, describing how lakes function and how the volunteer monitoring program helps in understanding the lake's health. A small copy of this poster is included in the appendix of this report.

Results

During the summer of 2003, 14 lakes and reservoirs were monitored. All results are tabulated in Table 3 with Secchi measurements converted to trophic state indices (TSI values). In addition, results from individual lakes are shown graphically in Figures 1-14, as well as trophic state indices since 1990 calculated by the Division of Water Quality (DWQ). The DWQ used 3 parameters to measure the TSI value; Secchi depth, phosphorus, and chlorophyll. Measurements were taken twice during the summer at several stations located on each lake or reservoir (UWQARC, 2002). TSI values from 1990-2003 for each lake or reservoir are shown in Figure 15.

The intensity of effort by volunteers varied from two measurements at East Canyon to 24 measurements at Hyrum (Figure 4 and 5). Average Secchi depths ranged from 0.81 to 6.25 at Yuba Lake and East Canyon Reservoir respectively. The TSI values were 30 at East Canyon and 60 at Yuba Reservoir. Although the classification of lakes ranged from oligotrophic to eutrophic, most of the lakes and reservoirs TSI value fell between 40-50 indicating mesotrophic classifications.

Discussion

Care should be taken in interpreting lake health based on one parameter alone. A TSI index can be calculated using several different indicators of lake health, including water clarity, phosphorus concentration in the lake, and chlorophyll concentration. See Table 3 for the conversion formula from Secchi depth to TSI value and TSI classification.

Typically these parameters are correlated to each other – high phosphorus concentrations may stimulate excessive plant growth (high chlorophyll concentrations), leading to low water clarity (low Secchi depths). These measurements are not always related, however. For example, shallow lakes with a high degree of suspended sediment from wind activity may have low water clarity but also low chlorophyll concentrations. In other cases, nitrogen rather than phosphorus may limit algal growth in a lake. In these cases, phosphorus is not well correlated to chlorophyll or to water clarity.

The 2003 TSI values based on Secchi depth alone suggest that Bear Lake, Deer Creek and East Canyon would all be considered oligotrophic, while Pineview, Otter Creek, Piute and Yuba Reservoirs were all in a eutrophic condition. All other water bodies would be considered mesotrophic. Year to year trends were not evident in many of the lakes, although Quail Creek and North Huntington Lake show signs of deteriorating water quality over the past few years, while Deer Creek and East Canyon have had improving trends. The water level at Deer Creek was low the entire summer which may have affected the water clarity. The role of low water flows on East Canyon is not known.

The aging of lakes and reservoirs is a naturally occurring process often referred to as eutrophication. Eutrophication begins when a body of water becomes enriched with nutrients such as nitrates and phosphates which enhance the growth of aquatic plants. Excess plant production results in more senescence creating an abundance of dead, decaying organic matter. Bacteria begin decomposing the plant material by using oxygen in the water column, resulting in oxygen depletion throughout the lake.

Human activities such as agriculture and recreation can accelerate the input of nutrients to a lake. Our hope is that volunteer efforts such as these, increase public awareness about the importance of Utah's Lakes and Reservoirs and inform citizens about how they can help to keep our watersheds functioning and our lakes in good health.

Appendix

Table 1. The data collected by ULW volunteers for each lake or reservoir.

Bear Lake

Volunteer: Scott Tolentino **Placed sampled: UTM's 0467773 N, 4645826 E**

Date	*Time*	*Weather*	*1 day ago*	*Secchi Depth (m)*	*TSI*	*Comments*
4/29/2003	1030	1		4.50	38.3	calm
5/19/2003	1000	1		4.50	38.3	light breeze
6/10/2003	1015	1		5.80	34.7	calm and clear
6/19/2003	1047	1		5.80	34.7	calm and clear
7/2/2003	1015	1		5.90	34.4	calm and clear
7/19/2003	1130	1		5.90	34.4	
8/15/2003	910	1		3.45	42.2	sun, breezy, rained night before
9/22/2003	1115	1		6.25	33.6	sunny and calm
10/10/2003	1030	1		5.75	34.8	light breeze
Average				*5.32*	*36.2*	

Causey Reservoir

Volunteer: Paul and Jonathan Baker **Place sampled:**

Date	*Time*	*Weather*	*1 day ago*	*Secchi Depth (m)*	*TSI*	*Comments*
6/2/2003	1830	3	4	2.38	47.5	Algae on the shore; the water is a greenish color
6/20/2003	1900	3	4	2.09	49.4	Algae in clumps; water fairly warm; lots of swimmers
7/6/2003	700	3		1.97	50.2	Water much colder than the previous time; no one swimming; algae in clumps
7/21/2003	1935	1		3.30	42.8	
8/5/2003	1125	3		3.05	43.9	
8/23/2003	1740	1	4	4.42	38.6	
9/20/2003	1625	1	4	2.30	48.0	
Average				*2.79*	*45.8*	

Deer Creek Reservoir

Volunteer: Rick Redmon **Place sampled: Between the two buoys at the dam.**

Date	*Time*	*Weather*	*1 day ago*	*Secchi Depth (m)*	*TSI*	*Comments*
6/28/2003	1350	1		6.50	33.0	water level low
6/30/2003	1345	1		6.10	33.9	water level low
8/30/2003	1230	3	4	4.50	38.3	water level low and stormy
9/1/2003	1410	1	4	4.30	39.0	water level low
Average				*5.35*	*36.1*	

East Canyon

Volunteer: Andrea Carrigan **Place sampled: UTM 550408.69 E 4529961.15 N**

Date	*Time*	*Weather*	*1 day ago*	*Secchi Depth (m)*	*TSI*	*Comments*
5/10/2003	1030	1		7.90	30.2	
6/5/2003	1545	3		5.00	36.8	
Average				*6.45*	*33.5*	

Hyrum Reservoir

Volunteer: Floyd Powell and Lee Gyllenskog **Place sampled: UTM 572381.26 E 4608698.85 N**

Date	*Time*	*Weather*	*1 day ago*	*Weather 2 days ago*	*Secchi Depth (m)*	*TSI*	*Comments*
5/31/2003	1400	1			3.85	40.6	
6/3/2003	1635	1	3	4	2.65	46.0	
6/14/2003	1918	1			2.00	50.0	busy boating day
6/21/2003	1751	1	3	4	3.10	43.7	rained in morning (7)
6/25/2003	1226	1	2	4	3.65	41.3	rained yesterday (6-24) 68°
6/27/2003	1440	1			2.90	44.7	
7/3/2003	1705	1	3	4	2.20	48.6	
7/6/2003	1231	1			2.50	46.8	
7/10/2003	1718	1	4		2.30	48.0	water 77° air 100°
7/12/2003	1542	1	3		2.15	49.0	water 78° air 98°
7/15/2003	1959	1	3		2.30	48.0	
7/18/2003	1757	2			2.55	46.5	depth 45 feet
7/19/2003	1610	1	3		2.10	49.3	water 78° air 96°
7/24/2003	1505	1	3	4	2.80	45.2	water 79 ° air 97°
8/2/2003	1521	2	4		2.65	46.0	water 78° air 92°
8/3/2003	1535	2	4	7	5.00	36.8	water 7° air 86°
8/14/2003	1453	3			2.10	49.3	water 78° air 95°
8/23/2003	1631	3	4		1.90	50.8	water 76° air 84° rained 8/22/03
8/24/2003	1248	3	4		2.10	49.3	water 77° air 80°
8/30/2003	1721	2	3	4	1.90	50.8	water 74° air 78°
9/1/2003	1909	3			1.85	51.1	water 73° air 83°
9/12/2003	1100	1	4		2.00	50.0	water 66° air 70°
9/16/2003	900	2	4	4	1.90	50.8	water 64° air 68°
9/20/2003	1210	2	3		2.20	48.6	water 65° air 74°
Average					*2.53*	*47.1*	

North Huntington Reservoir

Volunteer: Dan Richards **Place sampled: UTM 550408.69 E 4529961 N**

Date	*Time*	*Weather*	*1 day ago*	*Secchi Depth (m)*	*TSI*	*Comments*
5/29/2003	1000			3.15	43.5	calm 40' deep clear
6/8/2003	930			3.09	43.7	calm 40' deep clear
6/30/2003	900			3.06	43.9	calm 39' deep clear
7/7/2003	1000			2.40	47.4	calm 40' deep clear
7/29/2003	1030			1.97	50.2	calm 38' deep partly cloudy
8/12/2003	1300			1.85	51.1	slight breeze 35' deep clear
8/31/2003	1200			1.83	51.3	calm 32' deep clear
9/22/2003	1400			1.85	51.1	slight breeze 32' deep clear
Average				*2.4*	*47.8*	

Otter Creek Reservoir

Volunteer: Joe Russell **Place: 180 yards north of Otter Creek RV docks.**

Date	*Time*	*Weather*	*1 day ago*	*Secchi Depth (m)*	*TSI*	*Comments*
7/10/2003	1220	1		3.55	41.7	obvious algal bloom
7/28/2003	1400	2		1.30	56.2	thunderstorm yesterday
8/15/2003	1310	3		0.85	62.3	thunderstorm yesterday
8/29/2003	1305	3		0.40	73.2	murky, low water (discontinued after this due to low water)
Average				*1.53*	*58.4*	

Pineview Reservoir

Volunteer: Keith Runckles **Place sampled:**

Date	*Time*	*Weather*	*1 day ago*	*Secchi Depth (m)*	*TSI*	*Comments*
5/17/2003	1800			1.70	52.4	low run off
6/3/2003	1630			2.40	47.4	
6/19/2003	1700			3.30	42.8	
7/1/2003	1830			4.30	39.0	
7/16/2003	1800			3.40	42.4	
8/5/2003	1730			1.70	52.4	
8/19/2003	1730			1.40	55.2	
9/4/2003	1630			1.30	56.2	
9/28/2003	1800			0.90	61.5	
Average				*2.27*	*49.9*	

Piute Reservoir

Volunteer: John Russell **Place sampled: 266 yards from dam outlet gate**

Date	*Time*	*Weather*	*1 day ago*	*Secchi Depth (m)*	*TSI*	*Comments*
7/10/2003	1500	1		2.20	48.6	
7/28/2003	1205	3		1.15	58.0	thunderstorm yesterday
8/8/2003	1330	2		0.70	65.1	obvious algal blooms (discontinued due to low water)
Average				*1.35*	*57.3*	

Quail Creek Reservoir

Volunteer: Gary Pascoe **Place Sampled: UTM 710857.45 E 4118212.86 N**

Date	*Time*	*Weather*	*1 day ago*	*Secchi Depth (m)*	*TSI*	*Comments*
5/6/2003	1645	1	4	3.07	43.8	normal wind 4mph
5/17/2003	1400	1	4	2.90	44.7	normal wind 3-4 mph
5/24/2003	1515	1	4	2.80	45.2	normal wind 4mph
6/7/2003	1635	1	4	2.80	45.2	normal wind 4mph
6/29/2003	1515	1	4	2.30	48.0	normal wind 4-6 mph, hazy due to fires
7/12/2003	1630	1	4	2.50	46.8	normal wind
7/26/2003	1445	1	4	2.00	50.0	normal breeze
8/10/2003	1755	1	4	2.00	50.0	normal breeze
8/30/2003	1845	1	4	2.60	46.2	normal breeze
9/14/2003	1745	1		2.20	48.6	no wind
9/28/2003	1615	1	4	2.40	47.4	normal breeze
Average				*2.51*	*46.9*	

Rockport Resrevoir

Volunteer: Joe Donnell **Placed sampled: UTM 533930.77 E 4515409.24 N**

Date	*Time*	*Weather*	*1 day ago*	*Secchi Depth (m)*	*TSI*	*Comments*
5/2/2003	940	1		4.22	39.3	very windy week prior
6/14/2007	1640	1		4.03	39.9	

7/6/2003	1510	1		4.52	38.3	
8/3/2003	1320	1		4.05	39.8	lots of algae in water
Average				*4.21*	*39.3*	

Starvation Reservoir

Volunteer: Lawrence Twitchell **Placed Sampled:**

Date	*Time*	*Weather*	*1 day ago*	*Secchi Depth (m)*	*TSI*	*Comments*
6/14/2003	12:04			3.00	44.2	
6/20/2003	1106			3.40	42.4	
7/12/2003	1106			2.80	45.2	
8/9/2003	1245			5.40	35.7	
8/24/2003	1430			6.20	33.7	
8/30/2003	1200			4.00	40.0	
Average				*4.1*	*40.2*	

Wide Hollow

Volunteer: Kendall Farnsworth **Placed Sampled:**

Date	*Time*	*Weather*	*1 day ago*	*Secchi Depth (m)*	*TSI*	Test results may be inconclusive
5/27/2003	840	1	1	4.40	38.7	due to depth of lake. The secchi
6/14/2003	900			3.50	41.9	was likely coverd in lake

						bottom
7/4/2003	1630	4		3.00	44.2	moss.
Average				*3.63*	*41.6*	

Yuba Lake

Volunteer: Chris Evans **Place sampled: Buoy #3 from south side of dam**

Date	*Time*	*Weather*	*1 day ago*	*Secchi Depth (m)*	*TSI*	*Comments*
5/6/2003	1120	1	4	0.49	70.3	46' deep
5/20/2003	1140	1	4	0.65	66.2	45' deep
6/3/2003	950	1	4	1.80	51.5	42' deep
6/17/2003	1119	1	4	0.75	64.1	38' deep
7/1/2003	1421	1	4	0.50	70.0	30' deep
7/15/2003	1513	2	4	0.65	66.2	26' deep
Average				*0.81*	*64.7*	

Table 2. The 2003 Utah Lake Watch program list of volunteers and the lakes or reservoirs they monitor.

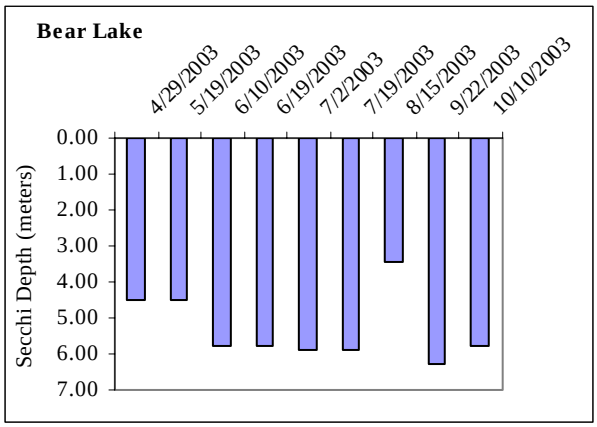
Lake or Reservoir	**Volunteer**
Bear Lake	Scott Tolentino
Causey Reservoir	Paul and Jonathan Baker
Deer Creek Reservoir	Rick Redmon
East Canyon	Andrea Carrigan
Hyrum Reservoir	Lee Gyllenskog
North Huntington	Dan Richards
Otter Creek	John Russell
Pineview Reservoir	Keith Runckles
Piute Reservoir	John Russell
Quail Creek	Gary Pascoe
Rockport Reservoir	Joe Donnell
Starvation Reservoir	Lawrence Twitchell
Wide Hollow	Kendall Farnsworth
Yuba Lake	Chris Evans

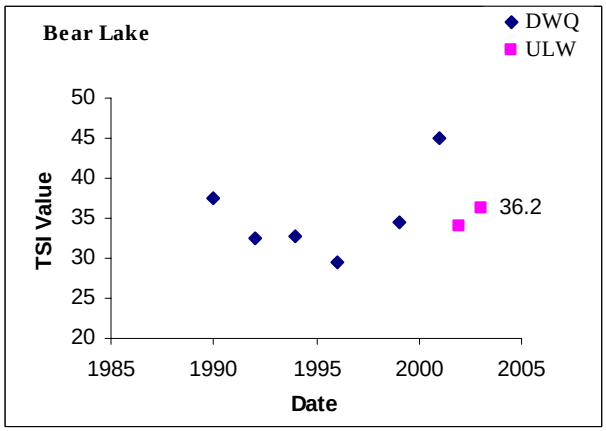
Table 3 . The Trophic State Index is calculated using Secchi depth measurements. TSI = 60-(14.41*ln (average Secchi depth)) (UWQARC, 2002).

Classification	***Definition***	***TSI Index Value***
Oligotrophic	A water body having low turbidity and abundant dissolved oxygen.	< 40
Mesotrophic	A water body having moderate turbidity and moderate dissolved oxygen.	40-50
Eutrophic	A water body having high turbidity and low amounts of dissolved oxygen.	50 - 70
Hypereutrophic	A water body that is extremely turbid and exceptionally low in dissolved oxygen.	>70

Figure 1-14. Secchi depth graphs are the data collected in 2003 by the ULW volunteers. The average TSI graphs are a combination of volunteer data and the Division of Water Quality. Values from 1990-2003 were taken from 1990-2000 every two years by the DWQ and were calculated using Secchi depths, phosphorus, and chlorophyll (UWQARC, 2002). The TSI values taken in 2002 and 2003 only used Secchi depths as a measurement taken by the ULW volunteers.

Figure 1.





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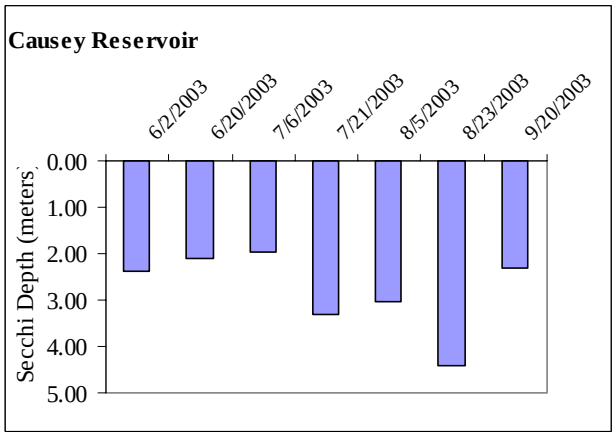

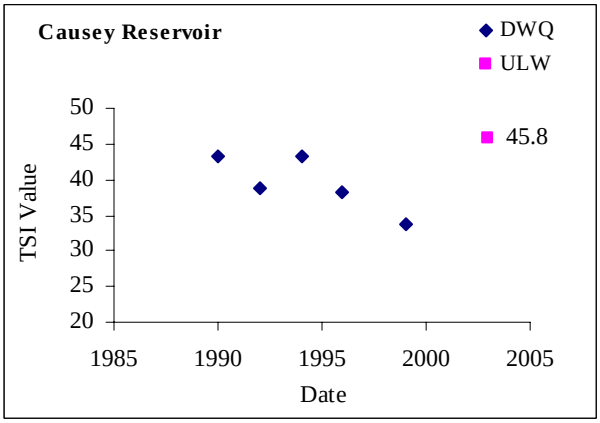

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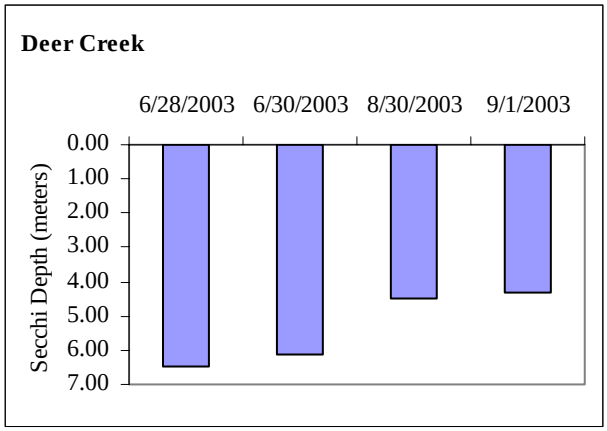

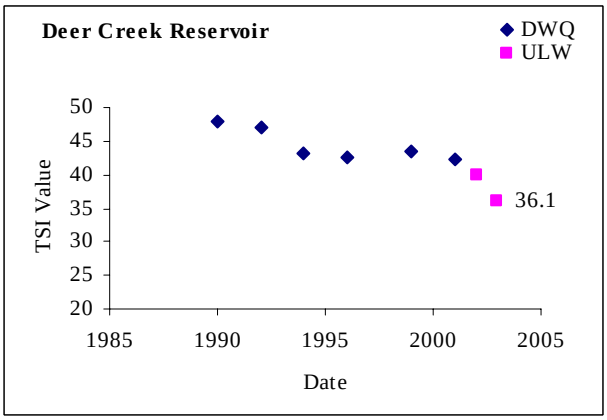

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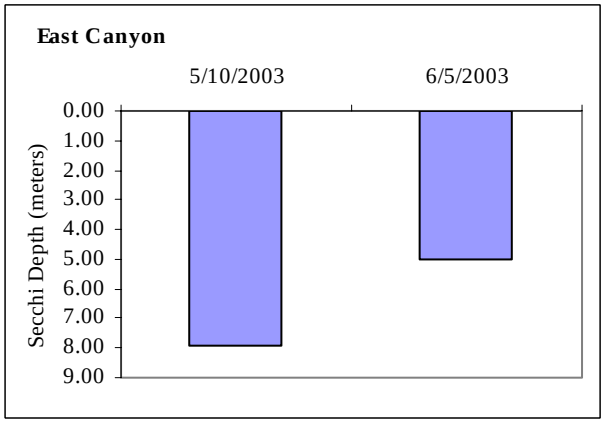

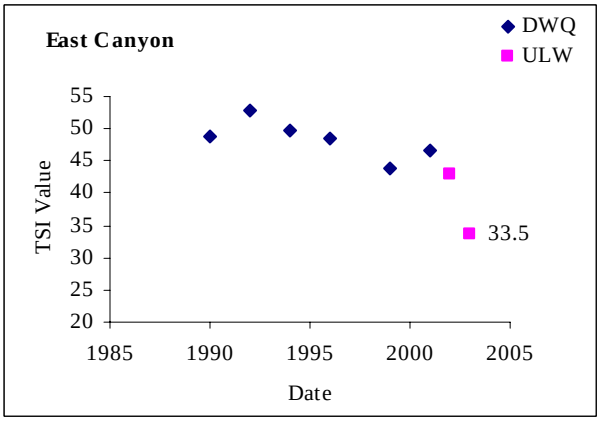

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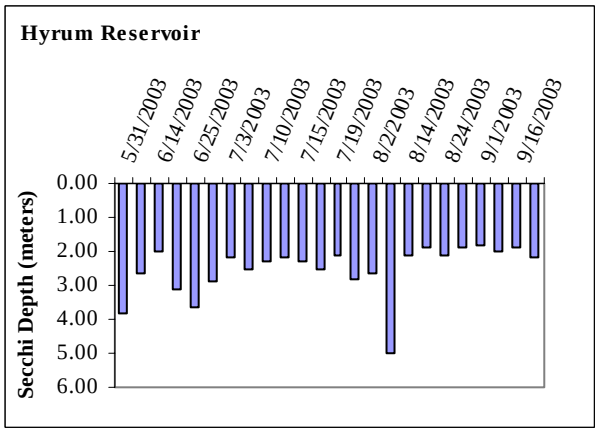

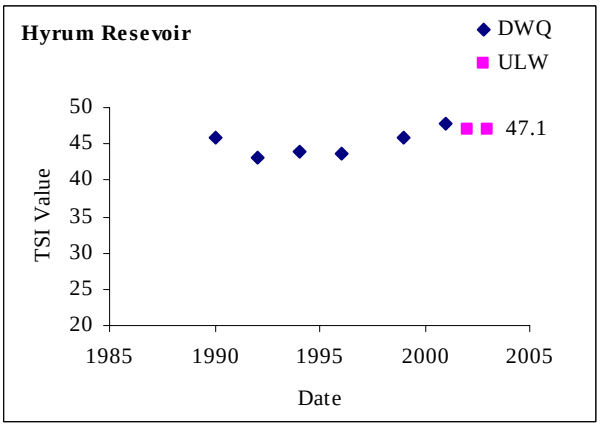

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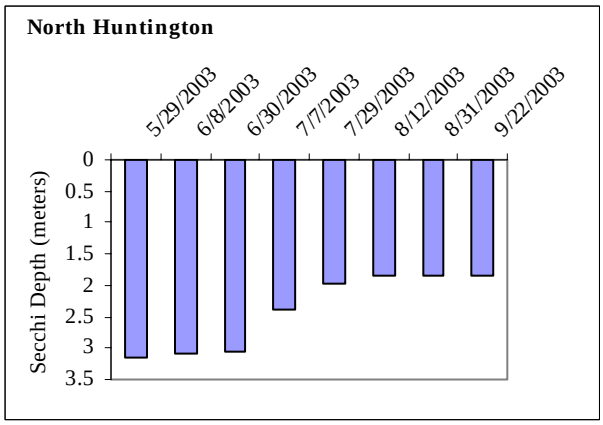

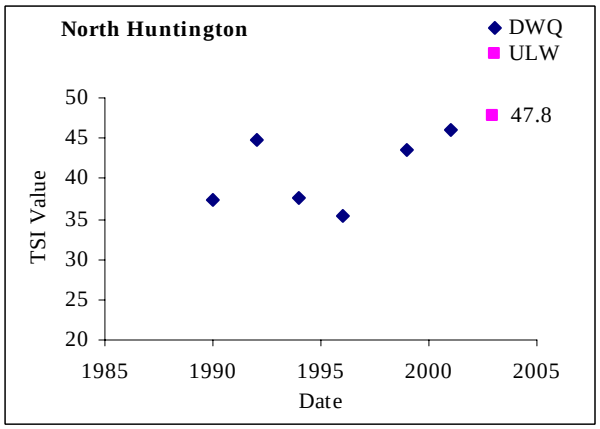

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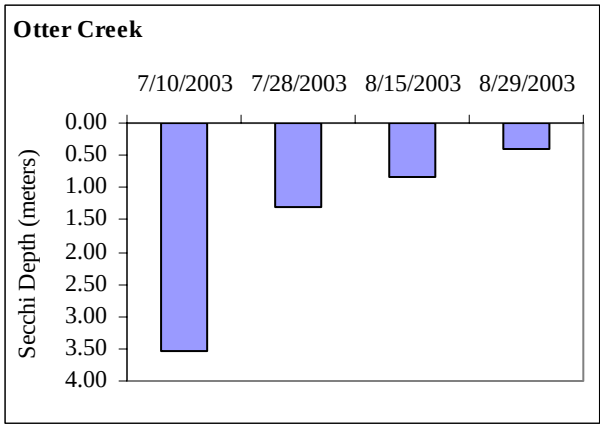

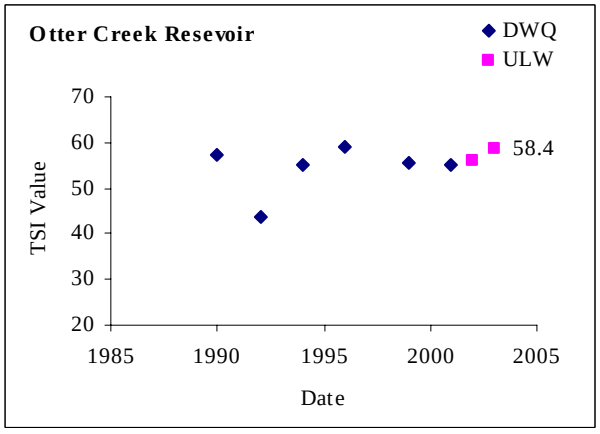

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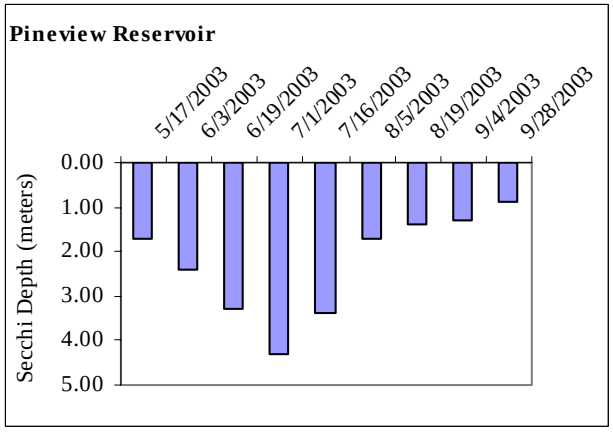

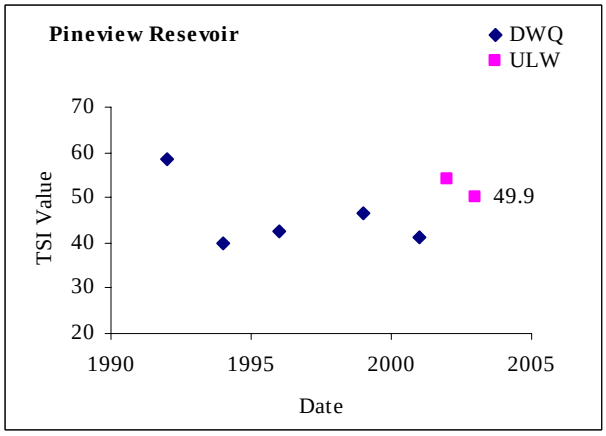

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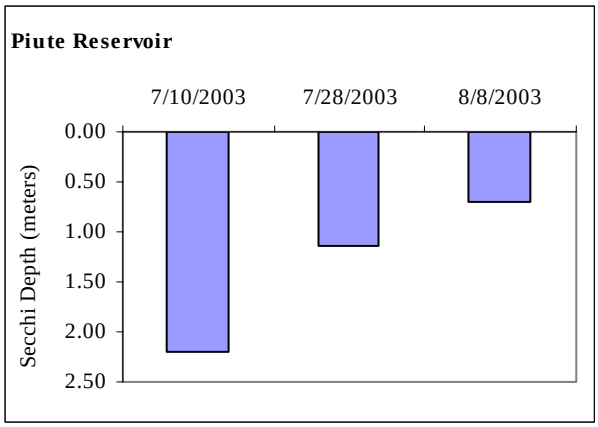

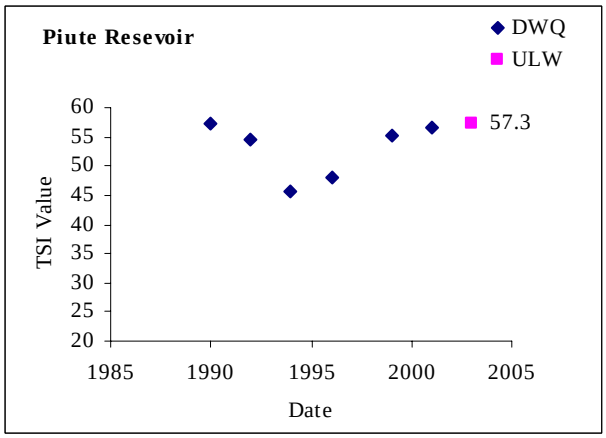

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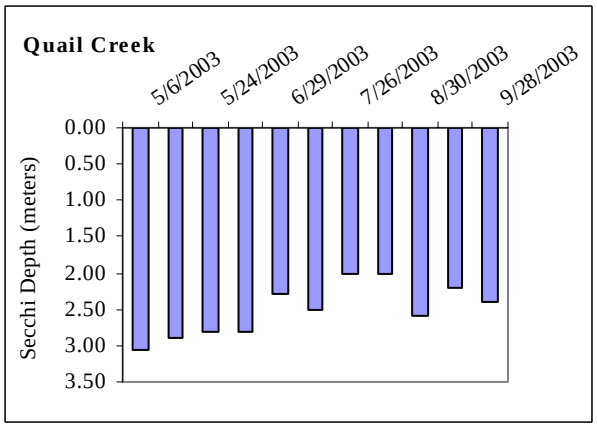

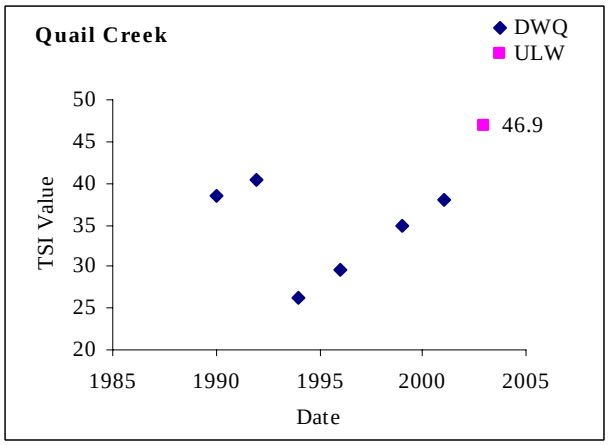

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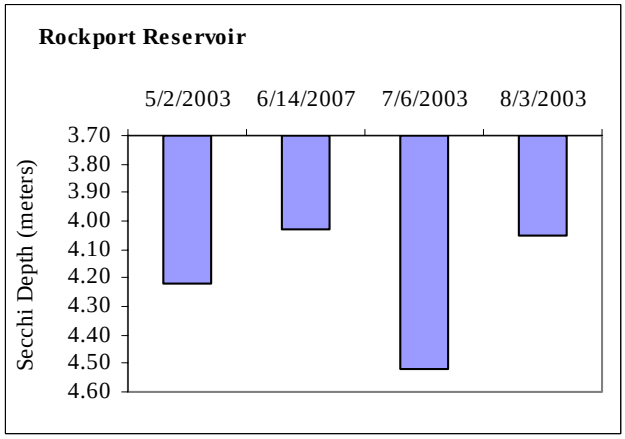


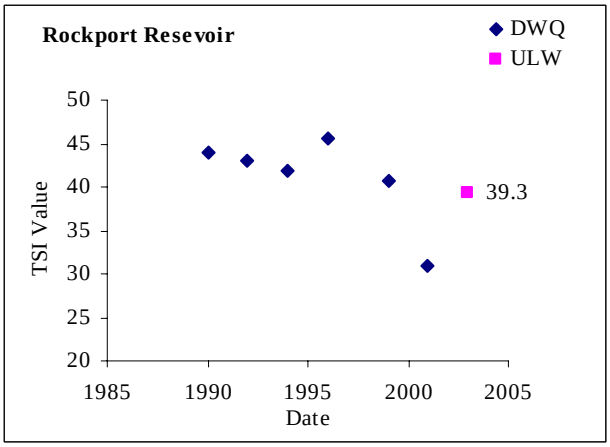
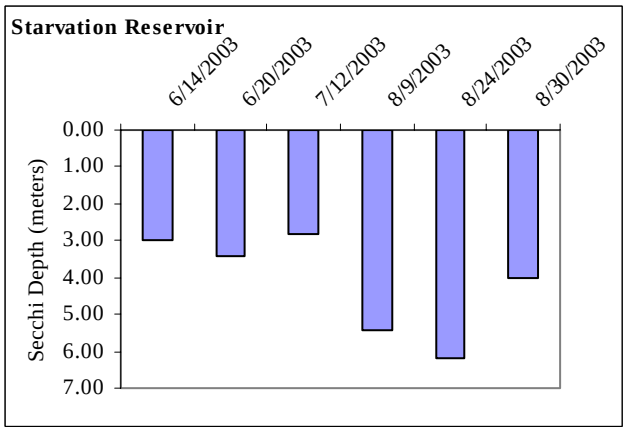


Figure 12.



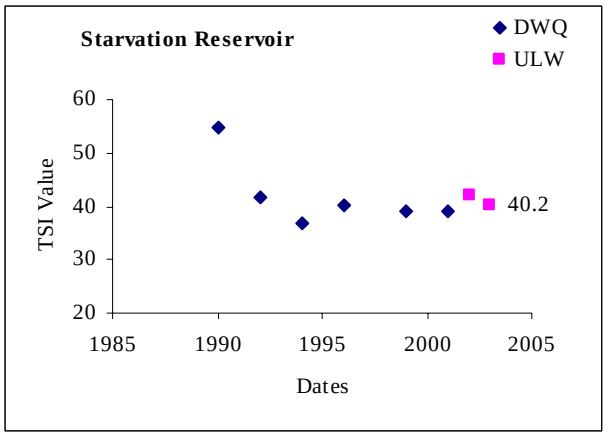
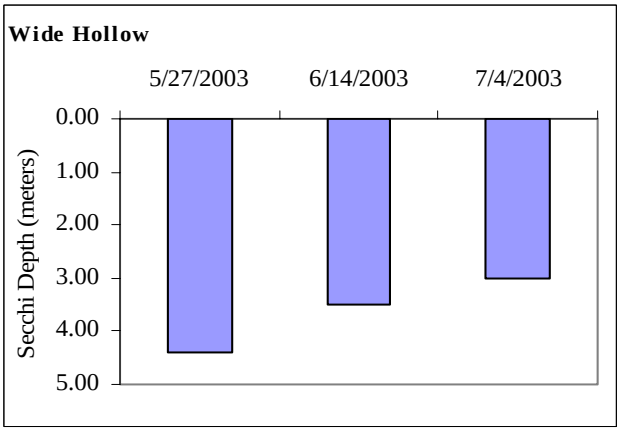


Figure 13.



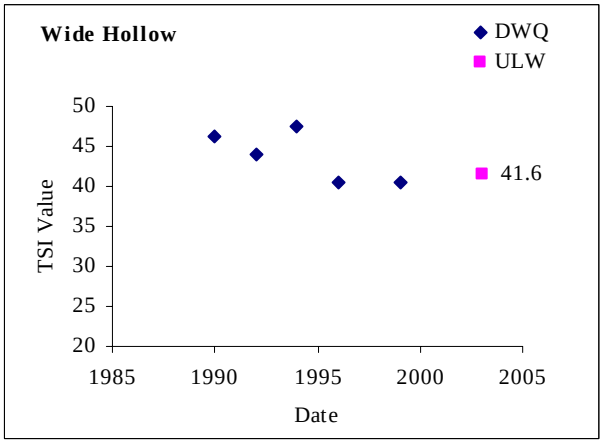
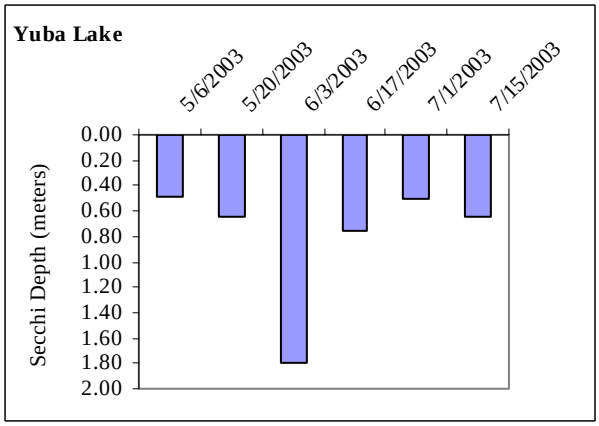
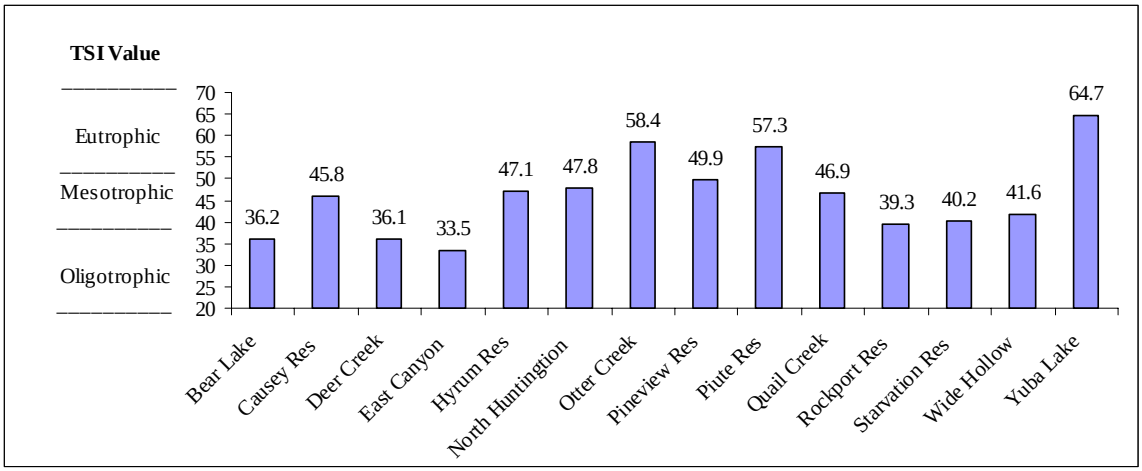


Figure 14.



There is no past TSI data for Yuba Lake. The TSI value for 2003 is 64.7.

Figure 15. The average TSI values from 1990-2003 were taken from 1990-2000 every two years and were calculated using Secchi depths, phosphorus, and chlorophyll (UWQARC, 2002). The TSI values taken in 2002 and 2003 only used Secchi depths as a measurement.



Utah Lake Watch

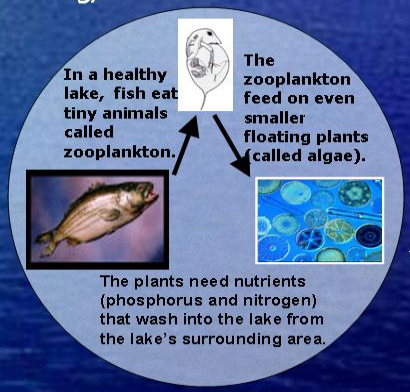
This summer, Utah Lake Watch volunteers are helping track the health of this lake.

We enjoy our lakes for the ....



good fishing, boating and swimming, and wonderful views.

But there's also a lot going on underneath the surface of a lake.



This underwater world can be threatened by pollution.

Too many nutrients in a lake, cause too much algae.

When these plants die and decompose, oxygen levels drop, and fish in the lake will die.

Nutrients and other pollutants come from many sources .... over-fertilized lawns, poorly functioning septic systems, wastewater treatment plants, agriculture, logging and construction activities.

This summer, a Utah Lake Watch volunteer is measuring the transparency of this lake.

Lake transparency is measured with a black and white disk.

This weighted "Secchi disk" is lowered into the water until it can no longer been seen.

The disk is then raised slowly until it is just visible and this depth is recorded.

Because lake water gets cloudier as more algae grow, the transparency is a good way to determine the lake's health.

How can you help keep our lakes clean?

You can start by not polluting or littering around a lake or reservoir.

- Follow the campground and park rules: Use designated camping areas and trails, fish washing stations, restrooms and RV dump stations.
- Make sure boat motors don't leak!
  Just one quart of oil can pollute an area three times the size of Utah Lake!

You can also help at home, by keeping pollutants out of our storm drains and streams

- Never dump household cleaners, oil, grass clippings or other green waste into drains or ditches.
- Don't use more fertilizer and pesticides than your lawn needs.
- Clean up pet waste and dispose of it properly.

And most importantly, be involved and active in your community!

To find out who is involved at a lake near you, or to get involved, contact us!
Utah State University Extension,
Water Quality
5210 Old Main Hill
Logan, UT 84321
(435) 797-2580
nancym@ext.usu.edu or
kckuester@cc.usu.edu

Utah Lake Watch is brought to you by:
Utah State University Extension, Utah Division of Water Quality, United States Forest Service, and Utah Department of Wildlife Resources.

References

Utah Water Quality Assessment Report to Congress. September 2002. Department of Environmental Quality Division of Water Quality Salt Lake City, Utah.