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## Culver Lake – Status 2015 (a brief mid-summer report)

Cold water fish need water temperatures below about 24 degrees C (for Brown Trout, below 20 degrees preferred), with adequate dissolved oxygen. During thermal stratification, warm water floats on the deeper cold water and the deep cold water doesn't get circulated to the surface where it can be replenished with oxygen. As a result, oxygen is consumed in deep strata and is not replenished naturally through the Summer. The Layer Aerators replenish dissolved oxygen in the middle depths of Culver Lake while maintaining stratification and cooler temperatures at depth.

Temperature °C			>25°C			
Depth (m)	28-Apr-15	28-May-15	4-Jun-15	20-Jun-15	1-Jul-15	8-Jul-15
0	9.8	25.6	19.9	23.8	22.7	25.4
1	9.7	25.7	20.1	23.8	22.7	25.3
2	9.6	25.7	20	23.8	22.7	25.2
3	9.5	25.7	20	23.8	22.6	25.1
4	9.5	25.6	19.9	23	22.6	23.4
5	9.4	21	17.1	19.6	22.6	21.3
6	9.3	15.5	15.2	15.5	17.5	17.6
7	9.3	14.1	12.4	13.3	14.2	13.9
8	9.3	13.6	11.2	12	13	13.2
9	9.3	13.3	10.3	11.1	11.4	12.3
10	9.3	13.1	9.9	10.2	10.9	10.7
11	9.2	11.7	9.5	9.7	10.4	9.9
12	9.1	10.6	9.2	9.2	9.1	9.2
13	8.7	9.1	8.9	8.9	8.8	8.8
14	7.9	8.9	8.7	8.5	8.8	8.6

The Hypolimnetic Aerator introduces dissolved oxygen to the deepest strata. Although dissolved oxygen concentrations are not maintained all summer in the deepest waters, the oxygen input remains very beneficial by decreasing the amount of hydrogen sulfide accumulation and maintaining a higher oxidation-reduction potential.

During early summer only one Layer Aerator was operational, yet dissolved oxygen concentrations were maintained. The second Layer Aerator and the Hypolimnetic Aerator were restored to fully functional in mid-July. Dissolved oxygen has been maintained and very little sulfide has been generated by the deepest layer.

Dissolved Oxygen (mg/L)			<0.5mg/L	<2 mg/L		
Depth (m)	28-Apr-15	28-May-15	4-Jun-15	20-Jun-15	1-Jul-15	8-Jul-15
0	12.6	6.8	9.5	9.1	8	8.5
1	12.6	6.9	9.3	9.2	8.1	8.7
2	12.6	6.9	9.3	9.2	8.1	8.7
3	12.5	7	9.3	9.1	8	8.5
4	12.4	6	9.2	7.3	8	8.1
5	12.4	0.8	7.1	6.5	8	5.1
6	12.3	2.4	6.8	4.5	2.8	2.7
7	12.3	3	6.9	5.6	3.4	3.9
8	12.2	2.7	7	5.8	3.8	4
9	12.2	2.9	7.3	4.8	4	3.8
10	12.1	2.4	7.4	6.8	3.9	5.7
11	12.1	1.9	6.9	6.5	3.4	5.4
12	11.8	1.1	6.5	4.4	1	2.2
13	11.5	0.9	3.3	1.3	0.6	2
14	10.8	0.7	1.2	1.2	0.6	1.9

The % saturation with dissolved oxygen compares the oxygen concentration to what the concentration would be if in equilibrium with our 21% oxygen atmosphere at the observed water temperature. Respiration consumes oxygen, photosynthesis produces oxygen; so % saturation greater than 100% is an indication of how intense photosynthesis is. Percent oxygen saturation in surface waters of Culver Lake has been lower than during most years; no intense photosynthetic bloom activity has been observed.

Percent DO Saturation (%)			>120	> 100		
Depth (m)	28-Apr-15	28-May-15	4-Jun-15	20-Jun-15	1-Jul-15	8-Jul-15
0	111.1	107.3	104.3	107.7	92.7	103.6
1	110.8	107.1	102.5	108.9	93.9	105.9
2	110.6	104.0	102.3	108.9	93.9	105.7
3	109.4	104.5	102.3	107.7	92.5	103.1
4	108.5	99.1	101.0	85.1	92.5	95.1
5	108.3	90.2	73.6	70.9	92.5	57.5
6	107.2	80.5	67.7	45.1	29.3	28.3
7	107.2	78.5	64.6	53.5	33.1	37.8
8	106.3	74.5	63.8	53.8	36.1	38.1
9	106.3	75.5	65.1	43.6	36.6	35.5
10	105.4	70.4	65.4	60.5	35.3	51.3
11	105.2	73.4	60.4	57.2	30.4	47.7
12	102.3	58.4	56.5	38.2	8.7	19.1
13	98.8	59.0	28.5	11.2	5.2	17.2
14	91.0	31.1	10.3	10.3	5.2	16.3

Relative Thermal Resistance to Mixing (RTRM) is a quantitative measure of the strength and location of thermal stratification. Culver Lake became stratified in late May and the thermocline strengthened at 5-7m deep.

RTRM			>20	>50		
Depth (m)	28-Apr-15	28-May-15	4-Jun-15	20-Jun-15	1-Jul-15	8-Jul-15
0	0	0	0	0	0	0
1	1	3	-5	0	0	3
2	1	11	3	0	0	3
3	1	8	0	0	3	3
4	0	41	2	24	0	52
5	1	56	66	92	0	60
6	1	40	38	91	130	91
7	0	47	47	39	65	73
8	0	16	17	20	20	11
9	0	12	11	12	23	14
10	0	4	5	11	7	21
11	1	3	4	5	6	9
12	1	1	3	5	14	7
13	3	2	3	3	3	4
14	6	2	2	3	0	2
15						
SUM	17	246	195	305	270	354
MAX	6	56	66	92	130	91

Culver Lake has exhibited typical and strong thermal stratification since the end of May.

Secchi transparency has been better than during most years, improving to over 8 ft Secchi transparency in July- then gradually decreasing in late July.

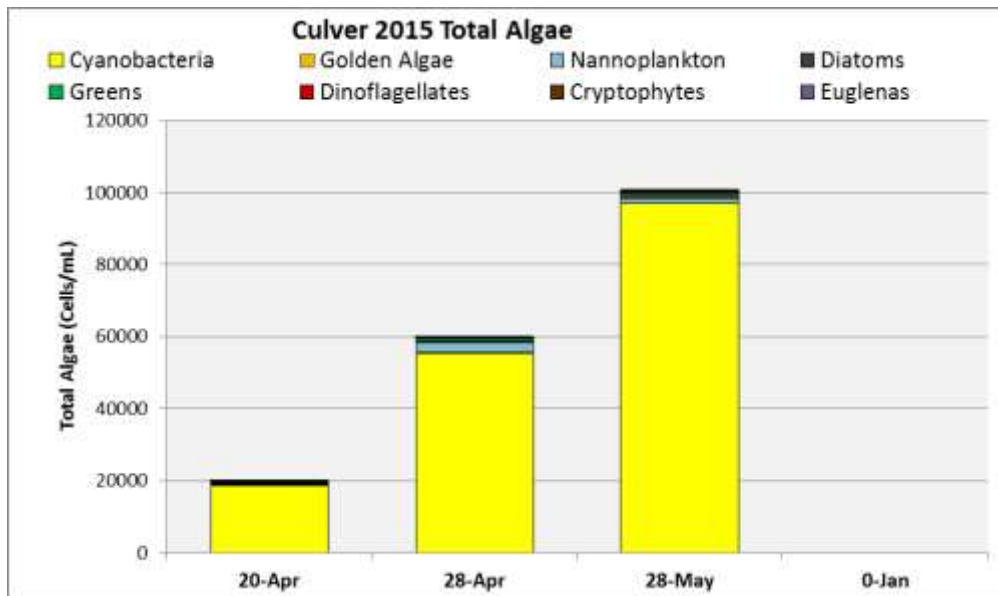
Secchi						
Date	28-Apr-15	28-May-15	4-Jun-15	20-Jun-15	1-Jul-15	8-Jul-15
Depth (ft)	6.7	5.5	4.9	4.2	7.2	8.21
Depth (m)	2.04	1.68	1.49	1.28	2.19	2.50

Total Phosphorus (TP as P) is an important nutrient which tends to be in shortest supply relative to the requirements of phytoplankton (algae). Therefore, although other nutrients and environmental conditions play important roles in determining “how much” and “what kind” of algae grows, TP tends to determine overall amount of algae and water quality at Culver Lake.

Total Phosphorus as P (µg/L)			
Depth	28-Apr	28-May	1-Jul
1m	31	24	25
3m			
5m	33	29	24
7m			19
9m	36	20	16
12m			
14m	48	78	493
Laboratory	CEL	UCONN	UCONN

Total phosphorus (TP) was approximately 30 ppb during Spring, then decreased to approximately 25 ppb in surface waters. The Layer Aerators continue to keep TP that accumulates in the deepest strata from reaching the surface waters. TP in the mid-depth Layer has been consistently low at Culver through the Summer –many years of observation. That may provide an opportunity for future management of late Summer conditions. The relatively low TP in surface water, while transparency becomes poor, suggests accumulation of biomass due to slow rate of removal by grazing.

Treatment of aquatic macrophytes has been a focus during 2015. Unfortunately an invasive macrophyte (Naiad) has posed significant nuisance at Culver Lake this year. Cyanobacteria also remain dominant over the phytoplankton community.



Management of the littoral macrophyte community (especially invasive species) and breaking the Cyanobacteria dominance over the phytoplankton community (returning to typical seasonal succession of phytoplankton) are important aspects of ongoing management of Culver Lake.