Lake Lacawac, Bruce R. Hargreaves, Lehigh University (brh0@lehigh.edu, http://www.lehigh.edu/~brh0) 41° 22.5'N 75° 17.3'W elevation 428m

24 Marchl 2012: platform moved to lake center, 12-1:00pm 3Nov 2012: platform move to dock by 12N

The water level sensor (referenced to dock) settles for several days after moving platform to lake center and thus underestimates water level during this period.

Dec11: Tw12 appears to be failing (drifting upward); need to check or replace when possible

H310 sensor depth & Lake level are based on differential pressure sensor with ca 0.1mm resolution & vertical position referenced to bottom of lake.
Sensor PSIG converted to depth using density of water at 4oC (1.43321 psi/m)
Lake level is referenced also to lower frame of dock at SE corner (2003-May2005)
(Actual water level at dock varies seasonally with density of water column and hourly from precip, runoff, evaporation, seepage & outflow. Outflow also varies with status of beaver dam).

5280	ft/mile
1609.3	m/mile

rain sum (in.) Aug-Sep2011=> 11.91

Std pressure at sea level =1 atm=760 mm Hg=29.92" Hg=1013.2 mbars
Std pressure at 428m elevation =724 mm Hg, 29.61 in. Hg, (965.2 mbars)

		Tair avg F	Tair max F	Tair min F		Rain-in	WS-mph	WS max mph					Tw 0.1m F	Tw 0.5m F	Tw 1m F	Tw 2m F	Tw 3m F	Tw 4m F	Tw 5m F	Tw 6m F	Tw 8m F	Tw 10m F	Tw 12m F						
		35.9	68.4	21.6		1.19	3.7	27					44.6	44.6	44.2	44.5	44.5	44.0	44.1	44.2	44.3	44.4	43.9						
Month summar	avg Tw	Tair avg-C	Tair Hi-C	Tair Min-C	RHair-%	Rain-mm	WS-m/s	WS Max-m/s	WDIR-deg	Barom-mb	Sum Rad W/m2	Sum PAR uM/m2/s	Tw 0.1m	Tw 0.5m	Tw 1m	Tw 2m	Tw 3m	Tw 4m	Tw 5m	Tw 6m	Tw 8m	Tw10.1m	Tw11.4m	H310_z (m)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
	6.8	2.2	20.2	-5.8	81.9	30.2	1.7	12.1	240.1	968.3	206694625	412	7.0	7.0	6.8	6.9	6.9	6.7	6.7	6.8	6.8	6.9	6.6	2.9	116.1	30.2	12.3	18.9	29.2

month (All)

Data

Location	% records	Date	Day of Yr	Tair avg-C	Tair Hi-C	Tair Min-C	RHair-%	Rain-mm	WS-m/s	WS Max m/s	WDIR-deg	Barom-mb	Sum Rad J/m2	Sum PAR Mol/m2	Tw 0.1m	Tw 0.5m	Tw 1m	Tw 2m	TW3m	TW4m	TW5m	TW6m	TW8m	TW H310-C	TW12m	H310 depth-m (4oC)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
LC	100%	11/1/2012	306	5.1	6.1	4.2	93.5	0.2	2.7	7.1	259	949.5	4199635	9	11.02	11.05	10.86	11.00	11.09	10.83	10.93	10.81	10.95	10.8	8.81	10.1	187.1	0.200	12.3	63.2	67.1
LC	100%	11/2/2012	307	3.8	6.0	2.1	92.1	1.3	2.8	9.4	301	952.9	5338663	11	10.65	10.69	10.50	10.64	10.73	10.46	10.56	10.45	10.59	10.5	9.49	10.1	170.6	1.500	12.3	63.9	68.4
LC	100%	11/3/2012	308	2.7	4.4	1.6	85.6	0.1	3.7	9.4	317	959.6	4755940	10	10.04	10.06	9.86	10.00	10.05	9.83	9.89	9.79	9.94	9.9	10.20	5.6	155.2	1.600	12.3	51.8	65.0
ND	100%	11/4/2012	309	1.6	2.8	0.5	90.2	0.0	3.3	8.0	326	963.1	4637007	10	9.46	9.47	9.26	9.38	9.36	9.18	9.21	9.16	9.26	9.4	9.60	2.4	144.2	1.600	12.3	21.2	60.2
ND	100%	11/5/2012	310	0.5	1.9	-1.3	78.1	0.0	3.2	7.5	291	965.1	3435647	7	8.85	8.86	8.64	8.77	8.72	8.53	8.56	8.53	8.59	8.7	8.87	2.4	135.1	1.600	12.3	15.8	60.8
ND	100%	11/6/2012	311	-1.0	4.0	-5.8	74.1	0.0	1.0	4.3	175	967.6	12775439	23	8.54	8.54	8.32	8.45	8.46	8.18	8.20	8.19	8.18	8.4	8.50	2.4	127.3	1.600	12.3	16.3	62.7
ND	100%	11/7/2012	312	0.1	2.5	-2.2	71.5	0.0	2.9	8.9	95	962.3	3963057	8	7.92	7.94	7.74	7.88	7.87	7.64	7.66	7.67	7.74	7.8	7.90	2.4	119.6	1.600	12.5	13.7	27.7
ND	100%	11/8/2012	313	1.5	5.8	-0.5	65.4	0.0	4.0	11.4	330	959.6	8095952	16	7.41	7.43	7.22	7.35	7.29	7.09	7.13	7.13	7.23	7.3	7.23	2.4	111.9	1.600	12.5	13.7	18.1
ND	100%	11/9/2012	314	2.2	6.7	-1.1	81.7	0.0	2.5	8.8	310	966.6	9677001	19	7.06	7.10	6.89	7.04	7.00	6.78	6.81	6.84	6.91	7.0	6.77	2.4	104.3	1.600	12.6	13.6	14.7
ND	100%	11/10/2012	315	5.0	9.4	0.7	88.2	0.0	0.7	3.6	245	973.3	4014611	8	7.14	7.10	6.82	6.95	6.96	6.73	6.75	6.86	6.89	6.9	6.64	2.3	100.8	1.600	12.6	13.2	14.1
ND	100%	11/11/2012	316	11.8	20.2	6.3	68.5	0.0	0.6	4.5	200	977.4	10856195	22	7.60	7.10	6.85	7.02	7.06	6.83	6.85	6.98	7.05	7.0	6.90	2.2	99.7	1.600	12.5	16.3	14.0
ND	100%	11/12/2012	317	13.0	17.1	8.4	82.7	0.0	1.1	7.3	205	974.6	8028845	16	7.75	7.38	7.07	7.17	7.16	6.95	6.96	7.04	7.12	7.2	6.95	2.1	104.1	1.600	12.6	14.6	12.9
ND	100%	11/13/2012	318	3.9	14.4	0.7	91.5	23.8	2.5	12.1	307	974.0	5163019	10	7.72	7.68	7.46	7.65	7.61	7.39	7.43	7.43	7.52	7.6	7.29	2.1	132.9	25.400	12.6	14.0	39.0
ND	100%	11/14/2012	319	1.3	5.7	-1.9	72.9	0.0	1.8	6.9	163	979.3	11270197	22	7.28	7.30	7.08	7.24	7.19	6.96	7.00	6.99	7.03	7.2	6.98	2.2	141.7	25.400	12.5	14.9	57.1
ND	100%	11/15/2012	320	-0.9	3.8	-4.3	89.9	0.0	0.5	3.6	207	975.7	6842589	14	6.98	7.03	6.81	6.99	6.97	6.72	6.75	6.85	6.86	6.9	6.82	2.2	138.9	25.400	12.6	13.6	53.5
ND	100%	11/16/2012	321	0.7	6.5	-3.4	81.6	0.0	1.1	6.1	252	974.4	7994264	16	6.76	6.82	6.61	6.81	6.78	6.53	6.56	6.62	6.62	6.8	6.50	2.2	135.4	25.400	12.6	13.6	23.9
ND	100%	11/17/2012	322	1.7	9.5	-2.8	84.5	0.0	0.4	2.9	232	981.7	10621572	20	6.96	6.80	6.54	6.68	6.65	6.38	6.41	6.47	6.45	6.6	6.29	2.2	131.5	25.400	12.5	14.7	17.0
ND	100%	11/18/2012	323	0.7	7.3	-3.1	92.5	0.1	0.6	3.7	203	983.0	9977579	19	6.71	6.70	6.38	6.55	6.56	6.30	6.32	6.41	6.44	6.5	6.24	2.2	127.4	25.500	12.5	14.2	15.2
ND	100%	11/19/2012	324	0.5	8.4	-3.7	89.4	0.0	0.6	3.6	174	976.6	9947583	19	6.62	6.65	6.43	6.59	6.51	6.26	6.30	6.36	6.39	6.5	6.16	2.2	122.4	25.500	12.5	14.3	14.9
ND	100%	11/20/2012	325	1.5	8.8	-3.0	82.9	0.0	0.3	2.6	220	968.4	6851104	13	6.38	6.31	6.07	6.26	6.30	6.03	6.05	6.16	6.18	6.3	5.97	2.2	116.9	25.500	12.5	13.4	14.3
ND	100%	11/21/2012	326	2.2	9.6	-2.5	79.8	0.0	0.4	3.5	209	969.4	9952625	19	6.23	6.20	5.92	6.08	6.07	5.80	5.83	5.92	5.94	6.1	5.74	2.2	110.5	25.500	12.5	14.3	14.3
ND	100%	11/22/2012	327	2.9	13.3	-3.4	78.1	0.0	0.3	1.9	201	970.4	9770428	19	6.62	6.22	5.92	6.09	6.13	5.85	5.88	5.95	6.00	6.1	5.81	2.2	102.5	25.500	12.5	14.8	14.3
ND	100%	11/23/2012	328	6.7	15.2	-0.3	73.8	0.2	1.0	7.6	243	960.2	8178304	16	6.22	6.13	5.81	6.01	6.03	5.76	5.78	5.86	5.92	6.0	5.74	2.1	97.6	25.700	12.5	13.4	13.6
ND	100%	11/24/2012	329	0.8	6.4	-1.4	69.8	0.0	4.0	11.0	306	955.3	4771997	9	5.76	5.79	5.58	5.74	5.68	5.46	5.49	5.51	5.66	5.7	5.43	2.1	92.6	25.700	12.5	13.2	13.9
ND	100%	11/25/2012	330	-0.9	0.2	-1.9	71.9	0.0	2.6	10.2	285	958.8	3406057	7	5.15	5.21	4.99	5.14	5.09	4.86	4.88	4.92	5.03	5.1	4.81	2.1	86.7	25.700	12.4	13.3	14.1
ND	100%	11/26/2012	331	1.2	4.5	-2.8	65.9	0.0	1.9	7.3	283	965.3	8629017	17	4.93	5.02	4.81	5.00	4.97	4.72	4.73	4.80	4.90	5.0	4.67	2.1	81.2	25.700	12.4	13.5	14.0
ND	100%	11/27/2012	332	-0.7	0.0	-2.6	97.9	2.9	0.7	3.1	160	970.4	609572	2	4.53	4.68	4.47	4.65	4.64	4.38	4.39	4.53	4.60	4.6	4.35	2.1	80.9	28.600	12.4	13.3	14.1
ND	100%	11/28/2012	333	-2.1	-0.6	-4.6	94.3	0.1	1.1	6.2	264	969.7	2726142	9	4.20	4.47	4.26	4.42	4.43	4.18	4.18	4.33	4.43	4.4	4.21	2.1	79.5	28.700	12.4	13.7	14.5
ND	100%	11/29/2012	334	-0.3	3.2	-3.2	81.9	1.0	1.3	6.7	260	971.8	6755437	15	4.01	4.27	4.09	4.26	4.29	4.03	4.03	4.20	4.32	4.3	4.08	2.1	74.9	29.700	12.5	13.9	14.4
ND	100%	11/30/2012	335	-0.2	3.1	-2.5	87.9	0.5	1.0	4.2	178	974.4	3449148	7	3.60	3.99	3.84	4.07	4.17	3.93	3.92	4.19	4.32	4.1	4.00	2.1	70.7	30.200	12.4	13.4	14.3
	0%																														

Lake water & energy budget daily summary from hourly data (negative values: loss from lake; runoff & seepage term is residual after adjusting lake level change for all others)

Ratio of lake watershed to lake area: 2.6176758 Runoff & seepage as % of watershed area precip: 60.3%

Data

DATE	DayOfYr	AvgTair C	AvgTw 0.1m	AvgTw0.5 m	Avg Tw1m	Avg Tw2m	Avg Tw3m	Avg Tw4m	AvgWS CSI m/s	SumRad J/m2	SumH Evap (*0.9=KJ/m2)	Sum Lk_lvl chg (mm)	SumRain mm	Sum Runoff & seepage, mm	SumLake evap (mm)	Sum Terrevap2	SumTerrevap2=AirVPD,mbar*WS,m/s*s
Grand sum/avg		2.18	7.00	7.00	6.77	6.93	6.93	6.69	1.5	206694625	-31048	-125.8	30.2	47.5	-42.4	0.0	0.0
11/1/2012	306	5.05	11.02	11.05	10.86	11.00	11.09	10.83	2.4	4199635	-1524	-15.808	0.2	13.9	-2.1	0.0	
11/2/2012	307	3.81	10.65	10.69	10.50	10.64	10.73	10.46	2.7	5338663	-1828	-16.495	1.3	4.6	-2.5	0.0	
11/3/2012	308	2.66	10.04	10.06	9.86	10.00	10.05	9.83	3.5	4755940	-2490	-13.462	0.1	2.7	-3.4	0.0	
11/4/2012	309	1.63	9.46	9.47	9.26	9.38	9.36	9.18	3.1	4637007	-2073	-9.738	0.0	2.1	-2.8	0.0	
11/5/2012	310	0.47	8.85	8.86	8.64	8.77	8.72	8.53	3.0	3435647	-2325	-7.968	0.0	1.7	-3.2	0.0	
11/6/2012	311	-1.03	8.54	8.54	8.32	8.45	8.46	8.18	0.8	12775439	-1254	-7.723	0.0	-1.2	-1.7	0.0	
11/7/2012	312	0.15	7.92	7.94	7.74	7.88	7.87	7.64	2.6	3963057	-2053	-7.723	0.0	-1.4	-2.8	0.0	
11/8/2012	313	1.53	7.41	7.43	7.22	7.35	7.29	7.09	3.7	8095952	-2579	-7.723	0.0	-1.5	-3.5	0.0	
11/9/2012	314	2.21	7.06	7.10	6.89	7.04	7.00	6.78	2.3	9677001	-1253	-6.347	0.0	-2.4	-1.7	0.0	
11/10/2012	315	5.04	7.14	7.10	6.82	6.95	6.96	6.73	0.6	4014611	-285	-1.756	0.0	0.8	-0.4	0.0	
11/11/2012	316	11.80	7.60	7.10	6.85	7.02	7.06	6.83	0.4	10856195	-88	1.450	0.0	3.7	-0.1	0.0	
11/12/2012	317	13.02	7.75	7.38	7.07	7.17	7.16	6.95	0.5	8028845	267	6.792	0.0	8.7	0.4	0.0	
11/13/2012	318	3.86	7.72	7.68	7.46	7.65	7.61	7.39	2.3	5163019	-900	34.099	23.8	18.0	-1.2	0.0	
11/14/2012	319	1.34	7.28	7.30	7.08	7.24	7.19	6.96	1.7	11270197	-1272	-1.715	0.0	8.3	-1.7	0.0	
11/15/2012	320	-0.93	6.98	7.03	6.81	6.99	6.97	6.72	0.5	6842589	-727	-3.480	0.0	5.0	-1.0	0.0	
11/16/2012	321	0.73	6.76	6.82	6.61	6.81	6.78	6.53	1.0	7994264	-859	-3.691	0.0	4.0	-1.2	0.0	
11/17/2012	322	1.74	6.96	6.80	6.54	6.68	6.65	6.38	0.3	10621572	-511	-3.970	0.0	2.4	-0.7	0.0	
11/18/2012	323	0.68	6.71	6.70	6.38	6.55	6.56	6.30	0.5	9977579	-551	-4.356	0.1	1.1	-0.8	0.0	
11/19/2012	324	0.52	6.62	6.65	6.43	6.59	6.51	6.26	0.5	9947583	-593	-5.414	0.0	-0.6	-0.8	0.0	
11/20/2012	325	1.51	6.38	6.31	6.07	6.26	6.30	6.03	0.3	6851104	-451	-5.828	0.0	-2.0	-0.6	0.0	
11/21/2012	326	2.15	6.23	6.20	5.92	6.08	6.07	5.80	0.4	9952625	-478	-7.566	0.0	-4.3	-0.7	0.0	
11/22/2012	327	2.91	6.62	6.22	5.92	6.09	6.13	5.85	0.2	9770428	-419	-6.781	0.0	-4.0	-0.6	0.0	
11/23/2012	328	6.70	6.22	6.13	5.81	6.01	6.03	5.76	0.8	8178304	-338	-3.726	0.2	-1.4	-0.5	0.0	
11/24/2012	329	0.79	5.76	5.79	5.58	5.74	5.68	5.46	3.7	4771997	-2032	-5.871	0.0	-0.9	-2.8	0.0	
11/25/2012	330	-0.89	5.15	5.21	4.99	5.14	5.09	4.86	2.3	3406057	-1424	-5.906	0.0	-1.5	-1.9	0.0	
11/26/2012	331	1.19	4.93	5.02	4.81	5.00	4.97	4.72	1.6	8629017	-1036	-4.851	0.0	-0.5	-1.4	0.0	
11/27/2012	332	-0.70	4.53	4.68	4.47	4.65	4.64	4.38	0.6	609572	-384	2.672	2.9	2.5	-0.5	0.0	
11/28/2012	333	-2.10	4.20	4.47	4.26	4.42	4.43	4.18	1.0	2726142	-589	-4.816	0.1	-2.2	-0.8	0.0	
11/29/2012	334	-0.29	4.01	4.27	4.09	4.26	4.29	4.03	1.1	6755437	-589	-4.500	1.0	-4.6	-0.8	0.0	
11/30/2012	335	-0.15	3.60	3.99	3.84	4.07	4.17	3.93	1.0	3449148	-409	-3.621	0.5	-3.5	-0.6	0.0	
#N/A																	

									1.000	<=SCALE ADJ (1.0=no adjustment)
									4.184	joule/calorie (= joule/degree for 1cm3)
Nominal diffuse %R from water=7%	#N/A	#N/A	20%			7	#N/A	#N/A	#N/A	#N/A
										slope
				4.184	<=CONVERT HEAT TO DEGREES				4.184	intercept
7%	0.9			6000000	cm3/m2 (for 0-4m integrated depth)				6000000	r2
Solar Heat input (absorbed from solar rad), KJ/m2)	Sum H evap (KJ/m²)	solar heat absorbed - evap loss (kJ/m²)	% of absorbed solar heat lost via evap	Solar Heat input (absorbed from solar rad), Tw 0-6m)	starting Tw (0-6m)	ending Tw (0-6m)	actual dTw, 0-6m	RESID1: NON-SOLAR FLUX (Heat flux to offset absorbed solar to match dTw)	evap loss (degC 0-6m)	RESID2: NON-SOLAR FLUX to offset absorbed solar to match dTw LESS EVAP (degC 0-6m)
3906	-1371	2534	35.1%	0.16	11.17	10.76	(0.41)	(0.57)	-0.05	(0.51)
4965	-1646	3319	33.1%	0.20	10.76	10.30	(0.45)	(0.65)	-0.07	(0.59)
4423	-2241	2182	50.7%	0.18	10.30	9.42	(0.88)	(1.06)	-0.09	(0.97)
4312	-1866	2447	43.3%	0.17	9.42	8.93	(0.49)	(0.66)	-0.07	(0.59)
3195	-2093	1102	65.5%	0.13	8.93	8.30	(0.62)	(0.75)	-0.08	(0.67)
11881	-1129	10752	9.5%	0.47	8.30	8.19	(0.12)	(0.59)	-0.04	(0.54)
3686	-1848	1838	50.1%	0.15	8.19	7.33	(0.86)	(1.01)	-0.07	(0.94)
7529	-2321	5208	30.8%	0.30	7.33	6.81	(0.52)	(0.82)	-0.09	(0.72)
9000	-1128	7872	12.5%	0.36	6.81	6.92	0.11	(0.25)	-0.04	(0.21)
3734	-257	3477	6.9%	0.15	6.92	6.89	(0.02)	(0.17)	-0.01	(0.16)
10096	-79	10017	0.8%	0.40	6.89	7.18	0.29	(0.11)	0.00	(0.11)
7467	241	7707	-3.2%	0.30	7.18	6.93	(0.25)	(0.54)	0.01	(0.55)
4802	-810	3992	16.9%	0.19	6.93	7.11	0.17	(0.02)	-0.03	0.01
10481	-1145	9337	10.9%	0.42	7.11	7.06	(0.05)	(0.47)	-0.05	(0.42)
6364	-654	5710	10.3%	0.25	7.06	6.66	(0.40)	(0.65)	-0.03	(0.62)
7435	-773	6661	10.4%	0.30	6.66	6.58	(0.08)	(0.37)	-0.03	(0.34)
9878	-460	9418	4.7%	0.39	6.58	6.66	0.08	(0.31)	-0.02	(0.30)
9279	-496	8784	5.3%	0.37	6.66	6.52	(0.14)	(0.51)	-0.02	(0.49)
9251	-534	8717	5.8%	0.37	6.52	6.39	(0.13)	(0.50)	-0.02	(0.48)
6372	-406	5966	6.4%	0.25	6.39	5.99	(0.40)	(0.66)	-0.02	(0.64)
9256	-430	8826	4.6%	0.37	5.99	6.22	0.24	(0.13)	-0.02	(0.11)
9086	-377	8710	4.1%	0.36	6.22	6.00	(0.22)	(0.59)	-0.02	(0.57)
7606	-304	7301	4.0%	0.30	6.00	5.98	(0.01)	(0.32)	-0.01	(0.30)
4438	-1829	2609	41.2%	0.18	5.98	5.12	(0.86)	(1.04)	-0.07	(0.97)
3168	-1281	1886	40.4%	0.13	5.12	4.86	(0.26)	(0.38)	-0.05	(0.33)
8025	-933	7092	11.6%	0.32	4.86	4.72	(0.14)	(0.46)	-0.04	(0.42)
567	-346	221	61.0%	0.02	4.72	4.32	(0.40)	(0.42)	-0.01	(0.41)
2535	-530	2005	20.9%	0.10	4.32	4.27	(0.05)	(0.16)	-0.02	(0.13)
6283	-530	5753	8.4%	0.25	4.27	4.14	(0.13)	(0.38)	-0.02	(0.35)
3208	-368	2840	11.5%	0.13	4.14	#N/A	#N/A	#N/A	-0.01	#N/A
	#N/A	#N/A		#N/A				#N/A	#N/A	