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

18 May 2013, 4:30-6:43pm EDT: platform moved to lake center 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

5280 ft/mile
1609.3 m/mile

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)

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).

	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					
	52.5	78.1	32.1		0.98	4.0	25					60.7	60.6	60.5	59.9	59.5	59.3	58.4	54.2	45.6	43.6	43.4					
Month summary 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	Tw11.1m	Tw12.4m	H310_z (m)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
12.5	11.4	25.6	0.1	73.7	25.0	1.8	11.0	219.1	966.6	337981924	687	15.9	15.9	15.8	15.5	15.3	15.2	14.6	12.3	7.6	6.4	6.3	11.1	-95.4	25.0	12.5	15.6	14.4

month (All)

PAR & PYR Integration period=15min instead of 60min after 11am on 9/11/2013

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%	10/1/2013	274	15.7	22.0	9.7	77.2	0.0	1.6	6.6	271	964.9	17113066	35.1	18.35	18.29	18.19	17.66	17.29	17.00	16.14	12.14	7.07	6.3	6.21	11.1	-83.8	0.000	12.6	11.8	12.3
LC	100%	10/2/2013	275	17.6	24.4	11.0	75.2	0.1	2.0	9.2	278	965.1	16266615	33.3	18.49	18.46	18.43	18.10	17.46	17.05	16.06	12.19	7.10	6.3	6.22	11.1	-85.6	0.100	12.6	12.4	12.6
LC	100%	10/3/2013	276	17.2	24.2	11.0	73.2	0.0	1.1	6.1	260	968.0	15946011	32.5	19.07	18.85	18.58	18.25	17.66	17.12	16.06	12.26	7.08	6.3	6.22	11.1	-87.4	0.100	12.6	12.6	12.6
LC	100%	10/4/2013	277	19.6	25.3	16.0	79.8	6.5	1.3	6.8	268	966.7	13667278	28.7	19.62	19.50	19.20	18.41	17.79	17.16	16.04	12.25	7.13	6.3	6.25	11.1	-87.6	6.600	12.6	13.8	15.0
LC	100%	10/5/2013	278	19.3	25.6	15.1	85.1	0.0	0.9	4.0	212	967.3	13290835	28.1	20.74	19.96	19.73	18.63	17.91	17.22	15.99	12.39	7.14	6.4	6.29	11.1	-82.9	6.600	12.6	15.1	24.0
LC	100%	10/6/2013	279	18.0	19.5	16.9	94.9	1.3	2.0	7.4	156	966.5	3894256	8.6	20.51	20.22	19.96	18.78	17.97	17.26	15.96	12.39	7.17	6.4	6.27	11.1	-82.7	7.900	12.6	14.3	16.7
LC	100%	10/7/2013	280	16.1	19.7	10.4	88.1	9.8	2.8	11.0	220	961.1	2303027	5.3	19.65	19.61	19.62	18.89	18.03	17.30	15.88	12.41	7.21	6.4	6.30	11.1	-79.0	17.700	12.6	14.4	18.4
LC	100%	10/8/2013	281	10.8	16.0	5.9	72.5	0.0	1.8	7.9	221	971.9	16565861	32.7	18.50	18.50	18.51	18.35	18.13	17.40	15.85	12.49	7.25	6.4	6.33	11.1	-75.3	17.700	12.5	13.8	14.5
LC	100%	10/9/2013	282	9.2	14.5	3.5	76.8	0.0	1.3	6.3	172	976.3	13208607	25.8	17.90	17.90	17.90	17.74	17.65	17.46	15.88	12.51	7.26	6.4	6.32	11.1	-78.2	17.700	12.7	13.2	13.4
LC	100%	10/10/2013	283	9.0	11.8	6.1	85.0	0.9	1.2	5.3	134	972.1	4166563	9.3	17.26	17.25	17.26	17.09	17.07	17.17	15.95	12.51	7.27	6.4	6.32	11.1	-80.0	18.600	12.6	12.5	13.2
LC	100%	10/11/2013	284	14.1	18.7	10.1	71.4	0.1	1.8	6.3	66	968.1	7391943	15.8	16.95	16.94	16.95	16.74	16.67	16.75	16.09	12.52	7.27	6.4	6.31	11.1	-80.6	18.700	12.6	14.4	14.6
LC	100%	10/12/2013	285	14.9	20.4	9.0	63.5	0.0	2.0	7.7	129	971.2	16891143	34.2	17.00	16.99	16.99	16.79	16.65	16.62	16.14	12.55	7.27	6.4	6.32	11.1	-82.3	18.700	12.6	16.7	14.3
LC	100%	10/13/2013	286	13.3	18.1	10.2	71.5	0.0	2.1	6.1	122	975.8	15037488	31.0	17.01	17.00	17.02	16.77	16.60	16.59	16.18	12.57	7.30	6.4	6.32	11.1	-85.2	18.700	12.6	16.5	14.1
LC	100%	10/14/2013	287	13.0	20.1	8.8	74.3	0.0	0.8	4.0	189	974.8	14474358	29.9	17.22	17.09	16.87	16.60	16.49	16.51	16.14	12.61	7.32	6.4	6.33	11.1	-87.3	18.700	12.6	17.4	13.9
LC	100%	10/15/2013	288	14.5	19.9	9.4	73.6	0.0	1.1	5.2	196	971.3	14505988	29.7	17.35	17.30	17.16	16.68	16.52	16.47	16.12	12.66	7.32	6.4	6.33	11.1	-88.8	18.700	12.6	17.9	14.0
LC	100%	10/16/2013	289	12.6	15.2	9.2	79.0	0.0	1.2	4.0	189	965.5	4049388	9.0	16.88	16.93	16.90	16.71	16.55	16.50	16.02	12.69	7.36	6.4	6.35	11.1	-90.6	18.700	12.6	15.0	13.2
LC	100%	10/17/2013	290	16.8	21.0	13.6	74.9	1.7	1.9	7.6	238	959.2	13244966	27.0	16.99	16.99	16.97	16.61	16.48	16.48	16.00	12.73	7.34	6.4	6.35	11.1	-91.7	20.400	12.6	20.5	14.8
LC	100%	10/18/2013	291	11.5	16.0	7.3	69.2	0.0	2.6	10.0	274	960.4	13400663	26.7	16.80	16.79	16.78	16.60	16.52	16.54	16.06	12.83	7.36	6.5	6.39	11.1	-92.3	20.400	12.6	18.3	13.7
LC	100%	10/19/2013	292	9.8	14.6	5.0	72.1	1.1	1.6	7.8	215	960.7	10052065	20.0	16.24	16.23	16.20	16.05	15.99	16.05	15.90	12.96	7.39	6.5	6.38	11.1	-95.4	21.500	12.6	16.3	13.9
LC	100%	10/20/2013	293	8.3	12.2	4.9	69.5	0.1	2.2	7.4	265	962.0	12640362	24.9	15.63	15.65	15.63	15.48	15.43	15.50	15.43	13.45	7.41	6.5	6.38	11.1	-97.1	21.600	12.6	16.5	16.1
LC	100%	10/21/2013	294	10.4	16.2	4.5	57.4	0.0	1.9	6.9	231	966.0	15152788	30.1	15.18	15.19	15.15	15.00	14.88	14.93	14.91	13.75	7.41	6.5	6.38	11.1	-100.1	21.600	12.6	18.5	13.8
LC	100%	10/22/2013	295	10.1	13.7	4.7	65.4	0.0	2.4	8.8	251	958.8	8267069	17.0	14.66	14.69	14.66	14.52	14.49	14.56	14.55	13.93	7.43	6.5	6.39	11.1	-103.0	21.600	12.6	17.0	13.3
LC	100%	10/23/2013	296	3.8	8.1	0.2	75.2	0.0	1.4	5.7	263	955.2	6790346	13.9	14.07	14.10	14.07	13.93	13.88	13.96	13.98	13.59	7.44	6.5	6.40	11.1	-105.1	21.600	12.6	14.3	13.4
LC	100%	10/24/2013	297	3.3	6.3	0.5	70.2	0.0	2.6	10.2	264	959.6	12743179	24.7	13.31	13.34	13.32	13.19	13.15	13.23	13.20	12.89	7.46	6.5	6.40	11.1	-107.9	21.600	12.5	15.1	13.5
LC	100%	10/25/2013	298	3.4	7.2	0.6	73.7	0.0	2.3	8.5	278	967.3	7696290	15.3	12.46	12.49	12.46	12.34	12.29	12.37	12.39	12.31	7.49	6.5	6.41	11.1	-111.3	21.600	12.5	14.4	13.5
LC	100%	10/26/2013	299	4.7	9.1	0.1	59.3	0.0	2.6	10.4	230	964.4	13531557	26.3	11.82	11.84	11.82	11.68	11.64	11.70	11.72	11.61	7.56	6.5	6.41	11.1	-114.4	21.600	12.5	16.3	13.5
LC	100%	10/27/2013	300	6.2	8.6	2.8	57.7	0.0	2.4	8.8	273	962.1	7631114	15.2	11.28	11.31	11.29	11.15	11.12	11.19	11.23	11.17	8.14	6.5	6.43	11.1	-117.5	21.600	12.6	15.5	13.2
LC	100%	10/28/2013	301	5.6	11.5	0.1	65.4	0.0	1.9	8.1	276	969.7	13954957	27.3	10.98	10.99	10.97	10.82	10.78	10.81	10.76	10.71	8.86	6.5	6.43	11.1	-119.8	21.600	12.5	17.6	13.4
LC	100%	10/29/2013	302	4.4	8.0	2.4	62.6	0.0	1.0	4.5	214	975.3	5904876	11.9	10.75	10.77	10.75	10.63	10.55	10.61	10.60	10.56	9.17	6.5	6.42	11.1	-121.5	21.600	12.5	15.0	13.3
LC	100%	10/30/2013	303	8.7	15.0	3.1	77.2	0.0	1.1	6.7	230	971.4	6973273	14.3	10.71	10.66	10.58	10.47	10.33	10.39	10.37	10.38	9.19	6.5	6.44	11.1	-122.5	21.600	12.5	17.9	13.5
LC	75%	10/31/2013	304	11.6	15.0	8.1	93.4	3.4	2.4	8.8	205	964.5	1225993	2.9	10.60	10.58	10.57	10.50	10.35	10.37	10.33	10.33	9.23	6.5	6.44	11.1	-121.8	25.000	12.5	18.4	16.9

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: 66%

1.000 <=SCALE ADJ (1.0=no adjustment)

4.184 joule/calorie (= joule/degree for 1cm3)

Grand sum/avg	11.40	15.94	15.89	15.83	15.53	15.31	15.18	1.6	337981924	-56841	-36.2	25.0	43.1	-78.2	0.0	0.0	Nominal diffuse %R from water=7%	-51232.7	261949.8	20%		15	15.1	-6.2		-2.0	-16.7

SumTerrevap2=AirVPD,mbar*WS,m/s*s

																					4.184	<=CONVERT HEAT TO DEGREES				4.184	slope
																	7%	0.9			6000000	cm3/m2 (for 0-4m integrated depth)				6000000	intercept
																												r2
DATE	DOY	AvgTair C	AvgTw 0.1m	AvgTw0.5 m	Avg Tw1m	Avg Tw2m	Avg Tw3m	Avg Tw4m	AvgWS m/s	CSI	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	Solar Heat input (absorbed from solar rad), KJ/m2)	Sum H evap (KJ/m^2)	solar heat absorbed - evap loss (kJ/m^2)	% 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)
10/1/2013	274	15.76	18.34	18.28	18.18	17.66	17.29	17.00	1.5	17112397	-1474	-1.978	0.0	0.7	-2.0	0.0	15915	-1326	14588	8.3%	0.63	16.70	16.87	0.18	(0.46)	-0.05	(0.41)
10/2/2013	275	17.52	18.48	18.45	18.42	18.09	17.44	17.05	1.9	16267310	-1466	-1.729	0.1	1.0	-2.0	0.0	15129	-1320	13809	8.7%	0.60	16.87	17.07	0.20	(0.40)	-0.05	(0.35)
10/3/2013	276	17.11	19.05	18.84	18.57	18.25	17.66	17.12	0.9	15945690	-1288	-1.809	0.0	0.8	-1.8	0.0	14829	-1159	13671	7.8%	0.59	17.07	17.19	0.12	(0.47)	-0.05	(0.42)
10/4/2013	277	19.65	19.60	19.48	19.17	18.40	17.78	17.15	1.2	13667302	-825	5.744	6.4	1.3	-1.1	0.0	12711	-742	11969	5.8%	0.51	17.19	17.40	0.21	(0.29)	-0.03	(0.26)
10/5/2013	278	19.25	20.71	19.95	19.73	18.62	17.91	17.23	0.7	13291149	-682	-0.813	0.1	0.9	-0.9	0.0	12361	-614	11747	5.0%	0.49	17.40	17.54	0.13	(0.36)	-0.02	(0.34)
10/6/2013	279	18.04	20.54	20.23	19.95	18.78	17.97	17.26	1.8	3893911	-1032	0.365	1.3	1.3	-1.4	0.0	3621	-929	2693	25.6%	0.14	17.54	17.53	(0.01)	(0.15)	-0.04	(0.11)
10/7/2013	280	16.37	19.68	19.64	19.65	18.89	18.03	17.30	2.6	2301626	-1743	9.572	9.8	3.0	-2.4	0.0	2141	-1569	571	73.3%	0.09	17.53	17.38	(0.15)	(0.24)	-0.06	(0.18)
10/8/2013	281	10.87	18.52	18.52	18.53	18.38	18.13	17.39	1.7	16566740	-3056	-3.376	0.0	1.7	-4.2	0.0	15407	-2751	12656	17.9%	0.61	17.38	17.13	(0.25)	(0.86)	-0.11	(0.75)
10/9/2013	282	9.11	17.92	17.92	17.91	17.76	17.67	17.46	1.2	13209703	-2513	-2.881	0.0	1.4	-3.5	0.0	12285	-2262	10023	18.4%	0.49	17.13	16.81	(0.33)	(0.81)	-0.09	(0.72)
10/10/2013	283	8.98	17.28	17.27	17.28	17.11	17.09	17.19	1.1	4166086	-1894	0.207	0.9	2.8	-2.6	0.0	3874	-1705	2170	44.0%	0.15	16.81	16.32	(0.48)	(0.64)	-0.07	(0.57)
10/11/2013	284	13.98	16.95	16.94	16.95	16.74	16.68	16.76	1.6	7392209	-1626	-1.692	0.1	1.3	-2.2	0.0	6875	-1463	5411	21.3%	0.27	16.32	16.24	(0.09)	(0.36)	-0.06	(0.30)
10/12/2013	285	14.95	17.00	16.99	16.98	16.79	16.64	16.63	1.8	16891069	-2287	-2.655	0.0	1.3	-3.2	0.0	15709	-2059	13650	13.1%	0.63	16.24	16.28	0.04	(0.59)	-0.08	(0.50)
10/13/2013	286	13.45	17.01	17.00	17.03	16.77	16.61	16.60	1.9	15038306	-2182	-2.476	0.0	1.4	-3.0	0.0	13986	-1964	12022	14.0%	0.56	16.28	16.20	(0.08)	(0.64)	-0.08	(0.56)
10/14/2013	287	12.93	17.20	17.07	16.86	16.60	16.49	16.51	0.8	14473220	-1270	-1.603	0.0	1.0	-1.8	0.0	13460	-1143	12317	8.5%	0.54	16.20	16.17	(0.03)	(0.56)	-0.05	(0.52)
10/15/2013	288	14.45	17.35	17.30	17.15	16.68	16.52	16.47	1.0	14506574	-1318	-1.654	0.0	1.0	-1.8	0.0	13491	-1187	12305	8.8%	0.54	16.17	16.28	0.10	(0.43)	-0.05	(0.39)
10/16/2013	289	12.54	16.91	16.95	16.92	16.72	16.56	16.50	1.1	4048888	-1380	-1.640	0.0	1.1	-1.9	0.0	3765	-1242	2523	33.0%	0.15	16.28	16.06	(0.21)	(0.36)	-0.05	(0.31)
10/17/2013	290	16.69	16.97	16.97	16.95	16.59	16.48	16.48	1.7	13245112	-1147	0.052	1.6	0.9	-1.6	0.0	12318	-1032	11286	8.4%	0.49	16.06	16.24	0.18	(0.31)	-0.04	(0.27)
10/18/2013	291	11.75	16.82	16.81	16.81	16.62	16.52	16.54	2.4	13399314	-2994	-2.698	0.1	2.2	-4.1	0.0	12461	-2694	9767	21.6%	0.50	16.24	16.02	(0.23)	(0.72)	-0.11	(0.62)
10/19/2013	292	9.77	16.26	16.25	16.22	16.07	16.01	16.07	1.5	10053372	-2291	-1.494	1.1	1.4	-3.2	0.0	9350	-2062	7288	22.1%	0.37	16.02	15.56	(0.46)	(0.83)	-0.08	(0.75)
10/20/2013	293	8.42	15.65	15.67	15.65	15.50	15.45	15.52	2.0	12638983	-2767	-3.055	0.1	1.5	-3.8	0.0	11754	-2491	9264	21.2%	0.47	15.56	15.10	(0.46)	(0.93)	-0.10	(0.83)
10/21/2013	294	10.28	15.19	15.20	15.16	15.01	14.89	14.95	1.8	15154520	-2532	-3.292	0.0	1.0	-3.5	0.0	14094	-2279	11815	16.2%	0.56	15.10	14.73	(0.37)	(0.93)	-0.09	(0.84)
10/22/2013	295	10.21	14.68	14.70	14.68	14.54	14.50	14.57	2.3	8265469	-2459	-2.312	0.0	1.9	-3.4	0.0	7687	-2213	5474	28.8%	0.31	14.73	14.33	(0.40)	(0.71)	-0.09	(0.62)
10/23/2013	296	3.83	14.09	14.12	14.09	13.95	13.90	13.98	1.3	6790576	-2145	-1.826	0.0	2.0	-2.9	0.0	6315	-1930	4385	30.6%	0.25	14.33	13.66	(0.67)	(0.92)	-0.08	(0.84)
10/24/2013	297	3.33	13.33	13.37	13.34	13.22	13.18	13.26	2.4	12743395	-3142	-3.866	0.0	1.3	-4.3	0.0	11851	-2828	9024	23.9%	0.47	13.66	12.83	(0.83)	(1.31)	-0.11	(1.19)
10/25/2013	298	3.43	12.48	12.51	12.49	12.36	12.32	12.40	2.1	7696660	-2534	-2.957	0.0	1.4	-3.5	0.0	7158	-2281	4877	31.9%	0.29	12.83	12.04	(0.78)	(1.07)	-0.09	(0.98)
10/26/2013	299	4.49	11.84	11.86	11.84	11.70	11.65	11.72	2.4	13532000	-2847	-3.379	0.0	1.4	-3.9	0.0	12585	-2562	10022	20.4%	0.50	12.04	11.47	(0.57)	(1.07)	-0.10	(0.97)
10/27/2013	300	6.32	11.30	11.32	11.31	11.17	11.14	11.20	2.2	7630668	-2306	-2.423	0.0	1.6	-3.2	0.0	7097	-2076	5021	29.2%	0.28	11.47	10.98	(0.49)	(0.77)	-0.08	(0.69)
10/28/2013	301	5.48	10.98	11.00	10.98	10.82	10.78	10.81	1.7	13955157	-1770	-2.309	0.0	1.0	-2.4	0.0	12978	-1593	11385	12.3%	0.52	10.98	10.78	(0.20)	(0.72)	-0.06	(0.65)
10/29/2013	302	4.51	10.76	10.78	10.77	10.64	10.56	10.62	1.0	5904874	-1325	-1.137	0.0	1.5	-1.8	0.0	5492	-1193	4299	21.7%	0.22	10.78	10.52	(0.26)	(0.48)	-0.05	(0.43)
10/30/2013	303	8.57	10.71	10.66	10.58	10.47	10.33	10.39	1.0	6973130	-629	-0.708	0.0	1.0	-0.9	0.0	6485	-566	5919	8.7%	0.26	10.52	10.45	(0.07)	(0.33)	-0.02	(0.31)
10/31/2013	304	11.48	10.61	10.59	10.57	10.50	10.35	10.37	2.2	1226514	85	3.636	3.4	1.2	0.1	0.0											