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 Apr 2014, 10:40-11:40am EDT: platform moved to lake center 16Nov 2013: platform move to dock 11:45-13:00 EDT

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.

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

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					
	57.3	78.6	35.0		4.55	4.9	29				62.3	62.2	61.9	59.2	54.9	52.4	50.2	48.5	43.4	42.0	41.9					
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	Tw11.2m	Tw12.5m	H310_z (m)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
10.9	14.1	25.9	1.7	68.7	115.5	2.2	13.2	238.5	965.1	583726033	1207	16.8	16.8	16.6	15.1	12.7	11.3	10.1	9.1	6.3	5.6	5.5	11.2	75.1	115.5	12.5	34.8	35.7

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%	5/1/2014	121	13.9	20.4	8.5	74.1	3.3	2.1	8.8	219	957.4	19504385	41.1	10.67	10.55	10.53	10.11	9.93	9.82	9.64	9.38	5.72	5.3	5.20	11.2	85.9	3.300	12.5	45.8	45.2
LC	100%	5/2/2014	122	10.4	13.6	5.9	60.6	0.0	2.3	9.0	248	957.1	15949712	33.2	11.54	11.56	11.56	10.84	10.11	9.87	9.64	9.29	5.80	5.3	5.20	11.2	85.8	3.300	12.6	45.7	40.6
LC	100%	5/3/2014	123	10.7	14.8	6.4	61.2	0.7	1.8	7.9	244	957.9	12252024	25.9	11.61	11.61	11.66	11.42	10.35	9.90	9.63	9.18	5.80	5.3	5.20	11.2	82.2	4.000	12.6	44.5	39.3
LC	100%	5/4/2014	124	9.4	12.5	7.2	59.6	1.5	3.5	13.0	281	955.9	17514091	36.1	11.55	11.60	11.66	11.60	10.80	10.12	9.64	9.13	5.88	5.3	5.21	11.2	79.3	5.500	12.6	47.1	42.0
LC	100%	5/5/2014	125	9.2	14.0	5.5	46.6	0.0	3.9	10.0	316	961.0	26572749	53.2	11.39	11.43	11.50	11.47	11.32	10.67	9.87	9.26	5.97	5.4	5.23	11.2	74.4	5.500	12.6	46.9	39.0
LC	100%	5/6/2014	126	9.3	14.2	3.8	46.4	0.0	2.6	10.5	295	963.1	24356538	50.0	11.85	11.87	11.93	11.86	11.70	10.92	10.20	9.40	5.97	5.4	5.25	11.2	68.8	5.500	12.6	45.8	38.3
LC	100%	5/7/2014	127	10.7	17.7	1.7	47.5	0.0	1.4	6.1	237	969.9	21958280	45.2	13.08	12.65	12.37	12.05	11.80	11.18	10.19	9.34	6.04	5.4	5.26	11.2	62.8	5.500	12.6	45.7	36.3
LC	100%	5/8/2014	128	12.8	18.4	9.1	84.3	6.3	1.0	5.5	141	968.6	14220669	30.7	14.24	13.83	13.19	12.20	11.79	11.18	10.17	9.27	6.10	5.4	5.30	11.2	55.1	11.800	12.6	47.7	48.8
LC	100%	5/9/2014	129	14.2	17.7	11.3	92.3	0.0	2.2	7.0	165	967.5	10554520	22.9	15.03	14.75	13.80	12.35	11.83	11.19	10.16	9.20	6.13	5.4	5.33	11.2	46.3	11.800	12.6	49.4	45.4
LC	100%	5/10/2014	130	19.3	24.9	15.0	71.2	0.0	2.6	9.6	241	961.3	20257816	43.0	16.18	16.14	15.41	12.63	11.89	11.25	10.12	9.10	6.17	5.4	5.37	11.1	40.7	11.800	12.6	49.8	44.2
LC	100%	5/11/2014	131	16.1	22.1	9.5	52.4	0.8	2.4	8.2	285	965.9	29238842	59.2	17.21	17.20	17.15	13.18	12.02	11.28	10.13	9.07	6.27	5.5	5.40	11.1	35.6	12.600	12.6	50.2	47.4
LC	100%	5/12/2014	132	18.7	25.1	11.9	56.0	0.0	1.1	7.5	274	968.0	14156647	30.1	18.11	17.94	17.57	13.74	12.11	11.28	10.15	9.03	6.26	5.5	5.42	11.1	30.1	12.600	12.6	48.0	42.5
LC	100%	5/13/2014	133	17.6	23.0	12.4	65.0	0.0	1.8	6.6	187	969.4	17698939	37.6	18.73	18.65	18.13	14.01	12.19	11.32	10.13	9.04	6.30	5.5	5.44	11.1	26.4	12.600	12.6	50.0	44.7
LC	100%	5/14/2014	134	15.3	20.9	9.7	66.7	0.0	2.3	8.1	166	972.1	23910817	50.9	18.91	18.83	18.43	14.38	12.27	11.35	10.15	8.97	6.29	5.5	5.44	11.1	21.1	12.600	12.6	49.7	44.6
LC	100%	5/15/2014	135	18.4	23.7	15.2	88.1	1.2	2.9	9.8	164	968.9	14481151	31.1	19.74	19.70	19.54	14.82	12.39	11.39	10.17	8.99	6.34	5.5	5.48	11.1	18.1	13.800	12.6	50.7	46.1
LC	100%	5/16/2014	136	15.3	19.1	10.3	92.5	80.3	3.1	11.7	220	961.0	3411276	8.4	18.99	19.00	19.08	15.72	12.49	11.45	10.20	9.04	6.35	5.6	5.51	11.2	54.5	94.143	12.6	53.7	54.3
LC	100%	5/17/2014	137	10.3	14.6	6.2	70.5	0.0	2.1	7.9	298	964.9	22231251	45.1	17.95	17.96	18.02	16.82	12.67	11.53	10.24	9.13	6.39	5.6	5.56	11.2	109.5	94.143	12.6	54.6	62.7
LC	100%	5/18/2014	138	8.5	12.6	3.6	71.8	0.0	2.1	9.1	284	970.3	21063576	42.6	17.33	17.35	17.42	17.26	12.82	11.56	10.26	9.12	6.44	5.6	5.57	11.2	105.2	94.143	12.6	52.4	56.8
LC	100%	5/19/2014	139	9.6	16.4	3.0	68.6	0.0	2.4	10.6	267	970.4	23422747	47.1	16.85	16.88	16.94	16.84	13.05	11.61	10.25	9.11	6.46	5.6	5.56	11.2	102.2	94.143	12.6	51.6	49.3
LC	100%	5/20/2014	140	13.6	20.1	5.7	61.0	0.0	2.0	8.5	290	968.0	26099852	52.7	17.18	17.12	17.15	16.63	13.36	11.64	10.28	9.10	6.51	5.7	5.59	11.2	99.8	94.143	12.6	36.6	38.1
LC	100%	5/21/2014	141	15.1	17.4	12.5	74.0	0.0	1.2	6.4	228	963.8	8899150	19.3	17.65	17.65	17.73	16.82	13.55	11.66	10.27	9.12	6.49	5.7	5.55	11.2	95.8	94.143	12.6	10.0	12.6
LC	100%	5/22/2014	142	16.5	22.4	12.8	82.7	16.0	1.5	13.2	223	959.4	18671837	38.5	18.49	18.13	17.87	16.98	13.70	11.75	10.29	9.10	6.49	5.7	5.56	11.2	102.0	110.143	12.6	9.8	17.4
LC	100%	5/23/2014	143	12.8	17.4	9.5	85.8	3.7	2.0	7.7	269	961.9	5169511	10.4	18.49	18.50	18.50	17.18	13.89	11.76	10.25	9.14	6.62	5.7	5.64	11.2	110.4	113.843	12.6	12.4	26.4
LC	100%	5/24/2014	144	13.5	18.2	10.4	81.7	1.1	2.3	8.3	269	966.1	15249200	31.8	18.03	18.04	18.11	17.71	14.05	11.80	10.24	9.11	6.60	5.8	5.65	11.2	108.9	114.943	12.5	10.4	13.8
LC	100%	5/25/2014	145	15.7	22.9	7.8	64.7	0.1	1.8	9.4	292	968.3	26893658	54.6	18.60	18.53	18.53	17.58	14.18	11.87	10.24	9.11	6.67	5.8	5.66	11.2	105.8	115.043	12.5	10.1	12.9
LC	100%	5/26/2014	146	19.4	25.9	11.5	54.7	0.0	1.9	7.9	269	965.9	26080553	53.7	19.61	19.57	19.50	17.86	14.38	11.92	10.25	9.13	6.64	5.8	5.69	11.2	100.6	115.043	12.6	9.5	11.5
LC	100%	5/27/2014	147	20.8	25.7	16.7	63.7	0.0	1.9	7.2	269	961.4	18256585	38.3	20.80	20.72	20.37	18.22	14.47	11.95	10.25	9.10	6.65	5.8	5.73	11.2	95.4	115.043	12.6	9.3	10.8
LC	100%	5/28/2014	148	17.0	21.9	10.5	85.6	0.0	2.3	9.2	195	963.0	18735318	38.9	21.31	21.25	21.21	18.42	14.58	11.99	10.24	9.13	6.73	5.9	5.77	11.2	90.8	115.043	12.6	9.9	11.8
LC	100%	5/29/2014	149	11.7	16.0	7.9	74.8	0.0	2.0	5.5	160	970.0	15360858	31.6	20.40	20.33	20.37	18.71	14.62	12.02	10.25	9.11	6.67	5.9	5.78	11.2	84.4	115.043	12.5	10.5	11.5
LC	100%	5/30/2014	150	15.5	21.3	10.8	65.4	0.5	2.7	9.5	243	967.9	24932379	50.5	20.10	20.10	20.16	19.29	14.69	12.09	10.22	9.08	6.72	5.9	5.80	11.2	78.9	115.543	12.5	10.0	11.4
LC	100%	5/31/2014	151	14.7	19.5	8.6	60.8	0.0	2.3	10.1	158	971.2	26621104	53.5	20.10	20.06	20.11	19.78	14.84	12.12	10.27	9.11	6.68	5.9	5.82	11.2	72.6	115.543	12.6	10.1	11.4

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: 6%

1.000 <=SCALE ADJ (1.0=no adjustment)

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

Grand sum/avg	14.07	16.82	16.75	16.62	15.10	12.70	11.33	2.0	583724875	-69293	-10.0	115.5	18.5	-95.5	0.0	0.0													-2.3	-12.8

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

Nominal diffuse %R from water=7%

																							-58635.5	459470.8	13%			13	13.1	5.5	

4.184 <=CONVERT HEAT TO DEGREES 4.184 slope

7% 0.9 6000000 cm3/m2 (for 0-4m integrated depth) 6000000 intercept r2

Data

DATE	DOY	AvgTair C	AvgTw 0.1m	AvgTw0.5m	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)
5/1/2014	121	13.98	10.64	10.52	10.50	10.10	9.92	9.82	1.9		19503791	-483	7.515	3.3	5.7	-0.7	0.0	18139	-435	17704	2.4%	0.72	9.80	10.34	0.55	(0.18)	-0.02	(0.16)
5/2/2014	122	10.54	11.53	11.55	11.55	10.81	10.11	9.87	2.1		15949062	-1733	-3.167	0.0	0.0	-2.4	0.0	14833	-1560	13273	10.5%	0.59	10.34	10.59	0.25	(0.34)	-0.06	(0.28)
5/3/2014	123	10.72	11.61	11.61	11.66	11.42	10.35	9.90	1.6		12253467	-1260	-2.957	0.7	-1.1	-1.7	0.0	11396	-1134	10262	10.0%	0.45	10.59	10.65	0.06	(0.40)	-0.05	(0.35)
5/4/2014	124	9.43	11.55	11.60	11.66	11.60	10.75	10.10	3.1		17512159	-2665	-3.282	1.5	-0.3	-3.7	0.0	16286	-2398	13888	14.7%	0.65	10.65	10.86	0.21	(0.44)	-0.10	(0.34)
5/5/2014	125	9.25	11.38	11.43	11.50	11.46	11.32	10.65	3.7		26571870	-3518	-6.429	0.0	-0.8	-4.8	0.0	24712	-3166	21546	12.8%	0.98	10.86	11.07	0.22	(0.77)	-0.13	(0.64)
5/6/2014	126	9.25	11.83	11.86	11.92	11.85	11.68	10.91	2.4		24358234	-2688	-5.413	0.0	-0.9	-3.7	0.0	22653	-2419	20234	10.7%	0.90	11.07	11.47	0.40	(0.50)	-0.10	(0.41)
5/7/2014	127	10.64	13.05	12.61	12.35	12.06	11.81	11.19	1.2		21958837	-1745	-8.535	0.0	-1.3	-2.4	0.0	20422	-1571	18851	7.7%	0.81	11.47	11.47	(0.01)	(0.82)	-0.06	(0.76)
5/8/2014	128	12.76	14.19	13.78	13.18	12.19	11.78	11.18	0.9		14220836	-568	-6.899	6.3	0.8	-0.8	0.0	13225	-511	12714	3.9%	0.53	11.47	11.69	0.23	(0.30)	-0.02	(0.28)
5/9/2014	129	14.21	15.02	14.73	13.77	12.35	11.83	11.18	2.0		10554427	-479	-7.070	0.0	-0.9	-0.7	0.0	9816	-431	9384	4.4%	0.39	11.69	11.96	0.27	(0.12)	-0.02	(0.10)
5/10/2014	130	19.22	16.13	16.09	15.35	12.62	11.89	11.25	2.4		20257893	-971	-5.248	0.0	-1.2	-1.3	0.0	18840	-874	17966	4.6%	0.75	11.96	12.33	0.37	(0.38)	-0.03	(0.35)
5/11/2014	131	16.27	17.18	17.17	17.10	13.15	12.01	11.29	2.3		29237733	-3076	-5.636	0.8	-1.4	-4.2	0.0	27191	-2768	24423	10.2%	1.08	12.33	12.77	0.43	(0.65)	-0.11	(0.54)
5/12/2014	132	18.59	18.09	17.93	17.58	13.74	12.12	11.27	1.0		14157008	-1415	-4.092	0.0	-1.3	-2.0	0.0	13166	-1273	11893	9.7%	0.52	12.77	12.89	0.13	(0.40)	-0.05	(0.35)
5/13/2014	133	17.71	18.73	18.63	18.11	14.00	12.18	11.33	1.6		17700487	-1969	-4.226	0.0	-0.7	-2.7	0.0	16461	-1772	14689	10.8%	0.66	12.89	13.08	0.19	(0.47)	-0.07	(0.40)
5/14/2014	134	15.16	18.89	18.81	18.41	14.36	12.26	11.35	2.0		23909987	-2562	-4.863	0.0	-0.5	-3.5	0.0	22236	-2306	19930	10.4%	0.89	13.08	13.38	0.30	(0.59)	-0.09	(0.50)
5/15/2014	135	18.29	19.73	19.69	19.51	14.81	12.38	11.38	2.6		14481547	-1407	-0.709	1.2	0.9	-1.9	0.0	13468	-1266	12202	9.4%	0.54	13.38	13.59	0.21	(0.32)	-0.05	(0.27)
5/16/2014	136	15.56	19.04	19.05	19.13	15.67	12.49	11.44	2.9		3410783	-2369	88.920	80.3	12.7	-3.3	0.0	3172	-2132	1040	67.2%	0.13	13.59	13.83	0.24	0.11	-0.08	0.20
5/17/2014	137	10.38	17.96	17.97	18.03	16.80	12.67	11.53	1.9		22230660	-3216	-0.163	0.0	5.1	-4.4	0.0	20675	-2894	17780	14.0%	0.82	13.83	13.90	0.07	(0.75)	-0.12	(0.64)
5/18/2014	138	8.56	17.34	17.36	17.44	17.26	12.82	11.56	2.0		21062919	-3391	-3.439	0.0	2.1	-4.7	0.0	19589	-3052	16537	15.6%	0.78	13.90	13.78	(0.12)	(0.90)	-0.12	(0.78)
5/19/2014	139	9.52	16.86	16.88	16.95	16.85	13.03	11.61	2.2		23423123	-3392	-1.419	0.0	4.1	-4.7	0.0	21784	-3053	18730	14.0%	0.87	13.78	13.77	(0.00)	(0.87)	-0.12	(0.75)
5/20/2014	140	13.41	17.15	17.09	17.13	16.64	13.34	11.64	1.8		26100725	-2700	-4.916	0.0	-0.4	-3.7	0.0	24274	-2430	21844	10.0%	0.97	13.77	13.90	0.13	(0.84)	-0.10	(0.74)
5/21/2014	141	15.08	17.66	17.66	17.72	16.81	13.56	11.66	1.1		8899634	-1335	-2.617	0.0	0.1	-1.8	0.0	8277	-1202	7075	14.5%	0.33	13.90	13.85	(0.05)	(0.38)	-0.05	(0.33)
5/22/2014	142	16.55	18.46	18.10	17.85	16.98	13.69	11.71	1.3		18671213	-1200	15.188	16.0	1.7	-1.7	0.0	17364	-1080	16284	6.2%	0.69	13.85	14.28	0.43	(0.26)	-0.04	(0.21)
5/23/2014	143	12.89	18.51	18.52	18.51	17.16	13.89	11.80	1.8		5169879	-1431	0.882	3.7	-0.3	-2.0	0.0	4808	-1288	3520	26.8%	0.19	14.28	14.14	(0.15)	(0.34)	-0.05	(0.29)
5/24/2014	144	13.48	18.03	18.04	18.11	17.70	14.05	11.80	2.2		15248080	-2357	-2.804	1.1	0.2	-3.2	0.0	14181	-2121	12059	15.0%	0.56	14.14	14.26	0.12	(0.45)	-0.08	(0.36)
5/25/2014	145	15.58	18.57	18.50	18.50	17.57	14.17	11.87	1.6		26894128	-2565	-4.548	0.1	-0.3	-3.5	0.0	25012	-2309	22703	9.2%	1.00	14.26	14.48	0.23	(0.77)	-0.09	(0.68)
5/26/2014	146	19.28	19.57	19.54	19.47	17.84	14.37	11.91	1.8		26080407	-2626	-5.409	0.0	-0.9	-3.6	0.0	24255	-2363	21891	9.7%	0.97	14.48	14.88	0.40	(0.57)	-0.09	(0.47)
5/27/2014	147	20.79	20.78	20.70	20.35	18.21	14.47	11.96	1.7		18257191	-1941	-4.915	0.0	-1.4	-2.7	0.0	16979	-1747	15232	10.3%	0.68	14.88	14.99	0.11	(0.56)	-0.07	(0.49)
5/28/2014	148	17.20	21.31	21.25	21.20	18.41	14.58	11.98	2.1		18735362	-2523	-5.150	0.0	-0.8	-3.5	0.0	17424	-2270	15153	13.0%	0.69	14.99	15.11	0.12	(0.57)	-0.09	(0.48)
5/29/2014	149	11.63	20.43	20.36	20.41	18.70	14.60	12.03	1.9		15360934	-3596	-6.214	0.0	-0.4	-5.0	0.0	14286	-3236	11049	22.7%	0.57	15.11	15.08	(0.04)	(0.60)	-0.13	(0.48)
5/30/2014	150	15.42	20.09	20.09	20.16	19.27	14.70	12.08	2.4		24931140	-3968	-5.664	0.5	0.2	-5.5	0.0	23186	-3571	19615	15.4%	0.92	15.08	15.33	0.25	(0.68)	-0.14	(0.53)
5/31/2014	151	14.84	20.10	20.06	20.11	19.79	14.83	12.11	2.1		26621358	-4142	-6.750	0.0	-0.2	-5.7	0.0											