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 13Nov 2011: platform move to dock 12-1pm

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=> 12.76

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						
		68.6	86.1	49.6		2.04	3.3	22					77.2	76.5	77.0	75.3	73.6	65.4	56.9	51.7	48.1	47.1	47.5						
Month summai	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	Tw10.0m	Tw11.3m	H310_z (m)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
	16.6	20.3	30.0	9.8	86.0	51.8	1.5	9.9	234.4	965.6	613391669	1265	25.1	24.7	25.0	24.0	23.1	18.6	13.8	10.9	9.0	8.4	8.6	10.0	-65.1	51.8	12.5	49.7	55.3

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%	8/1/2012	214	21.2	25.2	18.2	92.0	2.4	1.3	5.4	231	961.9	16911221	35	25.29	24.69	25.03	24.17	22.94	17.00	13.13	10.66	8.88	8.3	8.93	10.0	-45.8	2.400	12.5	47.0	58.2
LC	100%	8/2/2012	215	22.6	28.5	18.3	80.1	0.0	1.3	7.5	256	962.7	26367850	55	26.13	25.16	25.17	24.27	22.91	17.08	13.18	10.70	8.88	8.4	8.88	10.0	-48.3	2.400	12.5	47.0	56.9
LC	100%	8/3/2012	216	24.3	30.0	18.7	83.1	0.0	1.2	4.7	251	966.6	22624517	47	26.70	25.78	25.73	24.51	22.90	17.19	13.19	10.70	8.90	8.4	8.80	10.0	-52.3	2.400	12.5	46.3	56.7
LC	100%	8/4/2012	217	24.0	28.8	19.8	90.6	0.5	1.4	9.1	187	971.2	22879054	48	27.31	26.81	26.44	24.78	22.89	17.29	13.25	10.71	8.90	8.4	8.71	10.0	-55.6	2.900	12.5	47.9	57.2
LC	100%	8/5/2012	218	23.6	27.7	21.0	95.8	13.5	2.1	9.9	220	967.8	14399683	30	26.89	26.53	26.83	25.07	22.88	17.38	13.32	10.78	8.91	8.4	8.76	10.0	-53.4	16.400	12.5	48.3	60.6
LC	100%	8/6/2012	219	21.0	23.5	15.7	85.0	0.1	2.0	6.8	280	966.7	24170683	50	26.50	26.19	26.61	25.49	22.99	17.59	13.31	10.77	8.94	8.4	8.90	10.0	-44.7	16.500	12.5	49.7	62.4
LC	100%	8/7/2012	220	20.1	26.7	12.9	81.9	0.0	1.1	5.3	265	965.8	25058306	52	26.60	26.00	26.05	25.28	23.02	17.67	13.37	10.78	8.93	8.4	8.76	10.0	-49.8	16.500	12.5	48.3	57.5
LC	100%	8/8/2012	221	22.3	28.8	16.6	82.0	0.0	1.0	4.8	223	964.9	22819113	47	26.73	26.08	26.16	25.27	23.11	17.77	13.40	10.81	8.94	8.4	8.73	10.0	-54.0	16.500	12.6	48.4	58.3
LC	100%	8/9/2012	222	22.6	28.1	19.3	86.8	0.0	1.5	7.7	222	963.4	15484327	32	26.45	26.11	26.55	25.48	23.15	17.86	13.44	10.81	8.95	8.4	8.71	10.0	-57.8	16.500	12.6	48.8	56.6
LC	100%	8/10/2012	223	21.0	22.7	19.3	97.1	9.9	1.3	6.1	162	959.7	9771153	21	25.79	25.51	26.03	25.24	23.24	17.97	13.51	10.82	8.96	8.4	8.85	10.0	-53.7	26.400	12.5	50.1	66.9
LC	100%	8/11/2012	224	22.8	26.1	19.4	87.2	0.5	1.7	8.8	223	960.6	19516713	41	25.82	25.51	25.94	25.02	23.34	18.08	13.57	10.85	8.95	8.4	9.04	10.0	-51.0	26.900	12.5	50.7	65.7
LC	100%	8/12/2012	225	20.0	23.7	16.2	83.0	0.0	1.8	6.4	275	963.7	21537662	45	25.77	25.47	25.91	24.95	23.50	18.16	13.60	10.86	8.95	8.4	8.84	10.0	-55.7	26.900	12.5	50.4	59.3
LC	100%	8/13/2012	226	19.9	24.8	15.3	83.3	0.0	1.7	8.3	288	965.4	23106958	48	25.44	25.16	25.59	24.67	23.68	18.25	13.64	10.88	8.95	8.4	8.77	10.0	-61.0	26.900	12.5	50.3	59.7
LC	100%	8/14/2012	227	19.2	22.9	16.3	96.4	4.4	1.4	6.9	194	963.5	13528062	29	25.10	24.82	25.21	24.49	23.84	18.36	13.70	10.89	8.94	8.4	8.77	10.0	-62.0	31.300	12.5	51.0	63.9
LC	100%	8/15/2012	228	19.4	22.0	16.7	97.8	7.0	1.4	5.7	161	962.1	11564597	24	24.81	24.54	24.99	24.28	23.87	18.48	13.78	10.92	8.95	8.4	8.93	10.0	-55.6	38.300	12.5	52.1	68.6
LC	100%	8/16/2012	229	19.6	24.7	15.4	83.6	0.1	1.7	6.8	289	963.2	23669100	48	24.77	24.46	24.79	23.88	23.76	18.60	13.84	10.93	8.95	8.4	8.89	10.0	-58.0	38.400	12.5	52.4	63.3
LC	100%	8/17/2012	230	20.1	24.8	15.9	89.3	1.8	1.4	6.2	273	961.0	11008666	23	24.50	24.20	24.63	23.81	23.57	18.74	13.87	10.96	8.96	8.4	8.81	10.0	-61.4	40.200	12.5	51.6	63.1
LC	100%	8/18/2012	231	17.5	21.1	13.2	83.9	1.1	1.6	8.8	250	962.7	23253365	47	24.32	24.05	24.54	23.67	23.56	18.84	13.96	10.94	8.96	8.4	8.90	10.0	-62.4	41.300	12.5	53.4	69.1
LC	100%	8/19/2012	232	15.7	22.1	9.8	87.1	0.0	1.1	4.2	209	964.1	18420852	38	24.13	23.70	23.95	23.26	23.25	18.97	13.94	10.98	8.97	8.4	8.80	10.0	-66.7	41.300	12.5	52.4	64.9
LC	100%	8/20/2012	233	16.7	21.0	13.4	95.3	5.2	1.0	6.5	236	962.5	10457267	22	23.58	23.27	23.77	22.97	23.01	19.07	13.99	10.99	8.96	8.4	8.74	10.0	-68.2	46.500	12.5	52.4	64.5
LC	100%	8/21/2012	234	17.6	23.0	13.1	87.0	0.1	1.2	4.8	249	966.7	22679679	47	23.73	23.31	23.44	22.55	22.75	19.28	14.05	11.00	8.98	8.4	8.91	10.0	-66.9	46.600	12.5	53.6	70.4
LC	100%	8/22/2012	235	17.8	23.9	12.0	88.9	0.2	1.1	5.4	222	969.8	20133653	42	23.85	23.34	23.58	22.59	22.54	19.40	14.11	11.03	8.98	8.4	8.86	10.0	-70.1	46.800	12.5	53.6	65.9
LC	100%	8/23/2012	236	19.9	26.1	14.1	81.3	0.1	1.2	5.2	274	970.5	24351357	50	24.08	23.63	23.56	22.68	22.62	19.45	14.15	11.04	8.98	8.4	8.82	10.0	-73.1	46.900	12.5	53.4	64.6
LC	100%	8/24/2012	237	20.0	26.4	13.3	81.6	0.0	0.9	5.0	209	971.3	23190902	47	24.72	23.99	23.91	22.94	22.64	19.51	14.21	11.07	8.99	8.4	8.79	10.0	-76.4	46.900	12.5	53.5	64.6
LC	100%	8/25/2012	238	19.6	25.1	14.8	90.1	1.1	1.1	5.3	177	973.4	17479024	36	24.54	24.17	24.43	23.16	22.69	19.56	14.25	11.07	8.99	8.4	8.65	10.0	-79.3	48.000	12.5	53.4	51.8
LC	100%	8/26/2012	239	20.7	25.3	15.6	81.1	0.0	1.6	7.1	143	973.9	24055542	50	24.61	24.28	24.62	23.42	22.72	19.54	14.30	11.10	8.97	8.4	8.05	10.0	-81.6	48.000	12.5	50.4	16.7
LC	100%	8/27/2012	240	22.0	26.2	18.9	89.3	0.2	1.8	6.7	211	968.0	13338045	28	24.59	24.32	24.99	23.58	22.78	19.55	14.37	11.11	8.98	8.4	7.87	10.0	-85.2	48.200	12.5	47.0	12.6
LC	100%	8/28/2012	241	21.8	24.7	18.4	83.0	3.6	2.7	8.2	300	962.0	19611553	40	24.47	24.19	24.70	23.92	22.92	19.60	14.41	11.15	9.00	8.4	7.84	10.0	-85.1	51.800	12.5	46.6	13.6
LC	100%	8/29/2012	242	17.4	21.2	12.7	78.2	0.0	1.9	6.9	233	965.0	24720941	50	24.15	23.86	24.33	23.56	23.24	19.66	14.50	11.16	8.99	8.4	7.81	10.0	-89.6	51.800	12.5	45.5	11.3
LC	100%	8/30/2012	243	17.1	25.0	9.8	76.7	0.0	1.5	7.3	287	968.0	23807245	48	23.88	23.59	23.97	23.06	23.03	19.75	14.54	11.19	8.99	8.4	7.79	10.0	-94.6	51.800	12.5	43.3	11.3
LC	100%	8/31/2012	244	22.7	29.2	15.1	67.7	0.0	2.0	7.5	267	965.6	23474581	47	23.77	23.48	23.89	22.98	22.86	19.91	14.59	11.19	8.99	8.4	7.78	10.0	-98.9	51.800	12.5	41.0	11.2

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: 8.1%

Grand sum/avg	20.33	25.13	24.72	25.01	24.03	23.10	18.57	1.3	613391669	-73534	-55.5	51.8	10.9	-102.0	-12.8	0.0
																SumTerrevap2=AirVPD,mbar*WS,m/s*s

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
8/1/2012	214	21.19	25.29	24.69	25.03	24.17	22.94	17.00	1.2	16911221	-1624	-0.738	2.4	-0.7	-2.3	-0.2
8/2/2012	215	22.62	26.13	25.16	25.17	24.27	22.91	17.08	1.1	26367850	-2302	-3.937	0.0	-0.1	-3.2	-0.6
8/3/2012	216	24.26	26.70	25.78	25.73	24.51	22.90	17.19	1.1	22624517	-1629	-3.586	0.0	-0.8	-2.3	-0.4
8/4/2012	217	23.96	27.31	26.81	26.44	24.78	22.89	17.29	1.3	22879054	-1856	-3.199	0.5	-0.6	-2.6	-0.4
8/5/2012	218	23.62	26.89	26.53	26.83	25.07	22.88	17.38	1.9	14399683	-1816	15.222	13.5	4.6	-2.5	-0.2
8/6/2012	219	20.97	26.50	26.19	26.61	25.49	22.99	17.59	1.8	24170683	-3646	-5.589	0.1	0.1	-5.1	-0.6
8/7/2012	220	20.12	26.60	26.00	26.05	25.28	23.02	17.67	1.0	25058306	-2901	-4.429	0.0	0.1	-4.0	-0.4
8/8/2012	221	22.34	26.73	26.08	26.16	25.27	23.11	17.77	0.9	22819113	-2264	-3.972	0.0	-0.3	-3.1	-0.4
8/9/2012	222	22.64	26.45	26.11	26.55	25.48	23.15	17.86	1.3	15484327	-2171	-3.726	0.0	-0.2	-3.0	-0.4
8/10/2012	223	21.05	25.79	25.51	26.03	25.24	23.24	17.97	1.2	9771153	-1643	9.878	9.9	2.4	-2.3	-0.1
8/11/2012	224	22.77	25.82	25.51	25.94	25.02	23.34	18.08	1.5	19516713	-2104	-3.340	0.5	-0.3	-2.9	-0.5
8/12/2012	225	19.96	25.77	25.47	25.91	24.95	23.50	18.16	1.6	21537662	-3256	-5.203	0.0	-0.1	-4.5	-0.5
8/13/2012	226	19.92	25.44	25.16	25.59	24.67	23.68	18.25	1.6	23106958	-3075	-4.992	0.0	-0.1	-4.3	-0.5
8/14/2012	227	19.15	25.10	24.82	25.21	24.49	23.84	18.36	1.2	13528062	-2025	1.933	4.4	0.6	-2.8	-0.1
8/15/2012	228	19.36	24.81	24.54	24.99	24.28	23.87	18.48	1.3	11564597	-1824	5.660	7.0	1.4	-2.5	-0.1
8/16/2012	229	19.59	24.77	24.46	24.79	23.88	23.76	18.60	1.6	23669100	-2875	-4.465	0.1	0.1	-4.0	-0.5
8/17/2012	230	20.10	24.50	24.20	24.63	23.81	23.57	18.74	1.3	11008666	-1798	-0.914	1.8	0.1	-2.5	-0.3
8/18/2012	231	17.50	24.32	24.05	24.54	23.67	23.56	18.84	1.5	23253365	-3220	-3.551	1.1	0.4	-4.5	-0.4
8/19/2012	232	15.67	24.13	23.70	23.95	23.26	23.25	18.97	1.0	18420852	-2688	-3.902	0.0	0.1	-3.7	-0.2
8/20/2012	233	16.66	23.58	23.27	23.77	22.97	23.01	19.07	0.9	10457267	-1914	3.445	5.2	1.1	-2.7	-0.1
8/21/2012	234	17.62	23.73	23.31	23.44	22.55	22.75	19.28	1.1	22679679	-2284	-3.375	0.1	0.1	-3.2	-0.3
8/22/2012	235	17.75	23.85	23.34	23.58	22.59	22.54	19.40	1.0	20133653	-2066	-2.883	0.2	0.1	-2.9	-0.2
8/23/2012	236	19.88	24.08	23.63	23.56	22.68	22.62	19.45	1.1	24351357	-2113	-3.410	0.1	0.0	-2.9	-0.5
8/24/2012	237	20.03	24.72	23.99	23.91	22.94	22.64	19.51	0.8	23190902	-1976	-3.269	0.0	-0.1	-2.7	-0.4
8/25/2012	238	19.64	24.54	24.17	24.43	23.16	22.69	19.56	1.0	17479024	-1858	-1.652	1.1	0.3	-2.6	-0.3
8/26/2012	239	20.74	24.61	24.28	24.62	23.42	22.72	19.54	1.5	24055542	-2434	-4.008	0.0	0.1	-3.4	-0.6
8/27/2012	240	21.99	24.59	24.32	24.99	23.58	22.78	19.55	1.6	13338045	-1543	-2.672	0.2	-0.3	-2.1	-0.3
8/28/2012	241	21.78	24.47	24.19	24.70	23.92	22.92	19.60	2.5	19611553	-2894	-0.527	3.6	0.8	-4.0	-0.8
8/29/2012	242	17.43	24.15	23.86	24.33	23.56	23.24	19.66	1.7	24720941	-3759	-5.238	0.0	0.7	-5.2	-0.6
8/30/2012	243	17.12	23.88	23.59	23.97	23.06	23.03	19.75	1.4	23807245	-3252	-4.816	0.0	0.4	-4.5	-0.6
8/31/2012	244	22.74	23.77	23.48	23.89	22.98	22.86	19.91	1.8	23474581	-2724	-4.254	0.0	0.8	-3.8	-1.4

1.000	<=SCALE ADJ (1.0=no adjustment)
4.184	joule/calorie (= joule/degree for 1cm3)

Nominal diffuse %R from water=7%	-66180.8	504273.5	12%		20	#N/A	#N/A		-2.6	#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/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)
15727	-1462	14266	9.3%	0.63	19.89	19.93	0.04	(0.59)	-0.06	(0.53)
24522	-2072	22450	8.4%	0.98	19.93	20.01	0.08	(0.89)	-0.08	(0.81)
21041	-1466	19575	7.0%	0.84	20.01	20.29	0.28	(0.56)	-0.06	(0.50)
21278	-1670	19607	7.9%	0.85	20.29	20.51	0.22	(0.63)	-0.07	(0.56)
13392	-1634	11757	12.2%	0.53	20.51	20.61	0.10	(0.43)	-0.07	(0.37)
22479	-3282	19197	14.6%	0.90	20.61	20.76	0.15	(0.75)	-0.13	(0.61)
23304	-2610	20694	11.2%	0.93	20.76	20.57	(0.19)	(1.12)	-0.10	(1.01)
21222	-2037	19185	9.6%	0.85	20.57	20.68	0.10	(0.74)	-0.08	(0.66)
14400	-1954	12447	13.6%	0.57	20.68	20.69	0.02	(0.56)	-0.08	(0.48)
9087	-1479	7608	16.3%	0.36	20.69	20.56	(0.13)	(0.49)	-0.06	(0.43)
18151	-1893	16257	10.4%	0.72	20.56	20.57	0.01	(0.72)	-0.08	(0.64)
20030	-2930	17100	14.6%	0.80	20.57	20.58	0.01	(0.79)	-0.12	(0.67)
21489	-2768	18722	12.9%	0.86	20.58	20.52	(0.06)	(0.91)	-0.11	(0.80)
12581	-1823	10759	14.5%	0.50	20.52	20.40	(0.12)	(0.62)	-0.07	(0.55)
10755	-1642	9113	15.3%	0.43	20.40	20.34	(0.05)	(0.48)	-0.07	(0.42)
22012	-2588	19425	11.8%	0.88	20.34	20.35	0.00	(0.87)	-0.10	(0.77)
10238	-1618	8620	15.8%	0.41	20.35	20.22	(0.12)	(0.53)	-0.06	(0.47)
21626	-2898	18728	13.4%	0.86	20.22	20.16	(0.06)	(0.92)	-0.12	(0.81)
17131	-2420	14712	14.1%	0.68	20.16	19.97	(0.20)	(0.88)	-0.10	(0.78)
9725	-1723	8003	17.7%	0.39	19.97	19.84	(0.13)	(0.52)	-0.07	(0.45)
21092	-2055	19037	9.7%	0.84	19.84	19.93	0.10	(0.74)	-0.08	(0.66)
18724	-1859	16865	9.9%	0.75	19.93	19.81	(0.13)	(0.87)	-0.07	(0.80)
22647	-1902	20745	8.4%	0.90	19.81	19.98	0.17	(0.73)	-0.08	(0.65)
21568	-1779	19789	8.2%	0.86	19.98	20.19	0.21	(0.65)	-0.07	(0.58)
16255	-1672	14583	10.3%	0.65	20.19	20.18	(0.01)	(0.65)	-0.07	(0.59)
22372	-2191	20181	9.8%	0.89	20.18	20.36	0.18	(0.72)	-0.09	(0.63)
12404	-1389	11015	11.2%	0.49	20.36	20.50	0.14	(0.36)	-0.06	(0.30)
18239	-2605	15634	14.3%	0.73	20.50	20.47	(0.02)	(0.75)	-0.10	(0.64)
22990	-3383	19608	14.7%	0.92	20.47	20.31	(0.16)	(1.08)	-0.13	(0.94)
22141	-2927	19214	13.2%	0.88	20.31	20.17	(0.14)	(1.02)	-0.12	(0.90)
21831	-2451	19380	11.2%	0.87	20.17	#N/A	#N/A	#N/A	-0.10	#N/A