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
rain sum (in.) Aug-Sep2011=> 13.02	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					
	72.0	89.9	54.2		2.30	3.8	31				79.5	78.9	79.3	76.6	69.1	58.9	53.9	50.3	47.9	47.0	47.4					
Month summa 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
16.1	22.2	32.2	12.3	82.5	58.5	1.7	13.9	248.1	964.3	592723952	1234	26.4	26.0	26.3	24.8	20.6	14.9	12.2	10.2	8.8	8.3	8.6	10.0	-59.8	58.5	12.5	38.8	47.8

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%	7/1/2012	183	23.8	29.0	18.2	71.3	0.0	2.0	8.8	300	961.0	27871255	58	25.70	25.37	25.62	22.12	19.13	13.64	11.55	9.96	8.77	8.3	8.37	10.1	-11.5	0.000	12.5	33.4	41.6
LC	100%	7/2/2012	184	20.9	25.8	14.9	72.8	0.0	2.4	9.6	301	963.8	28619144	59	25.49	25.19	25.54	22.57	19.18	13.76	11.57	9.97	8.78	8.3	8.36	10.1	-18.2	0.000	12.5	33.3	41.6
LC	100%	7/3/2012	185	22.3	27.9	14.7	72.4	0.0	1.6	5.9	274	963.4	26008794	54	25.76	25.36	25.34	23.30	19.21	13.85	11.60	9.98	8.79	8.3	8.36	10.0	-23.9	0.000	12.5	32.7	40.3
LC	100%	7/4/2012	186	23.8	29.2	19.3	85.6	1.5	2.0	7.4	286	960.2	26100055	55	26.49	26.16	26.18	23.69	19.24	14.00	11.66	10.00	8.79	8.3	8.39	10.0	-27.7	1.500	12.5	34.7	42.1
LC	100%	7/5/2012	187	24.2	28.7	17.9	76.1	0.0	2.4	8.8	302	960.4	29033721	60	26.92	26.63	26.95	24.13	19.31	14.12	11.70	10.02	8.79	8.3	8.43	10.0	-32.5	1.500	12.5	35.8	43.7
LC	100%	7/6/2012	188	22.3	30.4	12.5	76.9	0.0	1.3	7.3	282	963.2	29332392	60	27.21	26.75	26.53	24.66	19.39	14.22	11.74	10.03	8.79	8.3	8.40	10.0	-38.7	1.500	12.5	33.8	41.6
LC	100%	7/7/2012	189	23.7	28.5	20.2	89.7	0.6	1.4	12.2	263	962.1	17412438	36	27.54	27.16	27.26	24.82	19.48	14.33	11.78	10.03	8.80	8.3	8.44	10.0	-42.6	2.100	12.5	36.5	43.2
LC	100%	7/8/2012	190	23.3	27.8	19.3	77.0	0.5	1.8	7.2	238	962.3	27437752	57	27.57	27.23	27.50	25.00	19.53	14.43	11.81	10.07	8.79	8.3	8.46	10.0	-45.8	2.600	12.5	37.0	44.2
LC	100%	7/9/2012	191	20.9	25.3	16.1	73.3	0.0	1.5	6.6	235	964.5	25746622	53	27.27	26.96	27.27	25.37	19.68	14.51	11.86	10.09	8.79	8.3	8.45	10.0	-51.7	2.600	12.5	36.3	43.5
LC	100%	7/10/2012	192	19.5	27.1	12.3	76.5	0.7	1.3	8.1	225	967.2	25703568	53	27.11	26.60	26.77	25.51	19.80	14.57	11.95	10.10	8.80	8.3	8.43	10.0	-57.5	3.300	12.5	35.6	42.7
LC	100%	7/11/2012	193	21.4	26.3	16.2	84.9	0.1	1.4	5.3	183	970.5	25523181	53	27.23	26.82	26.89	25.50	19.89	14.69	11.99	10.13	8.82	8.4	8.48	10.0	-61.4	3.400	12.5	36.9	44.5
LC	100%	7/12/2012	194	23.5	29.3	18.4	73.2	0.0	1.4	6.4	243	971.5	24201141	50	27.20	26.75	26.88	25.66	20.02	14.77	12.04	10.13	8.81	8.4	8.48	10.0	-66.2	3.400	12.5	36.8	43.8
LC	100%	7/13/2012	195	23.8	28.3	20.0	75.3	0.1	1.3	7.0	245	972.2	18004458	38	27.03	26.59	26.92	25.68	20.11	14.85	12.11	10.13	8.82	8.3	8.46	10.0	-70.7	3.500	12.5	37.2	43.9
LC	100%	7/14/2012	196	22.5	25.9	19.3	82.7	0.3	1.6	5.3	236	971.8	20262897	42	26.89	26.53	26.79	25.79	20.23	14.91	12.15	10.15	8.79	8.3	8.47	10.0	-74.6	3.800	12.5	38.2	44.4
LC	100%	7/15/2012	197	23.2	28.4	20.5	92.5	4.8	1.5	7.1	253	967.7	16270200	35	26.86	26.54	26.84	25.79	20.36	14.95	12.20	10.17	8.81	8.3	8.48	10.0	-77.2	8.600	12.5	38.8	45.6
LC	100%	7/16/2012	198	23.5	29.0	19.8	84.1	0.0	2.0	7.7	306	962.8	21734971	45	26.85	26.55	26.91	25.73	20.52	15.04	12.25	10.19	8.81	8.3	8.52	10.0	-76.9	8.600	12.5	39.9	47.3
LC	100%	7/17/2012	199	25.9	32.2	18.9	71.1	0.0	2.0	8.7	272	960.6	23930199	50	26.84	26.53	26.86	25.86	20.65	15.12	12.29	10.21	8.80	8.3	8.51	10.0	-81.9	8.600	12.5	38.6	45.7
LC	100%	7/18/2012	200	25.6	31.8	22.9	87.2	0.7	1.5	6.6	273	961.3	16718537	35	27.40	27.04	27.35	26.06	20.79	15.18	12.34	10.21	8.80	8.3	8.52	10.0	-86.1	9.300	12.5	40.1	46.6
LC	100%	7/19/2012	201	21.2	23.8	19.2	93.1	2.4	1.3	5.1	184	964.5	13967830	29	27.10	26.78	27.15	26.20	20.92	15.24	12.38	10.25	8.81	8.3	8.63	10.0	-86.8	11.700	12.5	41.9	52.5
LC	100%	7/20/2012	202	16.8	19.6	15.7	100.8	19.5	2.1	6.6	101	966.0	4579336	10	25.81	25.54	25.96	25.35	21.12	15.34	12.46	10.29	8.83	8.3	8.76	10.0	-75.6	31.200	12.5	42.8	61.8
LC	100%	7/21/2012	203	19.1	23.2	15.7	83.9	0.6	1.3	6.4	135	968.4	23686283	49	25.49	24.96	25.02	24.15	21.44	15.44	12.50	10.30	8.81	8.3	8.79	10.0	-71.3	31.800	12.5	42.2	56.3
LC	100%	7/22/2012	204	20.3	25.1	15.4	87.4	0.0	1.2	5.2	253	970.0	18441066	39	25.25	24.92	25.23	24.27	21.65	15.56	12.53	10.33	8.81	8.3	8.67	10.0	-75.0	31.800	12.5	41.8	50.9
LC	100%	7/23/2012	205	22.6	29.1	18.4	88.7	13.4	1.8	11.2	237	965.6	16148351	34	25.33	24.96	25.24	24.41	21.77	15.62	12.60	10.36	8.83	8.3	8.66	10.0	-75.0	45.200	12.6	42.6	53.0
LC	100%	7/24/2012	206	24.0	27.8	19.6	79.2	0.0	2.9	10.3	281	957.5	23461861	49	25.34	25.03	25.42	24.62	22.14	15.88	12.63	10.40	8.85	8.4	8.78	10.0	-67.2	45.200	12.5	43.0	54.1
LC	100%	7/25/2012	207	20.3	25.3	15.5	69.2	0.0	2.4	8.8	234	961.9	29142271	60	25.07	24.78	25.12	24.26	22.54	15.87	12.68	10.42	8.84	8.3	8.70	10.0	-73.6	45.200	12.5	42.5	51.3
LC	100%	7/26/2012	208	21.8	30.1	17.3	88.5	13.1	1.9	13.9	249	956.8	17836507	38	25.27	24.92	25.23	24.40	22.80	16.05	12.74	10.48	8.84	8.4	8.70	10.0	-72.3	58.300	12.6	43.2	55.5
LC	100%	7/27/2012	209	22.5	25.9	20.1	93.2	0.2	1.6	5.8	294	959.4	15548861	33	25.45	25.14	25.47	24.55	22.87	16.26	12.87	10.48	8.87	8.4	8.94	10.0	-65.3	58.500	12.5	44.4	59.7
LC	25%	7/28/2012	210	19.6	20.5	18.9	102.3	0.0	0.6	1.6	261	962.9	258	0	25.45	25.20	25.60	24.64	22.90	16.26	12.92	10.52	8.89	8.4	8.84	10.0	-66.7	58.500	12.5	45.8	57.0
	0%																														
	0%																														
	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)

																														1.000	<=SCALE ADJ (1.0=no adjustment)
Ratio of lake watershed to lake area:	2.6176758				Runoff & seepage as % of watershed area precip:			2.6%																						4.184	joule/calorie (= joule/degree for 1cm3)
Grand sum/avg	22.22	26.39	26.03	26.28	24.79	20.60	14.95	1.5	592723952	-77163	-57.8	58.5	3.9	-107.2	-10.1	0.0	Nominal diffuse %R from water=7%	#N/A	#N/A	14%		19	19.4	2.1		#N/A	-17.1
															SumTerrevap2=AirVPD,mbar*WS,m/s*s													

																														4.184	<=CONVERT HEAT TO DEGREES								4.184	slope
																														6000000	cm3/m2 (for 0-4m integrated depth)								6000000	intercept
																														7%	0.9									r2
		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					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)
7/1/2012	183	23.80	25.70	25.37	25.62	22.12	19.13	13.64	1.9	27871255	-3131	-6.117	0.0	-1.0	-4.3	-0.8					25920	-2818	23102	10.9%	1.03	17.78	18.03	0.25	(0.78)	-0.11	(0.67)
7/2/2012	184	20.86	25.49	25.19	25.54	22.57	19.18	13.76	2.3	28619144	-4486	-6.433	0.0	0.6	-6.2	-0.7					26616	-4037	22578	15.2%	1.06	18.03	18.26	0.23	(0.83)	-0.16	(0.67)
7/3/2012	185	22.34	25.76	25.36	25.34	23.30	19.21	13.85	1.5	26008794	-2938	-5.097	0.0	-0.4	-4.1	-0.5					24188	-2644	21544	10.9%	0.96	18.26	18.40	0.14	(0.82)	-0.11	(0.71)
7/4/2012	186	23.81	26.49	26.16	26.18	23.69	19.24	14.00	1.8	26100055	-2220	-3.164	1.5	-1.1	-3.1	-0.3					24273	-1998	22275	8.2%	0.97	18.40	18.77	0.37	(0.60)	-0.08	(0.52)
7/5/2012	187	24.19	26.92	26.63	26.95	24.13	19.31	14.12	2.3	29033721	-3882	-6.363	0.0	-0.1	-5.4	-0.7					27001	-3494	23507	12.9%	1.08	18.77	19.03	0.27	(0.81)	-0.14	(0.67)
7/6/2012	188	22.32	27.21	26.75	26.53	24.66	19.39	14.22	1.1	29332392	-2960	-5.132	0.0	-0.5	-4.1	-0.4					27279	-2664	24615	9.8%	1.09	19.03	19.07	0.04	(1.05)	-0.11	(0.94)
7/7/2012	189	23.69	27.54	27.16	27.26	24.82	19.48	14.33	1.3	17412438	-2049	-2.355	0.6	0.2	-2.8	-0.2					16194	-1844	14349	11.4%	0.65	19.07	19.34	0.27	(0.38)	-0.07	(0.31)
7/8/2012	190	23.27	27.57	27.23	27.50	25.00	19.53	14.43	1.6	27437752	-3748	-5.449	0.5	-0.1	-5.2	-0.5					25517	-3373	22144	13.2%	1.02	19.34	19.32	(0.02)	(1.03)	-0.13	(0.90)
7/9/2012	191	20.86	27.27	26.96	27.27	25.37	19.68	14.51	1.3	25746622	-4085	-6.187	0.0	0.0	-5.7	-0.4					23944	-3677	20268	15.4%	0.95	19.32	19.44	0.12	(0.83)	-0.15	(0.68)
7/10/2012	192	19.47	27.11	26.60	26.77	25.51	19.80	14.57	1.1	25703568	-3828	-4.394	0.7	0.7	-5.3	-0.3					23904	-3445	20459	14.4%	0.95	19.44	19.49	0.05	(0.91)	-0.14	(0.77)
7/11/2012	193	21.42	27.23	26.82	26.89	25.50	19.89	14.69	1.3	25523181	-3012	-4.429	0.1	0.0	-4.2	-0.2					23737	-2711	21026	11.4%	0.95	19.49	19.52	0.03	(0.91)	-0.11	(0.80)
7/12/2012	194	23.46	27.20	26.75	26.88	25.66	20.02	14.77	1.2	24201141	-2906	-4.500	0.0	0.0	-4.0	-0.4					22507	-2615	19892	11.6%	0.90	19.52	19.57	0.05	(0.85)	-0.10	(0.75)
7/13/2012	195	23.83	27.03	26.59	26.92	25.68	20.11	14.85	1.2	18004458	-2498	-4.359	0.1	-0.5	-3.5	-0.3					16744	-2248	14496	13.4%	0.67	19.57	19.71	0.15	(0.52)	-0.09	(0.43)
7/14/2012	196	22.46	26.89	26.53	26.79	25.79	20.23	14.91	1.4	20262897	-2773	-4.148	0.3	-0.2	-3.9	-0.3					18844	-2496	16349	13.2%	0.75	19.71	19.71	(0.01)	(0.76)	-0.10	(0.66)
7/15/2012	197	23.21	26.86	26.54	26.84	25.79	20.36	14.95	1.4	16270200	-1792	2.320	4.8	0.3	-2.5	-0.2					15131	-1613	13518	10.7%	0.60	19.71	19.67	(0.03)	(0.64)	-0.06	(0.57)
7/16/2012	198	23.46	26.85	26.55	26.91	25.73	20.52	15.04	1.9	21734971	-2786	-4.746	0.0	-0.4	-3.9	-0.4					20214	-2508	17706	12.4%	0.81	19.67	19.83	0.16	(0.65)	-0.10	(0.55)
7/17/2012	199	25.94	26.84	26.53	26.86	25.86	20.65	15.12	1.8	23930199	-2741	-5.519	0.0	-0.8	-3.8	-0.8					22255	-2467	19788	11.1%	0.89	19.83	19.94	0.11	(0.78)	-0.10	(0.68)
7/18/2012	200	25.59	27.40	27.04	27.35	26.06	20.79	15.18	1.4	16718537	-1517	-2.215	0.7	-0.4	-2.1	-0.3					15548	-1366	14183	8.8%	0.62	19.94	20.05	0.12	(0.50)	-0.05	(0.45)
7/19/2012	201	21.25	27.10	26.78	27.15	26.20	20.92	15.24	1.1	13967830	-2352	-0.457	2.4	0.6	-3.3	-0.1					12990	-2117	10873	16.3%	0.52	20.05	20.05	(0.01)	(0.53)	-0.08	(0.44)
7/20/2012	202	16.82	25.81	25.54	25.96	25.35	21.12	15.34	1.9	4579336	-3665	17.683	19.5	3.4	-5.1	0.0					4259	-3298	960	77.4%	0.17	20.05	19.24	(0.80)	(0.97)	-0.13	(0.84)
7/21/2012	203	19.12	25.49	24.96	25.02	24.15	21.44	15.44	1.1	23686283	-2737	-3.515	0.6	0.0	-3.8	-0.2					22028	-2463	19565	11.2%	0.88	19.24	19.37	0.13	(0.75)	-0.10	(0.65)
7/22/2012	204	20.26	25.25	24.92	25.23	24.27	21.65	15.56	1.1	18441066	-2075	-3.340	0.0	-0.2	-2.9	-0.2					17150	-1868	15283	10.9%	0.68	19.37	19.37	0.00	(0.68)	-0.07	(0.61)
7/23/2012	205	22.57	25.33	24.96	25.24	24.41	21.77	15.62	1.6	16148351	-1811	11.531	13.4	1.0	-2.5	-0.2					15018	-1630	13388	10.9%	0.60	19.37	19.63	0.26	(0.34)	-0.06	(0.28)
7/24/2012	206	24.03	25.34	25.03	25.42	24.62	22.14	15.88	2.7	23461861	-3007	-5.238	0.0	-0.3	-4.2	-0.7					21820	-2706	19114	12.4%	0.87	19.63	19.59	(0.04)	(0.91)	-0.11	(0.80)
7/25/2012	207	20.26	25.07	24.78	25.12	24.26	22.54	15.87	2.2	29142271	-4427	-6.082	0.0	0.8	-6.1	-0.6					27102	-3985	23118	14.7%	1.08	19.59	19.63	0.03	(1.05)	-0.16	(0.89)
7/26/2012	208	21.80	25.27	24.92	25.23	24.40	22.80	16.05	1.8	17836507	-1974	12.304	13.1	2.3	-2.7	-0.2					16588	-1776	14812	10.7%	0.66	19.63	19.89	0.26	(0.40)	-0.07	(0.33)
7/27/2012	209	22.50	25.45	25.14	25.47	24.55	22.87	16.26	1.5	15548861	-1436	-2.531	0.2	-0.5	-2.0	-0.1					14460	-1293	13168	8.9%	0.58	19.89	19.83	(0.05)	(0.63)	-0.05	(0.58)
7/28/2012	210	19.55	25.43	25.18	25.58	24.63	22.90	16.27	0.6	258	-326	0.105	0.0	0.4	-0.5	0.0					0	#N/A	#N/A		#N/A				#N/A	#N/A	
#N/A																						#N/A	#N/A		#N/A				#N/A	#N/A	
#N/A																						#N/A	#N/A		#N/A				#N/A	#N/A	
#N/A																						#N/A	#N/A		#N/A				#N/A	#N/A	