Lake Lacawac, Bruce R. Hargreaves, Lehigh University (brh0@lehigh.edu, http://www.lehigh.edu/~brh0) 41^{0} 22.5'N 75^{0} 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

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)

rain sum (in.) Aug-Sep2011=> 15.09

Month summary	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						
	61.7	86.5	38.5		4.37	3.8	25					66.9	66.1	65.4	59.2	54.8	51.9	50.9	49.4	47.6	46.8	45.7						
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
12.1	**16.5**	**30.3**	**3.6**	**84.2**	**110.9**	**1.7**	**11.4**	**206.9**	**965.1**	**579908978**	**1202**	**19.4**	**18.9**	**18.6**	**15.1**	**12.7**	**11.1**	**10.5**	**9.7**	**8.7**	**8.2**	**7.6**	**10.2**	**122.4**	**110.9**	**12.5**	**19.2**	**21.2**

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%	5/1/2012	122	12.5	19.1	7.7	87.8	5.6	1.4	6.1	192	965.2	9450575	20	12.55	12.11	12.22	11.04	10.63	10.36	10.31	9.58	8.59	8.1	7.32	10.1	78.1	5.600	12.5	13.0	14.6
LC	100%	5/2/2012	123	11.3	13.1	8.8	99.5	7.3	1.8	5.9	169	967.9	4550192	10	12.96	12.69	12.79	11.16	10.68	10.35	10.33	9.63	8.59	8.1	7.30	10.1	81.5	12.900	12.5	13.6	14.2
LC	100%	5/3/2012	124	14.6	24.1	8.8	94.1	6.6	1.4	6.3	167	967.1	19047666	40	14.40	12.95	12.86	11.39	10.77	10.38	10.32	9.60	8.60	8.1	7.42	10.1	97.8	19.500	12.5	16.7	22.6
LC	100%	5/4/2012	125	18.7	25.3	13.5	86.1	2.3	2.2	7.9	250	963.4	21642720	46	16.44	15.50	14.01	11.68	10.90	10.45	10.32	9.61	8.64	8.2	7.48	10.1	101.4	21.800	12.5	18.4	20.0
LC	100%	5/5/2012	126	17.2	21.5	14.0	86.2	0.0	1.7	7.6	182	963.6	16689968	35	17.97	17.53	15.29	11.89	11.01	10.49	10.33	9.62	8.66	8.2	7.47	10.1	101.6	21.800	12.6	17.5	17.6
LC	100%	5/6/2012	127	13.9	18.0	9.5	84.6	0.0	1.8	5.8	167	966.4	21159767	44	18.20	17.89	16.31	12.20	11.09	10.53	10.35	9.61	8.64	8.2	7.49	10.1	100.1	21.800	12.6	15.7	16.4
LC	100%	5/7/2012	128	13.2	15.6	11.0	92.5	1.7	1.8	6.6	191	966.7	7400263	16	17.88	17.62	16.94	12.31	11.19	10.53	10.34	9.60	8.66	8.2	7.50	10.1	98.9	23.500	12.6	15.3	14.6
LC	100%	5/8/2012	129	12.7	14.9	10.4	95.4	11.8	2.4	7.8	202	960.7	2531928	6	15.98	15.78	16.03	12.47	11.23	10.57	10.35	9.61	8.64	8.2	7.51	10.1	103.5	35.300	12.5	15.4	23.4
LC	100%	5/9/2012	130	15.7	18.7	12.5	91.0	0.1	1.3	5.3	264	955.4	13264262	28	16.39	16.11	16.17	12.81	11.29	10.57	10.36	9.60	8.64	8.1	7.59	10.2	112.0	35.400	12.5	18.9	35.4
LC	100%	5/10/2012	131	9.8	12.2	6.2	81.8	1.9	2.8	11.4	309	953.1	14717919	30	15.89	15.68	15.96	13.57	11.40	10.61	10.38	9.61	8.67	8.2	7.51	10.2	112.4	37.300	12.5	15.7	22.6
LC	100%	5/11/2012	132	10.7	17.1	3.6	62.6	0.0	3.1	11.0	303	963.9	29615260	59	15.03	14.81	15.11	14.43	11.78	10.69	10.38	9.63	8.68	8.2	7.55	10.2	108.9	37.300	12.6	14.8	18.6
LC	100%	5/12/2012	133	15.0	22.8	6.4	61.0	0.0	1.6	6.9	281	970.8	28162940	57	15.97	15.58	15.53	14.38	12.41	10.81	10.40	9.64	8.65	8.2	7.54	10.1	105.4	37.300	12.6	15.4	18.3
LC	100%	5/13/2012	134	17.8	22.7	11.0	64.1	0.0	1.1	6.2	255	969.8	20929933	43	18.03	16.99	16.57	14.58	12.58	10.87	10.43	9.64	8.67	8.2	7.57	10.1	102.9	37.300	12.6	16.5	18.1
LC	100%	5/14/2012	135	14.9	17.3	12.9	95.1	11.6	1.3	6.4	180	968.5	9702470	21	18.38	17.93	16.98	14.77	12.72	10.90	10.45	9.66	8.70	8.2	7.58	10.1	105.2	48.900	12.6	16.1	19.6
LC	100%	5/15/2012	136	16.2	18.5	15.0	100.1	39.7	1.4	5.5	181	964.5	6758271	15	17.88	17.59	17.49	14.86	12.85	11.02	10.47	9.68	8.68	8.2	7.67	10.2	138.8	88.600	12.5	19.2	27.3
LC	100%	5/16/2012	137	18.7	24.6	13.8	77.5	0.1	1.8	10.7	263	961.5	26571546	54	18.96	18.54	17.96	15.11	13.05	11.10	10.49	9.69	8.70	8.2	7.65	10.2	176.9	88.700	12.5	21.0	23.3
LC	100%	5/17/2012	138	12.3	17.9	6.2	63.5	0.0	2.6	9.3	204	967.7	30582032	61	18.88	18.63	18.83	15.75	13.20	11.19	10.55	9.71	8.74	8.3	7.65	10.2	175.2	88.700	12.5	16.1	18.9
LC	100%	5/18/2012	139	13.6	21.7	4.3	65.7	0.0	1.2	5.1	194	970.7	29911831	61	19.67	18.98	18.68	16.07	13.31	11.24	10.57	9.72	8.73	8.2	7.68	10.2	162.2	88.700	12.6	15.9	18.8
LC	100%	5/19/2012	140	17.3	26.2	7.5	67.1	0.0	1.2	6.2	201	970.0	29476210	60	20.69	19.98	19.46	16.36	13.43	11.33	10.59	9.72	8.72	8.3	7.69	10.2	155.0	88.700	12.6	17.0	19.2
LC	100%	5/20/2012	141	18.6	25.7	10.1	66.1	0.0	1.8	8.4	165	971.5	29308910	60	21.56	21.13	20.74	16.62	13.53	11.38	10.63	9.72	8.74	8.3	7.70	10.2	148.2	88.700	12.6	17.9	19.3
LC	100%	5/21/2012	142	15.2	16.5	13.9	90.3	2.4	1.5	4.8	93	968.2	5572687	12	20.91	20.69	21.04	16.77	13.60	11.45	10.64	9.72	8.71	8.3	7.69	10.2	143.4	91.100	12.5	16.5	17.1
LC	100%	5/22/2012	143	17.5	20.8	15.1	96.7	0.3	1.2	4.4	105	960.9	13851071	29	20.83	20.34	20.38	16.89	13.64	11.46	10.65	9.72	8.71	8.2	7.68	10.2	142.4	91.400	12.5	21.3	21.1
LC	100%	5/23/2012	144	19.1	22.8	16.7	93.7	0.1	1.3	7.1	161	962.4	17885037	38	21.65	21.20	20.81	17.06	13.71	11.48	10.67	9.72	8.72	8.2	7.68	10.2	138.6	91.500	12.5	22.8	22.2
LC	100%	5/24/2012	145	18.4	21.4	16.9	96.8	0.6	1.9	9.4	147	968.3	11981614	25	21.86	21.63	21.38	17.22	13.74	11.54	10.68	9.74	8.72	8.3	7.73	10.2	134.6	92.100	12.5	23.6	22.3
LC	100%	5/25/2012	146	19.4	23.4	16.1	95.7	1.0	2.0	7.2	180	969.4	19214760	40	22.04	21.75	21.64	17.35	13.81	11.55	10.71	9.71	8.72	8.3	7.77	10.2	131.9	93.100	12.5	24.7	23.7
LC	100%	5/26/2012	147	22.1	26.9	18.4	91.5	0.0	1.5	5.6	244	969.3	22027062	46	23.47	22.85	22.37	17.62	13.89	11.67	10.71	9.71	8.72	8.3	7.76	10.2	127.4	93.100	12.6	25.7	23.3
LC	100%	5/27/2012	148	20.8	25.5	16.4	89.7	3.3	1.2	6.1	207	969.0	19117547	40	24.33	23.84	23.04	17.86	13.98	11.67	10.73	9.73	8.73	8.3	7.78	10.2	123.1	96.400	12.5	25.3	23.6
LC	100%	5/28/2012	149	23.4	30.3	17.8	85.6	0.0	1.4	4.6	252	964.5	26537572	56	25.78	24.31	23.73	18.10	14.08	11.73	10.75	9.72	8.72	8.3	7.86	10.2	121.2	96.400	12.5	26.3	30.1
LC	100%	5/29/2012	150	23.2	29.6	18.1	90.4	14.4	1.6	10.4	243	959.4	22070386	46	26.49	25.63	24.63	18.41	14.18	11.82	10.79	9.72	8.74	8.3	7.84	10.2	119.9	110.800	12.6	27.1	28.6
LC	100%	5/30/2012	151	20.4	25.1	17.3	82.9	0.1	1.7	6.9	248	957.4	23062896	48	25.89	25.54	25.28	18.69	14.33	11.86	10.80	9.75	8.76	8.3	7.88	10.2	127.0	110.900	12.5	26.9	28.4
LC	100%	5/31/2012	152	17.0	20.1	12.7	74.3	0.0	2.2	9.2	217	960.6	27113682	55	24.95	24.66	24.99	18.93	14.37	11.91	10.82	9.74	8.77	8.3	7.84	10.2	119.5	110.900	12.5	24.1	23.9

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: **35.1%**

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		**16.49**	**19.42**	**18.92**	**18.56**	**15.11**	**12.66**	**11.08**	**1.5**	**579908978**	**-50088**	**41.3**	**110.9**	**101.7**	**-69.2**	**0.0**	**0.0**
5/1/2012	122	12.50	12.55	12.11	12.22	11.04	10.63	10.36	1.3	9450575	-364	5.449	5.6	0.3	-0.5	0.0	
5/2/2012	123	11.26	12.96	12.69	12.79	11.16	10.68	10.35	1.6	4550192	-372	8.437	7.3	1.7	-0.5	0.0	
5/3/2012	124	14.59	14.40	12.95	12.86	11.39	10.77	10.38	1.2	19047666	-138	10.581	6.6	4.2	-0.2	0.0	
5/4/2012	125	18.72	16.44	15.50	14.01	11.68	10.90	10.45	2.0	21642720	-64	3.058	2.3	3.3	-0.1	0.0	
5/5/2012	126	17.21	17.97	17.53	15.29	11.89	11.01	10.49	1.5	16689968	-807	-0.879	0.0	3.2	-1.1	0.0	
5/6/2012	127	13.88	18.20	17.89	16.31	12.20	11.09	10.53	1.7	21159767	-1623	-2.004	0.0	2.1	-2.2	0.0	
5/7/2012	128	13.19	17.88	17.62	16.94	12.31	11.19	10.53	1.7	7400263	-1485	0.352	1.7	0.8	-2.0	0.0	
5/8/2012	129	12.71	15.98	15.78	16.03	12.47	11.23	10.57	2.2	2531928	-1287	12.198	11.8	3.3	-1.8	0.0	
5/9/2012	130	15.72	16.39	16.11	16.17	12.81	11.29	10.57	1.2	13264262	-411	0.914	0.1	3.6	-0.6	0.0	
5/10/2012	131	9.83	15.89	15.68	15.96	13.57	11.40	10.61	2.6	14717919	-2820	-1.266	1.9	2.9	-3.9	0.0	
5/11/2012	132	10.69	15.03	14.81	15.11	14.43	11.78	10.69	2.8	29615260	-3524	-4.394	0.0	2.8	-4.8	0.0	
5/12/2012	133	14.97	15.97	15.58	15.53	14.38	12.41	10.81	1.4	28162940	-1698	-2.812	0.0	2.1	-2.3	0.0	
5/13/2012	134	17.83	18.03	16.99	16.57	14.58	12.58	10.87	1.0	20929933	-1199	-2.531	0.0	2.0	-1.7	0.0	
5/14/2012	135	14.86	18.38	17.93	16.98	14.77	12.72	10.90	1.2	9702470	-878	11.425	11.6	3.7	-1.2	0.0	
5/15/2012	136	16.21	17.88	17.59	17.49	14.86	12.85	11.02	1.3	6758271	-373	59.164	39.7	25.0	-0.5	0.0	
5/16/2012	137	18.67	18.96	18.54	17.96	15.11	13.05	11.10	1.6	26571546	-1530	5.800	0.1	20.9	-2.1	0.0	
5/17/2012	138	12.28	18.88	18.63	18.83	15.75	13.20	11.19	2.3	30582032	-3947	-12.163	0.0	5.7	-5.4	0.0	
5/18/2012	139	13.65	19.67	18.98	18.68	16.07	13.31	11.24	1.0	29911831	-2543	-7.453	0.0	4.1	-3.5	0.0	
5/19/2012	140	17.28	20.69	19.98	19.46	16.36	13.43	11.33	1.0	29476210	-2102	-6.363	0.0	2.7	-2.9	0.0	
5/20/2012	141	18.62	21.56	21.13	20.74	16.62	13.53	11.38	1.6	29308910	-2838	-7.945	0.0	0.7	-3.9	0.0	
5/21/2012	142	15.23	20.91	20.69	21.04	16.77	13.60	11.45	1.4	5572687	-1819	-0.316	2.4	3.7	-2.5	0.0	
5/22/2012	143	17.46	20.83	20.34	20.38	16.89	13.64	11.46	1.1	13851071	-869	-2.918	0.3	1.7	-1.2	0.0	
5/23/2012	144	19.10	21.65	21.20	20.81	17.06	13.71	11.48	1.1	17885037	-906	-4.394	0.1	0.0	-1.3	0.0	
5/24/2012	145	18.39	21.86	21.63	21.38	17.22	13.74	11.54	1.7	11981614	-1275	-3.445	0.6	0.5	-1.8	0.0	
5/25/2012	146	19.38	22.04	21.75	21.64	17.35	13.81	11.55	1.8	19214760	-1119	-3.164	1.0	-0.1	-1.5	0.0	
5/26/2012	147	22.14	23.47	22.85	22.37	17.62	13.89	11.67	1.4	22027062	-869	-4.535	0.0	-1.1	-1.2	0.0	
5/27/2012	148	20.82	24.33	23.84	23.04	17.86	13.98	11.67	1.1	19117547	-1488	-1.336	3.3	-0.5	-2.1	0.0	
5/28/2012	149	23.36	25.78	24.31	23.73	18.10	14.08	11.73	1.2	26537572	-1558	-5.379	0.0	-1.1	-2.2	0.0	
5/29/2012	150	23.21	26.49	25.63	24.63	18.41	14.18	11.82	1.4	22070386	-1878	11.074	14.4	1.4	-2.6	0.0	
5/30/2012	151	20.36	25.89	25.54	25.28	18.69	14.33	11.86	1.6	23062896	-3255	-6.117	0.1	0.6	-4.5	0.0	
5/31/2012	152	16.98	24.95	24.66	24.99	18.93	14.37	11.91	2.0	27113682	-5047	-7.699	0.0	1.1	-7.0	0.0	

1.000 <=SCALE ADJ (1.0=no adjustment)

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

Nominal diffuse %R from water=7%	**-45079.4**	**494235.9**	**10%**		**13**	**#N/A**	**#N/A**		**-1.8**	**#N/A**
				4.184	<=CONVERT HEAT TO DEGREES				4.184	slope 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)
8789	-328	8461	3.7%	0.35	10.78	10.89	0.11	(0.24)	-0.01	(0.23)
4232	-335	3897	7.9%	0.17	10.89	10.84	(0.05)	(0.22)	-0.01	(0.20)
17714	-124	17590	0.7%	0.71	10.84	11.27	0.43	(0.27)	0.00	(0.27)
20128	-58	20070	0.3%	0.80	11.27	11.76	0.49	(0.31)	0.00	(0.31)
15522	-727	14795	4.7%	0.62	11.76	11.88	0.12	(0.49)	-0.03	(0.47)
19679	-1461	18218	7.4%	0.78	11.88	12.06	0.18	(0.60)	-0.06	(0.55)
6882	-1337	5546	19.4%	0.27	12.06	11.95	(0.12)	(0.39)	-0.05	(0.34)
2355	-1158	1196	49.2%	0.09	11.95	11.89	(0.06)	(0.15)	-0.05	(0.10)
12336	-370	11966	3.0%	0.49	11.89	12.23	0.34	(0.15)	-0.01	(0.14)
13688	-2538	11149	18.5%	0.55	12.23	12.45	0.22	(0.33)	-0.10	(0.23)
27542	-3172	24371	11.5%	1.10	12.45	12.56	0.11	(0.98)	-0.13	(0.86)
26192	-1529	24663	5.8%	1.04	12.56	12.81	0.25	(0.79)	-0.06	(0.73)
19465	-1079	18385	5.5%	0.78	12.81	13.06	0.25	(0.53)	-0.04	(0.48)
9023	-790	8233	8.8%	0.36	13.06	13.16	0.10	(0.26)	-0.03	(0.22)
6285	-336	5950	5.3%	0.25	13.16	13.26	0.10	(0.15)	-0.01	(0.14)
24712	-1377	23335	5.6%	0.98	13.26	13.67	0.41	(0.57)	-0.05	(0.52)
28441	-3553	24889	12.5%	1.13	13.67	13.74	0.06	(1.07)	-0.14	(0.93)
27818	-2289	25529	8.2%	1.11	13.74	13.97	0.23	(0.88)	-0.09	(0.78)
27413	-1892	25521	6.9%	1.09	13.97	14.35	0.38	(0.71)	-0.08	(0.64)
27257	-2554	24703	9.4%	1.09	14.35	14.60	0.25	(0.83)	-0.10	(0.73)
5183	-1637	3545	31.6%	0.21	14.60	14.37	(0.23)	(0.44)	-0.07	(0.37)
12881	-782	12100	6.1%	0.51	14.37	14.43	0.06	(0.45)	-0.03	(0.42)
16633	-816	15818	4.9%	0.66	14.43	14.85	0.41	(0.25)	-0.03	(0.22)
11143	-1147	9996	10.3%	0.44	14.85	14.72	(0.13)	(0.57)	-0.05	(0.53)
17870	-1007	16863	5.6%	0.71	14.72	14.98	0.26	(0.45)	-0.04	(0.41)
20485	-782	19703	3.8%	0.82	14.98	15.25	0.27	(0.54)	-0.03	(0.51)
17779	-1340	16440	7.5%	0.71	15.25	15.48	0.22	(0.48)	-0.05	(0.43)
24680	-1402	23278	5.7%	0.98	15.48	15.66	0.18	(0.80)	-0.06	(0.75)
20525	-1690	18836	8.2%	0.82	15.66	15.84	0.18	(0.64)	-0.07	(0.57)
21448	-2930	18519	13.7%	0.85	15.84	16.03	0.19	(0.67)	-0.12	(0.55)
25216	-4542	20674	18.0%	1.00	16.03	#N/A	#N/A	#N/A	-0.18	#N/A