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=> 13.44	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					
	65.0	88.2	44.7		2.72	4.3	28				73.7	72.9	72.8	69.3	61.4	54.8	52.1	49.7	47.8	47.0	46.7					
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	Tw10.2m	Tw11.5m	H310_z (m)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
14.1	18.4	31.2	7.0	81.7	69.2	1.9	12.7	238.3	963.5	674332063	1391	23.2	22.7	22.7	20.7	16.3	12.6	11.1	9.8	8.8	8.3	8.2	10.1	59.0	69.2	12.5	28.6	36.8

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%	6/1/2012	153	14.7	19.0	9.1	88.9	10.1	2.5	9.7	149	962.1	12691714	26	23.33	23.06	23.40	19.22	14.44	11.94	10.82	9.74	8.76	8.3	7.81	10.2	83.0	10.100	12.6	22.0	22.8
LC	100%	6/2/2012	154	14.8	16.9	10.4	85.6	13.6	2.0	7.3	262	956.2	20336498	42	21.96	21.71	22.03	20.10	14.56	12.00	10.88	9.77	8.76	8.3	7.94	10.2	104.0	23.700	12.5	24.9	38.2
LC	100%	6/3/2012	155	13.8	18.1	9.6	87.3	2.6	1.9	10.5	266	955.9	22041745	45	21.38	21.11	21.43	20.29	14.66	12.05	10.88	9.76	8.76	8.3	7.89	10.2	101.1	26.300	12.5	22.7	28.7
LC	100%	6/4/2012	156	11.8	13.4	9.6	97.0	6.3	1.8	6.3	172	954.4	11662649	24	20.75	20.53	20.87	20.22	14.76	12.09	10.90	9.78	8.76	8.3	7.93	10.2	102.5	32.600	12.5	23.7	30.5
LC	100%	6/5/2012	157	11.4	14.5	7.0	88.7	0.1	1.7	6.4	201	960.8	12885818	26	19.80	19.56	19.90	19.31	14.86	12.11	10.91	9.78	8.75	8.2	7.92	10.2	101.8	32.700	12.5	23.0	26.9
LC	100%	6/6/2012	158	13.9	20.0	7.3	81.6	3.8	1.2	6.1	236	963.5	25489720	52	20.45	19.54	19.45	18.62	15.01	12.13	10.92	9.79	8.75	8.3	7.91	10.2	97.9	36.500	12.5	24.2	26.8
LC	100%	6/7/2012	159	14.9	19.8	9.4	86.3	2.1	1.5	10.0	255	963.5	26281140	53	20.96	20.43	20.15	18.66	15.27	12.18	10.96	9.81	8.79	8.3	8.04	10.2	99.8	38.600	12.5	25.3	38.1
LC	100%	6/8/2012	160	17.8	23.7	11.6	74.7	0.1	2.1	8.0	287	962.2	27035464	55	21.25	20.96	21.10	18.88	15.41	12.24	10.98	9.80	8.76	8.3	8.06	10.2	95.0	38.700	12.6	25.6	31.4
LC	100%	6/9/2012	161	18.6	21.8	15.2	77.5	0.0	1.7	8.2	276	963.0	15119751	32	21.33	21.04	21.34	19.11	15.52	12.28	11.00	9.81	8.76	8.3	8.07	10.2	89.8	38.700	12.5	26.1	32.6
LC	100%	6/10/2012	162	21.5	28.2	16.1	83.9	0.2	1.2	5.6	222	967.6	24169406	50	23.00	21.56	21.49	19.32	15.60	12.32	11.00	9.81	8.74	8.3	8.12	10.2	85.9	38.900	12.5	27.9	34.6
LC	100%	6/11/2012	163	20.1	23.2	16.6	87.5	0.0	2.2	7.1	150	970.9	22465741	46	23.78	23.21	22.27	19.53	15.68	12.38	11.03	9.82	8.75	8.3	8.16	10.2	81.2	38.900	12.5	29.2	35.0
LC	100%	6/12/2012	164	17.5	18.6	16.8	97.2	13.1	2.4	8.3	179	964.8	5950037	14	22.54	22.31	22.54	19.70	15.78	12.40	11.05	9.84	8.76	8.3	8.20	10.2	80.7	52.000	12.5	29.3	40.0
LC	100%	6/13/2012	165	16.9	20.1	13.1	81.3	1.1	3.0	10.5	175	965.1	30805504	62	21.95	21.69	22.02	20.68	15.90	12.52	11.07	9.84	8.75	8.3	8.30	10.2	88.2	53.100	12.5	30.3	40.9
LC	100%	6/14/2012	166	17.0	22.7	11.2	82.0	0.1	1.4	9.3	176	971.6	28511504	58	22.64	22.21	22.26	20.89	16.06	12.54	11.12	9.84	8.76	8.3	8.25	10.2	79.8	53.200	12.6	28.1	37.2
LC	100%	6/15/2012	167	18.1	24.6	12.0	83.6	0.0	1.1	5.3	183	974.0	24492996	51	23.61	22.79	22.67	20.96	16.17	12.60	11.13	9.84	8.76	8.3	8.24	10.1	73.6	53.200	12.6	29.0	38.4
LC	100%	6/16/2012	168	19.0	23.5	14.1	70.7	0.0	1.5	5.7	210	974.0	30147111	63	24.20	23.18	22.93	21.13	16.25	12.66	11.18	9.85	8.76	8.3	8.23	10.1	66.7	53.200	12.5	28.9	37.1
LC	100%	6/17/2012	169	17.1	21.3	13.1	81.5	0.0	1.9	7.0	187	969.9	26755744	55	23.99	23.56	23.45	21.27	16.35	12.70	11.18	9.87	8.77	8.3	8.23	10.1	59.0	53.200	12.5	28.6	37.9
LC	100%	6/18/2012	170	15.2	17.5	13.0	92.2	0.0	2.0	6.0	187	968.1	10934070	23	22.89	22.66	22.99	21.36	16.44	12.74	11.20	9.85	8.76	8.3	8.24	10.1	51.7	53.200	12.5	28.6	38.0
LC	100%	6/19/2012	171	20.2	26.5	15.6	91.4	0.0	1.8	5.7	227	968.7	19626349	42	22.81	22.46	22.47	21.44	16.48	12.77	11.19	9.85	8.73	8.3	8.27	10.1	46.2	53.200	12.5	30.8	39.2
LC	100%	6/20/2012	172	25.8	31.2	20.4	83.6	0.0	1.6	7.0	286	967.7	27741763	58	24.83	24.28	23.39	21.58	16.61	12.82	11.24	9.86	8.74	8.3	8.27	10.1	40.8	53.200	12.5	32.2	38.6
LC	100%	6/21/2012	173	25.9	31.0	20.3	80.6	0.0	1.7	7.9	282	963.5	28199084	59	26.83	26.29	24.57	21.78	16.74	12.90	11.23	9.87	8.75	8.3	8.25	10.1	34.8	53.200	12.5	32.5	38.7
LC	100%	6/22/2012	174	23.2	27.4	18.7	86.2	0.0	1.6	11.7	275	960.5	19823932	41	27.28	26.87	25.85	21.95	16.87	12.95	11.29	9.88	8.77	8.3	8.24	10.1	28.5	53.200	12.5	33.3	39.6
LC	100%	6/23/2012	175	20.1	24.0	15.0	72.7	0.0	2.3	8.4	299	963.5	29618979	61	26.22	25.92	26.24	22.11	16.93	13.00	11.30	9.86	8.73	8.4	8.25	10.1	21.5	53.200	12.5	31.9	39.0
LC	100%	6/24/2012	176	19.6	24.6	12.9	74.8	0.0	1.1	4.4	250	965.3	23977715	49	25.92	25.39	25.45	22.39	17.05	13.07	11.31	9.87	8.76	8.3	8.27	10.1	14.3	53.200	12.6	30.6	37.6
LC	100%	6/25/2012	177	17.4	20.7	12.7	81.9	16.0	2.7	9.5	294	958.2	17437009	36	24.83	24.57	24.90	22.93	17.19	13.16	11.35	9.90	8.79	8.4	8.44	10.1	20.8	69.200	12.5	32.4	50.6
LC	100%	6/26/2012	178	15.0	19.4	10.1	72.7	0.0	3.5	10.8	325	957.7	21743235	44	22.73	22.47	22.82	22.25	17.46	13.21	11.40	9.90	8.79	8.3	8.51	10.1	16.9	69.200	12.5	30.4	45.3
LC	100%	6/27/2012	179	18.4	23.5	12.7	65.4	0.0	3.3	12.7	308	959.0	30498542	62	21.97	21.70	22.03	21.45	18.24	13.28	11.42	9.91	8.78	8.3	8.44	10.1	9.0	69.200	12.5	30.1	41.7
LC	100%	6/28/2012	180	21.9	27.2	15.8	69.2	0.0	1.8	6.2	273	959.6	26452421	54	22.69	22.30	22.19	21.27	19.19	13.34	11.44	9.93	8.78	8.3	8.39	10.1	2.9	69.200	12.5	31.3	40.6
LC	100%	6/29/2012	181	25.6	30.9	20.3	75.0	0.0	1.9	7.3	279	956.5	27384997	57	24.46	24.01	23.40	21.51	19.25	13.45	11.49	9.93	8.78	8.3	8.39	10.1	-1.1	69.200	12.5	33.0	41.3
LC	100%	6/30/2012	182	23.5	28.0	17.8	71.5	0.0	1.7	8.1	274	958.7	24051425	50	25.42	25.11	24.64	21.80	19.18	13.52	11.50	9.95	8.77	8.3	8.39	10.1	-5.9	69.200	12.5	33.5	41.0
	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)

Ratio of lake watershed to lake area: 2.6176758 Runoff & seepage as % of watershed area precip: -6.2%

Grand sum/avg	18.35	23.19	22.75	22.68	20.72	16.33	12.65	1.8	674332063	-84654	-93.9	69.2	-11.3	-117.3	-21.9	0.0	Nominal diffuse %R from water=7%	#N/A	#N/A	14%		17	#N/A	#N/A		#N/A	#N/A
															SumTerrevap2=AirVPD,mbar*WS,m/s*s													

1.000 <=SCALE ADJ (1.0=no adjustment)

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

Data

DATE	DayOfYr	AvgTair C	AvgTw 0.1m	AvgTw0.5m	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
6/1/2012	153	14.74	23.33	23.06	23.40	19.22	14.44	11.94	2.3	12691714	-4101	5.414	10.1	1.3	-5.7	-0.4
6/2/2012	154	14.83	21.96	21.71	22.03	20.10	14.56	12.00	1.8	20336498	-3197	11.952	13.6	5.7	-4.4	-0.5
6/3/2012	155	13.76	21.38	21.11	21.43	20.29	14.66	12.05	1.8	22041745	-2994	-2.109	2.6	-0.1	-4.1	-0.4
6/4/2012	156	11.80	20.75	20.53	20.87	20.22	14.76	12.09	1.6	11662649	-2630	3.586	6.3	1.9	-3.6	0.0
6/5/2012	157	11.35	19.80	19.56	19.90	19.31	14.86	12.11	1.6	12885818	-2672	-4.394	0.1	0.4	-3.7	-0.2
6/6/2012	158	13.90	20.45	19.54	19.45	18.62	15.01	12.13	1.0	25489720	-2194	-0.773	3.8	-1.1	-3.0	-0.4
6/7/2012	159	14.91	20.96	20.43	20.15	18.66	15.27	12.18	1.3	26281140	-2178	-1.195	2.1	0.2	-3.0	-0.4
6/8/2012	160	17.78	21.25	20.96	21.10	18.88	15.41	12.24	1.9	27035464	-2718	-5.589	0.1	-0.7	-3.8	-1.1
6/9/2012	161	18.60	21.33	21.04	21.34	19.11	15.52	12.28	1.5	15119751	-1794	-4.781	0.0	-1.6	-2.5	-0.6
6/10/2012	162	21.47	23.00	21.56	21.49	19.32	15.60	12.32	1.1	24169406	-1192	-3.551	0.2	-1.4	-1.7	-0.6
6/11/2012	163	20.10	23.78	23.21	22.27	19.53	15.68	12.38	2.0	22465741	-2345	-5.660	0.0	-1.8	-3.3	-0.6
6/12/2012	164	17.51	22.54	22.31	22.54	19.70	15.78	12.40	2.1	5950037	-2187	12.304	13.1	2.4	-3.0	-0.1
6/13/2012	165	16.86	21.95	21.69	22.02	20.68	15.90	12.52	2.8	30805504	-3945	-6.961	1.1	-1.1	-5.5	-1.0
6/14/2012	166	16.99	22.64	22.21	22.26	20.89	16.06	12.54	1.3	28511504	-2434	-7.136	0.1	-1.2	-3.4	-0.5
6/15/2012	167	18.08	23.61	22.79	22.67	20.96	16.17	12.60	0.9	24492996	-2189	-5.836	0.0	0.0	-3.0	-0.4
6/16/2012	168	19.02	24.20	23.18	22.93	21.13	16.25	12.66	1.3	30147111	-2990	-7.839	0.0	-1.1	-4.1	-0.7
6/17/2012	169	17.12	23.99	23.56	23.45	21.27	16.35	12.70	1.7	26755744	-3390	-7.769	0.0	-2.5	-4.7	-0.5
6/18/2012	170	15.23	22.89	22.66	22.99	21.36	16.44	12.74	1.9	10934070	-3032	-6.468	0.0	-2.0	-4.2	-0.2
6/19/2012	171	20.19	22.81	22.46	22.47	21.44	16.48	12.77	1.6	19626349	-1284	-4.922	0.0	-2.8	-1.8	-0.3
6/20/2012	172	25.75	24.83	24.28	23.39	21.58	16.61	12.82	1.5	27741763	-780	-5.484	0.0	-3.3	-1.1	-1.0
6/21/2012	173	25.88	26.83	26.29	24.57	21.78	16.74	12.90	1.6	28199084	-1882	-6.890	0.0	-3.0	-2.6	-1.2
6/22/2012	174	23.16	27.28	26.87	25.85	21.95	16.87	12.95	1.4	19823932	-2526	-5.484	0.0	-1.4	-3.5	-0.5
6/23/2012	175	20.08	26.22	25.92	26.24	22.11	16.93	13.00	2.1	29618979	-5125	-8.542	0.0	0.1	-7.1	-1.5
6/24/2012	176	19.59	25.92	25.39	25.45	22.39	17.05	13.07	1.0	23977715	-3098	-6.011	0.0	-1.0	-4.3	-0.6
6/25/2012	177	17.37	24.83	24.57	24.90	22.93	17.19	13.16	2.5	17437009	-5032	9.913	16.0	1.8	-7.0	-0.8
6/26/2012	178	15.02	22.73	22.47	22.82	22.25	17.46	13.21	3.3	21743235	-6185	-8.296	0.0	1.6	-8.6	-1.3
6/27/2012	179	18.45	21.97	21.70	22.03	21.45	18.24	13.28	3.1	30498542	-4839	-7.910	0.0	1.1	-6.7	-2.2
6/28/2012	180	21.88	22.69	22.30	22.19	21.27	19.19	13.34	1.6	26452421	-2007	-4.183	0.0	-0.2	-2.8	-1.2
6/29/2012	181	25.62	24.46	24.01	23.40	21.51	19.25	13.45	1.7	27384997	-1181	-4.113	0.0	-1.1	-1.6	-1.3
6/30/2012	182	23.53	25.42	25.11	24.64	21.80	19.18	13.52	1.6	24051425	-2533	-5.203	0.0	-0.5	-3.5	-1.2
#N/A																

				4.184	<=CONVERT HEAT TO DEGREES				4.184	slope
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)
11803	-3691	8112	31.3%	0.47	15.98	15.66	(0.31)	(0.78)	-0.15	(0.64)
18913	-2878	16035	15.2%	0.75	15.66	15.85	0.19	(0.56)	-0.11	(0.45)
20499	-2695	17804	13.1%	0.82	15.85	15.89	0.04	(0.78)	-0.11	(0.67)
10846	-2367	8479	21.8%	0.43	15.89	15.49	(0.40)	(0.83)	-0.09	(0.74)
11984	-2405	9579	20.1%	0.48	15.49	15.16	(0.33)	(0.80)	-0.10	(0.71)
23705	-1975	21731	8.3%	0.94	15.16	15.19	0.03	(0.91)	-0.08	(0.83)
24441	-1961	22481	8.0%	0.97	15.19	15.45	0.26	(0.71)	-0.08	(0.64)
25143	-2447	22696	9.7%	1.00	15.45	15.62	0.17	(0.83)	-0.10	(0.73)
14061	-1615	12446	11.5%	0.56	15.62	15.75	0.12	(0.44)	-0.06	(0.37)
22478	-1073	21405	4.8%	0.90	15.75	15.93	0.18	(0.71)	-0.04	(0.67)
20893	-2111	18783	10.1%	0.83	15.93	16.09	0.16	(0.68)	-0.08	(0.59)
5534	-1968	3565	35.6%	0.22	16.09	16.03	(0.06)	(0.28)	-0.08	(0.20)
28649	-3551	25098	12.4%	1.14	16.03	16.34	0.31	(0.83)	-0.14	(0.69)
26516	-2190	24325	8.3%	1.06	16.34	16.54	0.21	(0.85)	-0.09	(0.76)
22778	-1970	20809	8.6%	0.91	16.54	16.55	0.01	(0.90)	-0.08	(0.82)
28037	-2691	25346	9.6%	1.12	16.55	16.84	0.29	(0.83)	-0.11	(0.72)
24883	-3051	21832	12.3%	0.99	16.84	16.96	0.12	(0.87)	-0.12	(0.75)
10169	-2729	7440	26.8%	0.41	16.96	16.70	(0.26)	(0.67)	-0.11	(0.56)
18253	-1155	17097	6.3%	0.73	16.70	16.81	0.11	(0.62)	-0.05	(0.57)
25800	-702	25098	2.7%	1.03	16.81	17.25	0.45	(0.58)	-0.03	(0.55)
26225	-1694	24531	6.5%	1.04	17.25	17.58	0.33	(0.72)	-0.07	(0.65)
18436	-2274	16163	12.3%	0.73	17.58	17.60	0.02	(0.71)	-0.09	(0.62)
27546	-4612	22933	16.7%	1.10	17.60	17.64	0.04	(1.06)	-0.18	(0.88)
22299	-2788	19511	12.5%	0.89	17.64	17.62	(0.02)	(0.91)	-0.11	(0.80)
16216	-4528	11688	27.9%	0.65	17.62	17.55	(0.07)	(0.72)	-0.18	(0.54)
20221	-5566	14655	27.5%	0.81	17.55	17.05	(0.50)	(1.30)	-0.22	(1.08)
28364	-4355	24008	15.4%	1.13	17.05	17.05	(0.01)	(1.14)	-0.17	(0.96)
24601	-1806	22795	7.3%	0.98	17.05	17.35	0.30	(0.68)	-0.07	(0.60)
25468	-1063	24405	4.2%	1.01	17.35	17.65	0.30	(0.71)	-0.04	(0.67)
22368	-2280	20088	10.2%	0.89	17.65	#N/A	#N/A	#N/A	-0.09	#N/A
	#N/A	#N/A		#N/A				#N/A	#N/A	