Lake Lacawac, Bruce R. Hargreaves, Lehigh University (brh0@lehigh.edu, http://www.lehigh.edu/~brh0)
17 April 2011: platform moved to lake center, 1-2pm
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.
Adjusted Tw sensors 13Nov07 based on comparison of depths and vs PUV & YSI sonde profiles (note that Tw at 11.3m matches PUV Tw at 12.5, probably within sediment boundary layer)
Tw12 adjusted to match others on bottom after moved to dock

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	

	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					
	66.0	88.6	45.6		5.46	4.0	31					73.8	73.6	73.3	70.1	60.8	52.7	48.5	46.0	43.8	43.3	43.2					
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	Tw09.8m	Tw11.1m	H310_z (m)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
13.1	18.9	31.4	7.6	83.7	138.7	1.8	13.8	239.4	962.8	605408501	1252	23.2	23.1	22.9	21.2	16.0	11.5	9.2	7.8	6.6	6.3	6.2	9.8	144.1	138.7	12.5	30.1	32.2
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%	6/1/2011	152	25.6	29.9	21.0	72.0	0.0	2.6	10.5	239	966.1	24672335	51	26.28	25.98	25.00	19.02	13.82	10.45	8.78	7.54	6.40	6.1	6.05	9.8	142.5	0.000	12.6	28.3	36.0
LC	100%	6/2/2011	153	17.2	22.2	12.3	51.8	0.0	4.2	13.3	314	964.0	30255984	61	23.58	23.66	23.77	19.56	13.98	10.51	8.78	7.55	6.41	6.2	6.08	9.8	132.9	0.000	12.6	23.3	34.6
LC	100%	6/3/2011	154	14.1	18.9	9.5	57.9	0.0	3.6	10.8	324	967.9	29575490	59	21.22	21.29	21.40	21.10	14.18	10.56	8.79	7.54	6.43	6.1	6.07	9.8	125.0	0.000	12.6	19.5	32.2
LC	100%	6/4/2011	155	13.0	17.2	7.6	79.5	0.0	1.4	7.5	279	967.8	9999279	21	20.17	20.24	20.33	20.31	14.40	10.60	8.82	7.55	6.42	6.1	6.08	9.8	122.0	0.000	12.6	19.2	32.2
LC	100%	6/5/2011	156	15.7	21.7	11.0	89.2	0.0	1.0	4.0	187	965.8	14079268	29	20.03	19.92	19.85	19.68	14.58	10.63	8.84	7.54	6.40	6.1	6.08	9.8	120.6	0.000	12.6	22.7	35.5
LC	100%	6/6/2011	157	18.1	24.8	11.2	78.4	0.0	1.4	5.8	197	966.0	27180714	56	21.00	20.76	20.36	19.73	14.75	10.71	8.86	7.56	6.41	6.1	6.09	9.8	117.9	0.000	12.6	24.5	35.8
LC	100%	6/7/2011	158	20.6	26.5	13.1	79.6	0.0	1.7	7.4	263	963.7	25257965	52	21.88	21.85	21.33	19.89	14.99	10.72	8.86	7.56	6.44	6.2	6.11	9.8	114.5	0.000	12.6	25.4	36.5
LC	100%	6/8/2011	159	24.5	31.4	17.9	80.1	0.0	1.7	6.9	259	963.0	27588922	57	23.81	23.41	22.42	20.08	15.16	10.81	8.90	7.57	6.46	6.1	6.12	9.8	110.1	0.000	12.6	27.2	37.2
LC	100%	6/9/2011	160	23.8	31.3	18.5	86.1	4.6	1.7	13.8	262	961.9	20618683	43	25.32	25.07	23.69	20.35	15.26	10.92	8.94	7.61	6.49	6.2	6.14	9.8	108.0	4.600	12.6	29.0	38.5
LC	100%	6/10/2011	161	21.0	25.6	17.8	85.7	2.7	1.7	6.6	259	964.8	25098835	52	25.16	25.14	24.79	20.51	15.45	11.03	8.97	7.65	6.51	6.2	6.20	9.8	108.4	7.300	12.6	29.6	39.7
LC	100%	6/11/2011	162	18.0	20.4	14.8	97.7	20.8	1.9	6.3	131	963.9	5278825	12	24.55	24.59	24.69	20.68	15.55	11.08	8.97	7.67	6.50	6.2	6.19	9.8	110.1	28.100	12.6	30.0	41.5
LC	100%	6/12/2011	163	17.3	21.7	14.4	98.1	12.6	1.5	12.7	130	960.6	11178640	24	23.18	23.11	23.16	21.00	15.74	11.24	9.07	7.71	6.52	6.2	6.23	9.8	136.8	40.700	12.5	31.3	49.9
LC	100%	6/13/2011	164	14.8	17.5	12.4	87.9	0.0	1.7	5.9	280	961.8	13872433	28	22.29	22.35	22.47	21.35	15.82	11.29	9.11	7.74	6.54	6.3	6.24	9.8	143.1	40.700	12.5	31.2	44.7
LC	100%	6/14/2011	165	14.2	18.4	11.1	93.3	11.8	2.3	8.1	272	961.7	16683501	35	21.53	21.60	21.70	21.53	15.88	11.37	9.13	7.74	6.54	6.2	6.22	9.8	144.3	52.500	12.6	29.3	44.1
LC	100%	6/15/2011	166	16.3	23.8	9.6	83.0	0.1	1.9	8.4	257	962.4	27787325	57	21.56	21.52	21.45	20.76	16.12	11.46	9.15	7.77	6.59	6.3	6.24	9.8	151.6	52.600	12.6	29.7	44.5
LC	100%	6/16/2011	167	17.5	23.5	11.7	78.2	1.0	1.3	7.8	244	962.5	17141768	35	21.86	21.81	21.83	20.83	16.25	11.53	9.18	7.78	6.63	6.3	6.26	9.8	148.2	53.600	12.6	29.4	42.7
LC	100%	6/17/2011	168	18.4	22.0	15.2	89.5	14.8	1.4	6.2	228	960.9	19314412	40	22.21	22.14	21.91	21.01	16.46	11.67	9.23	7.80	6.60	6.3	6.31	9.8	162.2	68.400	12.6	31.1	52.2
LC	100%	6/18/2011	169	19.6	23.9	14.4	84.1	0.1	1.5	5.7	278	961.0	24114109	50	22.73	22.72	22.34	21.21	16.63	11.67	9.26	7.81	6.58	6.3	6.29	9.8	160.6	68.500	12.6	30.9	46.0
LC	100%	6/19/2011	170	19.6	23.8	14.8	73.4	0.0	1.7	8.5	227	960.7	29052687	58	23.34	23.37	23.37	21.48	16.70	11.77	9.29	7.82	6.60	6.3	6.29	9.8	156.9	68.500	12.6	30.8	46.1
LC	100%	6/20/2011	171	19.1	25.1	11.7	80.7	0.0	1.1	5.2	236	961.6	24830506	51	24.18	23.62	23.38	21.71	16.75	11.86	9.27	7.83	6.60	6.3	6.30	9.8	152.9	68.500	12.6	29.6	44.8
LC	100%	6/21/2011	172	21.8	27.0	18.0	85.6	0.0	1.1	4.6	237	962.4	20786852	44	24.89	24.26	23.90	21.86	16.87	11.92	9.30	7.85	6.61	6.3	6.29	9.8	144.4	68.500	12.6	31.8	34.5
LC	100%	6/22/2011	173	21.7	24.4	19.5	98.5	7.2	1.0	6.0	154	961.1	9321704	20	25.08	24.95	24.25	21.89	16.70	11.85	9.29	7.83	6.61	6.3	6.23	9.8	121.7	75.700	12.6	34.2	9.8
LC	100%	6/23/2011	174	19.8	22.0	18.0	98.7	50.3	1.5	5.5	162	957.7	6603508	14	23.99	24.03	24.19	22.00	16.98	12.08	9.35	7.88	6.66	6.3	6.24	9.8	154.9	126.000	12.6	36.5	12.7
LC	100%	6/24/2011	175	20.1	23.2	18.1	92.7	3.0	2.0	7.8	192	955.8	21027603	44	23.77	23.77	23.80	22.22	17.09	12.28	9.45	7.92	6.66	6.3	6.24	9.9	186.9	129.000	12.6	36.8	10.2
LC	100%	6/25/2011	176	19.2	22.1	15.9	86.4	0.0	2.0	7.9	255	959.4	20521620	43	23.84	23.88	24.00	22.43	17.20	12.29	9.47	7.94	6.67	6.4	6.27	9.8	181.9	129.000	12.6	35.6	10.1
LC	100%	6/26/2011	177	17.8	21.0	14.2	87.1	0.0	1.3	4.5	281	963.8	15983146	33	23.57	23.54	23.56	22.62	17.21	12.30	9.48	7.94	6.67	6.4	6.27	9.8	176.5	129.000	12.6	34.4	10.2
LC	100%	6/27/2011	178	19.7	24.8	13.1	82.5	0.1	1.1	4.6	220	966.0	24682174	51	24.41	23.52	23.34	22.59	17.20	12.33	9.49	7.93	6.65	6.3	6.27	9.8	172.4	129.100	12.6	34.1	10.1
LC	100%	6/28/2011	179	20.9	24.4	16.0	92.4	9.5	1.6	8.7	211	962.2	14973130	31	24.08	24.04	23.74	22.53	17.27	12.36	9.52	7.96	6.66	6.4	6.27	9.8	169.0	138.600	12.6	35.3	10.0
LC	100%	6/29/2011	180	18.7	21.0	16.1	85.9	0.1	2.0	8.0	300	962.3	19527477	40	23.77	23.81	23.95	22.57	17.38	12.52	9.55	8.00	6.75	6.4	6.29	9.8	176.5	138.700	12.6	37.0	11.2
LC	100%	6/30/2011	181	18.1	22.7	14.4	75.4	0.0	2.2	8.0	305	964.8	28399609	58	23.51	23.55	23.63	22.86	17.42	12.52	9.55	7.99	6.71	6.4	6.29	9.8	170.5	138.700	12.6	35.6	10.4
	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: **2.61767578** Runoff & seepage as % of watershed area precip: **21.0%**

																													1.000
Nominal diffuse %R from water=7%	#N/A	#N/A	13%		16	#N/A	#N/A		#N/A	#N/A																			4.184
Grand sum/avg	**18.87**	**23.23**	**23.12**	**22.92**	**21.18**	**15.99**	**11.48**	**1.6**	**605408501**	**-73834**	**22.5**	**138.7**	**75.9**	**-109.1**	**-9.4**	**0.0**													

<=SCALE ADJ (1.0=no adjustment)

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

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

																													4.184
																													6000000
7%	0.9																												
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)																	
22945	-2866	20080	12.5%	0.91	15.10	15.20	0.10	(0.81)	-0.11	(0.70)																			
28138	-7881	20257	28.0%	1.12	15.20	15.14	(0.06)	(1.18)	-0.31	(0.87)																			
27505	-6064	21441	22.0%	1.10	15.14	15.06	(0.08)	(1.17)	-0.24	(0.93)																			
9299	-2128	7171	22.9%	0.37	15.06	14.68	(0.39)	(0.76)	-0.08	(0.67)																			
13094	-1062	12032	8.1%	0.52	14.68	14.60	(0.08)	(0.60)	-0.04	(0.56)																			
25278	-1516	23762	6.0%	1.01	14.60	14.91	0.31	(0.69)	-0.06	(0.63)																			
23490	-1310	22180	5.6%	0.94	14.91	15.10	0.19	(0.75)	-0.05	(0.69)																			
25658	-925	24733	3.6%	1.02	15.10	15.62	0.52	(0.50)	-0.04	(0.46)																			
19175	-1439	17736	7.5%	0.76	15.62	15.81	0.19	(0.57)	-0.06	(0.52)																			
23342	-2139	21203	9.2%	0.93	15.81	16.05	0.24	(0.69)	-0.09	(0.60)																			
4909	-2325	2584	47.4%	0.20	16.05	15.79	(0.26)	(0.46)	-0.09	(0.37)																			
10396	-1614	8782	15.5%	0.41	15.79	15.86	0.08	(0.34)	-0.06	(0.27)																			
12901	-2561	10340	19.9%	0.51	15.86	15.89	0.03	(0.49)	-0.10	(0.38)																			
15516	-2631	12885	17.0%	0.62	15.89	15.61	(0.29)	(0.90)	-0.10	(0.80)																			
25842	-2301	23541	8.9%	1.03	15.61	15.70	0.10	(0.93)	-0.09	(0.84)																			
15942	-1922	14019	12.1%	0.64	15.70	15.79	0.09	(0.55)	-0.08	(0.47)																			
17962	-1360	16602	7.6%	0.72	15.79	15.90	0.10	(0.61)	-0.05	(0.56)																			
22426	-1559	20867	7.0%	0.89	15.90	16.10	0.20	(0.69)	-0.06	(0.63)																			
27019	-2662	24357	9.9%	1.08	16.10	16.29	0.19	(0.89)	-0.11	(0.78)																			
23092	-2008	21085	8.7%	0.92	16.29	16.41	0.12	(0.80)	-0.08	(0.72)																			
19332	-1312	18020	6.8%	0.77	16.41	16.58	0.17	(0.60)	-0.05	(0.55)																			
8669	-850	7819	9.8%	0.35	16.58	16.62	0.04	(0.30)	-0.03	(0.27)																			
6141	-1242	4899	20.2%	0.24	16.62	16.61	(0.02)	(0.26)	-0.05	(0.21)																			
19556	-1616	17940	8.3%	0.78	16.61	16.63	0.02	(0.76)	-0.06	(0.69)																			
19085	-2355	16730	12.3%	0.76	16.63	16.85	0.22	(0.54)	-0.09	(0.45)																			
14864	-1937	12927	13.0%	0.59	16.85	16.79	(0.06)	(0.65)	-0.08	(0.57)																			
22954	-1807	21148	7.9%	0.91	16.79	16.82	0.03	(0.88)	-0.07	(0.81)																			
13925	-1211	12714	8.7%	0.55	16.82	17.06	0.24	(0.31)	-0.05	(0.27)																			
18161	-2520	15641	13.9%	0.72	17.06	16.96	(0.10)	(0.83)	-0.10	(0.73)																			
26412	-3329	23083	12.6%	1.05	16.96	#N/A	#N/A	#N/A	-0.13	#N/A																			
	#N/A	#N/A		#N/A				#N/A	#N/A																				

<=CONVERT HEAT TO DEGREES

cm3/m2 (for 0-4m integrated depth)

slope

intercept

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
6/1/2011	152	25.56	26.28	25.98	25.00	19.02	13.82	10.45	2.4	24672335	-3184	-6.222	0.0	0.0	-4.7	-1.1
6/2/2011	153	17.18	23.58	23.66	23.77	19.56	13.98	10.51	3.8	30255984	-8757	-9.281	0.0	5.0	-12.9	-0.9
6/3/2011	154	14.09	21.22	21.29	21.40	21.10	14.18	10.56	3.3	29575490	-6738	-5.976	0.0	5.0	-9.9	-0.6
6/4/2011	155	12.95	20.17	20.24	20.33	20.31	14.40	10.60	1.3	9999279	-2365	-2.109	0.0	1.9	-3.5	0.0
6/5/2011	156	15.67	20.03	19.92	19.85	19.68	14.58	10.63	0.9	14079268	-1180	-1.441	0.0	0.9	-1.7	-0.1
6/6/2011	157	18.14	21.00	20.76	20.36	19.73	14.75	10.71	1.3	27180714	-1684	-3.375	0.0	0.0	-2.5	-0.4
6/7/2011	158	20.60	21.88	21.85	21.33	19.89	14.99	10.72	1.6	25257965	-1456	-4.359	0.0	-1.2	-2.1	-0.5
6/8/2011	159	24.53	23.81	23.41	22.42	20.08	15.16	10.81	1.5	27588922	-1028	-3.972	0.0	-1.3	-1.5	-0.6
6/9/2011	160	23.76	25.32	25.07	23.69	20.35	15.26	10.92	1.5	20618683	-1599	2.531	4.6	1.3	-2.4	-0.5
6/10/2011	161	21.01	25.16	25.14	24.79	20.51	15.45	11.03	1.5	25098835	-2376	-1.512	2.7	0.1	-3.5	-0.3
6/11/2011	162	17.95	24.55	24.59	24.69	20.68	15.55	11.08	1.8	5278825	-2583	17.436	20.8	1.0	-3.8	0.0
6/12/2011	163	17.28	23.18	23.11	23.16	21.00	15.74	11.24	1.3	11178640	-1793	18.034	12.6	8.6	-2.6	0.0
6/13/2011	164	14.84	22.29	22.35	22.47	21.35	15.82	11.29	1.6	13872433	-2845	-2.672	0.0	2.0	-4.2	0.0
6/14/2011	165	14.22	21.53	21.60	21.70	21.53	15.88	11.37	2.1	16683501	-2923	11.460	11.8	4.5	-4.3	-0.1
6/15/2011	166	16.31	21.56	21.52	21.45	20.76	16.12	11.46	1.8	27787325	-2557	-3.515	0.1	1.0	-3.8	-0.4
6/16/2011	167	17.45	21.86	21.81	21.83	20.83	16.25	11.53	1.1	17141768	-2136	-0.879	1.0	2.1	-3.2	-0.4
6/17/2011	168	18.38	22.21	22.14	21.91	21.01	16.46	11.67	1.2	19314412	-1511	13.148	14.8	1.2	-2.2	-0.2
6/18/2011	169	19.60	22.73	22.72	22.34	21.21	16.63	11.67	1.4	24114109	-1733	-2.883	0.1	0.4	-2.6	-0.3
6/19/2011	170	19.57	23.34	23.37	23.37	21.48	16.70	11.77	1.5	29052687	-2957	-4.535	0.0	0.9	-4.4	-0.6
6/20/2011	171	19.12	24.18	23.62	23.38	21.71	16.75	11.86	1.0	24830506	-2231	-4.148	0.0	-0.1	-3.3	-0.3
6/21/2011	172	21.84	24.89	24.26	23.90	21.86	16.87	11.92	0.9	20786852	-1458	-20.284	0.0	1.8	-2.2	-0.2
6/22/2011	173	21.67	25.08	24.95	24.25	21.89	16.70	11.85	0.9	9321704	-944	-12.409	7.2	2.6	-1.4	0.0
6/23/2011	174	19.77	23.99	24.03	24.19	22.00	16.98	12.08	1.3	6603508	-1380	67.496	50.3	27.5	-2.0	0.0
6/24/2011	175	20.13	23.77	23.77	23.80	22.22	17.09	12.28	1.8	21027603	-1796	-0.633	3.0	2.2	-2.7	-0.2
6/25/2011	176	19.15	23.84	23.88	24.00	22.43	17.20	12.29	1.8	20521620	-2616	-6.328	0.0	0.3	-3.9	-0.3
6/26/2011	177	17.77	23.57	23.54	23.56	22.62	17.21	12.30	1.1	15983146	-2153	-3.972	0.0	1.5	-3.2	-0.2
6/27/2011	178	19.69	24.41	23.52	23.34	22.59	17.20	12.33	0.9	24682174	-2007	-4.500	0.1	0.6	-3.0	-0.2
6/28/2011	179	20.92	24.08	24.04	23.74	22.53	17.27	12.36	1.4	14973130	-1345	6.504	9.5	1.1	-2.0	-0.1
6/29/2011	180	18.70	23.77	23.81	23.95	22.57	17.38	12.52	1.8	19527477	-2800	-2.918	0.1	3.6	-4.1	-0.3
6/30/2011	181	18.13	23.51	23.55	23.63	22.86	17.42	12.52	2.0	28399609	-3698	-6.222	0.0	1.5	-5.5	-0.5
#N/A																