Lake Lacawac, Bruce R. Hargreaves, Lehigh University (brh0@lehigh.edu, http://www.lehigh.edu/~brh0)
13Apr09: Station moved from dock from 2:30-3:30pm (problems with ice-shift anchors result in wind direction error until corrected)
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						
	57.0	66.0	48.4		4.72	4.6	30					62.9	62.9	62.6	61.1	58.1	53.8	48.9	46.7	44.8	44.4	44.2						
Month summary	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	Tw10.3m	Tw11.6m	H310_z (m)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
	13.9	**18.9**	**9.1**	**75.4**	**119.9**	**2.0**	**13.6**	**211.3**	**965.5**	**551376715**	**1149**	**17.2**	**17.2**	**17.0**	**16.1**	**14.5**	**12.1**	**9.4**	**8.2**	**7.1**	**6.9**	**6.8**	**10.0**	**99.2**	**119.9**	**12.6**	**34.5**	**24.2**

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%	5/1/2009	121	15.2	17.6	11.5	87.3	1.7	2.5	8.2	203	961.4	6314964	14	16	16	15.8	14.7	11.1	9.8	8.5	7.7	7.0	6.9	6.6	10.3	44.0	1.700	12.6	28.7	18.6
LC	100%	5/2/2009	122	11.0	16.8	7.4	74.2	4.6	2.2	10.6	275	961.1	20238587	43	16	16	15.8	15.4	11.4	9.9	8.6	7.7	7.0	6.9	6.6	10.3	49.6	6.300	12.6	30.8	21.1
LC	100%	5/3/2009	123	9.8	13.6	5.6	83.2	0.1	0.9	4.3	217	963.9	9683080	22	15	16	15.6	15.3	11.6	10.0	8.6	7.8	7.0	6.9	6.6	10.3	47.6	6.400	12.7	27.6	16.7
LC	100%	5/4/2009	124	10.2	13.1	8.1	91.9	3.1	0.8	3.9	150	966.2	5530095	13	15	15	15.3	15.2	11.8	10.0	8.6	7.8	7.0	6.9	6.6	10.3	48.0	9.500	12.6	29.5	17.1
LC	100%	5/5/2009	125	10.1	11.9	9.1	92.5	2.5	2.1	8.6	74	967.4	6185960	14	15	15	14.8	14.7	12.0	10.0	8.7	7.8	7.0	6.9	6.7	10.3	50.0	12.000	12.6	31.2	19.3
LC	100%	5/6/2009	126	11.3	14.2	8.7	95.8	10.9	1.4	5.8	120	965.0	9502159	21	14	15	14.5	14.3	12.3	10.0	8.7	7.8	7.0	6.9	6.7	10.3	55.2	22.900	12.6	33.1	22.8
LC	100%	5/7/2009	127	14.6	18.7	10.6	85.6	6.8	2.3	10.3	220	957.4	17126274	37	15	15	15.1	14.7	12.8	10.2	8.7	7.8	7.0	6.9	6.7	10.3	69.4	29.700	12.6	34.8	26.1
LC	100%	5/8/2009	128	15.1	22.4	8.2	82.7	1.6	1.4	6.0	209	958.8	17373188	37	16	16	15.7	15.1	13.2	10.3	8.8	7.9	7.0	6.9	6.7	10.3	69.7	31.300	12.7	33.5	22.6
LC	100%	5/9/2009	129	18.2	23.7	13.4	78.2	11.0	2.8	13.6	185	953.5	17933754	38	17	17	16.7	15.5	13.3	10.4	8.9	7.9	7.0	6.9	6.7	10.3	81.0	42.300	12.6	35.7	28.0
LC	100%	5/10/2009	130	11.9	15.3	7.8	61.8	0.0	4.6	12.4	279	960.6	21128832	44	16	16	16.0	15.9	14.2	10.7	8.9	8.0	7.0	6.9	6.9	10.3	79.7	42.300	12.6	34.5	21.7
LC	100%	5/11/2009	131	9.7	14.6	5.1	61.5	0.0	2.1	9.0	267	966.1	23960128	49	15	16	15.6	15.5	14.9	11.0	8.9	8.0	7.0	6.9	6.8	10.3	75.8	42.300	12.7	30.2	17.9
LC	100%	5/12/2009	132	10.1	15.5	4.7	58.0	0.0	1.8	7.5	280	969.6	23794241	48	16	16	15.7	15.7	15.1	11.2	9.0	8.0	7.0	6.9	6.8	10.3	73.2	42.300	12.7	29.0	17.4
LC	100%	5/13/2009	133	11.5	18.2	1.1	59.2	0.0	2.2	8.6	190	975.1	27289285	55	16	16	15.9	15.6	15.1	11.5	9.1	8.1	7.1	6.9	6.8	10.3	69.8	42.300	12.7	28.8	19.4
LC	100%	5/14/2009	134	13.3	16.1	10.0	87.5	21.8	3.1	10.2	170	970.4	4063757	9	16	16	15.7	15.6	15.2	11.7	9.1	8.1	7.1	6.9	6.9	10.3	72.9	64.100	12.6	32.2	20.6
LC	100%	5/15/2009	135	17.1	23.5	12.9	77.5	0.1	1.0	5.4	203	971.8	26168669	54	17	16	15.9	15.6	15.3	12.2	9.2	8.1	7.1	6.9	6.9	10.3	95.1	64.200	12.6	37.1	26.5
LC	100%	5/16/2009	136	17.8	20.2	16.4	96.0	28.6	2.3	8.0	172	965.2	9996772	22	18	18	16.9	15.9	15.3	12.4	9.3	8.2	7.1	6.9	6.9	10.3	97.0	92.800	12.7	37.5	26.9
LC	100%	5/17/2009	137	9.3	16.5	5.2	72.0	5.6	3.7	10.3	299	965.9	19545719	40	17	17	17.0	16.6	15.7	12.9	9.5	8.3	7.1	6.9	6.8	10.4	144.9	98.400	12.6	38.2	40.9
LC	100%	5/18/2009	138	6.7	10.7	2.5	61.8	0.0	2.7	8.3	304	972.6	18083487	36	16	16	15.8	15.7	15.7	13.3	9.5	8.3	7.1	6.9	6.8	10.4	148.2	98.400	12.7	33.8	26.3
LC	100%	5/19/2009	139	10.4	20.8	-0.9	55.9	0.0	1.2	5.2	235	976.3	30199951	62	16	16	15.5	15.2	15.1	13.7	9.6	8.3	7.1	6.9	6.8	10.4	146.7	98.400	12.7	30.5	23.3
LC	100%	5/20/2009	140	18.3	27.0	9.5	45.3	0.0	1.7	6.0	226	975.7	29060437	60	18	17	16.4	15.5	15.0	13.8	9.7	8.3	7.1	6.9	6.8	10.4	144.1	98.400	12.7	33.9	24.5
LC	100%	5/21/2009	141	21.1	28.5	14.2	38.2	0.0	2.2	7.3	220	972.6	30348232	62	19	19	18.0	16.0	15.2	13.8	9.8	8.4	7.2	6.9	6.8	10.4	139.6	98.400	12.7	34.8	24.3
LC	100%	5/22/2009	142	21.1	26.8	12.8	58.9	0.0	1.6	6.7	246	969.1	27312452	57	20	20	19.0	16.4	15.4	13.7	9.9	8.4	7.2	6.9	6.8	10.4	135.4	98.400	12.7	35.2	23.8
LC	100%	5/23/2009	143	17.2	20.1	14.2	85.5	0.4	1.3	6.2	157	969.1	9019507	19	21	21	20.2	16.7	15.5	13.7	9.9	8.4	7.2	6.9	6.8	10.4	132.8	98.800	12.7	38.0	25.1
LC	100%	5/24/2009	144	17.8	24.2	11.6	87.3	0.3	1.4	7.3	216	965.3	17928177	38	20	20	20.1	16.9	15.5	13.7	10.0	8.5	7.2	6.9	6.8	10.4	130.1	99.100	12.6	37.9	24.9
LC	100%	5/25/2009	145	17.9	22.2	13.1	59.8	0.0	2.1	9.0	294	966.4	28685382	59	21	21	21.0	17.3	15.6	13.7	10.0	8.5	7.2	6.9	6.8	10.4	126.7	99.100	12.6	38.5	25.4
LC	100%	5/26/2009	146	10.6	13.9	7.4	71.3	7.1	2.4	7.4	125	970.8	15537791	32	20	20	20.0	17.9	15.7	13.7	10.1	8.5	7.2	6.9	6.8	10.3	121.6	106.200	12.7	36.2	21.2
LC	100%	5/27/2009	147	11.6	17.3	7.1	97.0	0.1	1.6	5.3	141	964.4	7467738	17	18	18	18.4	18.1	15.8	13.7	10.1	8.5	7.2	6.9	6.8	10.3	121.4	106.300	12.6	36.7	23.8
LC	100%	5/28/2009	148	16.5	19.0	13.5	96.5	1.6	2.0	7.0	151	959.5	7317724	16	18	18	18.3	18.0	15.8	13.6	10.2	8.5	7.2	6.9	6.8	10.3	119.4	107.900	12.6	40.5	28.1
LC	100%	5/29/2009	149	16.1	22.4	12.5	94.0	11.8	1.5	9.4	204	955.7	14450151	31	19	19	18.4	18.0	15.9	13.7	10.3	8.6	7.2	6.9	6.8	10.4	131.3	119.700	12.6	41.5	36.5
LC	100%	5/30/2009	150	14.8	19.9	10.4	77.3	0.2	1.8	8.2	257	956.5	23804658	49	19	19	19.1	18.2	16.1	13.7	10.4	8.6	7.2	7.0	6.8	10.4	129.8	119.900	12.6	41.1	30.8
LC	100%	5/31/2009	151	14.2	19.9	8.1	65.2	0.0	2.9	10.4	262	957.9	26325566	54	19	19	19.2	18.9	16.4	13.7	10.4	8.6	7.3	6.9	6.8	10.4	123.8	119.900	12.7	39.5	27.2

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)

																								1.000	<=SCALE ADJ (1.0=no adjustment)		
Ratio of lake watershed to lake area:	3.88		Runoff & seepage as % of watershed area precip:				13.8%																	4.184	joule/calorie (= joule/degree for 1cm3)		
Grand sum/avg	**13.89**	**17.19**	**17.17**	**17.02**	**16.14**	**14.48**	**12.1**	**1.9**	**551376715**	**-62867**	**73.6**	**119.9**	**64.2**	**-92.4**	**0.0**	**-18.5**	**73.2**	**-56580.5**	**458956.7**		**12%**	**-2.3**	**18.3**	**14**	**#N/A**	**#N/A**

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

																								4.184	<=CONVERT HEAT TO DEGREES		
		Data																0.9	6.5%	<=%R that optimizes r2 for plot of Resid vs VP				6000000	cm3/m2 (for 0-4m integrated depth)		
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	Sum Out flow (lake mm)	sum in+out (mm)	Sum H evap (KJ/m^2)	solar heat absorbed - evap loss (kJ/m^2)	% of absorbed solar heat lost via evap	evap loss (degC 0-6m)	Expected heat input minus evap (solar heat absorbed-evap loss) (degC 0-6m)	starting Tw (0-6m)	ending Tw (0-6m)	actual dTw, 0-6m	Heat presumed absorbed (as Tw, 0-6m)	RESID1: Heat absorbed (as Tw) minus dTw
5/1/2009	121	15.22	15.71	15.79	15.81	14.70	11.08	9.81	2.3	6314964	-771	1.441	1.7	1.3	-1.1	0.0	-0.6	1.294	-694	5211	11.7%	-0.03	0.21	11.9	12.0	0.10	0.24	0.14
5/2/2009	122	10.96	15.65	15.74	15.76	15.45	11.37	9.91	2.1	20238587	-2193	3.551	4.6	2.8	-3.2	0.0	-0.6	3.551	-1973	16950	10.4%	-0.08	0.68	12.0	12.3	0.24	0.75	0.51
5/3/2009	123	9.84	15.49	15.57	15.56	15.31	11.62	9.97	0.8	9683080	-1184	-1.758	0.1	0.5	-1.7	0.0	-0.6	-1.758	-1066	7988	11.8%	-0.04	0.32	12.3	12.2	(0.11)	0.36	0.47
5/4/2009	124	10.24	15.12	15.19	15.25	15.17	11.80	9.96	0.7	5530095	-861	2.988	3.1	1.7	-1.3	0.0	-0.6	2.988	-775	4396	15.0%	-0.03	0.18	12.2	12.0	(0.14)	0.21	0.35
5/5/2009	125	10.05	14.65	14.74	14.79	14.74	11.96	10.02	1.9	6185960	-1340	2.144	2.5	2.2	-2.0	0.0	-0.6	2.144	-1206	4578	20.9%	-0.05	0.18	12.0	11.8	(0.22)	0.23	0.45
5/6/2009	126	11.28	14.49	14.53	14.53	14.35	12.25	10.03	1.3	9502159	-644	11.109	10.9	1.7	-0.9	0.0	-0.6	11.109	-580	8304	6.5%	-0.02	0.33	11.8	12.0	0.21	0.35	0.14
5/7/2009	127	14.62	15.04	15.11	15.12	14.74	12.76	10.19	2.1	17126274	-684	6.785	6.8	1.6	-1.0	0.0	-0.6	6.785	-615	15398	3.8%	-0.02	0.61	12.0	12.3	0.25	0.64	0.38
5/8/2009	128	15.15	15.81	15.83	15.71	15.07	13.17	10.28	1.2	17373188	-741	0.879	1.6	0.9	-1.1	0.0	-0.6	0.879	-667	15577	4.1%	-0.03	0.62	12.3	12.6	0.32	0.65	0.33
5/9/2009	129	18.24	16.83	16.84	16.74	15.49	13.33	10.37	2.5	17933754	-1249	10.933	11.0	2.3	-1.8	0.0	-0.6	10.933	-1124	15644	6.7%	-0.04	0.62	12.6	13.1	0.51	0.67	0.16
5/10/2009	130	11.85	15.89	16.00	16.04	15.94	14.23	10.68	4.3	21128832	-4741	-4.535	0.0	3.0	-7.0	0.0	-0.6	-4.535	-4267	15488	21.6%	-0.17	0.62	13.1	12.8	(0.26)	0.79	1.05
5/11/2009	131	9.66	15.49	15.60	15.62	15.52	14.93	10.95	1.9	23960128	-2799	-2.812	0.0	1.8	-4.1	0.0	-0.5	-2.812	-2519	19884	11.2%	-0.10	0.79	12.8	13.1	0.22	0.89	0.67
5/12/2009	132	10.12	15.62	15.72	15.74	15.66	15.06	11.21	1.6	23794241	-2735	-2.918	0.0	1.6	-4.0	0.0	-0.5	-2.918	-2462	19786	11.1%	-0.10	0.79	13.1	13.2	0.11	0.89	0.78
5/13/2009	133	11.54	15.91	15.98	15.94	15.55	15.14	11.45	2.0	27289285	-2891	-4.254	0.0	0.5	-4.2	0.0	-0.5	-4.254	-2602	22913	10.2%	-0.10	0.91	13.2	13.3	0.16	1.02	0.85
5/14/2009	134	13.30	15.51	15.63	15.67	15.59	15.17	11.74	2.8	4063757	-1377	26.155	21.8	6.9	-2.0	0.0	-0.5	26.155	-1240	2560	32.6%	-0.05	0.10	13.3	13.2	(0.17)	0.15	0.32
5/15/2009	135	17.05	17.28	16.27	15.90	15.59	15.27	12.21	0.8	26168669	-777	1.687	0.1	3.3	-1.1	0.0	-0.5	1.687	-699	23769	2.9%	-0.03	0.95	13.2	13.6	0.41	0.97	0.57
5/16/2009	136	17.79	17.77	17.59	16.92	15.89	15.35	12.39	2.1	9996772	-124	31.990	28.6	4.1	-0.2	0.0	-0.5	31.990	-112	9235	1.2%	0.00	0.37	13.6	14.0	0.38	0.37	(0.00)
5/17/2009	137	9.34	16.84	16.94	16.95	16.57	15.67	12.95	3.5	19545719	-4671	21.339	5.6	23.5	-6.9	0.0	-0.9	21.339	-4204	14072	23.0%	-0.17	0.56	14.0	13.8	(0.18)	0.73	0.91
5/18/2009	138	6.74	15.65	15.75	15.79	15.74	15.69	13.33	2.5	18083487	-3775	-1.160	0.0	5.1	-5.5	0.0	-0.7	-1.160	-3398	13510	20.1%	-0.14	0.54	13.8	13.7	(0.11)	0.67	0.79
5/19/2009	139	10.40	16.50	16.13	15.52	15.23	15.06	13.73	1.0	30199951	-2422	-1.723	0.0	2.5	-3.6	0.0	-0.7	-1.723	-2180	26057	7.7%	-0.09	1.04	13.7	13.6	(0.05)	1.12	1.18
5/20/2009	140	18.30	17.63	17.28	16.39	15.54	15.04	13.77	1.5	29060437	-2314	-3.094	0.0	0.9	-3.4	0.0	-0.6	-3.094	-2082	25089	7.7%	-0.08	1.00	13.6	14.0	0.43	1.08	0.65
5/21/2009	141	21.09	18.54	18.55	17.95	15.96	15.21	13.81	2.1	30348232	-3364	-5.625	0.0	-0.1	-4.9	0.0	-0.6	-5.625	-3028	25348	10.7%	-0.12	1.01	14.0	14.5	0.42	1.13	0.71
5/22/2009	142	21.12	19.98	19.79	19.05	16.40	15.38	13.70	1.5	27312452	-1694	-2.812	0.0	0.2	-2.5	0.0	-0.6	-2.812	-1524	24013	6.0%	-0.06	0.96	14.5	14.9	0.47	1.02	0.55
5/23/2009	143	17.17	20.67	20.73	20.22	16.70	15.48	13.74	1.1	9019507	-1374	-2.285	0.4	-0.1	-2.0	0.0	-0.6	-2.285	-1237	7197	14.7%	-0.05	0.29	14.9	14.9	(0.07)	0.34	0.40
5/24/2009	144	17.83	20.42	20.39	20.10	16.94	15.53	13.67	1.2	17928177	-1067	-2.777	0.3	-1.0	-1.6	0.0	-0.5	-2.777	-960	15803	5.7%	-0.04	0.63	14.9	15.0	0.18	0.67	0.49
5/25/2009	145	17.91	20.95	21.00	20.96	17.33	15.64	13.68	2.0	28685382	-3531	-5.519	0.0	0.2	-5.2	0.0	-0.5	-5.519	-3178	23643	11.8%	-0.13	0.94	15.0	15.3	0.25	1.07	0.82
5/26/2009	146	10.58	19.84	19.92	19.97	17.94	15.74	13.66	2.2	15537791	-4257	-0.527	7.1	-0.7	-6.3	0.0	-0.6	-0.527	-3831	10697	26.4%	-0.15	0.43	15.3	15.2	(0.14)	0.58	0.72
5/27/2009	147	11.56	18.33	18.40	18.44	18.11	15.80	13.66	1.4	7467738	-1652	-2.496	0.1	0.4	-2.4	0.0	-0.5	-2.496	-1487	5495	21.3%	-0.06	0.22	15.2	14.9	(0.26)	0.28	0.54
5/28/2009	148	16.52	18.27	18.31	18.33	18.02	15.83	13.63	1.9	7317724	-649	0.703	1.6	0.6	-1.0	0.0	-0.5	0.703	-584	6258	8.5%	-0.02	0.25	14.9	15.0	0.06	0.27	0.21
5/29/2009	149	16.12	18.74	18.57	18.39	17.97	15.94	13.67	1.4	14450151	-783	10.687	11.8	0.6	-1.2	0.0	-0.5	10.687	-705	12806	5.2%	-0.03	0.51	15.0	15.1	0.11	0.54	0.43
5/30/2009	150	14.83	19.05	19.10	19.09	18.20	16.12	13.68	1.6	23804658	-2219	-4.394	0.2	-0.8	-3.3	0.0	-0.5	-4.394	-1997	20261	9.0%	-0.08	0.81	15.1	15.3	0.23	0.89	0.66
5/31/2009	151	14.21	19.10	19.17	19.20	18.95	16.39	13.70	2.7	26325566	-3985	-10.054	0.0	-3.6	-5.9	0.0	-0.9	-10.317	-3586	21028	14.6%	-0.14	0.84	15.3	#N/A	#N/A	0.98	#N/A