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

17 April 2011: platform moved to lake center, 1-2pm 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=> 12.85

	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					
	28.8	54.5	-1.7		2.13	4.1	28				33.4	36.7	37.3	37.6	37.8	38.1	38.1	37.9	37.9	37.4	37.9					
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	Tw01.6m	Tw02.1m	H310_z (m)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
3.2	-1.8	12.5	-18.7	80.5	54.1	1.8	12.3	238.4	961.3	173667179	342	0.8	2.6	3.0	3.1	3.2	3.4	3.4	3.3	3.3	3.0	3.3	1.6	55.8	54.1	12.3	31.6	15.0

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
ND	100%	1/1/2012	1	5.7	8.8	2.5	88.2	0.6	1.3	7.7	254	960.4	6397815	13	2.52	2.39	2.75	2.83	2.92	3.06	2.99	2.93	2.94	2.8	3.02	1.6	72.1	0.600	12.4	43.0	12.9
ND	100%	1/2/2012	2	-0.6	5.6	-3.9	74.1	0.0	2.7	9.6	281	954.0	6021141	12	2.40	2.21	2.55	2.43	2.57	2.63	2.57	2.54	2.56	2.5	2.59	1.6	69.3	0.600	12.6	39.0	14.2
ND	100%	1/3/2012	3	-9.0	-4.0	-14.1	77.2	0.0	3.8	11.1	320	960.2	6585591	12	1.59	1.41	1.73	1.70	1.84	1.88	1.78	1.80	1.80	1.7	1.83	1.6	64.7	0.600	12.6	30.1	15.8
ND	100%	1/4/2012	4	-10.9	-4.1	-16.0	76.5	0.0	1.4	4.7	276	962.7	5184436	10	0.87	1.02	1.42	2.01	2.07	2.29	2.11	2.00	1.90	1.5	2.08	1.6	59.8	0.600	12.5	24.6	16.6
ND	100%	1/5/2012	5	-3.2	-0.7	-7.3	77.3	0.0	1.6	8.1	270	956.7	5259935	10	1.03	1.24	1.62	2.23	2.26	2.50	2.30	2.21	2.07	1.7	2.30	1.6	56.6	0.600	12.4	33.0	14.8
ND	100%	1/6/2012	6	2.5	10.3	-3.9	72.1	0.0	0.9	7.4	244	954.6	6381992	13	1.31	1.52	1.87	2.39	2.42	2.65	2.49	2.36	2.29	1.9	2.47	1.6	53.9	0.600	12.5	37.7	14.1
ND	100%	1/7/2012	7	6.3	11.9	1.6	68.1	0.0	1.3	8.1	265	955.6	5857697	12	1.37	1.77	2.15	2.56	2.62	2.80	2.69	2.59	2.51	2.2	2.67	1.6	51.5	0.600	12.5	39.6	13.5
ND	100%	1/8/2012	8	0.4	2.9	-3.9	73.1	0.0	2.3	7.7	319	967.8	3022920	6	1.15	1.91	2.22	2.67	2.72	2.93	2.81	2.73	2.63	2.3	2.74	1.6	48.9	0.600	12.4	37.4	14.1
ND	100%	1/9/2012	9	-1.7	3.8	-6.4	69.4	0.0	0.6	4.9	229	967.8	7888989	15	1.27	2.07	2.41	2.86	2.92	3.15	3.06	2.91	2.84	2.5	2.95	1.6	46.3	0.600	12.4	36.1	14.8
ND	100%	1/10/2012	10	0.6	3.3	-3.0	76.7	0.0	1.3	6.7	262	959.5	3233696	7	1.02	2.17	2.60	2.91	2.98	3.17	3.09	3.00	2.92	2.6	3.04	1.6	43.8	0.600	12.5	35.2	14.2
ND	100%	1/11/2012	11	0.2	6.0	-4.8	85.2	2.6	0.7	5.5	123	961.4	7050037	14	1.24	2.28	2.63	3.06	3.14	3.37	3.29	3.14	3.07	2.7	3.21	1.6	41.6	3.200	12.4	37.1	14.4
ND	100%	1/12/2012	12	1.9	2.5	1.0	101.1	18.9	2.3	7.7	98	948.0	1581691	3	1.01	2.36	2.78	3.02	3.10	3.28	3.24	3.14	3.12	2.7	3.18	1.6	58.6	22.100	12.4	39.8	13.6
ND	100%	1/13/2012	13	-2.3	5.4	-6.9	88.2	2.5	3.0	11.4	229	944.5	4686762	9	1.23	2.42	2.78	2.90	3.02	3.13	3.12	3.05	3.03	2.8	3.07	1.6	65.0	24.600	12.4	50.1	14.5
ND	100%	1/14/2012	14	-6.1	-4.3	-8.4	85.0	0.0	2.5	7.1	295	958.5	3629452	7	1.04	2.50	2.83	3.00	3.11	3.24	3.21	3.13	3.14	2.9	3.11	1.6	62.1	24.600	12.3	48.6	15.5
ND	100%	1/15/2012	15	-12.0	-8.8	-14.9	77.3	0.0	3.0	9.4	316	971.4	8400389	15	0.83	2.59	2.92	3.13	3.21	3.35	3.33	3.23	3.30	3.0	3.17	1.6	58.4	24.600	12.3	42.7	17.1
ND	100%	1/16/2012	16	-8.0	-0.8	-14.9	78.8	0.0	0.9	7.3	233	971.5	7901689	15	0.53	2.73	3.07	3.30	3.41	3.53	3.54	3.41	3.46	3.1	3.39	1.6	55.2	24.600	12.5	40.7	16.2
ND	100%	1/17/2012	17	2.8	8.5	-1.0	97.0	1.9	1.0	7.3	243	953.1	1367993	3	0.50	2.80	3.14	3.33	3.43	3.54	3.60	3.47	3.48	3.2	3.50	1.6	54.6	26.500	12.4	47.8	13.6
ND	100%	1/18/2012	18	-2.2	8.8	-9.6	68.6	0.0	4.0	12.3	298	957.9	6688281	13	0.67	2.86	3.21	3.22	3.34	3.43	3.52	3.41	3.47	3.3	3.45	1.6	53.2	26.500	12.4	47.1	14.8
ND	100%	1/19/2012	19	-7.9	-3.7	-13.7	83.4	0.0	0.8	5.9	223	962.7	6259361	12	0.36	2.97	3.30	3.53	3.64	3.76	3.83	3.70	3.72	3.4	3.67	1.6	49.9	26.500	12.5	38.8	16.2
ND	100%	1/20/2012	20	-7.1	-4.0	-10.3	72.3	0.0	2.3	8.5	250	965.1	9008620	17	0.22	3.05	3.40	3.56	3.68	3.78	3.89	3.76	3.80	3.5	3.75	1.6	46.9	26.500	12.5	44.9	15.8
ND	100%	1/21/2012	21	-8.6	-5.7	-12.8	97.9	0.0	1.8	6.4	137	964.5	2896268	6	0.09	3.11	3.47	3.64	3.79	3.89	3.99	3.77	3.82	3.5	3.75	1.6	51.9	26.500	12.4	38.6	15.8
ND	100%	1/22/2012	22	-9.8	-3.3	-18.7	96.4	1.9	0.6	4.6	104	973.8	7767698	16	0.06	3.10	3.46	3.65	3.80	3.90	3.96	3.78	3.81	3.5	3.76	1.6	51.2	28.400	12.3	28.6	16.3
ND	100%	1/23/2012	23	1.8	6.5	-4.0	102.1	8.7	1.1	6.2	145	964.8	2222773	5	0.01	3.06	3.46	3.56	3.70	3.80	3.89	3.75	3.80	3.5	3.77	1.6	50.4	37.100	12.4	15.0	14.1
ND	100%	1/24/2012	24	3.8	5.1	1.4	89.9	0.0	2.0	7.7	277	961.4	4873120	10	0.18	3.12	3.56	3.63	3.77	3.86	3.99	3.88	3.89	3.6	3.91	1.6	51.8	37.100	12.3	12.8	17.4
ND	100%	1/25/2012	25	-0.7	1.2	-1.6	84.5	0.0	2.4	9.3	307	969.3	3919530	8	0.14	3.18	3.57	3.61	3.74	3.84	4.01	3.82	3.90	3.6	3.86	1.6	49.2	37.100	12.3	13.1	16.7
ND	100%	1/26/2012	26	-0.7	0.7	-1.9	96.6	4.2	0.9	4.1	119	964.1	1815989	4	0.07	3.24	3.59	3.69	3.84	3.94	4.05	3.84	3.86	3.6	3.87	1.6	48.8	41.300	12.3	13.1	16.5
ND	100%	1/27/2012	27	4.3	12.3	0.1	93.8	12.8	2.2	12.1	214	948.9	2222660	5	0.21	3.27	3.64	3.65	3.80	3.86	4.02	3.80	3.87	3.7	3.88	1.6	62.5	54.100	12.3	12.3	13.6
ND	100%	1/28/2012	28	1.8	5.2	-1.1	70.0	0.0	2.0	9.7	272	960.7	9262390	18	0.39	3.39	3.75	3.68	3.85	3.90	4.12	3.94	3.97	3.8	3.93	1.6	66.3	54.100	12.3	12.7	13.8
ND	100%	1/29/2012	29	-0.5	2.9	-3.8	55.2	0.0	1.9	7.6	265	964.6	9038415	17	0.45	3.51	3.87	3.71	3.87	3.92	4.15	3.98	3.99	3.9	3.95	1.6	64.2	54.100	12.6	13.2	14.5
ND	100%	1/30/2012	30	-2.1	0.7	-4.6	64.0	0.0	2.4	11.1	276	968.2	8191911	16	0.37	3.61	4.02	3.74	3.90	3.94	4.18	3.98	4.10	4.0	4.01	1.6	61.3	54.100	12.6	13.7	14.7
ND	100%	1/31/2012	31	5.5	12.5	-1.8	54.3	0.0	1.1	6.9	243	965.6	9047938	18	0.38	3.75	4.15	3.87	4.03	4.07	4.31	4.13	4.09	4.1	4.09	1.6	58.3	54.100	12.6	12.5	13.4

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: 18.7%

																												1.000	<=SCALE ADJ (1.0=no adjustment)
																												4.184	joule/calorie (= joule/degree for 1cm3)
Grand sum/avg	-1.80	0.79	2.60	2.97	3.13	3.24	3.37	1.6	173667179	-15274	-15.5	54.1	20.1	-22.1	0.0	0.0												-0.5	#N/A
																SumTerrevap2=AirVPD,mbar*WS,m/s*s													

Nominal diffuse %R from water=7% -13746.6 147763.9 7% 3 #N/A #N/A

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
1/1/2012	1	5.65	2.52	2.39	2.75	2.83	2.92	3.06	0.8	6397815	97	-0.844	0.6	0.9	0.1	0.0
1/2/2012	2	-0.63	2.40	2.21	2.55	2.43	2.57	2.63	2.3	6021141	-906	-4.535	0.0	-0.9	-1.3	0.0
1/3/2012	3	-8.98	1.59	1.41	1.73	1.70	1.84	1.88	3.6	6585591	-1954	-5.906	0.0	-1.0	-2.8	0.0
1/4/2012	4	-10.90	0.87	1.02	1.42	2.01	2.07	2.29	1.2	5184436	-949	-3.410	0.0	0.0	-1.4	0.0
1/5/2012	5	-3.23	1.03	1.24	1.62	2.23	2.26	2.50	1.5	5259935	-591	-2.953	0.0	-0.1	-0.9	0.0
1/6/2012	6	2.50	1.31	1.52	1.87	2.39	2.42	2.65	0.7	6381992	-187	-2.496	0.0	-0.2	-0.3	0.0
1/7/2012	7	6.25	1.37	1.77	2.15	2.56	2.62	2.80	1.1	5857697	-2	-2.250	0.0	-0.1	0.0	0.0
1/8/2012	8	0.39	1.15	1.91	2.22	2.67	2.72	2.93	2.2	3022920	-530	-2.812	0.0	0.2	-0.8	0.0
1/9/2012	9	-1.72	1.27	2.07	2.41	2.86	2.92	3.15	0.4	7888989	-361	-2.566	0.0	0.4	-0.5	0.0
1/10/2012	10	0.63	1.02	2.17	2.60	2.91	2.98	3.17	1.1	3233696	-249	-2.461	0.0	0.5	-0.4	0.0
1/11/2012	11	0.23	1.24	2.28	2.63	3.06	3.14	3.37	0.5	7050037	-151	0.914	2.6	1.4	-0.2	0.0
1/12/2012	12	1.94	1.01	2.36	2.78	3.02	3.10	3.28	2.2	1581691	107	20.143	18.9	3.2	0.2	0.0
1/13/2012	13	-2.29	1.23	2.42	2.78	2.90	3.02	3.13	2.5	4686762	-821	0.141	2.5	0.9	-1.2	0.0
1/14/2012	14	-6.12	1.04	2.50	2.83	3.00	3.11	3.24	2.3	3629452	-977	-3.515	0.0	-0.1	-1.4	0.0
1/15/2012	15	-12.02	0.83	2.59	2.92	3.13	3.21	3.35	2.8	8400389	-1661	-3.621	0.0	0.8	-2.4	0.0
1/16/2012	16	-7.95	0.53	2.73	3.07	3.30	3.41	3.53	0.6	7901689	-634	-3.023	0.0	-0.1	-0.9	0.0
1/17/2012	17	2.77	0.50	2.80	3.14	3.33	3.43	3.54	0.7	1367993	174	1.758	1.9	1.6	0.3	0.0
1/18/2012	18	-2.24	0.67	2.86	3.21	3.22	3.34	3.43	3.7	6688281	-1138	-4.148	0.0	-0.4	-1.6	0.0
1/19/2012	19	-7.88	0.36	2.97	3.30	3.53	3.64	3.76	0.4	6259361	-575	-2.707	0.0	0.3	-0.8	0.0
1/20/2012	20	-7.11	0.22	3.05	3.40	3.56	3.68	3.78	2.2	9008620	-1044	-3.129	0.0	0.8	-1.5	0.0
1/21/2012	21	-8.61	0.09	3.11	3.47	3.64	3.79	3.89	1.7	2896268	-711	7.804	0.0	11.0	-1.0	0.0
1/22/2012	22	-9.82	0.06	3.10	3.46	3.65	3.80	3.90	0.6	7767698	-521	-3.621	1.9	-2.6	-0.8	0.0
1/23/2012	23	1.85	0.01	3.06	3.46	3.56	3.70	3.80	0.5	2222773	157	3.094	8.7	-3.6	0.2	0.0
1/24/2012	24	3.85	0.18	3.12	3.56	3.63	3.77	3.86	1.7	4873120	143	-1.723	0.0	0.2	0.2	0.0
1/25/2012	25	-0.71	0.14	3.18	3.57	3.61	3.74	3.84	2.2	3919530	-339	-3.129	0.0	-0.4	-0.5	0.0
1/26/2012	26	-0.69	0.07	3.24	3.59	3.69	3.84	3.94	0.8	1815989	-53	6.082	4.2	4.2	-0.1	0.0
1/27/2012	27	4.28	0.21	3.27	3.64	3.65	3.80	3.86	2.0	2222660	307	11.882	12.8	0.7	0.4	0.0
1/28/2012	28	1.77	0.39	3.39	3.75	3.68	3.85	3.90	1.7	9262390	-310	0.035	0.0	2.6	-0.4	0.0
1/29/2012	29	-0.49	0.45	3.51	3.87	3.71	3.87	3.92	1.6	9038415	-663	-2.637	0.0	0.4	-1.0	0.0
1/30/2012	30	-2.06	0.37	3.61	4.02	3.74	3.90	3.94	2.1	8191911	-779	-3.410	0.0	-0.3	-1.1	0.0
1/31/2012	31	5.46	0.38	3.75	4.15	3.87	4.03	4.07	0.9	9047938	-153	-2.426	0.0	-0.3	-0.2	0.0

				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)
5950	88	6038	-1.5%	0.24	2.59	2.86	0.27	0.03	0.00	0.03
5600	-815	4784	14.6%	0.22	2.86	2.21	(0.65)	(0.87)	-0.03	(0.84)
6125	-1759	4366	28.7%	0.24	2.21	1.25	(0.96)	(1.20)	-0.07	(1.13)
4822	-854	3967	17.7%	0.19	1.25	2.17	0.92	0.73	-0.03	0.76
4892	-532	4360	10.9%	0.19	2.17	2.26	0.09	(0.10)	-0.02	(0.08)
5935	-168	5767	2.8%	0.24	2.26	2.47	0.20	(0.03)	-0.01	(0.02)
5448	-2	5446	0.0%	0.22	2.47	2.60	0.14	(0.08)	0.00	(0.08)
2811	-477	2334	17.0%	0.11	2.60	2.71	0.11	(0.01)	-0.02	0.01
7337	-325	7012	4.4%	0.29	2.71	2.94	0.23	(0.06)	-0.01	(0.05)
3007	-224	2783	7.4%	0.12	2.94	2.94	(0.00)	(0.12)	-0.01	(0.11)
6557	-136	6421	2.1%	0.26	2.94	3.00	0.06	(0.20)	-0.01	(0.20)
1471	96	1567	-6.5%	0.06	3.00	3.13	0.13	0.07	0.00	0.07
4359	-739	3620	17.0%	0.17	3.13	2.89	(0.24)	(0.41)	-0.03	(0.38)
3375	-879	2497	26.0%	0.13	2.89	3.09	0.20	0.07	-0.04	0.10
7812	-1495	6317	19.1%	0.31	3.09	3.27	0.18	(0.13)	-0.06	(0.07)
7349	-571	6778	7.8%	0.29	3.27	3.29	0.02	(0.28)	-0.02	(0.25)
1272	156	1429	-12.3%	0.05	3.29	3.27	(0.02)	(0.08)	0.01	(0.08)
6220	-1025	5196	16.5%	0.25	3.27	3.48	0.21	(0.04)	-0.04	0.00
5821	-518	5304	8.9%	0.23	3.48	3.53	0.06	(0.17)	-0.02	(0.15)
8378	-940	7438	11.2%	0.33	3.53	3.70	0.17	(0.17)	-0.04	(0.13)
2694	-640	2053	23.8%	0.11	3.70	3.65	(0.05)	(0.16)	-0.03	(0.13)
7224	-469	6755	6.5%	0.29	3.65	3.71	0.06	(0.23)	-0.02	(0.21)
2067	141	2208	-6.8%	0.08	3.71	3.66	(0.05)	(0.13)	0.01	(0.14)
4532	129	4661	-2.8%	0.18	3.66	3.65	(0.01)	(0.19)	0.01	(0.19)
3645	-305	3340	8.4%	0.15	3.65	3.69	0.04	(0.11)	-0.01	(0.10)
1689	-48	1641	2.8%	0.07	3.69	3.69	0.00	(0.06)	0.00	(0.06)
2067	276	2343	-13.4%	0.08	3.69	3.56	(0.13)	(0.21)	0.01	(0.22)
8614	-279	8335	3.2%	0.34	3.56	3.69	0.12	(0.22)	-0.01	(0.21)
8406	-597	7809	7.1%	0.33	3.69	3.77	0.08	(0.25)	-0.02	(0.23)
7618	-701	6918	9.2%	0.30	3.77	3.84	0.07	(0.24)	-0.03	(0.21)
8415	-137	8277	1.6%	0.34	3.84	#N/A	#N/A	#N/A	-0.01	#N/A