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

rain sum (in.) Aug-Sep2011=> 11.49

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						
		31.9	53.2	12.6		0.77	4.1	31					35.9	38.9	39.5	39.1	39.4	39.6	39.8	39.5	39.6	39.5	39.5						
Month summai	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
	4.1	-0.1	11.8	-10.8	77.9	19.6	1.8	13.7	246.9	963.8	256753977	500	2.1	3.8	4.2	3.9	4.1	4.2	4.4	4.2	4.2	4.2	4.2	1.5	35.8	19.6	12.4	13.1	14.2

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
ND	100%	2/1/2012	32	8.9	11.8	3.2	70.3	0.1	1.8	8.5	248	961.4	6277802	13	0.71	3.91	4.28	3.95	4.13	4.17	4.39	4.17	4.16	4.2	4.15	1.6	56.5	0.100	12.6	11.5	12.7
ND	100%	2/2/2012	33	0.2	3.0	-2.6	87.3	0.0	2.1	10.1	278	965.1	1954571	4	0.64	3.88	4.24	3.95	4.14	4.20	4.42	4.17	4.11	4.2	4.10	1.6	54.8	0.100	12.5	13.0	14.2
ND	100%	2/3/2012	34	-1.1	2.3	-3.4	72.8	0.0	2.7	9.3	309	974.4	11957533	23	1.77	4.02	4.38	4.02	4.21	4.24	4.47	4.29	4.39	4.3	4.30	1.6	52.0	0.100	12.5	13.1	14.3
ND	100%	2/4/2012	35	0.3	2.4	-3.7	74.5	0.0	1.4	6.3	277	969.8	7770895	15	1.57	4.07	4.41	4.09	4.27	4.34	4.55	4.37	4.38	4.4	4.32	1.6	49.7	0.100	12.6	13.0	14.1
ND	100%	2/5/2012	36	-2.6	-0.4	-4.6	77.4	0.0	1.9	8.0	239	966.5	11675732	22	2.34	4.13	4.44	4.14	4.33	4.38	4.57	4.40	4.46	4.4	4.37	1.6	47.8	0.100	12.6	13.6	14.8
ND	100%	2/6/2012	37	1.3	8.6	-4.4	69.2	0.0	1.3	6.6	259	964.4	12547289	24	2.74	4.15	4.45	4.17	4.36	4.41	4.60	4.43	4.51	4.4	4.42	1.6	45.5	0.100	12.6	13.0	14.3
ND	100%	2/7/2012	38	1.4	2.9	-1.4	74.2	0.0	2.1	8.3	317	965.6	4037820	8	2.57	4.02	4.37	4.08	4.30	4.34	4.51	4.34	4.44	4.3	4.34	1.6	43.0	0.100	12.5	12.8	14.0
ND	100%	2/8/2012	39	-2.4	0.4	-4.7	81.3	0.0	1.1	4.7	197	969.1	6035919	12	1.92	4.03	4.40	4.17	4.37	4.45	4.63	4.39	4.43	4.4	4.34	1.6	41.0	0.100	12.5	13.4	14.4
ND	100%	2/9/2012	40	-1.7	3.0	-5.7	79.5	0.8	1.5	7.2	287	966.1	14530910	23	1.82	3.98	4.38	4.17	4.37	4.45	4.59	4.38	4.51	4.3	4.37	1.6	40.1	0.900	12.5	13.4	14.8
ND	100%	2/10/2012	41	-1.4	2.3	-5.2	73.6	0.0	0.9	5.6	247	963.6	10859708	21	1.46	3.97	4.35	4.19	4.39	4.45	4.61	4.37	4.51	4.3	4.35	1.5	38.0	0.900	12.6	13.4	14.7
ND	100%	2/11/2012	42	-2.0	1.2	-9.2	87.1	0.4	1.9	9.6	229	953.6	5711493	11	1.17	3.95	4.32	4.14	4.36	4.42	4.56	4.35	4.47	4.3	4.35	1.5	36.6	1.300	12.6	13.3	14.4
ND	100%	2/12/2012	43	-7.9	-4.7	-10.8	78.9	0.0	3.7	10.7	307	956.8	5923691	12	1.71	3.78	4.14	3.89	4.10	4.15	4.29	4.14	4.24	4.1	4.12	1.5	34.9	1.300	12.5	14.7	15.9
ND	100%	2/13/2012	44	-2.4	1.7	-5.9	65.2	0.0	2.0	10.0	268	961.6	14015491	26	1.58	3.58	4.03	3.81	4.05	4.11	4.26	4.12	4.23	4.1	4.13	1.5	32.2	1.300	12.5	13.5	14.7
ND	100%	2/14/2012	45	0.3	3.8	-2.2	72.1	0.0	0.8	4.9	207	964.0	6925369	14	1.35	3.74	4.13	4.00	4.19	4.28	4.41	4.22	4.35	4.2	4.23	1.5	29.9	1.300	12.5	12.8	14.0
ND	100%	2/15/2012	46	0.3	2.3	-2.3	100.4	2.4	0.5	4.3	129	968.5	2803431	6	1.29	3.84	4.21	4.00	4.23	4.31	4.48	4.22	4.29	4.3	4.19	1.5	30.4	3.700	12.5	12.8	13.9
ND	100%	2/16/2012	47	-0.7	2.7	-4.0	101.9	4.7	0.5	5.4	221	968.3	1811851	5	1.26	3.89	4.28	4.05	4.27	4.34	4.48	4.29	4.37	4.3	4.25	1.5	31.2	8.400	12.5	13.2	14.3
ND	100%	2/17/2012	48	2.4	4.0	-1.2	79.6	0.3	2.0	8.5	292	963.1	10846617	21	1.87	3.99	4.34	4.04	4.29	4.34	4.52	4.33	4.43	4.3	4.39	1.5	32.9	8.700	12.4	12.5	13.7
ND	100%	2/18/2012	49	0.0	4.3	-3.6	76.7	0.3	1.4	8.0	266	962.7	5612661	11	2.29	3.95	4.30	3.97	4.22	4.28	4.45	4.29	4.37	4.3	4.28	1.5	31.2	9.000	12.6	13.1	14.3
ND	100%	2/19/2012	50	-1.0	1.6	-2.7	77.8	0.2	1.9	8.0	223	964.5	10898252	21	2.05	3.94	4.30	3.98	4.24	4.30	4.48	4.28	4.33	4.3	4.26	1.5	29.9	9.200	12.5	13.1	14.4
ND	100%	2/20/2012	51	-2.0	2.0	-5.8	66.3	0.0	2.8	8.2	255	968.6	14999285	28	2.49	3.96	4.28	3.95	4.20	4.26	4.43	4.26	4.34	4.3	4.25	1.5	27.7	9.200	12.6	13.4	14.6
ND	100%	2/21/2012	52	-1.3	4.7	-8.9	74.6	0.0	0.9	6.0	236	967.0	10062663	19	2.69	3.99	4.26	3.95	4.18	4.25	4.40	4.25	4.33	4.3	4.22	1.5	26.0	9.200	12.6	13.4	14.7
ND	100%	2/22/2012	53	5.7	10.0	1.8	72.6	0.3	1.3	6.9	251	952.9	10923520	22	3.04	4.03	4.34	3.95	4.20	4.26	4.42	4.30	4.37	4.3	4.32	1.5	24.6	9.500	12.6	11.9	13.0
ND	100%	2/23/2012	54	3.9	6.9	0.3	77.4	0.1	1.7	9.9	248	948.9	13366454	26	3.75	4.15	4.43	4.03	4.27	4.33	4.52	4.34	4.42	4.4	4.36	1.5	23.6	9.600	12.6	12.3	13.4
ND	100%	2/24/2012	55	0.6	3.5	-0.5	99.5	7.6	1.9	11.5	141	948.8	653110	2	3.08	3.91	4.24	4.00	4.20	4.26	4.43	4.23	4.26	4.3	4.20	1.5	32.9	17.200	12.5	12.8	13.9
ND	100%	2/25/2012	56	-0.1	2.0	-3.1	66.9	0.4	4.7	13.7	298	950.9	10471864	21	3.37	3.58	3.94	3.68	3.86	3.91	4.03	3.87	3.97	3.9	3.89	1.5	34.4	17.600	12.5	12.9	14.1
ND	100%	2/26/2012	57	-3.1	1.1	-5.7	69.5	0.0	2.9	12.0	295	973.1	16177966	31	3.02	3.02	3.34	3.17	3.33	3.42	3.47	3.34	3.37	3.4	3.33	1.5	29.6	17.600	12.6	13.9	14.7
ND	100%	2/27/2012	58	2.6	10.1	-5.6	68.9	2.0	0.9	8.8	229	970.5	10405534	21	2.80	3.27	3.61	3.63	3.79	3.89	4.01	3.87	3.86	3.7	3.84	1.5	27.7	19.600	12.6	12.9	13.9
ND	100%	2/28/2012	59	0.8	4.4	-1.9	67.9	0.0	3.0	9.8	290	974.3	16120512	31	3.32	3.30	3.62	3.32	3.51	3.57	3.71	3.55	3.62	3.6	3.53	1.5	25.5	19.600	12.6	12.8	13.7
ND	100%	2/29/2012	60	-0.8	0.3	-1.9	94.6	0.0	1.4	5.5	116	966.1	1376033	3	2.67	3.04	3.42	3.39	3.55	3.66	3.74	3.62	3.61	3.5	3.60	1.5	29.0	19.600	12.5	13.1	14.1
	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: 10.8%

Grand sum/avg	-0.06	2.15	3.83	4.18	3.93	4.13	4.20	1.6	256753977	-17527	-22.7	19.6	6.3	-25.4	0.0	0.0
																SumTerrevap2=AirVPD,mbar*WS,m/s*s

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
2/1/2012	32	8.92	0.71	3.91	4.28	3.95	4.13	4.17	1.5	6277802	412	-1.055	0.1	0.2	0.6	0.0
2/2/2012	33	0.16	0.64	3.88	4.24	3.95	4.14	4.20	2.0	1954571	-343	-2.637	0.0	0.0	-0.5	0.0
2/3/2012	34	-1.10	1.77	4.02	4.38	4.02	4.21	4.24	2.5	11957533	-886	-2.566	0.0	0.9	-1.3	0.0
2/4/2012	35	0.28	1.57	4.07	4.41	4.09	4.27	4.34	1.3	7770895	-405	-1.863	0.0	1.0	-0.6	0.0
2/5/2012	36	-2.60	2.34	4.13	4.44	4.14	4.33	4.38	1.7	11675732	-877	-2.285	0.0	1.4	-1.3	0.0
2/6/2012	37	1.26	2.74	4.15	4.45	4.17	4.36	4.41	1.2	12547289	-509	-2.144	0.0	1.2	-0.7	0.0
2/7/2012	38	1.37	2.57	4.02	4.37	4.08	4.30	4.34	1.9	4037820	-557	-2.601	0.0	1.0	-0.8	0.0
2/8/2012	39	-2.40	1.92	4.03	4.40	4.17	4.37	4.45	1.0	6035919	-460	-1.019	0.0	2.6	-0.7	0.0
2/9/2012	40	-1.71	1.82	3.98	4.38	4.17	4.37	4.45	1.3	14530910	-557	-1.758	0.8	0.7	-0.8	0.0
2/10/2012	41	-1.40	1.46	3.97	4.35	4.19	4.39	4.45	0.8	10859708	-415	-2.039	0.0	-1.4	-0.6	0.0
2/11/2012	42	-1.97	1.17	3.95	4.32	4.14	4.36	4.42	1.8	5711493	-570	-0.668	0.4	-0.2	-0.8	0.0
2/12/2012	43	-7.90	1.71	3.78	4.14	3.89	4.10	4.15	3.4	5923691	-1772	-2.601	0.0	0.0	-2.6	0.0
2/13/2012	44	-2.42	1.58	3.58	4.03	3.81	4.05	4.11	1.7	14015491	-847	-2.777	0.0	-1.5	-1.2	0.0
2/14/2012	45	0.29	1.35	3.74	4.13	4.00	4.19	4.28	0.6	6925369	-278	-0.844	0.0	-0.4	-0.4	0.0
2/15/2012	46	0.33	1.29	3.84	4.21	4.00	4.23	4.31	0.4	2803431	-33	-0.316	2.4	-2.6	0.0	0.0
2/16/2012	47	-0.69	1.26	3.89	4.28	4.05	4.27	4.34	0.3	1811851	-78	3.867	4.7	-0.6	-0.1	0.0
2/17/2012	48	2.40	1.87	3.99	4.34	4.04	4.29	4.34	1.8	10846617	-406	-1.582	0.3	-1.2	-0.6	0.0
2/18/2012	49	0.05	2.29	3.95	4.30	3.97	4.22	4.28	1.2	5612661	-454	-0.949	0.3	-0.5	-0.7	0.0
2/19/2012	50	-0.96	2.05	3.94	4.30	3.98	4.24	4.30	1.7	10898252	-608	-2.180	0.2	-1.4	-0.9	0.0
2/20/2012	51	-2.03	2.49	3.96	4.28	3.95	4.20	4.26	2.6	14999285	-1247	-2.144	0.0	-0.3	-1.8	0.0
2/21/2012	52	-1.28	2.69	3.99	4.26	3.95	4.18	4.25	0.5	10062663	-486	-1.793	0.0	-1.0	-0.7	0.0
2/22/2012	53	5.66	3.04	4.03	4.34	3.95	4.20	4.26	1.0	10923520	-181	-0.633	0.3	-0.6	-0.3	0.0
2/23/2012	54	3.93	3.75	4.15	4.43	4.03	4.27	4.33	1.5	13366454	-385	-1.195	0.1	-0.7	-0.6	0.0
2/24/2012	55	0.56	3.08	3.91	4.24	4.00	4.20	4.26	1.7	653110	-288	13.148	7.6	6.0	-0.4	0.0
2/25/2012	56	-0.05	3.37	3.58	3.94	3.68	3.86	3.91	4.2	10471864	-1909	-3.902	0.4	-1.5	-2.8	0.0
2/26/2012	57	-3.05	3.02	3.02	3.34	3.17	3.33	3.42	2.7	16177966	-1508	-4.183	0.0	-1.9	-2.2	0.0
2/27/2012	58	2.64	2.80	3.27	3.61	3.63	3.79	3.89	0.7	10405534	-349	-1.195	2.0	-2.6	-0.5	0.0
2/28/2012	59	0.80	3.32	3.30	3.62	3.32	3.51	3.57	2.8	16120512	-1192	-2.320	0.0	-0.5	-1.7	0.0
2/29/2012	60	-0.84	2.67	3.04	3.42	3.39	3.55	3.66	1.4	1376033	-341	9.562	0.0	10.1	-0.5	0.0
#N/A																
#N/A																

									1.000	<=SCALE ADJ (1.0=no adjustment)
									4.184	joule/calorie (= joule/degree for 1cm3)
Nominal diffuse %R from water=7%	#N/A	#N/A	9%		4	#N/A	#N/A		#N/A	#N/A
										slope
				4.184	<=CONVERT HEAT TO DEGREES				4.184	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)
5838	371	6209	-6.4%	0.23	4.02	4.00	(0.02)	(0.25)	0.01	(0.27)
1818	-308	1509	17.0%	0.07	4.00	4.04	0.03	(0.04)	-0.01	(0.03)
11121	-797	10323	7.2%	0.44	4.04	4.15	0.11	(0.33)	-0.03	(0.30)
7227	-364	6863	5.0%	0.29	4.15	4.24	0.09	(0.19)	-0.01	(0.18)
10858	-790	10069	7.3%	0.43	4.24	4.26	0.02	(0.41)	-0.03	(0.38)
11669	-458	11211	3.9%	0.46	4.26	4.34	0.08	(0.39)	-0.02	(0.37)
3755	-501	3254	13.4%	0.15	4.34	4.27	(0.07)	(0.22)	-0.02	(0.20)
5613	-414	5200	7.4%	0.22	4.27	4.28	0.02	(0.21)	-0.02	(0.19)
13514	-502	13012	3.7%	0.54	4.28	4.24	(0.04)	(0.58)	-0.02	(0.56)
10100	-373	9726	3.7%	0.40	4.24	4.20	(0.04)	(0.45)	-0.01	(0.43)
5312	-513	4799	9.7%	0.21	4.20	4.14	(0.06)	(0.28)	-0.02	(0.26)
5509	-1595	3914	29.0%	0.22	4.14	3.90	(0.24)	(0.46)	-0.06	(0.39)
13034	-762	12272	5.8%	0.52	3.90	4.03	0.13	(0.39)	-0.03	(0.36)
6441	-250	6191	3.9%	0.26	4.03	4.18	0.16	(0.10)	-0.01	(0.09)
2607	-29	2578	1.1%	0.10	4.18	4.16	(0.02)	(0.13)	0.00	(0.13)
1685	-70	1615	4.2%	0.07	4.16	4.17	0.01	(0.06)	0.00	(0.06)
10087	-365	9722	3.6%	0.40	4.17	4.13	(0.03)	(0.43)	-0.01	(0.42)
5220	-409	4811	7.8%	0.21	4.13	4.11	(0.02)	(0.23)	-0.02	(0.21)
10135	-547	9588	5.4%	0.40	4.11	4.16	0.05	(0.35)	-0.02	(0.33)
13949	-1122	12827	8.0%	0.56	4.16	4.17	0.00	(0.55)	-0.04	(0.51)
9358	-437	8921	4.7%	0.37	4.17	4.07	(0.09)	(0.47)	-0.02	(0.45)
10159	-163	9996	1.6%	0.40	4.07	4.17	0.10	(0.30)	-0.01	(0.30)
12431	-346	12085	2.8%	0.50	4.17	4.35	0.18	(0.32)	-0.01	(0.30)
607	-260	348	42.7%	0.02	4.35	3.95	(0.40)	(0.43)	-0.01	(0.42)
9739	-1718	8021	17.6%	0.39	3.95	3.41	(0.54)	(0.93)	-0.07	(0.86)
15046	-1357	13688	9.0%	0.60	3.41	3.59	0.18	(0.42)	-0.05	(0.36)
9677	-314	9363	3.2%	0.39	3.59	3.45	(0.14)	(0.53)	-0.01	(0.51)
14992	-1073	13919	7.2%	0.60	3.45	3.69	0.24	(0.35)	-0.04	(0.31)
1280	-307	973	24.0%	0.05	3.69	#N/A	#N/A	#N/A	-0.01	#N/A
	#N/A	#N/A		#N/A				#N/A	#N/A	
	#N/A	#N/A		#N/A				#N/A	#N/A	