Lake Lacawac, Bruce R. Hargreaves, Lehigh University (brh0@lehigh.edu, http://www.lehigh.edu/~brh0) 41^0 22.5'N 75^0 17.3'W elevation 428m
24 Marchl 2012: platform moved to lake center, 12-1:00pm 3Nov 2012: platform move to dock by 12N
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=> 11.89

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						
		46.2	71.6	23.0		1.17	4.3	38					50.3	49.9	49.5	48.7	48.3	48.1	47.8	47.5	47.5	49.0	47.6						
Month summary	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	Tw02.3m	Tw02.8m	H310_z (m)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
	9.1	7.9	22.0	-5.0	74.0	29.8	1.9	16.8	221.6	967.7	135264490	274	10.2	9.9	9.7	9.3	9.1	9.0	8.8	8.6	8.6	9.4	8.7	2.3	59.7	29.7	12.6	11.9	16.9

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%	4/1/2013	91	4.5	9.6	-1.0	83.5	0.5	2.5	12.0	272	954.2	3117859	6	4.28	4.47	4.44	4.26	4.25	4.20	4.39	4.28	4.25	4.6	4.28	2.3	60.9	0.400	12.7	12.2	13.5
ND	100%	4/2/2013	92	-1.8	1.1	-4.4	59.3	0.0	3.4	10.4	302	961.7	4544301	9	4.25	4.30	4.28	4.06	4.05	4.00	4.15	4.05	4.01	4.4	4.05	2.3	58.1	0.400	12.7	13.5	14.3
ND	100%	4/3/2013	93	-1.4	1.5	-3.5	57.1	0.0	3.8	11.1	310	967.5	4635581	9	4.15	4.18	4.14	3.94	3.93	3.88	4.03	3.94	3.88	4.2	3.93	2.3	53.7	0.400	12.6	13.2	14.1
ND	100%	4/4/2013	94	2.2	10.6	-5.0	55.5	0.0	1.7	8.0	284	970.5	5638513	11	4.62	4.29	4.22	3.98	4.00	3.97	4.11	4.01	4.00	4.3	4.04	2.3	49.9	0.400	12.6	12.5	13.7
ND	100%	4/5/2013	95	4.3	9.3	-0.8	54.0	0.0	2.7	10.0	300	960.2	5677401	11	4.55	4.77	4.77	4.63	4.59	4.53	4.61	4.50	4.48	4.9	4.47	2.2	47.2	0.400	12.6	12.1	13.3
ND	100%	4/6/2013	96	1.6	8.4	-2.7	53.3	0.0	2.4	9.8	256	969.5	6245550	12	5.38	5.27	5.12	4.82	4.80	4.77	4.82	4.71	4.74	5.1	4.76	2.2	43.5	0.400	12.7	12.5	13.6
ND	100%	4/7/2013	97	8.2	14.0	3.2	55.3	0.0	1.5	8.5	251	966.4	4239435	9	5.68	5.54	5.33	5.00	4.99	4.93	5.01	4.92	4.93	5.3	4.94	2.2	41.0	0.400	12.7	11.4	12.8
ND	100%	4/8/2013	98	12.6	20.3	3.6	67.8	0.0	1.1	5.6	237	964.8	5467115	11	7.49	6.73	6.48	5.97	5.91	5.84	5.82	5.71	5.76	6.2	5.77	2.2	39.1	0.400	12.7	10.8	12.9
ND	100%	4/9/2013	99	17.4	22.0	13.4	61.1	0.0	2.0	10.4	264	963.8	5827944	12	9.14	8.40	7.94	7.36	7.19	7.06	6.80	6.63	6.74	7.5	6.71	2.2	38.2	0.400	12.7	10.4	12.5
ND	100%	4/10/2013	100	15.3	19.8	10.9	90.8	0.0	1.2	14.7	187	961.5	3643505	8	11.39	10.67	10.17	8.48	8.01	7.78	7.48	7.27	7.27	8.5	7.29	2.2	40.8	0.400	12.7	10.8	18.8
ND	100%	4/11/2013	101	9.5	14.1	4.7	97.0	0.0	2.2	6.9	153	962.4	2059414	5	11.83	11.59	11.35	9.26	8.40	8.03	7.62	7.40	7.41	9.1	7.48	2.3	51.2	0.400	12.7	11.9	42.3
ND	100%	4/12/2013	102	2.9	3.8	2.0	104.9	0.0	2.8	8.4	108	958.5	713292	2	10.04	10.04	10.01	9.76	9.40	9.15	8.67	8.40	8.56	9.9	8.63	2.3	58.2	0.400	12.6	12.6	22.2
ND	100%	4/13/2013	103	5.7	8.9	2.9	85.5	0.0	1.6	6.9	268	959.5	3489996	7	9.78	9.70	9.57	9.38	8.93	8.75	8.52	8.29	8.32	9.4	8.40	2.3	64.3	0.400	12.6	12.5	18.0
ND	100%	4/14/2013	104	5.2	9.0	2.9	74.5	0.0	2.0	8.6	265	966.0	4304825	9	9.61	9.56	9.50	9.32	9.15	9.03	8.78	8.59	8.71	9.5	8.70	2.3	62.4	0.400	12.7	12.1	15.3
ND	100%	4/15/2013	105	8.3	15.1	2.6	67.3	0.0	1.1	6.1	167	972.6	4892474	10	10.10	9.62	9.50	9.23	9.11	9.03	8.89	8.70	8.77	9.4	8.78	2.3	59.9	0.400	12.7	11.5	15.1
ND	100%	4/16/2013	106	11.5	16.2	7.1	90.7	0.0	1.5	6.8	249	971.8	1481749	3	10.10	9.98	9.84	9.37	9.17	9.08	8.93	8.73	8.77	9.5	8.76	2.3	57.7	0.400	12.7	11.3	14.3
ND	100%	4/17/2013	107	11.1	16.2	6.7	74.8	0.1	2.0	7.8	152	972.0	6473719	13	11.59	11.23	11.04	10.75	10.43	10.25	9.90	9.76	9.83	10.8	9.83	2.3	58.6	0.500	12.7	12.2	15.9
ND	100%	4/18/2013	108	9.4	12.7	5.7	85.7	0.0	1.2	8.7	137	971.7	1507361	3	11.63	11.43	11.29	10.70	10.53	10.41	10.08	9.95	9.97	10.8	9.94	2.3	56.3	0.500	12.7	11.5	13.6
ND	100%	4/19/2013	109	15.4	20.4	9.3	101.2	21.3	1.6	16.8	249	958.8	1964815	4	11.89	11.48	11.35	10.88	10.66	10.53	10.23	10.08	10.06	11.0	10.04	2.3	58.2	21.800	12.7	12.7	18.1
ND	100%	4/20/2013	110	6.7	9.2	2.7	73.7	3.9	2.8	11.2	293	962.5	4648584	9	11.99	12.00	11.92	11.77	11.68	11.63	11.27	11.22	11.24	11.9	11.27	2.3	85.6	25.700	12.7	12.6	39.9
ND	100%	4/21/2013	111	2.9	9.1	-1.5	64.3	0.0	2.5	7.5	199	980.1	6928996	14	11.77	11.63	11.50	11.32	11.10	11.00	10.91	10.80	10.74	11.4	10.75	2.3	83.8	25.700	12.7	12.4	19.5
ND	100%	4/22/2013	112	5.7	10.5	0.3	59.2	0.0	1.9	9.0	131	981.9	6662963	13	11.95	11.70	11.62	11.39	11.26	11.16	10.94	10.86	10.86	11.5	10.92	2.3	81.2	25.700	12.7	11.9	16.3
ND	100%	4/23/2013	113	5.0	9.2	0.8	87.4	0.0	2.2	6.2	99	974.0	4518218	9	11.96	11.81	11.72	11.54	11.45	11.37	11.19	11.10	11.09	11.7	11.10	2.3	77.9	25.700	12.7	11.9	14.6
ND	100%	4/24/2013	114	12.9	20.9	4.3	82.2	0.0	1.0	6.4	220	962.7	5704730	12	12.77	12.27	12.10	11.68	11.49	11.36	11.16	11.07	11.05	11.8	11.09	2.3	75.8	25.700	12.7	11.3	15.7
ND	100%	4/25/2013	115	8.2	14.0	3.4	63.6	1.1	2.9	9.9	304	968.7	6821285	14	13.53	13.29	13.10	12.48	12.22	12.12	11.86	11.81	11.79	12.5	11.80	2.3	73.2	26.800	12.7	11.5	15.2
ND	100%	4/26/2013	116	8.3	13.0	3.9	62.2	0.0	1.9	7.2	280	976.3	6954256	14	13.94	13.73	13.60	13.04	12.69	12.52	12.13	12.09	12.06	13.0	12.12	2.3	69.0	26.800	12.7	11.4	13.7
ND	100%	4/27/2013	117	9.7	18.4	0.0	63.0	0.0	0.9	6.5	236	976.5	6848619	14	15.02	14.52	13.82	13.10	12.88	12.75	12.36	12.30	12.25	13.2	12.29	2.3	65.0	26.800	12.7	11.2	14.4
ND	100%	4/28/2013	118	12.8	19.4	4.5	61.8	0.0	0.9	7.0	219	972.3	5386401	11	15.35	14.76	14.36	13.41	13.13	12.94	12.53	12.44	12.32	13.5	12.42	2.3	61.4	26.800	12.7	10.8	13.3
ND	100%	4/29/2013	119	9.7	11.0	9.0	97.0	2.4	1.2	5.6	130	970.1	914261	2	14.46	14.49	14.32	13.65	13.35	13.14	12.61	12.57	12.38	13.8	12.45	2.3	59.2	29.200	12.7	11.3	13.1
ND	100%	4/30/2013	120	12.0	17.9	8.9	86.8	0.5	1.3	5.5	125	972.9	3951330	8	14.46	14.20	14.09	13.79	13.59	13.44	12.94	12.84	12.67	13.9	12.80	2.3	58.4	29.700	12.6	12.0	16.5
	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: 31.6%

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	SumTerrevap2=AirVPD,mbar*WS,m/s*s
Grand sum/avg		7.87	10.16	9.92	9.75	9.28	9.08	8.96	1.6	135264490	-33805	-3.9	29.8	24.6	-46.3	0.0	0.0
4/1/2013	91	4.50	4.28	4.47	4.44	4.26	4.25	4.20	2.2	3117859	-575	-1.115	0.5	-0.6	-0.8	0.0	
4/2/2013	92	-1.80	4.25	4.30	4.28	4.06	4.05	4.00	3.1	4544301	-2016	-4.152	0.0	-1.3	-2.7	0.0	
4/3/2013	93	-1.35	4.15	4.18	4.14	3.94	3.93	3.88	3.5	4635581	-2155	-4.488	0.0	-1.4	-2.9	0.0	
4/4/2013	94	2.17	4.62	4.29	4.22	3.98	4.00	3.97	1.4	5638513	-957	-2.600	0.0	-1.2	-1.3	0.0	
4/5/2013	95	4.35	4.55	4.77	4.77	4.63	4.59	4.53	2.5	5677401	-1236	-3.469	0.0	-1.7	-1.7	0.0	
4/6/2013	96	1.60	5.38	5.27	5.12	4.82	4.80	4.77	2.0	6245550	-1458	-3.018	0.0	-0.9	-2.0	0.0	
4/7/2013	97	8.21	5.68	5.54	5.33	5.00	4.99	4.93	0.9	4239435	-465	-2.492	0.0	-1.7	-0.6	0.0	
4/8/2013	98	12.62	7.49	6.73	6.48	5.97	5.91	5.84	0.7	5467115	-153	-1.089	0.0	-0.8	-0.2	0.0	
4/9/2013	99	17.36	9.14	8.40	7.94	7.36	7.19	7.06	1.7	5827944	13	-1.032	0.0	-0.9	0.0	0.0	
4/10/2013	100	15.27	11.39	10.67	10.17	8.48	8.01	7.78	0.9	3643505	305	12.294	0.0	12.0	0.4	0.0	
4/11/2013	101	9.50	11.83	11.59	11.35	9.26	8.40	8.03	2.0	2059414	-744	1.287	0.0	2.4	-1.0	0.0	
4/12/2013	102	2.90	10.04	10.04	10.01	9.76	9.40	9.15	2.7	713292	-1487	13.340	0.0	15.5	-2.0	0.0	
4/13/2013	103	5.75	9.78	9.70	9.57	9.38	8.93	8.75	1.3	3489996	-971	-0.863	0.0	0.6	-1.3	0.0	
4/14/2013	104	5.22	9.61	9.56	9.50	9.32	9.15	9.03	1.8	4304825	-1454	-2.443	0.0	-0.3	-2.0	0.0	
4/15/2013	105	8.33	10.10	9.62	9.50	9.23	9.11	9.03	0.5	4892474	-725	-2.313	0.0	-1.2	-1.0	0.0	
4/16/2013	106	11.49	10.10	9.98	9.84	9.37	9.17	9.08	0.9	1481749	86	-1.197	0.0	-1.2	0.1	0.0	
4/17/2013	107	11.15	11.59	11.23	11.04	10.75	10.43	10.25	1.7	6473719	-994	-0.053	0.1	1.3	-1.4	0.0	
4/18/2013	108	9.44	11.63	11.43	11.29	10.70	10.53	10.41	0.9	1507361	-583	-2.144	0.0	-1.2	-0.8	0.0	
4/19/2013	109	15.40	11.89	11.48	11.35	10.88	10.66	10.53	0.9	1964815	674	25.014	21.3	3.0	0.9	0.0	
4/20/2013	110	6.70	11.99	12.00	11.92	11.77	11.68	11.63	2.5	4648584	-2435	4.981	3.9	7.0	-3.3	0.0	
4/21/2013	111	2.92	11.77	11.63	11.50	11.32	11.10	11.00	2.1	6928996	-2714	-2.869	0.0	3.6	-3.7	0.0	
4/22/2013	112	5.70	11.95	11.70	11.62	11.39	11.26	11.16	1.7	6662963	-2193	-3.097	0.0	2.9	-3.0	0.0	
4/23/2013	113	4.99	11.96	11.81	11.72	11.54	11.45	11.37	2.0	4518218	-1693	-2.842	0.0	0.0	-2.3	0.0	
4/24/2013	114	12.88	12.77	12.27	12.10	11.68	11.49	11.36	0.6	5704730	-358	-1.228	0.0	-0.6	-0.5	0.0	
4/25/2013	115	8.19	13.53	13.29	13.10	12.48	12.22	12.12	2.5	6821285	-2730	-4.434	1.1	-1.7	-3.7	0.0	
4/26/2013	116	8.27	13.94	13.73	13.60	13.04	12.69	12.52	1.6	6954256	-2341	-4.190	0.0	-0.9	-3.2	0.0	
4/27/2013	117	9.72	15.02	14.52	13.82	13.10	12.88	12.75	0.7	6848619	-1665	-3.525	0.0	-1.1	-2.3	0.0	
4/28/2013	118	12.79	15.35	14.76	14.36	13.41	13.13	12.94	0.5	5386401	-1238	-4.130	0.0	-2.3	-1.7	0.0	
4/29/2013	119	9.74	14.46	14.49	14.32	13.65	13.35	13.14	0.8	914261	-817	0.281	2.4	-0.9	-1.1	0.0	
4/30/2013	120	11.98	14.46	14.20	14.09	13.79	13.59	13.44	1.1	3951330	-725	-2.340	0.5	-1.8	-1.0	0.0	
#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	29%		9	#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)
2900	-518	2382	17.8%	0.12	4.28	3.94	(0.34)	(0.46)	-0.02	(0.44)
4226	-1815	2411	42.9%	0.17	3.94	3.85	(0.09)	(0.26)	-0.07	(0.19)
4311	-1940	2371	45.0%	0.17	3.85	3.68	(0.16)	(0.33)	-0.08	(0.26)
5244	-861	4383	16.4%	0.21	3.68	4.13	0.44	0.23	-0.03	0.27
5280	-1113	4167	21.1%	0.21	4.13	4.25	0.12	(0.09)	-0.04	(0.04)
5808	-1312	4497	22.6%	0.23	4.25	4.90	0.64	0.41	-0.05	0.47
3943	-419	3524	10.6%	0.16	4.90	5.55	0.66	0.50	-0.02	0.52
5084	-137	4947	2.7%	0.20	5.55	6.22	0.67	0.46	-0.01	0.47
5420	12	5432	-0.2%	0.22	6.22	7.98	1.76	1.55	0.00	1.55
3388	274	3663	-8.1%	0.13	7.98	8.66	0.68	0.55	0.01	0.54
1915	-670	1245	35.0%	0.08	8.66	9.24	0.58	0.50	-0.03	0.53
663	-1338	-675	201.8%	0.03	9.24	9.28	0.04	0.01	-0.05	0.07
3246	-874	2372	26.9%	0.13	9.28	8.83	(0.45)	(0.58)	-0.03	(0.55)
4003	-1308	2695	32.7%	0.16	8.83	9.00	0.17	0.01	-0.05	0.06
4550	-653	3897	14.3%	0.18	9.00	9.44	0.45	0.27	-0.03	0.29
1378	78	1456	-5.6%	0.05	9.44	9.82	0.37	0.32	0.00	0.31
6021	-895	5126	14.9%	0.24	9.82	10.42	0.61	0.37	-0.04	0.41
1402	-525	877	37.4%	0.06	10.42	10.84	0.42	0.36	-0.02	0.38
1827	606	2434	-33.2%	0.07	10.84	11.60	0.76	0.69	0.02	0.66
4323	-2192	2131	50.7%	0.17	11.60	11.42	(0.18)	(0.35)	-0.09	(0.27)
6444	-2442	4002	37.9%	0.26	11.42	11.25	(0.16)	(0.42)	-0.10	(0.32)
6197	-1974	4223	31.9%	0.25	11.25	11.58	0.32	0.08	-0.08	0.16
4202	-1524	2678	36.3%	0.17	11.58	11.55	(0.03)	(0.20)	-0.06	(0.14)
5305	-322	4983	6.1%	0.21	11.55	12.00	0.45	0.24	-0.01	0.25
6344	-2457	3887	38.7%	0.25	12.00	12.56	0.56	0.31	-0.10	0.40
6467	-2107	4361	32.6%	0.26	12.56	12.74	0.18	(0.08)	-0.08	0.01
6369	-1498	4871	23.5%	0.25	12.74	13.65	0.91	0.66	-0.06	0.72
5009	-1114	3895	22.2%	0.20	13.65	13.03	(0.62)	(0.82)	-0.04	(0.77)
850	-735	115	86.5%	0.03	13.03	13.52	0.49	0.46	-0.03	0.48
3675	-652	3023	17.7%	0.15	13.52	#N/A	#N/A	#N/A	-0.03	#N/A
	#N/A	#N/A		#N/A				#N/A	#N/A	