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

18 Apr 2014, 10:40-11:40am EDT: platform moved to lake center 16Nov 2013: platform move to dock 11:45-13:00 EDT

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.

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)

	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					
	44.8	75.6	20.9		4.02	5.0	30				47.0	47.2	47.1	46.5	46.3	45.8	45.0	44.2	42.6	42.5	42.2					
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	Tw02.2m	Tw02.7m	H310_z (m)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
7.2	7.1	24.2	-6.2	64.6	102.0	2.2	13.5	224.9	964.8	503336513	1027	8.4	8.4	8.4	8.1	7.9	7.7	7.2	6.8	5.9	5.8	5.7	5.1	119.2	102.0	12.5	40.6	33.6

month (All)

PAR & PYR Integration period=15min instead of 60min after 11am on 9/11/2013

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%	4/1/2014	91	5.0	13.6	-2.6	61.5	0.0	0.9	4.4	215	965.7	18413393	36.8	2.37	4.48	4.44	4.23	4.33	4.31	4.39	4.59	4.25	4.2	4.29	2.2	106.7	0.000	12.7	39.1	27.5
ND	100%	4/2/2014	92	6.9	14.4	1.5	61.7	0.0	1.0	7.1	223	965.6	14472842	30.0	3.42	4.70	4.62	4.43	4.58	4.53	4.56	4.75	4.46	4.4	4.42	2.2	109.5	0.000	12.7	39.3	29.0
ND	100%	4/3/2014	93	6.0	11.9	1.2	49.6	1.2	1.2	5.5	210	967.1	19644970	39.5	3.40	4.77	4.77	4.56	4.73	4.63	4.67	4.87	4.51	4.5	4.55	2.2	107.1	1.200	12.6	40.1	26.3
ND	100%	4/4/2014	94	2.6	4.1	1.6	96.8	7.5	1.8	6.7	106	961.3	1921599	4.7	2.38	4.40	4.48	4.38	4.51	4.46	4.46	4.67	4.24	4.3	4.33	2.2	120.2	8.700	12.6	36.2	27.6
ND	100%	4/5/2014	95	2.5	4.4	-0.4	73.8	0.3	2.6	10.5	267	959.6	8041886	16.9	2.89	4.33	4.39	4.29	4.40	4.36	4.36	4.58	4.29	4.2	4.32	2.3	129.1	9.000	12.6	36.8	31.2
ND	100%	4/6/2014	96	3.1	12.2	-2.5	49.6	0.0	2.2	9.3	260	968.7	24477445	48.2	4.21	4.22	4.28	4.18	4.26	4.20	4.22	4.49	4.10	4.1	4.13	2.3	136.9	9.000	12.6	38.1	27.1
ND	100%	4/7/2014	97	2.9	7.3	-1.6	68.4	4.4	1.4	6.8	117	964.6	4946171	11.1	4.27	4.28	4.38	4.27	4.36	4.32	4.33	4.58	4.22	4.2	4.22	2.3	137.4	13.400	12.7	34.6	25.1
ND	100%	4/8/2014	98	7.7	13.0	4.8	77.5	1.4	2.5	11.9	234	948.4	10398526	21.8	4.35	4.28	4.38	4.28	4.32	4.28	4.30	4.50	4.18	4.2	4.15	2.3	151.4	14.800	12.6	40.6	33.8
ND	100%	4/9/2014	99	5.0	8.5	0.4	63.6	0.0	2.9	10.4	306	957.1	22748151	45.3	4.99	4.98	5.06	4.97	4.98	4.91	4.94	5.05	4.81	4.9	4.73	2.3	154.6	14.800	12.6	40.5	30.5
ND	100%	4/10/2014	100	7.8	16.1	-2.3	48.7	0.0	1.5	7.4	254	965.7	24653906	49.6	6.24	5.56	5.43	5.26	5.26	5.20	5.24	5.33	5.07	5.1	4.99	2.3	151.6	14.800	12.7	38.0	28.7
ND	100%	4/11/2014	101	11.3	16.4	6.4	68.2	6.2	1.2	6.7	241	964.0	7008619	15.3	6.65	6.36	6.34	6.13	6.11	6.02	6.03	6.05	5.87	5.9	5.69	2.3	149.3	21.000	12.6	42.5	34.3
ND	100%	4/12/2014	102	10.3	18.3	3.6	66.3	0.1	1.1	6.8	247	969.3	24527235	49.3	8.23	7.66	7.50	6.87	6.59	6.39	6.41	6.42	6.19	6.5	6.08	2.3	149.8	21.100	12.6	42.7	35.4
ND	100%	4/13/2014	103	17.5	24.2	8.6	50.9	0.0	1.7	7.6	260	966.0	20459211	42.5	9.53	8.66	8.36	7.58	7.24	7.02	7.07	7.02	6.80	7.3	6.63	2.3	146.3	21.100	12.6	42.4	35.2
ND	100%	4/14/2014	104	18.4	21.4	14.4	62.5	0.0	2.1	12.3	256	960.8	16468431	34.5	11.01	10.51	10.22	9.15	8.66	8.30	8.39	8.19	8.03	8.7	7.79	2.3	143.2	21.100	12.6	43.9	37.0
ND	100%	4/15/2014	105	9.5	16.9	-2.8	92.3	26.0	2.6	12.1	273	954.6	2627503	6.5	11.60	11.40	11.38	10.89	10.60	10.29	10.29	9.99	10.02	10.5	9.73	2.3	152.4	47.100	12.6	44.1	46.1
ND	100%	4/16/2014	106	-2.0	2.6	-6.2	60.1	0.2	3.8	11.0	292	973.5	25828673	50.3	9.90	9.81	9.86	9.75	9.70	9.63	9.64	9.70	9.51	9.5	9.34	2.3	166.5	47.300	12.5	38.0	41.4
ND	100%	4/17/2014	107	2.2	9.0	-3.7	54.4	0.0	1.4	8.1	143	983.0	26208909	51.5	9.83	9.38	9.36	9.25	9.21	9.11	9.12	9.20	8.99	9.0	8.86	2.3	137.8	47.300	12.6	38.5	32.9
ND	100%	4/18/2014	108	3.3	9.0	-1.5	67.3	0.0	0.8	4.6	172	976.7	16239832	33.0	9.79	9.50	9.52	9.37	9.33	9.23	9.20	9.28	9.13	9.1	8.98	2.3	127.4	47.300	12.6	38.8	31.7
ND	100%	4/19/2014	109	7.8	12.7	3.0	50.6	0.0	2.7	9.5	224	973.3	25854979	51.7	9.91	9.83	9.89	9.81	9.69	9.26	7.98	7.61	7.19	7.1	6.89	7.1	121.4	47.300	12.6	41.0	34.0
ND	100%	4/20/2014	110	7.5	14.9	-0.2	50.5	0.0	1.6	6.2	210	976.6	26888474	54.7	10.86	10.70	10.59	10.01	9.74	8.98	7.11	6.16	5.48	5.2	5.07	11.2	117.0	47.300	12.6	41.4	32.8
ND	100%	4/21/2014	111	11.2	21.1	-0.2	36.7	0.0	1.5	7.3	229	966.6	26228392	53.8	12.14	11.56	11.31	10.40	9.80	8.96	7.19	6.20	5.47	5.2	5.09	11.2	113.4	47.300	12.6	40.9	32.4
ND	100%	4/22/2014	112	13.3	19.1	9.9	54.7	6.4	1.6	6.8	258	953.0	8910547	19.7	12.65	12.50	12.19	10.63	9.82	8.94	7.20	6.30	5.47	5.2	5.09	11.2	110.6	53.700	12.6	42.9	36.4
ND	100%	4/23/2014	113	4.8	10.0	1.6	79.1	0.6	4.6	12.6	313	954.2	12573809	26.6	11.65	11.57	11.62	11.05	10.41	9.12	7.43	6.45	5.49	5.2	5.12	11.2	113.9	54.300	12.6	43.2	42.6
ND	100%	4/24/2014	114	5.2	10.3	0.4	40.6	0.0	4.5	13.5	327	962.6	28377397	56.3	10.33	10.26	10.34	10.30	10.26	10.06	8.61	7.00	5.50	5.2	5.11	11.2	107.5	54.300	12.5	40.3	34.9
ND	100%	4/25/2014	115	7.7	15.9	-0.7	47.9	2.4	2.1	9.1	201	961.3	21529574	44.5	10.66	10.56	10.59	10.36	10.05	9.87	9.28	7.57	5.52	5.3	5.12	11.2	98.8	56.700	12.6	41.0	34.7
ND	100%	4/26/2014	116	8.6	13.9	5.0	72.9	2.2	2.6	8.5	277	956.6	18438955	38.0	11.44	11.26	11.28	11.01	10.42	9.91	9.29	7.73	5.54	5.3	5.13	11.2	81.6	58.900	12.6	43.2	36.9
ND	100%	4/27/2014	117	6.1	8.7	3.8	64.2	0.0	3.6	9.4	290	964.6	14270878	29.6	11.03	10.95	11.02	10.94	10.73	10.39	9.33	7.79	5.67	5.3	5.15	11.2	66.5	58.900	12.6	42.2	36.6
ND	100%	4/28/2014	118	8.4	14.9	-0.1	56.4	0.0	1.5	6.0	164	966.6	25301122	51.1	11.73	11.36	11.08	10.75	10.58	10.35	9.68	7.94	5.65	5.3	5.16	11.1	57.3	58.900	12.6	41.4	34.4
ND	100%	4/29/2014	119	5.9	11.2	3.3	79.3	6.2	4.0	11.3	142	971.5	2973468	7.3	11.31	11.20	11.24	10.97	10.77	10.45	9.79	8.08	5.71	5.3	5.18	11.1	53.6	65.100	12.5	42.5	37.7
ND	100%	4/30/2014	120	5.1	8.9	2.4	96.5	36.9	3.5	9.3	129	970.0	2901502	7.2	10.19	10.11	10.20	10.18	10.15	10.08	9.70	8.91	5.69	5.3	5.18	11.2	76.2	102.000	12.5	40.9	41.9
#N/A	100%	5/1/2014	121	8.9	8.9	8.9	98.7	0.0	3.0	4.4	131	961.6	113	0.0	9.97	9.87	9.97	9.92	9.91	9.85	9.64	9.16	5.73	5.3	5.19	11.2	100.7	102.000	12.6	42.8	46.5

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: 41%

1.000 <=SCALE ADJ (1.0=no adjustment)

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

Grand sum/avg	7.10	8.35	8.42	8.38	8.06	7.91	7.65	2.0	503336513	-42138	-3.2	102.0	108.5	-57.7	0.0	0.0	Nominal diffuse %R from water=7%	-37911.8	430190.8	12%		8	7.8	5.6		-1.5	-11.6

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

4.184 <=CONVERT HEAT TO DEGREES 4.184 slope

7% 0.9 6000000 cm3/m2 (for 0-4m integrated depth) 6000000 intercept r2

Data

DATE	DOY	AvgTair C	AvgTw 0.1m	AvgTw0.5 m	Avg Tw1m	Avg Tw2m	Avg Tw3m	Avg Tw4m	AvgWS m/s	CSI	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	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)
4/1/2014	91	5.11	2.33	4.48	4.43	4.22	4.33	4.31	0.7		18413031	-223	7.402	0.0	8.4	-0.3	0.0	17124	-201	16923	1.2%	0.68	4.22	4.50	0.28	(0.40)	-0.01	(0.39)
4/2/2014	92	6.93	3.41	4.70	4.62	4.43	4.58	4.53	0.8		14473048	-254	-6.158	0.0	-5.0	-0.3	0.0	13460	-228	13232	1.7%	0.54	4.50	4.60	0.09	(0.44)	-0.01	(0.43)
4/3/2014	93	5.92	3.39	4.77	4.77	4.56	4.72	4.63	1.0		19645003	-528	11.165	0.8	11.9	-0.7	0.0	18270	-475	17795	2.6%	0.73	4.60	4.68	0.08	(0.65)	-0.02	(0.63)
4/4/2014	94	2.64	2.45	4.41	4.49	4.39	4.52	4.47	1.6		1921554	-31	8.287	7.9	1.3	0.0	0.0	1787	-28	1759	1.6%	0.07	4.68	4.33	(0.35)	(0.42)	0.00	(0.42)
4/5/2014	95	2.54	2.82	4.34	4.39	4.29	4.40	4.37	2.3		8040626	-799	13.905	0.3	16.2	-1.1	0.0	7478	-719	6759	9.6%	0.30	4.33	4.30	(0.03)	(0.33)	-0.03	(0.30)
4/6/2014	96	3.08	4.20	4.21	4.27	4.17	4.26	4.19	2.0		24477551	-1208	-1.416	0.0	3.6	-1.6	0.0	22764	-1087	21677	4.8%	0.91	4.30	4.61	0.31	(0.59)	-0.04	(0.55)
4/7/2014	97	2.86	4.29	4.31	4.40	4.29	4.38	4.34	1.2		4946990	-508	5.556	4.1	5.7	-0.7	0.0	4601	-457	4143	9.9%	0.18	4.61	4.01	(0.61)	(0.79)	-0.02	(0.77)
4/8/2014	98	7.61	4.33	4.27	4.37	4.26	4.31	4.27	2.2		10397965	-293	13.587	1.7	15.2	-0.4	0.0	9670	-264	9406	2.7%	0.39	4.01	4.42	0.41	0.03	-0.01	0.04
4/9/2014	99	5.16	4.98	4.96	5.05	4.96	4.97	4.90	2.8		22749291	-1249	-2.733	0.0	1.8	-1.7	0.0	21157	-1124	20033	5.3%	0.84	4.42	4.88	0.46	(0.38)	-0.04	(0.34)
4/10/2014	100	7.49	6.19	5.52	5.39	5.22	5.22	5.16	1.1		24652924	-900	-2.118	0.0	1.9	-1.2	0.0	22927	-810	22117	3.5%	0.91	4.88	5.93	1.05	0.14	-0.03	0.17
4/11/2014	101	11.49	6.64	6.35	6.33	6.11	6.09	6.01	1.1		7009799	-137	1.017	6.2	-2.1	-0.2	0.0	6519	-124	6396	1.9%	0.26	5.93	6.41	0.48	0.22	0.00	0.23
4/12/2014	102	10.16	8.17	7.59	7.45	6.85	6.59	6.40	1.0		24527721	-548	-3.720	0.1	-0.2	-0.8	0.0	22811	-493	22317	2.2%	0.91	6.41	6.84	0.43	(0.48)	-0.02	(0.46)
4/13/2014	103	17.26	9.49	8.62	8.32	7.53	7.21	7.00	1.2		20457760	-243	-2.896	0.0	0.4	-0.3	0.0	19026	-219	18807	1.2%	0.76	6.84	8.10	1.26	0.50	-0.01	0.51
4/14/2014	104	18.42	10.97	10.47	10.17	9.09	8.59	8.21	1.5		16469056	-23	-6.039	0.0	1.3	0.0	0.0	15316	-21	15295	0.1%	0.61	8.10	10.07	1.97	1.36	0.00	1.36
4/15/2014	105	10.12	11.63	11.42	11.40	10.87	10.57	10.25	1.9		2628023	-1059	33.367	26.0	14.6	-1.5	0.0	2444	-953	1491	39.0%	0.10	10.07	10.61	0.54	0.44	-0.04	0.48
4/16/2014	106	-2.06	9.93	9.84	9.89	9.79	9.74	9.66	3.6		25827203	-3731	-22.794	0.2	2.2	-5.1	0.0	24019	-3358	20662	14.0%	0.96	10.61	9.55	(1.06)	(2.02)	-0.13	(1.89)
4/17/2014	107	2.22	9.83	9.37	9.36	9.25	9.21	9.12	1.1		26209824	-1792	-18.666	0.0	-3.4	-2.5	0.0	24375	-1613	22763	6.6%	0.97	9.55	9.52	(0.03)	(1.00)	-0.06	(0.93)
4/18/2014	108	3.21	9.79	9.50	9.51	9.37	9.33	9.23	0.5		16239314	-1122	-6.404	0.0	1.5	-1.5	0.0	15103	-1009	14093	6.7%	0.60	9.52	9.54	0.02	(0.59)	-0.04	(0.55)
4/19/2014	109	7.71	9.89	9.81	9.87	9.79	9.69	9.28	2.4		25855857	-2357	-5.292	0.0	3.2	-3.2	0.0	24046	-2122	21924	8.8%	0.96	9.54	9.02	(0.52)	(1.48)	-0.08	(1.40)
4/20/2014	110	7.53	10.82	10.66	10.57	10.01	9.73	8.97	1.3		26888234	-1668	-3.767	0.0	3.0	-2.3	0.0	25006	-1502	23505	6.0%	1.00	9.02	9.27	0.25	(0.74)	-0.06	(0.68)
4/21/2014	111	10.93	12.11	11.53	11.27	10.39	9.79	8.97	1.3		26228453	-1987	-4.199	0.0	2.5	-2.7	0.0	24392	-1789	22604	7.3%	0.97	9.27	9.56	0.29	(0.68)	-0.07	(0.61)
4/22/2014	112	13.36	12.65	12.50	12.18	10.64	9.82	8.94	1.5		8910353	-1133	3.723	5.3	3.6	-1.6	0.0	8287	-1020	7267	12.3%	0.33	9.56	9.55	(0.01)	(0.34)	-0.04	(0.30)
4/23/2014	113	5.02	11.72	11.64	11.67	11.04	10.38	9.10	4.2		12572244	-3363	-3.815	1.7	3.2	-4.6	0.0	11692	-3027	8665	25.9%	0.47	9.55	9.67	0.12	(0.35)	-0.12	(0.23)
4/24/2014	114	5.07	10.34	10.26	10.34	10.31	10.27	10.04	4.2		28377667	-4526	-7.225	0.0	2.4	-6.2	0.0	26391	-4073	22318	15.4%	1.05	9.67	9.86	0.19	(0.86)	-0.16	(0.69)
4/25/2014	115	7.68	10.64	10.54	10.57	10.35	10.06	9.88	1.9		21530872	-2108	-13.278	1.3	1.2	-2.9	0.0	20024	-1897	18127	9.5%	0.80	9.86	10.01	0.15	(0.65)	-0.08	(0.57)
4/26/2014	116	8.57	11.42	11.25	11.26	10.99	10.41	9.92	2.3		18438320	-1642	-17.267	3.3	-2.2	-2.3	0.0	17148	-1478	15669	8.6%	0.68	10.01	10.38	0.37	(0.31)	-0.06	(0.25)
4/27/2014	117	6.08	11.05	10.97	11.04	10.95	10.72	10.38	3.4		14270249	-2887	-12.053	0.0	2.2	-4.0	0.0	13271	-2599	10673	19.6%	0.53	10.38	10.28	(0.10)	(0.63)	-0.10	(0.52)
4/28/2014	118	8.17	11.68	11.33	11.06	10.75	10.58	10.34	1.3		25303057	-1563	-7.100	0.0	2.6	-2.1	0.0	23532	-1407	22125	6.0%	0.94	10.28	10.41	0.12	(0.81)	-0.06	(0.76)
4/29/2014	119	6.12	11.38	11.25	11.26	10.98	10.77	10.45	3.7		2972829	-2617	1.786	6.2	1.1	-3.6	0.0	2765	-2355	409	85.2%	0.11	10.41	10.27	(0.14)	(0.25)	-0.09	(0.15)
4/30/2014	120	4.90	10.21	10.13	10.22	10.20	10.18	10.11	3.3		2901384	-1623	43.989	36.9	10.2	-2.2	0.0	2698	-1461	1238	54.1%	0.11	10.27	9.79	(0.48)	(0.59)	-0.06	(0.53)
5/1/2014	121	8.89	9.97	9.88	9.98	9.94	9.92	9.86	2.5		312	-14	0.000	0.0	0.0	0.0	0.0											