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

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

5280 ft/mile

rain sum (in.) Aug-Sep2011=> 12.07 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)

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).

	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						
	25.6	44.1	1.5		1.35	4.5	29				32.1	37.7	37.8	37.6	37.6	37.7	38.2	38.0	38.3	38.2	38.2						
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	Tw02.3m	Tw02.8m	H310_z (m)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
3.3	-3.5	6.7	-16.9	84.5	34.4	2.0	12.9	234.5	961.5	54391762	107	0.1	3.2	3.2	3.1	3.1	3.2	3.5	3.3	3.5	3.4	3.4	2.3	52.0	34.4	12.6	13.9	15.2

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%	2/1/2013	32	-7.0	-5.6	-8.5	76.5	0.0	3.4	11.8	292	957.1	2137695	4	0.22	2.92	2.94	2.80	2.83	2.84	3.14	3.00	3.17	3.1	3.18	2.3	92.0	0.000	12.8	14.6	16.0
ND	100%	2/2/2013	33	-9.6	-7.8	-12.3	80.4	0.0	1.6	8.7	264	965.5	1751718	3	-0.07	3.07	3.05	2.91	2.94	2.97	3.29	3.14	3.33	3.2	3.27	2.3	89.5	0.000	12.7	15.1	16.5
ND	100%	2/3/2013	34	-8.2	-5.1	-11.0	96.4	1.8	0.4	3.4	104	957.4	1141081	3	-0.08	3.12	3.10	2.96	2.98	3.04	3.38	3.20	3.39	3.3	3.35	2.3	86.9	1.800	12.7	16.9	15.9
ND	100%	2/4/2013	35	-7.3	-5.3	-9.6	72.3	0.0	2.7	9.0	290	957.8	1918549	4	-0.07	3.11	3.10	2.95	2.98	3.00	3.31	3.17	3.34	3.3	3.24	2.3	82.5	1.800	12.7	14.7	16.0
ND	100%	2/5/2013	36	-5.5	-2.9	-7.4	95.4	0.3	0.7	3.4	123	958.3	979704	2	0.01	3.11	3.09	2.95	2.97	3.01	3.38	3.21	3.38	3.3	3.31	2.3	77.8	2.100	12.7	14.1	15.2
ND	100%	2/6/2013	37	-3.9	-1.0	-9.9	84.0	0.4	1.9	8.4	283	964.1	2156977	4	-0.07	3.09	3.10	2.95	2.98	3.02	3.35	3.20	3.35	3.3	3.29	2.3	73.5	2.500	12.7	14.0	15.3
ND	100%	2/7/2013	38	-7.9	-2.6	-13.6	77.7	0.0	0.8	4.1	148	974.2	1659993	3	-0.17	3.10	3.11	2.97	3.00	3.06	3.40	3.23	3.39	3.3	3.24	2.3	67.8	2.500	12.7	15.0	16.4
ND	100%	2/8/2013	39	-3.4	-1.9	-5.2	98.0	0.0	2.3	8.1	123	962.3	602117	1	-0.07	3.08	3.12	2.98	3.01	3.05	3.37	3.22	3.40	3.3	3.25	2.3	63.7	2.500	12.7	13.7	14.9
ND	100%	2/9/2013	40	-6.8	-3.0	-10.4	88.3	0.0	4.2	12.9	322	963.9	3194340	6	0.03	2.99	3.13	2.99	3.02	3.03	3.31	3.13	3.30	3.3	3.23	2.3	67.7	2.500	12.6	14.3	15.7
ND	100%	2/10/2013	41	-6.6	4.3	-16.9	71.0	4.8	0.7	4.6	186	973.5	3384221	6	0.08	2.96	3.13	3.00	3.02	3.05	3.39	3.25	3.36	3.3	3.27	2.3	62.6	7.300	12.7	14.8	16.9
ND	100%	2/11/2013	42	1.3	5.6	-1.9	90.8	1.4	1.2	8.0	246	960.5	1262977	3	0.07	2.87	3.12	3.01	3.03	3.06	3.38	3.27	3.36	3.3	3.30	2.3	58.5	8.700	12.7	12.7	14.4
ND	100%	2/12/2013	43	1.1	2.9	-0.4	78.1	0.0	2.7	9.2	297	957.6	1119776	2	0.12	2.85	3.13	3.02	3.04	3.06	3.35	3.23	3.36	3.3	3.34	2.3	54.5	8.700	12.7	12.8	14.3
ND	100%	2/13/2013	44	-0.2	4.7	-6.0	81.1	0.0	0.8	6.0	207	956.8	2884079	6	0.12	2.88	3.14	3.03	3.06	3.09	3.45	3.31	3.46	3.3	3.41	2.3	49.7	8.700	12.7	13.1	14.6
ND	100%	2/14/2013	45	-0.2	4.7	-4.0	87.9	1.7	0.9	4.6	271	958.2	3253824	7	0.10	2.94	3.15	3.05	3.07	3.09	3.46	3.30	3.44	3.4	3.37	2.2	46.9	10.400	12.7	13.6	14.8
ND	100%	2/15/2013	46	3.1	6.7	0.1	74.5	0.0	1.7	8.3	271	961.0	3133166	6	0.07	3.01	3.17	3.07	3.10	3.10	3.44	3.34	3.50	3.4	3.44	2.2	42.9	10.400	12.8	12.4	13.9
ND	100%	2/16/2013	47	-3.4	-0.1	-5.5	86.9	1.5	2.1	7.3	272	960.3	1516426	2	0.03	3.15	3.20	3.10	3.11	3.13	3.48	3.36	3.56	3.4	3.49	2.2	41.9	11.900	12.8	13.6	14.7
ND	100%	2/17/2013	48	-8.2	-5.9	-11.8	61.8	0.0	4.7	12.9	330	955.7	3026934	6	0.19	3.20	3.24	3.13	3.15	3.14	3.40	3.27	3.45	3.4	3.43	2.2	40.5	11.900	12.7	14.7	16.1
ND	100%	2/18/2013	49	-8.4	-1.9	-12.7	66.5	0.0	3.0	10.5	288	966.5	3793093	7	0.24	3.29	3.28	3.18	3.20	3.21	3.46	3.35	3.54	3.5	3.53	2.2	40.6	11.900	12.6	14.8	16.3
ND	100%	2/19/2013	50	-0.6	1.4	-4.2	80.9	2.5	1.1	7.4	233	959.0	886518	2	0.18	3.35	3.34	3.21	3.23	3.26	3.54	3.41	3.54	3.5	3.59	2.2	38.0	14.400	12.6	13.2	14.7
ND	100%	2/20/2013	51	-5.2	-0.6	-7.6	71.0	0.0	3.7	10.0	297	956.7	2054242	4	0.23	3.36	3.37	3.23	3.25	3.24	3.48	3.37	3.54	3.5	3.54	2.2	36.6	14.400	12.6	14.1	15.5
ND	100%	2/21/2013	52	-7.3	-5.1	-9.1	76.7	0.0	4.2	11.4	319	964.4	2584540	5	0.25	3.37	3.37	3.25	3.27	3.26	3.48	3.39	3.52	3.5	3.53	2.2	33.0	14.400	12.7	14.5	15.7
ND	100%	2/22/2013	53	-5.3	0.4	-11.3	85.7	0.0	1.0	5.0	180	972.3	2348569	5	0.11	3.37	3.36	3.27	3.29	3.31	3.61	3.50	3.62	3.6	3.58	2.2	29.7	14.400	12.7	14.2	15.6
ND	100%	2/23/2013	54	0.5	3.2	-2.0	103.4	1.7	1.0	4.3	97	964.4	843333	2	0.04	3.37	3.36	3.28	3.30	3.32	3.60	3.53	3.61	3.6	3.60	2.2	27.8	16.100	12.7	12.8	14.1
ND	100%	2/24/2013	55	-0.2	1.5	-2.5	96.2	0.2	2.2	9.0	255	958.0	1128522	2	0.14	3.39	3.41	3.27	3.32	3.34	3.61	3.55	3.66	3.6	3.65	2.2	27.1	16.300	12.7	13.0	14.3
ND	100%	2/25/2013	56	-1.0	1.3	-3.0	89.6	0.0	2.1	6.7	312	966.6	1169633	2	0.11	3.47	3.46	3.29	3.33	3.37	3.67	3.54	3.65	3.7	3.67	2.2	24.8	16.300	12.7	13.2	14.5
ND	100%	2/26/2013	57	-1.8	3.1	-7.1	94.4	0.0	1.7	10.0	129	968.3	1897837	4	0.17	3.52	3.51	3.35	3.39	3.42	3.69	3.63	3.73	3.7	3.76	2.2	23.0	16.300	12.6	13.5	14.9
ND	100%	2/27/2013	58	1.4	3.6	-2.1	103.1	16.3	2.9	10.9	170	951.7	829863	2	0.17	3.57	3.56	3.43	3.45	3.46	3.68	3.61	3.71	3.7	3.74	2.2	34.7	32.600	12.7	12.8	14.1
ND	100%	2/28/2013	59	1.2	3.0	-0.7	98.3	1.8	0.9	5.5	259	950.0	1732035	3	0.14	3.62	3.61	3.46	3.49	3.51	3.78	3.70	3.79	3.8	3.86	2.2	40.7	34.400	12.6	12.9	14.3
	0%																														
	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: #DIV/0!

																														1.000	<=SCALE ADJ (1.0=no adjustment)
																														4.184	joule/calorie (= joule/degree for 1cm3)
Grand sum/avg			-3.44	0.09	3.20	3.25	3.12	3.15	3.17	1.8	54391912	-16197	-50.7	34.4	-50.0	-22.0	0.0	0.0												#N/A	-0.7
																	SumTerrevap2=AirVPD,mbar*WS,m/s*s														slope
																			Nominal diffuse %R from water=7%	#N/A	#N/A	27%		3	3.2	0.7					intercept
																							4.184	<=CONVERT HEAT TO DEGREES					4.184		
																			7%	0.9			6000000	cm3/m2 (for 0-4m integrated depth)					6000000		r2

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	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)
2/1/2013	32	-6.96	0.22	2.92	2.94	2.80	2.83	2.84	3.0	2137695	-1269	-0.323	0.0	3.4	-1.7	0.0	1988	-1142	846	57.4%	0.08	2.79	2.93	0.14	0.06	-0.05	0.10
2/2/2013	33	-9.55	-0.07	3.07	3.05	2.91	2.94	2.97	1.4	1751718	-827	-2.335	0.0	1.1	-1.1	0.0	1629	-745	885	45.7%	0.06	2.93	3.01	0.08	0.01	-0.03	0.04
2/3/2013	34	-8.21	-0.08	3.12	3.10	2.96	2.98	3.04	0.4	1141081	-431	-4.393	1.8	-3.1	-0.6	0.0	1061	-388	673	36.6%	0.04	3.01	3.02	0.02	(0.03)	-0.02	(0.01)
2/4/2013	35	-7.28	-0.07	3.11	3.10	2.95	2.98	3.00	2.4	1918549	-1113	-4.968	0.0	-0.6	-1.5	0.0	1784	-1001	783	56.1%	0.07	3.02	3.01	(0.01)	(0.08)	-0.04	(0.04)
2/5/2013	36	-5.51	0.01	3.11	3.09	2.95	2.97	3.01	0.6	979704	-314	-3.462	0.3	-2.6	-0.4	0.0	911	-283	628	31.0%	0.04	3.01	3.02	0.01	(0.03)	-0.01	(0.02)
2/6/2013	37	-3.91	-0.07	3.09	3.10	2.95	2.98	3.02	1.7	2156977	-574	-5.632	0.4	-5.1	-0.8	0.0	2006	-517	1489	25.8%	0.08	3.02	3.02	(0.00)	(0.08)	-0.02	(0.06)
2/7/2013	38	-7.89	-0.17	3.10	3.11	2.97	3.00	3.06	0.7	1659993	-557	-5.572	0.0	-4.7	-0.8	0.0	1544	-501	1042	32.5%	0.06	3.02	3.03	0.01	(0.05)	-0.02	(0.03)
2/8/2013	39	-3.36	-0.07	3.08	3.12	2.98	3.01	3.05	2.2	602117	-347	2.057	0.0	2.6	-0.5	0.0	560	-312	248	55.7%	0.02	3.03	3.03	(0.01)	(0.03)	-0.01	(0.02)
2/9/2013	40	-6.82	0.03	2.99	3.13	2.99	3.02	3.03	3.9	3194340	-1373	-1.812	0.0	0.2	-1.9	0.0	2971	-1236	1735	41.6%	0.12	3.03	3.04	0.01	(0.11)	-0.05	(0.06)
2/10/2013	41	-6.63	0.08	2.96	3.13	3.00	3.02	3.05	0.6	3384221	-535	-5.271	4.8	-9.2	-0.7	0.0	3147	-481	2666	15.3%	0.13	3.04	3.04	0.00	(0.12)	-0.02	(0.10)
2/11/2013	42	1.31	0.07	2.87	3.12	3.01	3.03	3.06	0.8	1262977	15	-3.177	1.4	-4.5	0.0	0.0	1175	14	1188	-1.2%	0.05	3.04	3.04	0.00	(0.04)	0.00	(0.04)
2/12/2013	43	1.08	0.12	2.85	3.13	3.02	3.04	3.06	2.4	1119776	-304	-5.009	0.0	-4.5	-0.4	0.0	1041	-273	768	26.2%	0.04	3.04	3.05	0.01	(0.03)	-0.01	(0.02)
2/13/2013	44	-0.24	0.12	2.88	3.14	3.03	3.06	3.09	0.6	2884079	-178	-2.759	0.0	-2.4	-0.2	0.0	2682	-160	2522	6.0%	0.11	3.05	3.08	0.02	(0.08)	-0.01	(0.08)
2/14/2013	45	-0.22	0.10	2.94	3.15	3.05	3.07	3.09	0.8	3253824	-127	-4.215	1.7	-5.6	-0.2	0.0	3026	-114	2912	3.8%	0.12	3.08	3.08	(0.00)	(0.12)	0.00	(0.12)
2/15/2013	46	3.10	0.07	3.01	3.17	3.07	3.10	3.10	1.4	3133166	-82	-3.294	0.0	-3.1	-0.1	0.0	2914	-74	2840	2.5%	0.12	3.08	3.12	0.04	(0.07)	0.00	(0.07)
2/16/2013	47	-3.39	0.03	3.15	3.20	3.10	3.11	3.13	2.0	1516426	-530	-1.447	1.5	-2.1	-0.7	0.0	1410	-477	933	33.8%	0.06	3.12	3.13	0.01	(0.05)	-0.02	(0.03)
2/17/2013	48	-8.20	0.19	3.20	3.24	3.13	3.15	3.14	4.4	3026934	-2158	2.244	0.0	5.3	-2.9	0.0	2815	-1942	873	69.0%	0.11	3.13	3.16	0.03	(0.08)	-0.08	(0.00)
2/18/2013	49	-8.42	0.24	3.29	3.28	3.18	3.20	3.21	2.7	3793093	-1496	-3.623	0.0	-1.5	-2.0	0.0	3528	-1346	2181	38.2%	0.14	3.16	3.23	0.07	(0.07)	-0.05	(0.02)
2/19/2013	50	-0.57	0.18	3.35	3.34	3.21	3.23	3.26	0.7	886518	-178	-0.354	2.5	-2.5	-0.2	0.0	824	-160	664	19.4%	0.03	3.23	3.25	0.02	(0.02)	-0.01	(0.01)
2/20/2013	51	-5.23	0.23	3.36	3.37	3.23	3.25	3.24	3.4	2054242	-1348	-3.643	0.0	-1.7	-1.8	0.0	1910	-1213	697	63.5%	0.08	3.25	3.24	(0.00)	(0.08)	-0.05	(0.03)
2/21/2013	52	-7.28	0.25	3.37	3.37	3.25	3.27	3.26	3.9	2584540	-1633	-3.606	0.0	-1.3	-2.2	0.0	2404	-1469	934	61.1%	0.10	3.24	3.29	0.04	(0.05)	-0.06	0.01
2/22/2013	53	-5.30	0.11	3.37	3.36	3.27	3.29	3.31	0.7	2348569	-421	-2.752	0.0	-2.1	-0.6	0.0	2184	-379	1805	17.4%	0.09	3.29	3.30	0.01	(0.07)	-0.02	(0.06)
2/23/2013	54	0.54	0.04	3.37	3.36	3.28	3.30	3.32	0.8	843333	53	-0.339	1.7	-2.0	0.1	0.0	784	47	832	-6.1%	0.03	3.30	3.33	0.03	(0.00)	0.00	(0.01)
2/24/2013	55	-0.19	0.14	3.39	3.41	3.27	3.32	3.34	2.1	1128522	-212	-1.965	0.2	-1.8	-0.3	0.0	1050	-191	858	18.2%	0.04	3.33	3.31	(0.02)	(0.06)	-0.01	(0.05)
2/25/2013	56	-1.04	0.11	3.47	3.46	3.29	3.33	3.37	1.9	1169633	-260	-2.245	0.0	-1.8	-0.4	0.0	1088	-234	854	21.5%	0.04	3.31	3.35	0.04	(0.00)	-0.01	0.01
2/26/2013	57	-1.77	0.17	3.52	3.51	3.35	3.39	3.42	1.6	1897837	-164	1.524	0.0	1.9	-0.2	0.0	1765	-148	1617	8.4%	0.07	3.35	3.41	0.06	(0.01)	-0.01	(0.00)
2/27/2013	58	1.40	0.17	3.57	3.56	3.43	3.45	3.46	2.7	829863	154	14.348	16.3	-2.0	0.2	0.0	772	139	911	-18.0%	0.03	3.41	3.45	0.04	0.01	0.01	0.00
2/28/2013	59	1.23	0.14	3.62	3.61	3.46	3.49	3.51	0.8	1732035	10	1.308	1.8	-0.4	0.0	0.0	1611	9	1620	-0.6%	0.06	3.45	3.51	0.06	(0.01)	0.00	(0.01)
#N/A	60	-0.33	0.20	3.63	3.61	3.49	3.51	3.50	1.0	150	0	0.000	0.0	0.0	0.0	0.0	0	#N/A	#N/A		#N/A				#N/A	#N/A	
#N/A																		#N/A	#N/A		#N/A				#N/A	#N/A	
#N/A																		#N/A	#N/A		#N/A				#N/A	#N/A	