Lake Lacawac, Bruce R. Hargreaves, Lehigh University (brh0@lehigh.edu, http://www.lehigh.edu/~brh0)
Station moved from dock from 2:30-3:30pm (problems with ice-shift anchors result in wind direction error until corrected)
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.
Adjusted Tw sensors 13Nov07 based on comparison of depths and vs PUV & YSI sonde profiles (note that Tw at 11.3m matches PUV Tw at 12.5, probably within sediment boundary layer)
Tw12 adjusted to match others on bottom after moved to dock

5280	ft/mile
1609.3	m/mile

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						
	48.4	57.6	38.8		2.27	5.0	30					50.2	50.2	50.0	48.6	47.2	46.6	45.7	45.2	44.7	44.7	44.6						
Month summary	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	Tw02.1m	Tw02.6m	H310_z (m)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
	9.1	14.2	3.8	65.7	57.7	2.3	13.4	204.2	962.6	482835572	995	10.1	10.1	10.0	9.2	8.5	8.1	7.6	7.3	7.1	7.1	7.0	6.6	82.4	57.7	12.6	25.2	16.1

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%	4/1/2009	91	4.6	6.4	2.1	92.7	2.2	1.1	7.0	124	966.1	2158191	5	7	7	6.7	6.5	6.6	6.6	6.6	6.6	6.5	6.6	6.7	2.1	40.5	2.200	12.6	14.2	13.9
ND	100%	4/2/2009	92	10.0	17.9	4.9	83.3	0.0	0.9	6.5	125	963.5	19424631	40	8	8	7.4	7.1	6.9	7.0	7.0	7.0	6.9	7.2	7.2	2.1	43.3	2.200	12.6	18.2	16.4
ND	100%	4/3/2009	93	11.3	13.7	6.9	94.8	20.6	2.7	13.4	152	944.3	4579858	10	9	9	8.4	8.0	7.7	7.8	7.8	7.7	7.7	8.1	8.0	2.1	58.2	22.800	12.7	30.4	17.6
ND	100%	4/4/2009	94	5.0	6.7	2.7	80.1	2.0	4.2	12.9	290	947.1	3645104	8	8	8	7.9	7.8	7.7	7.8	7.7	7.7	7.7	7.8	7.9	2.1	76.5	24.800	12.6	46.5	17.2
ND	100%	4/5/2009	95	7.1	14.2	2.9	65.4	0.0	3.1	11.5	283	956.1	23140319	47	8	8	7.7	7.5	7.4	7.5	7.5	7.5	7.5	7.6	7.7	2.1	77.4	24.800	12.6	34.0	15.7
ND	100%	4/6/2009	96	5.2	6.1	4.0	92.8	5.8	1.7	7.1	130	944.7	3200578	7	8	8	7.7	7.7	7.6	7.7	7.6	7.6	7.6	7.7	7.8	2.1	81.9	30.600	12.7	23.0	14.6
ND	100%	4/7/2009	97	1.0	4.4	-0.8	73.2	0.0	3.1	9.6	300	942.8	9103881	19	7	7	7.3	7.2	7.3	7.3	7.3	7.3	7.2	7.3	7.4	2.1	85.6	30.600	12.6	20.6	14.6
ND	100%	4/8/2009	98	0.9	4.6	-1.7	71.3	0.0	1.7	7.7	265	950.5	9430103	20	7	7	7.0	6.9	6.9	7.0	6.9	6.9	6.8	7.0	7.1	2.1	83.7	30.600	12.6	18.4	14.4
ND	100%	4/9/2009	99	5.5	12.3	-1.7	53.9	0.0	1.4	8.5	265	957.7	23380455	47	8	7	7.3	7.0	7.0	7.1	7.0	7.0	7.0	7.1	7.3	2.1	82.4	30.600	12.7	19.8	14.9
ND	100%	4/10/2009	100	5.7	11.7	-0.9	75.3	1.9	1.2	5.6	149	962.9	8642408	19	8	8	7.7	7.5	7.4	7.5	7.5	7.4	7.4	7.6	7.7	2.1	82.0	32.500	12.7	18.2	14.3
ND	100%	4/11/2009	101	5.8	9.1	1.0	79.6	0.2	2.9	9.4	147	960.9	6449748	14	8	8	7.7	7.7	7.6	7.7	7.7	7.7	7.6	7.7	7.8	2.1	83.7	32.700	12.7	19.9	14.5
ND	100%	4/12/2009	102	0.2	3.2	-2.1	55.1	0.0	4.3	12.5	331	967.7	25515274	49	7	7	7.1	7.0	7.0	7.1	7.0	7.0	6.9	7.0	7.2	2.1	79.5	32.700	12.6	16.4	14.2
ND	100%	4/13/2009	103	3.2	9.6	-3.1	50.4	0.2	2.2	8.1	293	967.5	23206895	46	7	7	7.2	7.1	7.1	7.1	7.0	6.9	6.8	6.9	7.0	4.8	76.5	32.900	12.7	16.8	14.0
LC	100%	4/14/2009	104	5.7	7.6	3.6	59.0	2.2	1.7	6.5	100	963.3	4919111	11	7	7	7.5	7.4	7.3	7.3	7.1	7.0	6.8	6.8	6.8	10.3	77.8	35.100	12.7	17.2	13.9
LC	100%	4/15/2009	105	7.8	14.3	3.3	56.8	0.9	1.9	8.2	81	964.2	19662808	41	8	8	7.8	7.6	7.5	7.4	7.3	7.2	6.9	6.8	6.8	10.3	82.9	36.000	12.6	19.6	14.9
LC	100%	4/16/2009	106	8.1	15.7	-0.7	52.7	0.0	1.5	7.4	254	972.1	26367323	53	9	9	8.7	8.3	7.7	7.6	7.3	7.2	6.9	6.8	6.8	10.3	82.9	36.000	12.7	18.7	14.6
LC	100%	4/17/2009	107	9.9	18.1	0.8	46.9	0.0	2.1	8.8	267	971.6	26045819	52	10	10	9.6	9.2	8.1	7.7	7.4	7.2	7.0	6.9	6.8	10.3	81.7	36.000	12.7	18.7	14.5
LC	100%	4/18/2009	108	14.6	21.1	8.4	37.3	0.0	2.1	9.9	225	964.5	18866957	39	10	10	10.4	10.2	8.6	7.8	7.4	7.2	6.9	6.9	6.6	10.3	80.4	36.000	12.7	20.1	14.8
LC	100%	4/19/2009	109	11.4	14.9	7.2	59.0	0.0	2.0	7.7	164	965.3	16632122	35	11	11	11.3	10.9	9.0	8.0	7.5	7.2	6.9	6.9	6.6	10.3	79.7	36.000	12.7	20.1	14.5
LC	100%	4/20/2009	110	4.2	6.9	1.8	83.5	9.6	3.5	9.6	91	964.3	2518308	6	11	11	10.8	10.6	9.4	8.1	7.5	7.2	6.9	6.9	6.6	10.3	82.3	45.600	12.6	20.2	13.9
LC	100%	4/21/2009	111	9.9	17.0	5.5	86.7	10.3	1.8	10.4	160	954.9	18179692	38	10	10	10.3	9.8	9.4	8.6	7.6	7.3	6.9	6.9	6.6	10.3	97.4	55.900	12.6	52.4	19.8
LC	100%	4/22/2009	112	7.2	11.5	2.8	79.4	1.5	2.3	9.9	235	953.9	17863456	37	11	11	11.0	10.5	9.6	8.8	7.7	7.3	7.0	6.9	6.6	10.3	101.6	57.400	12.7	38.4	20.7
LC	100%	4/23/2009	113	5.5	9.4	2.9	74.2	0.0	3.2	11.2	265	961.5	13215160	27	10	10	10.5	10.4	10.0	9.0	7.8	7.4	6.9	6.9	6.6	10.3	101.8	57.400	12.7	30.3	17.9
LC	100%	4/24/2009	114	11.9	21.5	0.1	54.9	0.0	1.9	6.7	211	971.0	24361571	50	11	11	10.7	10.2	9.9	9.5	8.1	7.4	7.0	6.9	6.6	10.3	100.4	57.400	12.7	28.1	18.1
LC	100%	4/25/2009	115	21.1	28.4	10.2	49.6	0.0	2.3	9.7	210	970.2	25941852	54	12	12	12.2	11.1	10.0	9.5	8.2	7.5	7.0	6.9	6.6	10.3	98.5	57.400	12.7	30.2	19.8
LC	100%	4/26/2009	116	21.4	29.3	13.0	57.7	0.0	1.3	8.7	224	972.2	25450957	53	15	15	14.4	12.2	10.3	9.5	8.3	7.5	7.0	6.9	6.6	10.3	97.3	57.400	12.7	30.8	19.4
LC	100%	4/27/2009	117	23.1	30.6	13.3	52.2	0.0	1.7	8.5	205	973.1	20785696	44	17	17	15.7	12.6	10.4	9.6	8.4	7.6	7.0	6.9	6.6	10.3	95.1	57.400	12.7	30.0	19.7
LC	100%	4/28/2009	118	22.7	28.5	12.2	47.6	0.0	3.5	11.3	246	971.2	25920733	54	18	18	17.2	13.0	10.6	9.7	8.4	7.6	7.0	6.9	6.6	10.3	90.8	57.400	12.7	31.3	19.8
LC	100%	4/29/2009	119	11.7	17.6	5.6	51.7	0.3	2.2	8.1	173	978.1	26327425	53	18	18	17.7	13.9	10.9	9.8	8.5	7.7	7.0	6.9	6.6	10.3	87.9	57.700	12.6	27.7	16.2
LC	100%	4/30/2009	120	11.8	14.2	9.1	54.2	0.0	2.3	7.8	163	974.2	7899133	18	17	17	16.8	14.2	11.0	9.8	8.5	7.7	7.0	6.9	6.6	10.3	83.2	57.700	12.7	25.4	14.7
	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)

1.000 <=SCALE ADJ (1.0=no adjustment)

Ratio of lake watershed to lake area: 3.88 Runoff & seepage as % of watershed area precip: 243.3%

4.184 joule/calorie (= joule/degree for 1cm3) Note: first adju

Grand sum/avg	9.11	10.11	10.11	9.99	9.24	8.47	8.10	2.0	482835572	-43125	40.8	57.7	543.2	-63.0	0.0	-498.1	39.9	#N/A	#N/A		13%	#N/A	16.7	9	#N/A	#N/A	#N/A	#N/A
															SumTerrevap2=AirVPD,mbar*WS,m/s*sc													0.05929
																							4.184	<=CONVERT HEAT TO DEGREES				-0.25622
																		0.9	5.0%	<=%R that optimizes Tair-Tsurf			6000000	cm3/m2 (for 0-4m integrated depth)				0.273

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	Sum Out flow (lake mm)	sum in+out (mm)	Sum H evap (KJ/m²)	solar heat absorbed - evap loss (kJ/m²)	% of absorbed solar heat lost via evap	evap loss (degC 0-6m)	solar heat - evap loss (degC 0-6m)	starting Tw (0-6m)	ending Tw (0-6m)	actual Tw chg, 0-6m	non-evap heat exchange to balance solar heat gain (oC, 0-	residual lake exchange (non-evap xchg minus
4/1/2009	91	4.57	6.83	6.78	6.72	6.52	6.59	6.61	0.7	2158191	-319	2.004	2.2	5.9	-0.5	0.0	-5.9	1.717	-287	1763	14.0%	-0.01	0.1	6.9	6.6	(0.25)	(0.32)	(0.08)
4/2/2009	92	9.98	8.16	7.59	7.41	7.06	6.94	7.02	0.6	19424631	-148	2.109	0.0	8.3	-0.2	0.0	-6.0	2.109	-133	18320	0.7%	-0.01	0.7	6.6	7.2	0.55	(0.18)	0.03
4/3/2009	93	11.34	8.65	8.56	8.42	7.97	7.67	7.77	2.3	4579858	334	30.233	20.6	16.8	0.5	0.0	-7.7	30.233	300	4651	-6.9%	0.01	0.2	7.2	8.1	0.98	0.79	(0.89)
4/4/2009	94	5.02	7.73	7.86	7.85	7.77	7.68	7.77	3.8	3645104	-1642	2.426	2.0	14.4	-2.4	0.0	-11.6	2.426	-1478	1985	42.7%	-0.06	0.1	8.1	7.3	(0.88)	(0.96)	0.55
4/5/2009	95	7.14	7.94	7.83	7.70	7.52	7.44	7.54	2.8	23140319	-1429	1.195	0.0	15.3	-2.1	0.0	-12.0	1.195	-1286	20697	5.9%	-0.05	0.8	7.3	7.8	0.54	(0.28)	(0.02)
4/6/2009	96	5.18	7.61	7.72	7.73	7.67	7.61	7.68	1.6	3200578	-498	8.121	5.8	17.3	-0.7	0.0	-14.3	8.121	-448	2592	14.7%	-0.02	0.1	7.8	7.6	(0.23)	(0.33)	(0.07)
4/7/2009	97	1.00	7.17	7.28	7.30	7.24	7.27	7.33	2.9	9103881	-1881	-2.109	0.0	17.0	-2.7	0.0	-16.4	-2.109	-1693	6956	19.6%	-0.07	0.3	7.6	6.8	(0.74)	(1.02)	0.39
4/8/2009	98	0.92	6.77	6.92	6.96	6.87	6.93	6.98	1.5	9430103	-1200	-1.512	0.0	15.4	-1.7	0.0	-15.2	-1.512	-1080	7879	12.1%	-0.04	0.3	6.8	6.7	(0.11)	(0.42)	(0.18)
4/9/2009	99	5.46	7.51	7.42	7.35	7.03	7.00	7.08	1.2	23380455	-1185	-0.281	0.0	15.9	-1.7	0.0	-14.4	-0.281	-1066	21145	4.8%	-0.04	0.8	6.7	7.5	0.78	(0.06)	(0.32)
4/10/2009	100	5.74	7.71	7.76	7.71	7.49	7.42	7.53	1.1	8642408	-534	1.933	1.9	15.0	-0.8	0.0	-14.2	1.933	-480	7730	5.9%	-0.02	0.3	7.5	7.8	0.34	0.03	(0.41)
4/11/2009	101	5.78	7.59	7.72	7.74	7.67	7.63	7.73	2.7	6449748	-1202	-2.883	0.2	13.9	-1.7	0.0	-15.2	-2.883	-1082	5046	17.7%	-0.04	0.2	7.8	6.9	(0.94)	(1.14)	0.77
4/12/2009	102	0.24	6.96	7.07	7.06	6.96	7.01	7.08	4.0	25515274	-3190	-4.429	0.0	13.2	-4.6	0.0	-13.0	-4.429	-2871	21369	11.8%	-0.11	0.9	6.9	6.7	(0.24)	(1.09)	0.44
4/13/2009	103	3.15	7.11	7.23	7.24	7.14	7.09	7.08	2.0	23206895	-1712	-1.241	0.2	12.6	-2.5	0.0	-11.6	-1.241	-1541	20506	7.0%	-0.06	0.8	6.7	7.3	0.65	(0.16)	(0.33)
4/14/2009	104	5.69	7.32	7.46	7.47	7.42	7.34	7.33	1.6	4919111	-1027	5.836	2.2	17.3	-1.5	0.0	-12.2	5.836	-924	3749	19.8%	-0.04	0.1	7.3	7.3	(0.03)	(0.18)	(0.18)
4/15/2009	105	7.84	7.67	7.79	7.79	7.64	7.47	7.44	1.6	19662808	-1202	1.371	0.9	17.0	-1.8	0.0	-14.7	1.371	-1082	17597	5.8%	-0.04	0.7	7.3	7.7	0.43	(0.27)	0.03
4/16/2009	106	8.09	8.80	8.79	8.73	8.34	7.74	7.56	1.3	26367323	-1314	-0.703	0.0	15.9	-1.9	0.0	-14.7	-0.703	-1182	23867	4.7%	-0.05	1.0	7.7	8.2	0.48	(0.47)	0.17
4/17/2009	107	9.88	9.58	9.63	9.60	9.25	8.07	7.67	1.9	26045819	-1748	-1.406	0.0	15.2	-2.5	0.0	-14.0	-1.406	-1574	23170	6.4%	-0.06	0.9	8.2	8.8	0.57	(0.35)	0.11
4/18/2009	108	14.62	10.41	10.49	10.44	10.22	8.62	7.85	1.8	18866957	-1515	-0.703	0.0	14.9	-2.2	0.0	-13.4	-0.703	-1364	16560	7.6%	-0.05	0.7	8.8	9.2	0.44	(0.22)	0.21
4/19/2009	109	11.38	11.30	11.34	11.29	10.88	8.99	8.02	1.7	16632122	-1188	-1.301	0.0	13.4	-1.7	0.0	-13.0	-1.301	-1070	14731	6.8%	-0.04	0.6	9.2	9.4	0.13	(0.45)	0.20
4/20/2009	110	4.17	10.62	10.76	10.79	10.65	9.38	8.12	3.2	2518308	-2335	10.722	9.6	19.1	-3.4	0.0	-14.6	10.722	-2101	291	87.8%	-0.08	0.0	9.4	9.0	(0.38)	(0.39)	(0.25)
4/21/2009	111	9.93	10.46	10.40	10.26	9.85	9.45	8.56	1.6	18179692	-505	12.374	10.3	28.7	-0.7	0.0	-25.9	12.374	-455	16816	2.6%	-0.02	0.7	9.0	9.3	0.35	(0.32)	0.04
4/22/2009	112	7.16	10.96	11.05	11.00	10.46	9.58	8.75	2.1	17863456	-1461	0.703	1.5	31.5	-2.1	0.0	-30.2	0.703	-1315	15655	7.8%	-0.05	0.6	9.3	9.6	0.32	(0.30)	(0.18)
4/23/2009	113	5.46	10.33	10.47	10.49	10.45	10.04	9.01	3.0	13215160	-2210	-1.266	0.0	32.3	-3.2	0.0	-30.4	-1.266	-1989	10565	15.8%	-0.08	0.4	9.6	9.4	(0.21)	(0.63)	0.09
4/24/2009	114	11.92	10.70	10.76	10.66	10.16	9.90	9.50	1.7	24361571	-1368	-2.004	0.0	28.8	-2.0	0.0	-28.8	-2.004	-1231	21912	5.3%	-0.05	0.9	9.4	9.8	0.37	(0.50)	0.31
4/25/2009	115	21.09	12.39	12.32	12.20	11.13	10.01	9.54	2.1	25941852	-820	-1.406	0.0	26.6	-1.2	0.0	-26.8	-1.406	-738	23907	3.0%	-0.03	1.0	9.8	10.7	0.92	(0.03)	0.29
4/26/2009	116	21.37	15.28	14.88	14.42	12.17	10.25	9.55	1.1	25450957	-577	-1.230	0.0	25.2	-0.8	0.0	-25.6	-1.230	-520	23659	2.1%	-0.02	0.9	10.7	11.1	0.43	(0.52)	0.62
4/27/2009	117	23.05	17.31	16.96	15.70	12.58	10.43	9.60	1.6	20785696	-1337	-3.902	0.0	21.7	-2.0	0.0	-23.6	-3.902	-1203	18543	6.1%	-0.05	0.7	11.1	11.5	0.33	(0.41)	0.50
4/28/2009	118	22.69	18.05	18.05	17.20	12.96	10.64	9.68	3.2	25920733	-3073	-2.918	0.0	21.6	-4.5	0.0	-20.0	-2.918	-2765	21859	11.2%	-0.11	0.9	11.5	11.7	0.24	(0.63)	0.65
4/29/2009	119	11.69	17.71	17.76	17.68	13.93	10.85	9.75	1.9	26327425	-3628	-4.851	0.3	18.1	-5.3	0.0	-17.9	-4.851	-3266	21746	13.1%	-0.13	0.9	11.7	12.0	0.33	(0.54)	(0.07)
4/30/2009	120	11.79	16.67	16.77	16.81	14.22	11.01	9.80	2.1	7899133	-3208	-4.043	0.0	14.9	-4.7	0.0	-14.9	-4.745	-2887	4617	38.5%	-0.11	0.2	12.0	#N/A	#N/A	#N/A	#N/A
#N/A																			#N/A	#N/A		#N/A					#N/A	#N/A