Big Blake Lake Zooplankton (number per liter)

	June	July	Aug	June	July	Aug	June	July	Aug
	2013	2013	2013	2014	2014	2014	2015	2015	2015
Adineta sp.	0	0	1.674937	0	0.314051	0	0	0	0
Anuraeopsis fissa	0	0	0	0	0	0	0	0	0
Ascomorpha sp.	0	0	0	0	0	0	0.628101	0	0.314051
Asplanchna brightwelli	0	0	0	0	0	0	0	0	0
Asplanchna herricki	0	0	0	0	0	0	0	0	0
Aplanchna priodonta	0	0	0	0	0	0	0	0	0
Brachionus angularis	0	0	0	0	0	0	0	0	0
Brachionus quadridentatus	0	0	0	0	0	0	0	0	0
Collotheca sp.	0	0	0.418734	0	0	0	0	0	0
Colurella sp.	0	0	0	0	0	0	0	0	0
Conochilus unicornis	0	0	0	0	0	0.418734	9.421519	0	0.628101
Euchlanis sp.	0	0	0	0	0	0	0	0	0
Filinia longiseta	0	1.256202	0	0	0	2.093671	0	0.418734	1.256202
Filinia terminalis	0	0	0.837468	0	0	0	0	0	0
Gastropus sp.	0	0	0	1.674937	0	0	0	0	0
Hexarthra mira	0	0	0	0	0	0	0	0	0
Kellicottia bostoniensis	0	0	0	0	0	0	0	0	0
Kellicottia longispina	0	0	0	0	0	0	0	0	0
Keratella crassa	0	0	0	0	0	0	0	0	0
Keratella cochlearis cochlearis	7.851266	8.374683	1.256202	4.606076	0.314051	5.02481	2.826456	13.81823	5.966962
Keratella cochlearis hispida	0	0	0	0	0	0	0	0	0
Keratella cochlearis robusta	0.314051	0.837468	0	0	0	7.118481	0.628101	1.256202	1.256202
Keratella cochlearis tecta	0	0	0	0	0	0	0	0	0
Keratella earlinae	0	0	0	0	0	0	0	0	0
Lecane luna	0	0	0	0	0	0	0	0	0
Monostyla bulla	0	0	0	0	0	0.418734	0	0	0
Monostyla closterocerca	0	0	0	0	0	0	0	0	0

Monostyla lunaris	0	0	0	0	0	0	0	0	0
Monostyla quadridentata	0	0	0	0	0	0	0	0	0
Notholca squamula	0	0	0	0	0	0	0	0	0
Notholca acuminata var extensa	0	0	0	0	0	0	0	0	0
Notomata sp.	0	0	0	0	0	0	0	0	0
Polyarthra sp.	0.314051	0	0	0	0.314051	0	0	0	0
Polyarthra dolichoptera	1.570253	0	0	0.837468	0	0	0	0	0
Polyarthra euryptera	0.628101	0.837468	0	0.837468	0	0	1.884304	0	0.628101
Polyarthra major	0	0	0	0	0	0	0	0	0
Polyarthra remata	0	1.256202	0	3.349873	0	1.256202	10.36367	3.349873	0.942152
Polyarthra vulgaris	0	0	0	0	0	0	0	0	0
Pompholyx sulcata	0	0	0	0	0.628101	0	0	0	0
Proales sp.	0	0	0	0	0	0	0	0	0
Synchaeta sp.	0	0	0	0	3.140506	0	0	0	0
Trichocerca (bicristata)	0	0	0	0	0	0	0	0	0
Trichocerca cylindrica	0.314051	0.837468	0	0	0	0	0	0.418734	0
Trichocerca elongata	0	0	0	0	0	0	0	0	0
Trichocerca pusilla	0	1.256202	0	2.093671	0	0	0	0.837468	0
Trichocerca lata	0	0	0	0	0	0	0	0	0
Trichocerca longiseta	0	0	0	0	0	0	0.314051	0	0
Trichocerca multicrinis	0	0	0	0	0	0	0	0	0
Trichocerca similis	0	0	0	0	0	0	0	0	0
Trichotria tetractis	0	0	0	0	0	0	0	0	0
Trocosphaera sp.	0	0	0	0	0	0	0	0	0
unidentified rotifer	0	0	0	0	0	0	0	1.674937	0
cyclopoid nauplius	2.512405	6.281012	2.093671	1.256202	2.198354	5.02481	4.396709	6.281012	8.165316
cyclopoid copepodid	0.628101	7.537215	1.256202	2.512405	0.628101	1.674937	1.570253	7.118481	10.99177
calanoid nauplius	0.628101	0	0	0	0.628101	0	0.942152	0	0
calanoid copepodid	0.314051	1.256202	0	0	0.628101	1.256202	0.628101	1.256202	0
Acanthocyclops sp.	0	0	0	0	0	0	0	0	0

Cyclops sp.	0	0	0	0	0	0	0	0	0
Diacyclops spp.	0.314051	0.837468	0	0	1.570253	0	0	1.256202	1.570253
Megacyclops viridis	0	0	0	0	0	0.418734	0	0	0.314051
Mesocyclops sp.	0.314051	0	0	0	0	0	0	0	0.314051
(Metacyclops sp.)	0	0	0	0	0	0	0	0	0
Microcyclops sp.	0	0	0	0	0	0	0	0	0
Paracyclops chiltoni	0	0	0	0	0	0	0	0	0
[Thermocyclops crassus]	0	0	0	0	0	0	0	0	0
Diaptomidae	0	0	0	0	0	0	0	0	0.628101
(Arctodiaptomus arapahoensis)	0	0	0	0	0	0	0	0	0
Heterocope septeptrionalis	0	0	0	0	0	0	0	0	0
(Limnocalanus sp.)	0	0	0	0	0	0	0	0	0
(Osphrantium sp.)	0	0	0	0	0	0	0	0	0
Skistodiaptomus oregonensis	0	0	0	0	0	0.837468	0.628101	0.837468	0
(Senecella calanoides)	0	0	0	0	0	0	0	0	0
Bosmina coregoni	0	0	0	0	0	0	0.314051	0	0
Bosmina leideri	0	0	0	0	0	0	0	0	0
Bosmina longirostris	0	0	0	0	0	0	1.570253	0	0
Bosmina longispina	0	0	0	0	0	0	0	0	0
Ceriodaphnia sp.	0	0	0	0.418734	0	0	0	0	0
Ceriodaphnia lacustris	0	0	0	0	0	0	0	0	0
Ceriodaphnia laticaudata	0	0	0	0	0	0	0	0	0
Ceriodaphnia pulchella	0	0	0	0	0	0	0	0	0
Ceriodaphnia quadrangula	0	0	0	0	0	0	0.628101	0	0
Chydorus sp.	0	0.418734	0	0	0	0.418734	0	0	0
Chydorus faviformis	0	0	0	0	0	0	0	0	0
Chydorus sphaericus	0	0	0	0	0	0	0	0	0
Diaphanosoma sp.	0	0.837468	0	0	0.314051	0	1.256202	1.674937	0.314051
Daphnia ambigua	0	0.837468	0	0	0	0	0.314051	0	0
Daphnia mendotae	1.256202	2.931139	1.256202	0	0.942152	2.093671	0.314051	0	0.314051

Daphnia parvula	0	0	0	0	0	0	0	0	0
Daphnia pulex	0	0	0	0	0	0	0	0	0
Daphnia retrocurva	0	0	2.512405	0	0	0	0	0	0
Holopedium gibberum	0	0.418734	0	0	0	0	0	0	0
Leptodora kindtii	0	0	0	0	0	0	0	0	0
Acroperus harpae	0	0	0	0	0	0	0	0	0
Camptocercus sp.	0	0	0	0	0	0	0	0	0
Paralona pigra	0	0	0	0	0	0	0	0	0
Sida sp.	0	0	0	0	0	0	0	0	0
Simocephalus mirabilis	0	0	0	0	0	0	0	0	0
Arcella gibbosa	0	0	0	0	0	0	0	0	0
Centropyxis aerophila	0	0	0	0	0	0	0	0	0
Codonella sp.	0	0	0	0	0	0	0	0	0
Cyclopyxis arcelloides	0	0	0	0	0	0	0	0	0
Difflugia globosa	0	0	0.837468	0	0	0	0	0	0
Difflugia oblonga	0	0	0	0	0	0	0	0	0
Difflugia lobostoma	0	0	0	0	0	0.418734	0	1.256202	0
Trinema sp.	0	0	0	0	0	0	0	0	0
unidentified protist	0	0	0	0	0	0	0	0	0

Zooplankton of Big Blake and Lotus Lakes, Polk County (WI) 2013-2016.

Toben Lafrançois, PhD
November 2016

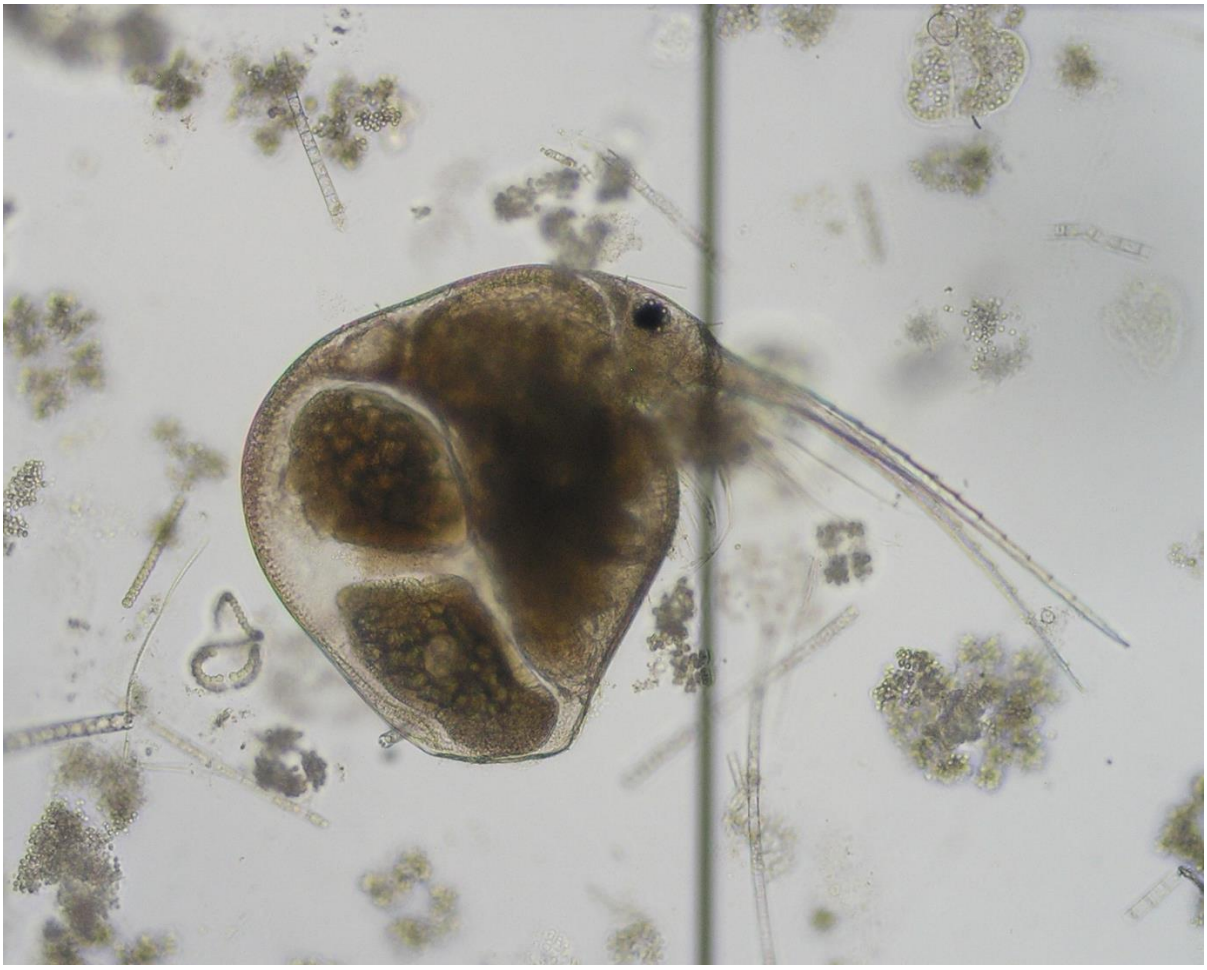

Figure 1. *Bosmina coregoni* from Big Blake Lake, Polk Co., WI, 2015. Field of view = 0.65 mm. Photo T. Lafrançois.

Suggested citation: Lafrançois, T. 2016. Zooplankton of Big Blake and Lotus Lakes, Polk County (WI) 2013-2016. Final report to Polk County Land & Water Resources Department, Polk Co. WI.

Eighteen samples from Big Blake and Lotus Lakes in Polk County were examined for zooplankton species abundances. Final data and basic community analyses have been sent with this report as an attachment in Microsoft Excel.

Methods

Zooplankton samples were collected by Polk Co. with WI plankton nets using known depths for volumetric calculation and preserved in ETOH. Laboratory methods used a dual counting technique for different size fractions modified from Chick et al. 2006 and Chick et al. 2010. This process has been found to be cost-effective and statistically robust in nearby systems (Lafrancois 2009, Lafrancois 2013, Lafrancois *et al*. 2016). Samples were condensed on a 20 µm filter, transferred to 40 mL centrifuge tubes and diluted to between 20 and 40 ml depending on sample density. This volume was rigorously agitated, sub-sampled with a 1mL Hensen-Stempel pipette, and transferred to a 1mL Sedgwick Rafter counting slide. Organisms of all size fractions were counted on a compound microscope at magnifications of 40x to 100x using an Olympus CX41 compound microscope. Counts of rotifers and protists were tallied row by row (1/20 ml increments) on the Sedgwick Rafter cell until stable variance in taxa diversity was achieved (Colwell & Coddington 1994). Stable variance in taxonomic diversity and total number for these samples was achieved when at least 50 individuals of smaller species were counted (with volume counted between 0.6 and 2 ml out of 20-40 ml). The larger organisms (copepods and cladocerans) were then counted for the entire cell and checked against the entire sample. Insecta were counted from the entire sample, but in this case only one *Chaoborus* sp. was found in one sample. At least two aliquots were counted in this manner for each sample. Standard identification keys were used from Thorp & Covich (2010) to allow cross study comparison. Zooplankton counts were converted from numbers per subsample to number per liter (n/l).

Results and Summary

Thirty-eight species / lowest practically identifiable taxa from Big Blake Lake and thirty seven from Lotus Lake were identified from samples reported here (2013 to 2016), Tables 1 and 2 respectively. Basic diversity measures are presented in Table 3.

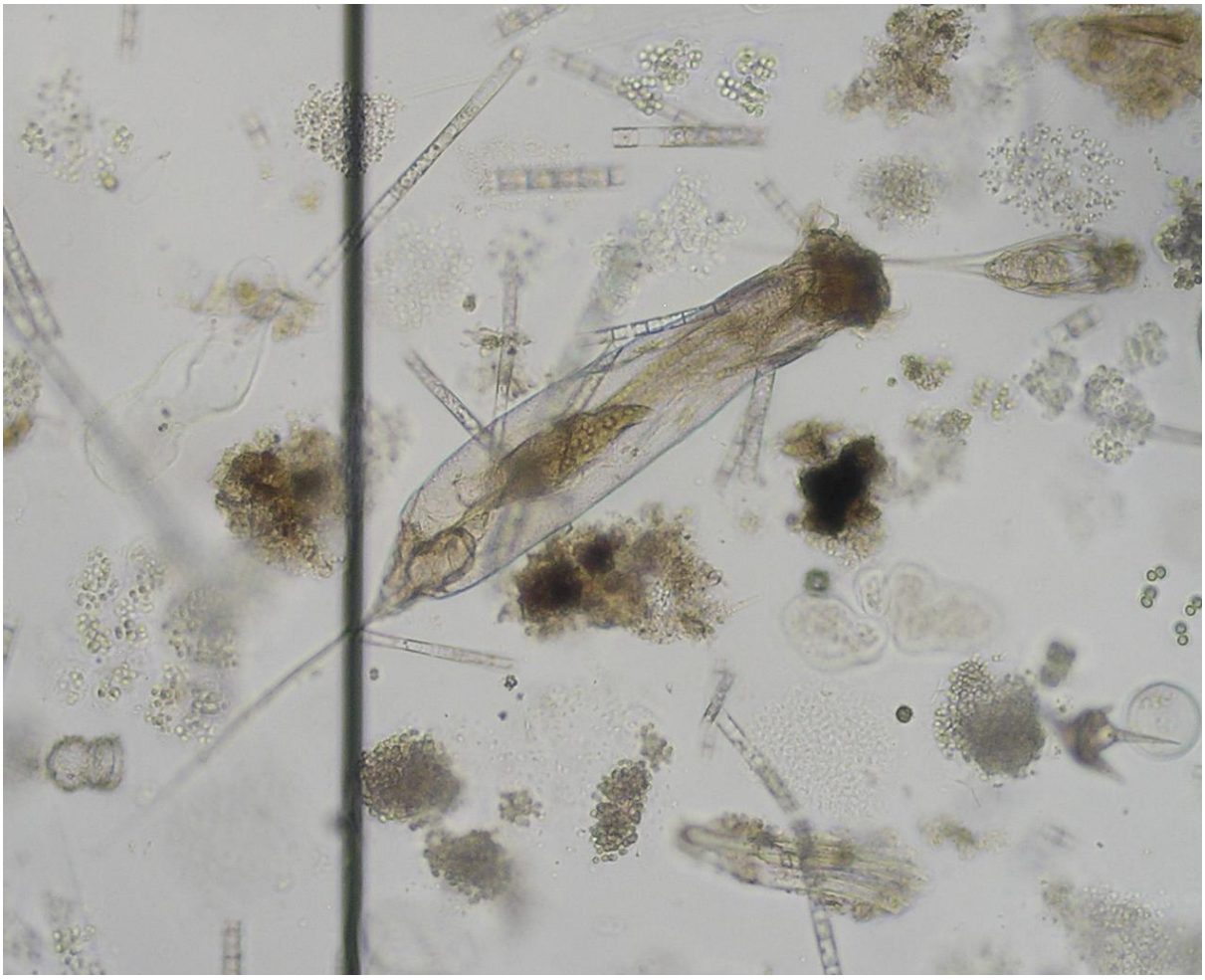

Figure 2. *Trichocerca elongata* and *Filinia longiseta* from Lotus Lake, Polk Co., WI (field of view 1mm across).

Community composition baselines are shown in Figures 3 and 4, with numbers per liter of four primary taxonomic groups. Rotifera are small multicellular organisms that generally feed on bacteria and algae. Cladocerans are crustacean plankton that are typically grazers, and copepods are crustacean often size selective omnivores or predators. Testate protozoa are single celled organisms that leave behind a shell used for identification and counting. It is unclear whether testate protozoa correlate to the total protozoan community, or perhaps are inverse (increasing at the expense of other soft protozoa that leave no trace in preserved samples). They are included because they may indicate run-off events and could be important to long term monitoring as knowledge of this group's ecology develops.

Zooplankton occupy an ecologically critical position between top-down (e.g., fish predation) and bottom-up (e.g., eutrophication) processes. Typically zooplankton will increase in abundance over the summer, and peak in August or September, tracking overall productivity. However, patterns can change

as the community responds to fish stocking and growth, temperature, algal growth and community change – particularly due to nutrients and eutrophication, and other factors. Looking *just* at the community patterns over time gives some insight into these processes but is most meaningful when coupled with environmental and fish stocking data. That said, some general patterns stick out.

Big Blake Lake shows some interesting patterns in 2013, where a typical phenological pattern appears in June and July with a crash in August (Fig. 3). This crash is someone unexpected since August tends to be a very productive year. Environmental factors need to be analyzed to explain this change, which would typically occur later in October or November. The 2014 trends show a more typical response with an unexpected drop in rotifers in July but otherwise a slow increase into the most productive months. In 2015 there was a major increase in copepods over the summer, with a decline in rotifers that could be associated with copepod predation, and a decrease in cladocerans. The cladoceran decrease could be due to either fish pressure or a change in algal community structure. The concurrent increase in copepods suggests that a bottom-up mechanism is more likely, since planktivorous fish tend to favor cladocerans but also enjoy copepods, being mostly size selective.

Lotus Lake produced an order of magnitude greater density of zooplankton than Big Blake in 2014 and 2015 with a curious crash in 2016 for all groups except rotifers in June (Fig. 4). In 2014 and 2015 there was a bump in zooplankton populations, all groups, in July. One particularly notable spike of rotifers in June 2016, Lotus Lake, is primarily due to *B. angularis*, *F. longiseta*, and *Collotheca* sp. (probably *C. mutabilis*). The first two rotifer specie are indicators of eutrophic conditions, combined with *Collotheca* sp. in this spike it would appear to relate to a bacterial bloom related to high nutrients and/or high temperatures (Pejler 1983, Walz 1993, Mola 2011).

A simple principle components ordination based on Bray-Curtis similarities helps sort out the complex of species level community composition. Environmental factors were not tested at this time. The ordination shows community similarity between lakes and sample periods, both month and year (Figure 5). This ordination confirms that there are differences between the zooplankton communities in Big Blake and Lotus Lake across the x-axis, which explains 66.2% of variation in community similarity. Samples from Lotus Lake also spread out a bit more, showing what look to be important groups of different community patters. All of the patterns pointed out here between and within Big Blake and Lotus Lake will be best explained when these results are compared to the larger data set of all factors from these lakes.

Table 1. Lowest identified taxa from Big Blake Lake, Polk County (WI) 2013-2015 with total percent occurrence.

Rotifera		**Cladocera**	
Adineta sp.	0.77%	*Bosmina coregoni*	0.15%
Ascomorpha sp.	0.46%	*Bosmina longirostris*	0.77%
Collotheca sp.	0.15%	*Ceriodaphnia* sp.	0.15%
Conochilus unicornis	5.11%	*Ceriodaphnia quadrangula*	0.31%
Filinia longiseta	2.01%	*Chydorus* sp.	0.31%
Filinia terminalis	0.31%	*Diaphanosoma* sp.	1.86%
Gastropus sp.	0.62%	*Daphnia ambigua*	0.46%
Keratella cochlearis	20.59%	*Daphnia mendotae*	3.72%
Keratella cochlearis robusta	4.49%	*Daphnia retrocurva*	0.93%
Monostyla bulla	0.15%	*Holopedium gibberum*	0.15%
Polyarthra sp.	0.31%		
Polyarthra dolichoptera	1.08%	**Copepoda**	
Polyarthra euryptera	2.17%	cyclopoid nauplius	16.25%
Polyarthra remata	8.98%	cyclopoid copepodid	14.24%
Pompholyx sulcata	0.31%	calanoid nauplius	1.08%
Synchaeta sp.	1.55%	calanoid copepodid	2.17%
Trichocerca cylindrica	0.62%	*Diacyclops* spp.	2.48%
Trichocerca pusilla	1.55%	*Megacyclops viridis*	0.31%
Trichocerca longiseta	0.15%	*Mesocyclops* sp.	0.31%
unidentified rotifer	0.62%	Diaptomidae	0.31%
		Skistodiaptomus oregonensis	0.93%
testate Protista			
Difflugia globosa	0.31%		
Difflugia lobostoma	0.62%		
Insecta			
Chaoborus sp.	0.15%		

Table 2. Lowest identified taxa from Lotus Lake, Polk County (WI) 2013-2016 with total percent occurrence.

Rotifera		**Copepoda**	
Anuraeopsis fissa	4.58%	cyclopoid nauplius	4.84%
Aplanchna priodonta	0.52%	cyclopoid copepodid	3.79%
Brachionus angularis	6.15%	calanoid nauplius	0.52%
Collotheca sp.	3.01%	calanoid copepodid	0.16%
Conochilus unicornis	0.13%	*Diacyclops* spp.	1.44%
Filinia longiseta	8.50%	*Paracyclops chiltoni*	1.18%
Kellicottia longispina	0.78%	Diaptomidae	0.02%
Keratella cochlearis cochlearis	30.09%	*Skistodiaptomus oregonensis*	0.03%
Keratella cochlearis hispida	0.13%		
Keratella cochlearis robusta	0.26%	**Cladocera**	
Polyarthra euryptera	0.13%	*Bosmina coregoni*	0.78%
Polyarthra remata	0.92%	*Bosmina leideri*	0.52%
Pompholyx sulcata	8.37%	*Chydorus sphaericus*	1.45%
Trichocerca (bicristata)	0.92%	*Daphnia ambigua*	0.92%
Trichocerca cylindrica	0.65%	*Daphnia mendotae*	3.01%
Trichocerca elongata	0.13%	*Daphnia retrocurva*	1.80%
Trichocerca pusilla	0.26%	*Sida* sp.	0.01%
Trichocerca multicrinis	0.13%		
Trichocerca similis	0.26%		
unidentified rotifer	0.52%		

testate protista	
Arcella gibbosa	0.65%
Centropyxis aerophila	0.26%
Codonella sp.	1.57%
Difflugia oblonga	0.13%
Difflugia lobostoma	10.33%
unidentified protist	0.13%

Table 3. Diversity indices for Big Blake and Lotus Lakes, 2013 to 2016, Polk Co., WI including S (raw number of species or lowest identified taxa), d (Margaleff Diversity), J' (Pielou's index), Brillouin and Fisher indices, H' (Shannon index, natural log) and in the last column the inverse Simpson index.

Sample	S	d	J'	Brillouin	Fisher	H'(loge)	1-Lambda'
BBlakeJune2013	13	4.24	0.73	1.20	25.49	1.86	0.79
BBlakeJuly2013	16	4.19	0.82	1.84	11.03	2.27	0.88
BBlakeAug2013	9	3.20	0.95	1.40	15.74	2.09	0.94
BBlakeJune2014	9	2.79	0.91	1.48	7.39	1.99	0.89
BBlakeJuly2014	12	4.49	0.87	1.40	****	2.16	0.93
BBlakeAug2014	14	3.88	0.83	1.70	10.90	2.20	0.89
BBlakeJune2015	18	4.65	0.77	1.84	13.11	2.24	0.86
BBlakeJuly2015	14	3.49	0.79	1.72	7.43	2.09	0.84
BBlakeAug2015	15	3.98	0.72	1.57	10.40	1.95	0.82
LotusJune2014	10	1.77	0.67	1.43	2.36	1.54	0.66
LotusJuly2014	19	2.70	0.75	2.19	3.51	2.22	0.86
LotusAug2014	14	2.50	0.85	2.11	3.53	2.23	0.86
LotusJune2015	21	3.94	0.83	2.35	6.47	2.53	0.90
LotusJuly2015	14	2.44	0.88	2.22	3.40	2.32	0.88
LotusAug2015	14	3.08	0.88	2.00	5.35	2.32	0.88
LotusJune2016	11	1.48	0.57	1.34	1.78	1.36	0.59
LotusJuly2016	12	2.91	0.90	1.92	5.45	2.23	0.89
LotusAug2016	11	2.81	0.78	1.59	5.50	1.86	0.77

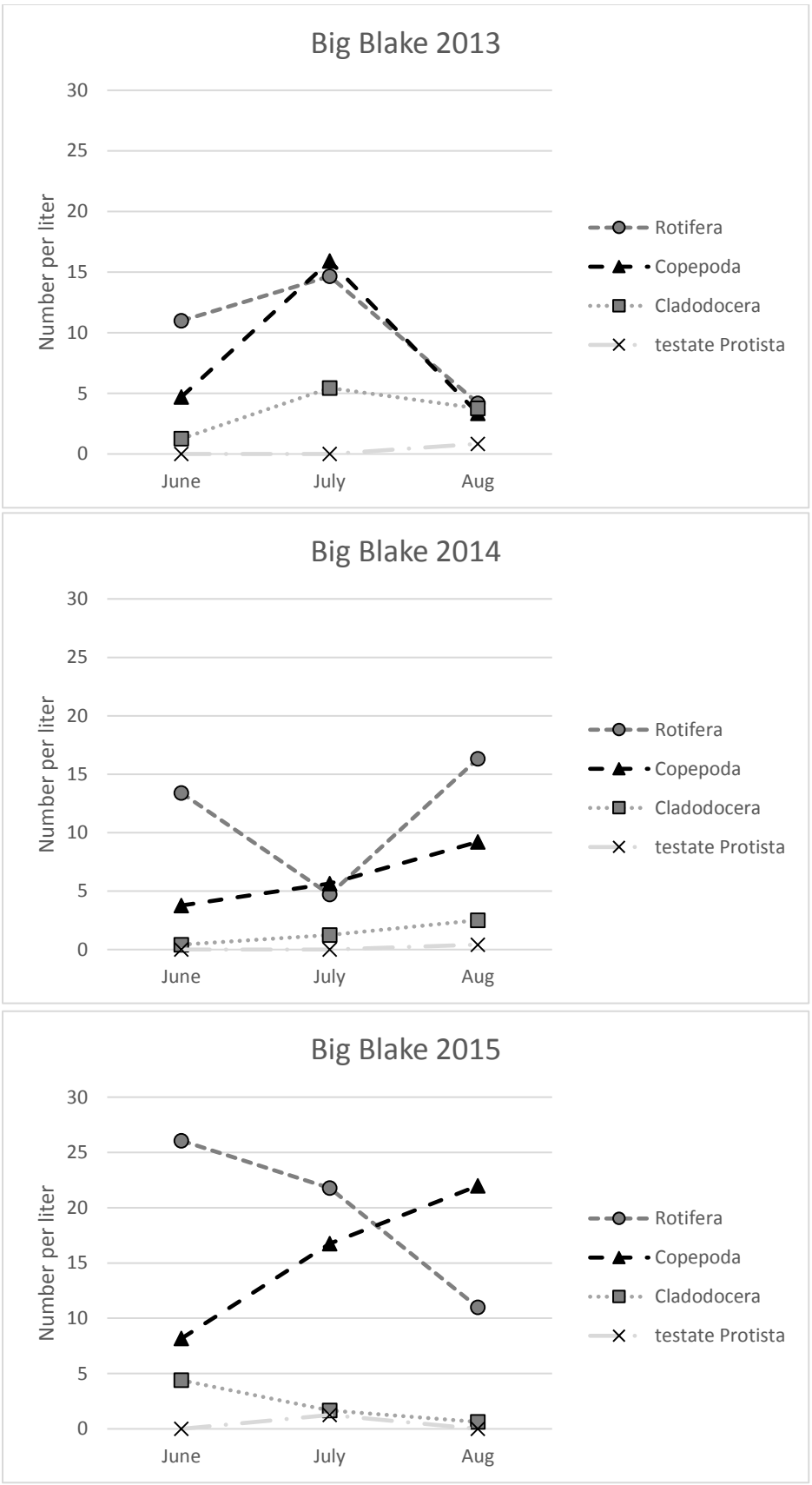

Figure 3. Zooplankton community composition (as total numbers per liter of four primary taxonomic groups) of samples from Big Blake Lake, Polk Co. (WI), 2013 to 2015.

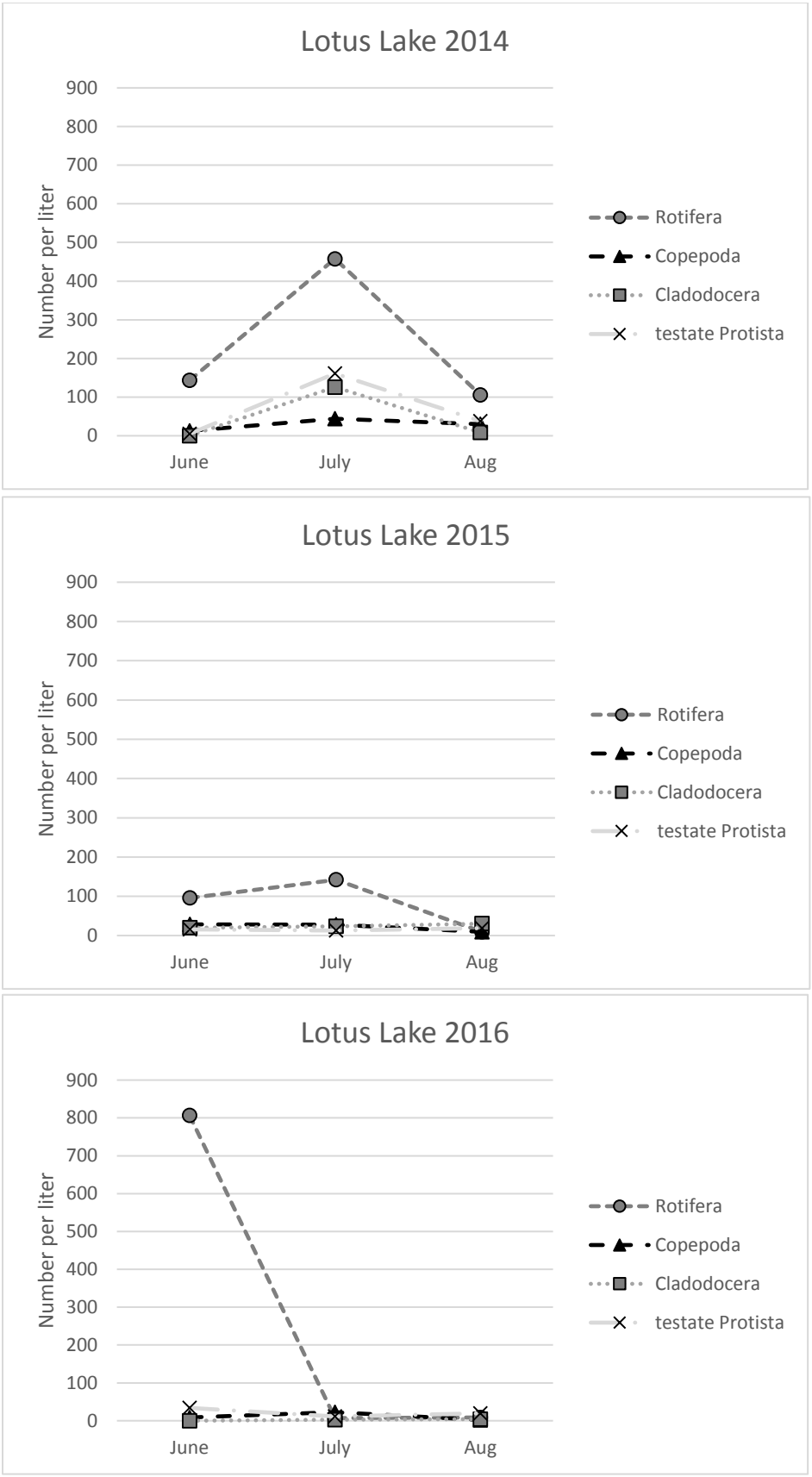

Figure 4. Zooplankton community composition (as total numbers per liter of four primary taxonomic groups) from Lotus Lake, Polk Co. (WI), 2014-2016.

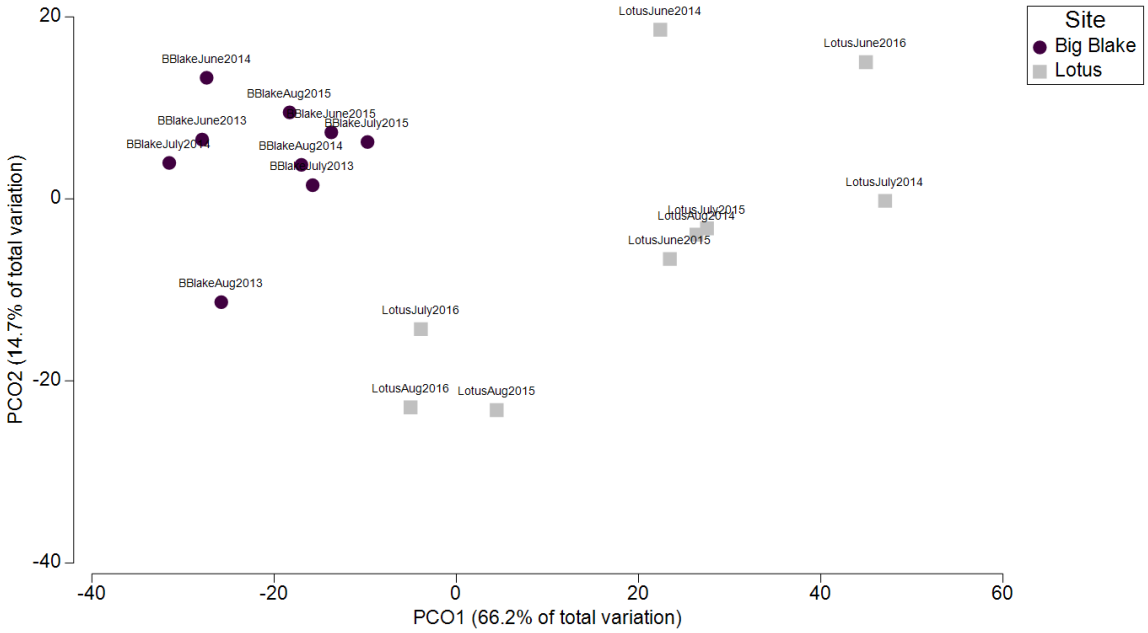

Figure 5. Principal components analysis of zooplankton community composition. Abundances (numbers per liter) were square root transformed before calculating Bray-Curtis resemblance for the ordination. This plot lumped species into major groups to weight the differences between the lakes to show major composition shifts over the more local variations in species. Plot was run in Primer 7 software.

Works Cited

Chick, J.H., H. Havel, J. Jack, K. Medley & A. Levchuk (2006) Analysis of EMAP Great Rivers zooplankton data: update and preliminary results. Great River Ecosystems Reference Conditions Workshop. Cincinnati, OH.

Chick, J.H., A.P. Levchuk, K.A. Medley & J.H. Havel. 2010. Underestimation of rotifer abundance a much greater problem than previously appreciated. *Limnol. Oceanogr*. *Methods* 8, 79-87.

Colwell, R.K. & J.A. Coddington (1994) Estimating terrestrial biodiversity through extrapolation. *Phil. Trans. Royal Soc. London*. Series B 345, 101-118.

Emmons & Olivier Resources, Inc. (EOR), 2009. Interim Report on the Carnelian-Marine-St. Croix Watershed District Multi-Lake TMDL. Prepared for the Carnelian-Marine-St. Croix Watershed District, Washington Conservation District, and Minnesota Pollution Control Agency. 30 September 2009.

Lafrançois, T. 2009. Zooplankton of Wild Goose and Ward Lakes, Polk Co. WI, 2008. Final report to Polk County Land and Water Resources Dept., March 2009.

Lafrançois, T. 2013. Zooplankton of the Apple River Flowage, Big Lake, Church Pine Lake, Long Lake and Wind Lake of Polk County, WI, 2012. Final report to Polk County Land & Water Resources Department, Polk Co. WI.

Lafrancois, T., D. VanderMeulen, and B. Karns. 2016. Zooplankton community differences among four main pools of Lake St. Croix (Minnesota–Wisconsin) 2010–2011. Natural Resource Report NPS/GLKN/NRR—2016/1267. National Park Service, Fort Collins, Colorado.

Mola, Hesham R. Abdel. 2011. Seasonal and spatial distribution of *Brachionus* (Pallas, 1966; Eurotatoria: Monogonanta: Brachionidae), a bioindicator of eutrophication in lake El-Manzalah, Egypt. *Biol. and Medicine* 3(2): 60-69.

Pejler, B. 1983. Zooplankton indicators of trophy and their food. *Hydrobiol*. 101:111-114.

Reid, J. 1991. The genus Metacyclops (Copepoda: Cyclopoida) present in North America: *M. cushae*, new species from Louisiana. *J. Crust. Biol*. 11(4): 639-646.

Thorp, J.H. & A.P. Covich (eds.) (2010) Ecology and classification of North American freshwater invertebrates. Academic Press (Elsevier) 1021 pp.

Walz, N. 1993. Plankton Regulation Dynamics: Experiments and Models in Rotifer Continuous Cultures. New York: Springer-Verlag. pp. 194-206.

Appendix G

Curly-leaf Pondweed Biomass and Turion Data

Date	Site	Dredge turion (#)	Turions/m^2	Biomass (grams)	Turion # attached to biomass
6/19/13	4	2	86.95652174	0	0
	8	1	43.47826087	0.5	0
	6	3	130.4347826	0.6	0
	12	4	173.9130435	0.7	0
	44	0	0	0.3	0
	46	6	260.8695652	0.1	0
	48	1	43.47826087	0.1	0
	51	1	43.47826087	2.8	0
6/20/13	69	0	0	0	0
	72	4	173.9130435	9	0
	82	4	173.9130435	12.3	0
	84	0	0	0	0
	79	10	434.7826087	4.2	0
	87	3	130.4347826	0.1	0
	97	9	391.3043478	0	0
	93	0	0	0	0
	92	0	0	0	0
	91	0	0	0	0
	120	0	0	0	0
	121	1	43.47826087	0	0
	125	0	0	0.3	0
	141	0	0	0	0
	140	0	0	0	0
	138	0	0	0	0
	160	0	0	0	0
	154	1	43.47826087	0	0
	165	0	0	0	0
	166	0	0	0	0
	168	0	0	0	0
	169	0	0	0	0
	173	0	0	0	0
9/25/13	181	1	43.47826087	0	0
	188	0	0	0.1	0
	189	2	86.95652174	0	0
	209	5	217.3913043	0	0
	203	5	217.3913043	0	0
	198	0	0	0	0
	193	0	0	0	0
	219	2	86.95652174	0	0
	220	1	43.47826087	0.2	0
	228	3	130.4347826	0	0
	232	15	652.173913	0.1	1
	238	9	391.3043478	0.3	0
	241	2	86.95652174	0	0

	255	1	43.47826087	0	0
	256	1	43.47826087	0.1	0
	260	0	0	0.1	0
	268	12	521.7391304	0.9	0
	267	26	1130.434783	0	0
	276	0	0	0	0

Date	Site	Dredge turion (#)	Turions/m^2	Biomass (grams)	Turion # attached to biomass
6/2/14-6/4/14	4	1	43.47826087	0	0
	10	0	0	0	0
	11	3	130.4347826	0.9	0
	14	4	173.9130435	8.1	1
	37	4	173.9130435	2.4	3
	30	5	217.3913043	0	0
	19	0	0	0	0
	31	2	86.95652174	0.3	0
	49	5	217.3913043	7.3	12
	23	0	0	0.1	0
	56	0	0	1.7	0
	65	7	304.3478261	0.9	1
	67	1	43.47826087	0	0
	73	0	0	0	0
	77	0	0	0.1	0
	82	0	0	6.6	2
	85	0	0	0	0
	94	0	0	0	0
	96	0	0	0	0
	105	0	0	0	0
	111	1	43.47826087	0	0
	124	0	0	0	0
	133	0	0	0	0
	136	0	0	0	0
	139	1	43.47826087	0	0
	147	0	0	0	0
	159	0	0	0	0
	167	0	0	0	0
	170	1	43.47826087	0	0
	171	0	0	0	0
	185	1	43.47826087	0	0
	188	1	43.47826087	0	0
	195	0	0	0	0
	202	2	86.95652174	0	0
	210	3	130.4347826	4.8	2
	217	0	0	3.3	0

	222	1	43.47826087	0	0
	224	4	173.9130435	0	0
	228	5	217.3913043	0	0
	234	4	173.9130435	1.2	1
	237	7	304.3478261	0	0
	239	1	43.47826087	0	0
	241	2	86.95652174	0	0
	244	0	0	0.5	1
	250	1	43.47826087	0	0
	255	1	43.47826087	0	0
	264	10	434.7826087	0.2	0
	269	7	304.3478261	0	0
	271	10	434.7826087	0	0
	273	0	0	0	0

Date	Site	Dredge turion (#)	Turions/m^2	Biomass (grams)	Turion # attached to biomass
6/16/15	10	0	0	2.7	0
	15	0	0	0	0
	18	0	0	2.3	0
	24	3	130.4347826	2.2	1
	30	1	43.47826087	3.3	0
	31	1	43.47826087	12.5	0
	34	0	0	0.2	0
	44	0	0	0.2	0
	57	2	86.95652174	21.8	0
	66	1	43.47826087	35.2	0
	70	0	0	0	0
	89	1	43.47826087	2.2	1
	94	0	0	0	0
	97	0	0	0.5	0
	103	0	0	0.2	0
	105	0	0	0	0
	111	0	0	0	0
	120	0	0	0	0
	122	0	0	0	0
	128	0	0	0	0
	130	0	0	0	0
	139	0	0	0	0
	142	0	0	0	0
	147	0	0	0	0
	149	0	0	0	0
	154	0	0	0	0
	161	0	0	0	0
	165	0	0	0	0

	169	0	0	0	0
	174	0	0	0	0
	185	0	0	0	0
	189	1	43.47826087	0	0
	194	0	0	0	0
	197	0	0	0	0
	199	1	43.47826087	0	0
	205	0	0	0	0
	208	2	86.95652174	0.6	0
	213	0	0	1.1	0
	219	3	130.4347826	0.1	0
	224	0	0	0.4	1
	231	4	173.9130435	1.9	0
	234	2	86.95652174	4.2	0
	240	15	652.173913	4.2	0
	243	0	0	1.1	0
	249	1	43.47826087	0.6	0
	255	2	86.95652174	0.1	0
	264	2	86.95652174	0.7	0
	270	8	347.826087	15	0
	271	14	608.6956522	0.3	1
	273	0	0	0	0

Appendix H

Point Intercept Aquatic Macrophyte Survey Data

9:00am - 1:30 EW, JW, KH

cool spring, 1st record lake ice OFF [redacted]

Field Sheet 1 of 2 pages

Observers for this page: names and hours worked by each:

Lake: Big Blake **WBIC** **County** Polk **Date:** 6/11/13 Tuesday PSL

Site #	Depth (ft)	Dominant sediment type Muck (M), Sand (S), Rock (R)	Rake pole (P) or rake rope (R)	comments	EWM	CLP	POTCR	1 POTRU	2 CERDE	3 POTZO	4 POTIL	5 POTPR	6 ZIZAQ	7 LEMTR	8 VAL AMER.	9 Wolffia	10 Lem Mi	11	12	13	14	15
1	8.5	M				1 ✓		1														
2	10	M				1 ✓		1														
3	9.5	M				1		1	1													
4	9	M						1		1												
5	9	M				1		1			V											
6	8	[redacted]				V		1 ✓														
7	10	M				1		1 ✓														
8	11	M				1		✓														
9	10.5	M				1		✓														
10	10	M				1		1 ✓														
11	9.5	M				1		1 ✓														
12	9	M				1			1 ✓													
13	8	M				1	✓															
14	5	M				2	✓		1			1										
15	3	M				1 ✓			2	1			V	1								
16	7	S				1 ✓																
17	8	M						1 ✓						1								
18	10	M						1 ✓	1													
19	10.5	M						1 ✓														
20	11	M				1		1 ✓														
21	11	M						1 ✓														
22	11	M						1 ✓				1										
23	10	M				1 ✓																
24	10	M				1 ✓																
25	10	M				1																
26	8.5	M				2 ✓			1													
27	8	M				1 ✓			1				1			V	V					
28	7	[redacted]				2 ✓			1													
29	10	[redacted]				1 ✓		1	1					1								
30	10.5	M						1														

Observers for this page: names and hours worked by each:

Lake: WBIC County Date:

Site #	Depth (ft)	Dominant sediment type Muck (M), Sand (S), Rock (R)	Rake pole (P) or rake rope (R)	comments	EWM	CLP	1 POTCR	2 POTPU	3 CERDE	4 POTZO	5 POTIL	6 POTPR	7 ZIZAQ	8 LEMTR	9 VALAM	10 WOLCO	11 LEMMI	12 RAAQ	13 HETDU	14 FIL ALG	15 MYR SI
31	11	m				1	1														
32	11	↓		Ø																	
33	11	↓				1															
34	11	↓				1															
35	10	↓				1															
36	10	↓					1														
37	9.5	↓				1	1	1													
38	5	S				1	1						1		1	1	1				
39	9	M				2															
40	10.5	M					1														
41	11	M					1														
42	11	M				1															
43	11	M					1														
44	11	M		Ø																	
45	10.5	M				1															
46	10.5	M				1															
47	9.5	M				1															
56	10	M				2															
55	11	M				1															
54	11	M					1														
53	11	M		Ø																	
52	11	M				1															
51	11	M				1	1														
50	11	M					1														
49	10	M				1															
48	3	R				1	1						1			1	1	2	1	1	
57	4.5	M				3										V					
58	3.5	S				1	1												1		
59	3	S				2	1														
60	3	S				2	1			V							1			1	

Observers for this page: names and hours worked by each:																					
Lake:				WBIC							County					Date:					
Site #	Depth (ft)	Dominant sediment type Muck (M), Sand (S), Rock (R)	Rake pole (P) or rake rope (R)	comments	EWM	CLP	1 Pot Pu	2 Cert de	3 Pot Zo	4 Pot IL	5 Pot Pr	6 ZIZ AQ	7 Lemna Tri	8 Val Am	9 Wolffia	10 Lem mi	11 RAN AQ	12 Hete Du	13 Fil Alg	14 Myr Si	15 Nup VA
61	12	M																			
62	12	M																			
63	12.5																				
64	11	M				1✓															
65	3.5	M				2✓		1✓													2✓
66	10	M				1✓															
67	12					1✓															
68	13																				
69	15																				
70	15																				
71	9					1✓															
72	13.5																				
73	15.5																				
74	16																				
75	10	R																			
76	16																				
77	13.5																				
78	9.5	S				1✓	1✓														
79	7	R				1✓															
80	7.5	M				1✓															
81	4.5	M				2✓															
82	7	R				2✓															
83	12.5	M																			
84	14																				
85	13.5																				
86	12	M																			
87	11.5	M				1✓															
88	10	M				V✓															
89	5.5	M				1✓	1✓														
90	Shore																				

Observers for this page: names and hours worked by each:

Lake: **WBIC** **County** **Date:**

Site #	Depth (ft)	Dominant sediment type Muck (M), Sand (S), Rock (R)	Rake pole (P) or rake rope (R)	comments	EWM	CLP	1 Pot pu	2 certde	3 Pot zo	4 Pot IL	5 Pot ri	6 Ziz aq	7 Lemna To	8 Val Am	9 Wolfia	10 Lemna Mi	11 Ran Pa	12 Het Du	13 Tri Ala	14 Myr Si	15 Nur Va
91	12.5																				
92	13.5																				
93	14																				
94	13																				
95	12	M																			
96	12	M																			
97	12	M				1															
98	15	R				2	1									1					
99	[illegible]	R				1															
100	13.5																				
101	13.5																				
102	14																				
103	13																				
104	12																				
105	12																				
106	12					1															
107	10					1															
108	11.5																				
109	14																				
110	13																				
111	12.5																				
112	12.5																				
113	12.5																				
114	12	M																			
115	13																				
116	[illegible]	R				1															
117	10	R																			
118	14																				
119	13																				
120	12.5																				

135 - start point for 6/13/13 10:30-12:30

Field Sheet 1 of 2 pages

PS 4

Observers for this page: names and hours worked by each:

Lake: WBIC County Date:

Site #	Depth (ft)	Dominant sediment type Muck (M), Sand (S), Rock (R)	Rake pole (P) or rake rope (R)	comments	EWM	CLP	1 Pot Pu	2 Cer. de	3 Pot zo	4 Pot Il	5 Pot Pr	6 Ziz Aq	7 Lemna Tr	8 Val Am	9 Wolfia	10 Lemna Mi	11 Ran Ac	12 Het Du	13 Ut Au	14 Myr Si	15 Nup Va
121	12.5																				
122	12.5																				
123	13																				
124	13																				
125	11	M																			
126	11.5																				
127	13.5																				
128	13.5																				
129	12.5																				
130	13																				
131	13																				
132	13																				
133	12	M																			
134	12																				
135	11	R																			
136	14																				
137	14																				
138	12.5																				
139	12.5																				
140	13																				
141	13																				
142	12.5																				
143	12	M				1/															
144	11.5	M				1/															
145	8.5	M				1/															
146	15																				
147	14																				
148	13.5																				
149	13																				
150	13																				

Observers for this page: names and hours worked by each:

Lake: **WBIC** **County** **Date:**

Site #	Depth (ft)	Dominant sediment type Muck (M), Sand (S), Rock (R)	Rake pole (P) or rake rope (R)	comments	EWM	CLP	1 Pot pu	2 Cerde	3 Pot 10	4 Pot 11	5 Pot 9	6 Ziz Aq	7 Lemna TF	8 Val Am	9 Wolffia	10 Lemna Mi	11 Ran Aq	12 Hot pu	13 Fil Algae	14 Nym Sp	15 Nup Var
151	12.5																				
152	12.5																				
153	12.5																				
154	12	M				1															
155	11.5	M																			
156	9	R				1	1	1													
157	8.5	MS																			
158	16																				
159	15																				
160	14																				
161	13																				
162	12																				
163	13.5																				
164	13.5																				
165	13.5																				
166	14																				
167	13																				
168	13																				
169	13																				
170	13																				
171	13																				
172	12.5																				
173	11.5	M																			
174	13.5																				
175	14.5																				
176	14																				
177	13.5																				
178	13.5																				
179	13.5																				
180	14																				

Observers for this page: names and hours worked by each:

Lake: WBIC County Date:

Site #	Depth (ft)	Dominant sediment type Muck (M), Sand (S), Rock (R)	Rake pole (P) or rake rope (R)	comments	EWM	CLP	1 Pot pu	2 Cer de	3 Pot ZO	4 Pot IL	5 Pot Pr	6 Ziz Aq	7 Lemna Tr	8 Val Am	9 Wolffia	10 Lemna Mi	11 Ran Aq	12 Hel Du	13 Fil Alg	14 Myr Si	15 Nup Va	Nym Od
181	13.5																					
182	13																					
183	13																					
184	12.5																					
185	13																					
186	12.5																					
187	12.5																					
188	12.5																					
189	12	M																				
190	11	M																				
191	11	M																				
192	12.5																					
193	13.5																					
194	13.5																					
195	15																					
196	13																					
197	12.5																					
198	12	M																				
199	12.5																					
200	13																					
201	12.5																					
202	12	M																				
203	11.5	M																				
204	12.5																					
205	12	M						1														
206	11	M																				
207	10.5	M																				
208	10.5	M																				
209	10	M																				
210	6	M				2			1												V		V

Meg

Observers for this page: names and hours worked by each:																						
Lake:						WBIC					County						Date:					
Site #	Depth (ft)	Dominant sediment type Muck (M), Sand (S), Rock (R)	Rake pole (P) or rake rope (R)	comments	EWM	CLP	1 Pot Py	2 Cer de	3 Pot Zo	4 Pot IL	5 Pot pr	6 Biz Aq	7 Lemna Tr	8 Val Am	9 Wolffia	10 Lemna Mi	11 Ran Aq	12 Het du	13 Fil Alg	14 Myr Si	15 Nup Va	Nym Od
211	10	R				2																
212	12	M																				
213	11	M																				
214	12	M																				
215	13																					
216	8.5	M				2	1															
217	9.5	M				V																
218	9	M				V	1						1									
219	11.5	M																				
220	11	M																				
221	10	M				1																
222	10	M				1																
223	10	M				1																
224	9	M						1														
225	5.5	R				2																
226	5	M				2																
227	10.5	M																				
228	10.5	M							1													
229	10	M				1																
230	10	M																				
231	10	M																				
232	9	M																				
233	4	M				1	1	V					1			[illegible]						V
234	4	M				2	1	1	V													
235	10.5	M																				
236	9.5	M				1																
237	9	M				1																
238	9.5	M																				
239	9.5	M				1																
240	9	M				1	[illegible]	1	V				1									

Observers for this page: names and hours worked by each:

Lake: **WBIC** **County** **Date:**

Site #	Depth (ft)	Dominant sediment type Muck (M), Sand (S), Rock (R)	Rake pole (P) or rake rope (R)	comments	EWM	CLP	1 Pot pu	2 Cer de	3 Po Zo	4	5 Pot IL	6 Pot Pr	7 Ziz Ar	8 Lem a Tr	9 Val Am	10 Wolffia	11 Lemna Mi	12 Rac ta	13 Het Du	14 Fil Alga	15 Myr Si	Nym Var
241	10.5	M										1										
242	9.5	M				1	1					1										
243	9.5	M																				
244	9.5	MR				1		1														
245	6	R				1		3														
246	8	M				1	V															
247	2	M				1		2	V				2								V	V
248	10	M																				
249	8	M						1														
250	9	M					1															
251	8	M				V		2														
252	5	M						3	1				1								V	
253	1.5	M				V		2	1				2				1	1			V	1
254	8	M				1		1	1													
255	9	M					1	1	1													
256	8.5	M						1			2											
257	5	M						2	1													
258	4.5	M				V		2	1			V	1									V
259	4	M				1	1	1	1		2											
260	8	M						1	1		V											
261	8	M						2	1													
262	5	M				1	1	2	1		V		1									
263	2	M				V	1	1	1			V	1								V	1
264	6	M				1		1	1				1									
265	7	M						2	1													
266	6.5	M						3	1				1									
267	4.5	M						3	V			V	1									V
268	3	M						2	1				1									V
269	4.5	M				V		3	1				1									
270	3	M				V		1										1				

Observers for this page: names and hours worked by each:

Lake: **WBIC** **County** **Date:**

Site #	Depth (ft)	Dominant sediment type Muck (M), Sand (S), Rock (R)	Rake pole (P) or rake rope (R)	comments	EWM	CLP	1 Pot pu	2 Cer de	3 Pot zo	4 Pot ill	5 Pot pr	6 Zizania	7 Vall Am	8 Vall Am	9 Elodea	10 Elodea	11 Ranun	12 Heter	13 Fil Al	14 Myr Sp	15 Nuph	Nym Od
271	2.5	M				1		2					1									1
272	1.5	M				1	1	1	1						1	1		1				1
273	1.5	M				1		2					1		1	1						1
274	2.5	M				1	1	1							1	1			1			1
275																						
276																						

Big Blake Polk WBIC 2627000 **Date:** 8/13/13

Observer 1: name and hours: KH	Observer 2: name and hours: EW	Observer 3: name and hours: JW	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotPu	3 Nymod	4 PotZo	5 LemTr	6 LemMi	7 WolRh	8 SpiPo	9 Filamentous algae	10 ZizAq	11 NupVa	12 SchLa	13 HetDu	14 ValAm	15 PotRi	16 RanAq	17 MyrSi	18 PotPe	19 NajFl	20	21	22	23
1	8.5																												
2	9																												
3	9																												
4	8.5																												
5	8						1	1																					
6	8																												
7	9																												
8	9.5																												
9	9.5																												
10	9																												
11	9																												
12	8.5						1																						
13	7.5																												
14	6.5						1																						
15	3						2		1	1	1	1	1	1	V	V													
16	5						2			1																			
17	8						1																						
18	9																												
19	9.5																												
20	9.5																												
21	9.5																												
22	9.5																												
23	9						3			1																			
24	9						V																						
25	9						1																						
26	8.5																												
27	rice																												
28	7						1		V																				
29	9						1			1																			

Big Blake Polk WBIC 2627000 **Date:**

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotPu	3 NymOd	4 PotZo	5 LemTr	6 LemMi	7 WolFq	8 SprPo	9 Filalg	10 BizAq	11 NupVa	12 SenTa	13 HetPu	14 ValAm	15 PotFi	16 RanAq	17 MyrSi	18 NajFl	19	20	21	22	23
30	9.5																												
31	9.5																												
32	9.5																												
33	9.5																												
34	9.5																												
35	9.5																												
36	9																												
37	8.5																												
38	Shore																												
39	9	S																											
40	10																												
41	10																												
42	10																												
43	10																												
44	10																												
45	9.5																												
46	9																												
47	6.5						1										V	V											
48	4									2									1										
49	9						2																						
50	10																												
51	10																												
52	10																												
53	10																												
54	10																												
55	10																												
56	7	R						1				1			1														
57	3						1			1																			
58	2						2				1									1	1	1		1					

Big Blake Polk WBIC 2627000 **Date:**

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotPu	3 NymOd	4 PotZa	5 LemTr	6 LemMi	7 WolFi a	8 SprPo	9 Filalgae	10 ZizAq	11 NupVa	12 SchTa	13 HetDe	14 ValAm	15 PotRi	16 RanAq	17 MyrSi	18	19	20	21	22	23
59	5.5						1	1																					
60	9.5																												
61	10.5																												
62	10.5																												
63	11.5																												
64	11.5																												
65	2						2		1		1						V			1		1							
66	8.5																												
67	10.5																												
68	11																												
69	13																												
70	13.5																												
71	9									1																			
72	11.5																												
73	13.5																												
74	15																												
75	12																												
76	13																												
77	12.5																												
78	5	R						1																					
79	6.5									1																			
80	8	S																											
81	6.5	S					1	1						1															
82	12																												
83	12																												
84	12																												
85	12																												
86	10.5																												
87	10																												

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 Cerbe	2 PotPu	3 Nymod	4 PotZo	5 LemTr	6 LemMi	7 WolFa	8 SpiPo	9 Filalgae	10 ZizAq	11 NupVa	12 SchTa	13 HetDu	14 VaLAm	15 PotFi	16 RanAq	17 MyrSi	18	19	20	21	22	23
88	9.5																												
89	4	R															✓												
90	shore																												
91	12																												
92	12																												
93	12																												
94	11																												
95	11																												
96	10.5																												
97	9.5																												
98	9	R						1		1	1			1			✓												
99	11.5																												
100	12.5																												
101	12.5																												
102	11.5																												
103	11.5																												
104	11																												
105	12																												
106	12																												
107	8																												
108	11																												
109	14																												
110	12.5																												
111	12																												
112	11																												
113	11.5																												
114	11.5																												
115	12.5																												
116	4	R						✓		1				1			✓					1							

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotPu	3 Nymod	4 Potzo	5 LemTr	6 LemMi	7 Wolfi a	8 Spr Po	9 Fl alg	10 ZizAq	11 NupVa	12 Schta	13 HetPu	14 Valam	15 PotKi	16 Ranta	17 Myrsi	18	19	20	21	22	23
117	13																												
118	12.5																												
119	12																												
120	12																												
121	12																												
122	12																												
123	12																												
124	13																												
125	11																												
126	13.5																												
127	13																												
128	12																												
129	12.5																												
130	12																												
131	12																												
132	12																												
133	12																												
134	10.5																												
(135)	8.5																												
136	14																												
137	13																												
138	12.5																												
139	12.5																												
140	12																												
141	12																												
142	12																												
143	12																												
144	11																												
145	9							1			1																		

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotPu	3 NyMod	4 PotZo	5 LemTr	6 LemMi	7 WolFi	8 SprPo	9 Fil algae	10 ZizAq	11 NupVa	12 SchTa	13 UtrPu	14 VaIAm	15 PotRi	16 RanAq	17 MyrSi	18	19	20	21	22	23
146	13																												
147	14																												
148	13																												
149	12.5																												
150	12.5																												
151	12																												
152	12																												
153	12																												
154	12.5																												
155	12.5																												
156	10.5																												
157	10																												
158	15																												
159	13.5																												
160	13																												
161	13																												
162	12.5																												
163	12.5																												
164	12.5																												
165	12.5																												
166	12.5																												
167	13																												
168	12.5																												
169	12.5																												
170	12.5																												
171	12																												
172	12																												
173	10																												
174	11																												

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 Cerbe	2 PotPu	3 Nymod	4 Potzo	5 LeWTr	6 LemMi	7 WolFi	8 SprPo	9 fil algae	10 ZizAq	11 NupVa	12 ScHTa	13 HetDu	14 ValAm	15 PotRi	16 RanAq	17 MyrSi	18	19	20	21	22	23
175	14.5																												
176	13																												
177	13																												
178	12.5																												
179	12.5																												
180	12.5																												
181	12.5																												
182	12																												
183	11.5																												
184	12																												
185	12																												
186	12																												
187	11.5																												
188	11.5																												
189	10.5																												
190	10																												
191	10.5																												
(192)	11																												
193	12.5																												
194	13																												
195	14																												
196	13																												
197	13																												
198	12.5																												
199	12																												
200	11.5																												
201	11																												
202	11																												
203	11																												

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotPu	3 NymOd	4 PotZo	5 LemTr	6 LemMi	7 WolFi	8 SprPo	9 fil algae	10 ZizAq	11 NupVa	12 SchTa	13 HetDu	14 ValAm	15 PotRi	16 RanFl	17 MyrSi	18	19	20	21	22	23
204	11																												
205	10.5																												
206	10																												
207	10																												
208	10																												
209	8																												
210	7	R																				V							
211	9.5	R																											
212	12																												
213	12																												
214	11																												
215	11																												
216	7.5	R						1																					
217	7	S					1	1		1												2							
218	8						1			3												1							
219	11																												
220	10																												
221	9.5																												
222	9.5																												
223	9						2													1									
224	9																												
225	5							1		V												1							
226	5.5						1																						
227	10																												
228	9.5																												
229	9.5																												
230	9																												
231	9																												
232	9						V																						

Observer 1: name and hours: | Observer 2: name and hours: | Observer 3: name and hours: | Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotPu	3 NymOd	4 Potzo	5 LemTr	6 LemMi	7 WolFl	8 SprPo	9 fil algae	10 ZizAq	11 NupVa	12 ScrTa	13 HetDu	14 ValAm	15 PotKi	16 RanAq	17 MyrSi	18	19	20	21	22	23
233	2						1		1		1						V		1	1	1								
234	5						3		V	1	1																		
235	10																												
236	9																												
237	9						1																						
238	9																												
239	7.5																												
240	8						2				1																		
241	10																												
242	9																												
243	9						1																						
244	8																												
245	6.5	R		1			1																						
246	7						V																						
247	Nym bed																												
248	9.5																												
249	8.5						1			1																				
250	8.5																												
251	6						2			1				1															
252	4						3			1	1																		
253	rice bed																												
254	7						1		V	1	1																		
255	8.5						1																						
256	8						2			1																			
257	7						1													1									
258	4						3		V	2	1																		
259	7.5						1			1																			
260	8									1																			
261	7						1			1																			

Big Blake Polk WBIC 2627000 **Date:**

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotPu	3 Nymod	4 PotZo	5 LemTr	6 LemMi	7 WolFi	8 SprPo	9 filam algae	10 ZizAq	11 NupVa	12 SchTa	13 HetDu	14 ValAm	15 PotRi	16 RanAq	17 MyrSi	18 PotPr	19	20	21	22	23
262	5						2			1	1													1					
263	Nym bed																												
264	6						3		V	1																			
265	7						1			1	1																		
266	4.5						1			1	1																		
267	4						1		V																				
268	Shore																												
269	4						1			1																			
270	3						2		V																				
271	3						3	1	1	2	1					V			1				1						
272	Dmp bed																												
273																													
274																													
275																													
276																													
277																													
278																													
279																													
280																													
281																													
282																													
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285																													
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287																													
288																													
289																													
290																													

6/2/14 JW KH
6/3/14 JW KH GW

Big Blake Lake Polk County WBIC 2627000 **Date:** **Page 1 of 29**

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 Pot pu	2 Pot pf	3 Lem tr	4 Lem ni	5 Wolfia	6 Cer de	7 Fil	8 Potzo	9 Ziza	10	11	12	13	14	15	16	17	18	19	20	21
1	8.0	M	P				1																				
2	8.2	M	P			1	1																				
3	7.6	M	P			1	1																				
4	8.0	M	P	1		V	1	V																			
5	6.0	M	P			3	1																				
6	7.2	M	P				1																				
7	8.5	M	P				1					1															
8	8.9	M	P																								
9	8.3	M	P																								
10	9.3	M	P	1			1																				
11	8.3	M	P	1		1	1																				
12	6.9	M	P				1					1															
13	7.0	M	P			2	1					1															
14	3.9	M	P	V		2	2		1	V	V	1	V														
15	1.5	M	P				1		V	V	V	V		1	1												
16	5.8	M	P				1																				
17	9.6	M	P				2																				
18	8.3	M	P				1																				
19	4.3	M	P	1																							
20	8.1	M	P			1																					
21	8.4	M	P			2																					
22	8.6	M	P																								
23	8.6	M	P	1		1																					
24	7.7	M																									
25	7.4	M	P			1	1																				
26	7.2	M	P			1	1																				
27	Shallow																										
28	4.0	R	P				1					1			1												
29	8.3	M	P				1																				
30	9.5	M	P	1		Nothing																					

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:							Observer 2: name and hours:									Observer 3: name and hours:										Total hours worked:					
Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 Pot pu	2 Pot pr	3 Cer tr	4 Cer mi	5 Wolfia	6 Ceratophyllum	7 Fil.	8 Potzo	9 Zizania	10 Nymod	11 SpAreu	12 SchTa	13 NupVa	14	15	16	17	18	19	20	21
31	8.2	M	P	1		1	1																				
32	7.3	M	P				1																				
33	8.4	M	P			1																					
34	8.1	M	P			1																					
35	8.1	M	P			1																					
36	8.5	M	P			1		V																			
37	8.5	M	P	1		1	1																				
38	2.5	M	P				1		1			1			V	V											
39	8.7	M	P																								
40	9.0	M	P			1																					
41	9.2	M	P			1																					
42	8.5	M	P				1																				
43	8.0	M	P																								
44	8.3	M	P			1																					
45	8.6	M	P			1																					
46	7.9	M	P			1																					
47	2.5	M	P			1	1		1			1					V	3									
48	3	S	P			1	1		1				1														
49	8.2	R	R	1		2	1																				
50	10.5	M	P			1																					
51	11.1	M	P			1																					
52	10.5	M	P																								
53	11	M	P																								
54	10.5	M	P			1																					
55	8.3	M	P			1																					
56	4.8	M	P			1	1																				
57	1.5	M	P			1	1		1				2	V				1									
58	2.7	M	P			1	1																				
59	6.5	M	P			2	1																				
60	10.5	M	P			1																					

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:							Observer 2: name and hours:																		Observer 3: name and hours:														Total hours worked:						
Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 PotPu	2 PotPr	3 LemTr	4 LemMi	5 VisTh a	6 CerDe	7 Fil	8 Pot Zo	9 ZiAqu	10 NymOd	11 SpAeU	12 SchTa	13 NupVa	14	15	16	17	18	19	20	21
61	9.5	M	P			1																					
62	10.0	M	P																								
63	9.2	R	P																								
64	8.5	M	P			1																					
65	2.5	M	P			1	1		1			1						1									
66	8.6	M	P			1																					
67	10.1	M	P																								
68	11.7	M	R			1																					
69	13.7	M	R																								
70	12	M	P																								
71	9.8	M	P			1																					
72	12.4	M	P																								
73	14.5																										
74	15																										
75	11.5	M	R																								
76	13.5																										
77	11.5	M	R			1																					
78	2.7	R	P																								
79	5.0	R	P			V																					
80	7.7	M	P			1																					
81	5.5	M	P			1																					
82	7.0	M	P			2																					
83	11.2	M	R																								
84	12	M	R																								
85	11.2	M	R																								
86	10.5	M	P																								
87	10.0	M	P																								
88	9.6	M	P																								
89	3.0	R	P			1	1																				
90	1.0	R	P																								

Big Blake Lake Polk County WBIC 2627000 Date:

X

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 PotPu	2 PotPc	3 LemTc	4 LemMi	5 Wolffia	6 CerDe	7 fil	8 Pot20	9 ZizAq	10 NymOd	11 SpAeu	12 SchTa	13 NupVa	14	15	16	17	18	19	20	21
91	10.8	M	R																								
92	12.8	-	-																								
93	12.2	-	-																								
94	11.7	M	R																								
95	10.2	M	P																								
96	10.3	M	P																								
97	10.4	M	P																								
98	3.0	M	P			1	1												V								
99	9	S	P																								
100	12.4	-	-																								
101	12.7	-	-																								
102	12.1	-	-																								
103	11.5	M	R																								
104	11.2	M	R																								
105	10.5	M	P																								
106	10.5	M	P																								
107	7	R	P			1																					
108	9.5	M	P																								
109	12.8	-	-																								
110	11.9	M	R																								
111	11.2	M	R																								
112	11.4	M	R																								
113	11.3	M	R																								
114	11.0	M	R																								
115	11.0	M	P			1																					
116	4.5	R	P			2	1						1														
117	5.5	R	P										1														
118	12.7	-	-																								
119	10.5	M	P																								
120	11.0	M	R																								

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:							Observer 2: name and hours:																		Observer 3: name and hours:														Total hours worked:						
Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 Rot Ru	2 RotPr	3 LemTr	4 LemMi	5 WolFlg	6 CerDe	7 Fil	8 PotZo	9 ZiAqu	10 NymOd	11 SpAeu	12 SchTa	13 NuvVa	14	15	16	17	18	19	20	21																			
121	11.2	M	R																																											
122	11.0	M	R																																											
123	11.3	M	R																																											
124	11.0	M	R																																											
125	9.8	M	P																																											
126	12.5	-	-																																											
127	12.2	-	-																																											
128	11.5	M	R																																											
129	11.7	M	R																																											
130	11.5	M	R																																											
131	11.3	M	R																																											
132	11.4	M	R																																											
133	10.5	M	P																																											
134	10.2	M	P																																											
135	5.5	R	P			1																																							
136	12.9	-	-																																											
137	13.5	-	-																																											
138	12.1	-	-																																											
139	11.3	M	R																																											
140	11.8	M	R																																											
141	12.4	-	-																																											
142	11.5	M	R																																											
143	10.8	M	R																																											
144	10.7	M	P																																											
145	4.5	R	P																																											
146	14.2	-	-																																											
147	13.9	-	-																																											
148	12.0	-	-																																											
149	11.4	-	-																																											
150	12.0	-	-																																											

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 PotPu	2 PotPr	3 NymTr	4 NymMi	5 NajFl	6 CerDe	7 Fi	8 PotZo	9 ZizAq	10 NymOd	11 SpAru	12 SchTa	13 NupVa	14	15	16	17	18	19	20	21
151	11.7	-	-																								
152	11.5	-	-																								
153	11.7	-	-																								
154	11.3	-	-																								
155	10.8	M	P																								
156	9.6	S	P																								
157	6.8	R	P			1																					
158	14.5	-	-																								
159	13.5	-	R																								
160	12	-	-																								
161	11.4	-	-																								
162	12.7	-	-																								
163	12.5	-	-																								
164	12.5	-	-																								
165	12.7	-	-																								
166	12.5	-	-																								
167	11.5	-	-																								
168	11.7	-	-																								
169	11.5	-	-																								
170	12.0	-	-																								
171	11.4	M	R																								
172	10.6	M	P																								
173	11.5	M	R							V	V																
174	9.8	R	P																								
175	13	-	-																								
176	12.5	-	-																								
177	12.0	-	-																								
178	12.5	-	-																								
179	12.5	-	-																								
180	12.6	-	-																								

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:							Observer 2: name and hours:									Observer 3: name and hours:										Total hours worked:					
Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 PotPu	2 PotPr	3 LemTr	4 *LemMi	5 NymSp	6 CerDe	7 Fil	8 PotZo	9 ZizAq	10 NymOd	11 SpaAm	12 SchTa	13 NupVa	14	15	16	17	18	19	20	21					
181	12.4	-	-																												
182	12.2	-	-																												
183	12.3	-	-																												
184	12.1	-	-																												
185	11.9	-	-																												
186	11.8	-	-																												
187	12.2	-	-																												
188	11.9	-	-																												
189	11.5	-	-																												
190	10.7	M	P					1																							
191	9.5	M	P																												
192	12.3	-	-																												
193	11.7	-	-																												
194	12.3	-	-																												
195	13.3	-	-																												
196	12.2	-	-																												
197	11.6	-	-																												
198	11.2	-	-																												
199	11.7	-	-																												
200	12.1	-	-																												
201	12.0	-	-																												
202	11.1	-	-																												
203	11.6	-	-																												
204	12.0	-	-																												
205	11.5	-	-																												
206	11.1	-	-																												
207	10.1	M	P																												
208	9.2	M	P									1																			
209	7.0	M	P		1			1				1																			
210	5.0	M	P		1																										

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 PotFo	2 PotPu	3 VenTr	4 LemMi	5 WolMi	6 CerDe	7 Fil	8 PotZo	9 ZizAq	10 NymOd	11 SpAeu	12 SchTa	13 NupVa	14 MyrSi	15	16	17	18	19	20	21
211	8.5	R	P			2																					
212	12.5	-	-																								
213	10.4	M	P																								
214	10.5	M	P																								
215	7.0	M	P			1																					
216	5.0	R	P			1	1						1						1								
217	5.0	M	P			1	1		1				3														
218	4.5	M	P			1						1							1								
219	11.5	-	-																								
220	10.5	M	P																								
221	9.2	M	P							V	V																
222	9.0	M	P					V																			
223	9.5	M	P				1					1															
224	8.5	M	P																								
225	8.2	M	P			1																					
226	5.0	M	P			3			-			2							1								
227	10.0	M	P						1																		
228	10.0	M	P																								
229	9.2	M	P											1													
230	9.0	M	P						1			1															
231	8.5	M	P			1			1																		
232	8.5	M	P																								
233	5.0	M	P			1	1	V	1																		
234	6.2	R	P			1			1																		
235	10.0	M	P						1																		
236	9.0	M	P						1																		
237	8.5	M	P																								
238	8.4	M	P							V	V		1														
239	9.0	M	P											1													
240	7.0	M	P					V	1																		

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 PotPu	2 PotFr	3 LouTr	4 LemMi	5 WolFo	6 CerDe	7 Fil	8 PotZo	9 ZizAq	10 NymOd	11 SpaEu	12 SchTa	13 NupVa	14 MyrSi	15	16	17	18	19	20	21
241	9.5	M	P																								
242	9.0	M	P			1																					
243	8.7	M	P																								
244	6.9	R	P			1																					
245	3.0	R	P			2			1			1		1													
246	6.8	M	P						1			1	1														
247	2.0	M	P						2			2		1		1			1								
248	8.4	M	P																								
249	8.0	M	P					1																			
250	8.5	M	P																								
251	7.8	M	P						1			1	1														
252	4.0	M	P			1			1			2		1													
253	Shallow - terrestrial																										
254	6.0	M	P				1		1			1	2	1													
255	8.3	M	P						1			1															
256	7.5	M	P				1						1														
257	7.0	M	P						1			1															
258	4.0	M	P					1	1	V	V	1	1	1													
259	8.0	M	P						1			1		1													
260	7.8	M	P									1		1													
261	7.2	M	P									1		1													
262	5.8	M	P									1															
263	Shallow - terrestrial																										
264	6.0	M	P			1	1					1		1													
265	7.3	M	P									1		1													
266	5.5	M	P						1			2	1	1													
267	3.0	M	P						1			3	1														
268	1.8	M	P				2		1			1				1											
269	4.2	M	P									1															
270	2.6	M	P						1			3	3														

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:					Observer 2: name and hours:										Observer 3: name and hours:										Total hours worked:
Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 PotPu	2 PotPr	3 LemTr	4 LemMi	5 WolSt	6 CerDe	7 SpI	8 PotZo	9 ZizAqu	10 NymOd	11 SpAru	12 SchTa	13 NupVa	14 MyrSi	15	16	17	18	19	20	21
271	2.0	M	P						1			2		1	V												
272	1.5	M	P						1			3	2														
273	1.5	M	P				1		1			1	1														
274	2.7	S	P									1															
275	1.5	M	P				V						V			V											
276																											
277																											
278																											
279																											
280																											
281																											
282																											
283																											
284																											
285																											
286																											
287																											
288																											
289																											
290																											
291																											
292																											
293																											
294																											
295																											
296																											
297																											
298																											
299																											
300																											

KH JW 8/25/14

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 Cer De	2 Pot Pu	3 Ziz Aq	4 F L	5 Lem Tr	6 Myr Si	7	8 Nym od	9 Pot Zo	10	11	12	13	14	15	16	17	18	19	20	21
1	7.3	M	P								1															
2	7.8	M	P				V	1																		
3	7.6	M	P				V																			
4	7.3	M	P				V	1																		
5	6.8	M	P				1	1																		
6	6.9	M	P				V					1	V	1												
7	8.2	M	P				1																			
8	8.4	M	P				1																			
9	8.8	M	P				1																			
10	8.5	M	P				1																			
11	8.3	M	P				1																			
12	7.8	M	P				2																			
13	6.3	M	P				1																			
14	5.4	M	P				1				1															
15	Rice						1																			
16	4.0	M	P				2	1	V		1			1												
17	7.3	M	P				1																			
18	7.8	M	P				1																			
19	8.1	M	P				1																			
20	9.1	M	P				1																			
21	10.2	M	P				1																			
22	8.2	M	P				1																			
23	9.2	M	P				1																			
24	8.3	M	P				1																			
25	7.0	M	P		1		1							V												
26	6.9	M	P		1		1																			
27		R	IC	E																						
28	6.1	M	P				1				1															
29	8.1	M	P				1																			
30	8.2	M	P				1																			

JW KH

Big Blake Lake Polk County WBIC 2627000 **Date: 8/25/14** **Page 2 of 29**

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 Cer	2 Pot	3 Ziz	4 Ric	5 Nym	6 Myr	7 Hyd	8 Lem	9 Pot	10 Val	11 Pot	12 Naj	13 Nup	14 Sag	15	16	17	18	19	20	21
31	9.0	M	P			1																					
32	9.6	M	P			1																					
33	10.4	M	P			1																					
34	10.0	M	P			V																					
35	10.0	M	P			1																					
36	8.6	M	P			1																					
37	7.8	M	P			1																					
38	2.8	R	P			1					V	V	1														
39	8.5	M	P										1														
40	9.0	M	P			1																					
41	9.9	M	P			1																					
42	10.9	M	P			1																					
43	10.3	M	P			1																					
44	10.1	M	P			1																					
45	9.3	M	P			1																					
46	8.4	M	P			V								1													
47	6.8	M	P											1													
48	1.3	R	P					1	V		V		1		1	1		1	1								
49	8.1	M	P			1																					
50	8.7	M	P			1																					
51	9.1	M	P			1																					
52	9.3	M	P			1																					
53	9.1	M	P			1																					
54	9.2	M	P			1																					
55	8.9	M	P			1																					
56	8.2	M	P			1																					
57	1.0	R	P			1					V		1				1	V	V								
58	6.9	M	P			1																					
59	8.5	M	P			1																					
60	9.7	M	P			1																					

Big Blake Lake Polk County WBIC 2627000 JW KM Date: 8/25/19

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 POTPu	3 ZizAq	4 fil	5 PotZo	6 LemTr	7 NupVa	8 MyrOd	9 LemMi	10 WolFl	11 RanAq	12 MyrSi	13	14	15	16	17	18	19	20	21
Observer 1: name and hours:							Observer 2: name and hours:										Observer 3: name and hours:										Total hours worked:
61	10.9	Deep																									
62	10.6	Deep																									
63	11.5	Deep																									
64	9.7	M	P				—																				
65	2.7						1			1		1	1	1	1	1	1										
66	8.5	M	P								1	1															
67	10.6	Deep																									
68	10.9	Deep																									
69	13.3	Deep																									
70	13.7	Deep																									
71	7.3						—																				
72	11.2	Deep																									
73	14.3	Deep																									
74	15.0	Deep																									
75	8.7	R	P				—																				
76	14.1	Deep																									
77	12.1	Deep																									
78	7.1	R	P				←																				
79	3.0	R	P								V	1				1	1										
80	7.1	M	P				V																				
81	5.0	R	P				1					1															
82	6.0	R	P				1						V				1										
83	12.5	Deep																									
84	12.9	Deep																									
85	12.8	Deep																									
86	11.7	Deep																									
87	10.3	M					—																				
88	9.7	M	P								1																
89	4.3	R	P				—					1															
90	8.2	R	P				—																				

JW KH

Big Blake Lake Polk County WBIC 2627000 **Date:** 8-25-14

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 Ceratophyllum	2 Potamogeton	3 Zizania	4 Typha	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
91	11.9	Deep					1																				
92	12.9	Deep																									
93	12.9	Deep																									
94	11.3	Deep																									
95	12.9	Deep																									
96	11.7	Deep																									
97	11.4	Deep																									
98	4.2	R	P		1		1																				
99	9.0	R	P		1		1																				
100	12.2	Deep																									
101	11.0	Deep																									
102	12.3	Deep																									
103	11.4	Deep																									
104	11.8	Deep																									
105	11.9	Deep																									
106	12.3	Deep																									
* 107	6.5	R	P				2																				
108	9.8	M																									
109	14.3	Deep																									
110	12.7	Deep																									
111	10.4	Deep																									
112	11.4	Deep																									
113	11.4	Deep																									
114	12.3	Deep																									
115	12.5	Deep																									
116	4.9	R	P				1																				
117	7.2	R	P				1																				
118	13.5	Deep																									
119	12.5	Deep																									
120	12.3	Deep																									

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotFr	3 ZizAq	4 FiL	5 PotZo	6 MyrSp	7 NymOd	8	9	10	11	12	13	14	15	16	17	18	19	20	21
121	11.9	Deep					—																				
122	11.6	Deep																									
123	12.1	Deep																									
124	12.6	Deep																									
*125	11.9	M	P				—																				
126	11.6	Deep																									
127	13.2	Deep																									
128	12.7	Deep																									
129	12.2	Deep																									
130	12.2	Deep																									
131	11.7	Deep																									
132	12.1	Deep																									
133	12.1	Deep																									
134	10.9	Deep																									
135	3.4	R	P								1	1	V														
136	13.8	Deep																									
137	13.4	Deep																									
138	12.5	Deep																									
139	11.2	Deep																									
140	11.6	Deep																									
141	11.9	Deep																									
142	11.5	Deep																									
143	11.9	Deep																									
144	11.2	Deep																									
*145	4.8	R	P				—	—																			
146	14.6	Deep																									
147	13.6	Deep																									
148	12.8	Deep																									
149	12.3	Deep																									
150	12.2	Deep																									

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:					Observer 2: name and hours:										Observer 3: name and hours:										Total hours worked:	
Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 Cerbe	2 Potpu	3 Zizaq	4 Fil	5 Nai fl	6 Nym od	7 Pot zo	8 Het du	9 Myr si	10	11	12	13	14	15	16	17	18	19	20	21
151	11.8	Deep																								
152	11.7	Deep																								
153	12.4	Deep																								
154	12.8	Deep																								
155	12.2	Deep																								
156	9.1	R	P																							
157	3.7	R	P			1	1	1			2	V	1	1	1											
158	12.5	Deep																								
159	13.4	Deep																								
160	13.1	Deep																								
161	11.8	Deep																								
162	12.1	Deep																								
163	11.9	Deep																								
164	12.2	Deep																								
165	12.2	Deep																								
166	12.5	Deep																								
167	11.7	Deep																								
168	12.2	Deep																								
169	11.8	Deep																								
170	11.7	Deep																								
171	11.8	Deep																								
172	11.4	Deep																								
173	11.0	S	P				—																			
174	12.1	Deep																								
175	13.3	Deep																								
176	12.7	Deep																								
177	12.4	Deep																								
178	12.3	Deep																								
179	12.2	Deep																								
180	12.3	Deep																								

Observer 1: name and hours:						Observer 2: name and hours:																Observer 3: name and hours:										Total hours worked:	
Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 Cer De	2 Pot Pu	3 Zos Na	4 Fil	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21							
181	12.3	Deep																															
182	12.0	Deep																															
183	11.7	Deep																															
184	12.0	Deep																															
185	11.7	Deep																															
186	11.7	Deep																															
187	11.9	Deep																															
188	11.2	Deep																															
189	10.9	Deep																															
190	10.6	Deep																															
191	9.5	S	P				—																										
192	11.7	Deep																															
193	13.0	Deep																															
194	13.2	Deep																															
195	13.6	Deep																															
196	13.3	Deep																															
197	11.8	Deep																															
198	12.2	Deep																															
199	11.3	Deep																															
200	11.8	Deep																															
201	10.9	Deep																															
202	11.1	Deep																															
203	16.7	Deep																															
204	11.6	Deep																															
205	11.0	Deep																															
206	10.6	Deep																															
207	9.8	M	P				—																										
208	9.8	M	P				—																										
*209	9.1	M	P				—																										
210	7.2	M	P				—																										

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:						Observer 2: name and hours:										Observer 3: name and hours:										Total hours worked:	
Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 Cerod	2 Potpu	3 Zizpa	4 fil	5 Lem tr	6 Wolf	7 Lem mi	8 Nym ad	9 Nuv. va	10 Pot zo	11 Myr sp	12	13	14	15	16	17	18	19	20	21	
241	9.2	M	P			1																					
242	8.2	M	P			1																					
243	8.1	M	P			1																					
244	7.5	R	P							1																	
245	2.4	R	P						1	1						1											
246	5.7	M	P			2										1											
247	2.5	R	P		V	1			1	1	1	1	1	1	V												
248	7.8	M	P			2																					
249	7.7	M	P													1											
250	7.7	M	P			1																					
251	7.4	M	P			1																					
252	3.0	M	P			3				1			V		2		1										
253	Rice																1										
254	6.8	M	P			1			2	1			V		1												
255	7.7	M	P			1																					
256	7.6	M	P			1						1															
257	5.8	M	P			1				1																	
258	2.8	M	P			3				1	V	V	V		1		✓										
259	6.0	M	P			1																					
260	7.2	M	P			1										1											
261	6.6	M	P			1				1																	
262	4.8	M	P			2				1						1											
263	Rice																										
264	5.7					2										1											
265	6.1	M	P			1										2											
266	4.6	M	P			3				1						1											
267	3.7	M	P			1																					
268	Terrestrial																										
269	3.4	M	P			3				1						1	V										
270	3.8	M	P			2			1																		

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotPu	3 ZizAq	4 FiL	5 Lem Tr	6 Pot zo	7 Wolf	8 Lem mi	9 Nym sp	10	11	12	13	14	15	16	17	18	19	20	21
271	2.2	M	P				2			1	2	1	✓	1													
272	2.2	M	P				1			1			✓	1	1												
273	2.2	M	P				3	1		1	1																
274																											
275																											
276																											
277																											
278																											
279																											
280																											
281																											
282																											
283																											
284																											
285																											
286																											
287																											
288																											
289																											
290																											
291																											
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293																											
294																											
295																											
296																											
297																											
298																											
299																											
300																											

Lakes Database / Big Blake / WiAPMs files / BB_Polk_262700_Eco_2015

Big Blake Lake Polk County WBIC 2627000 **Date:** 5/20/15 **Page 1 of 29** 11:05

Observer 1: name and hours: KH | Observer 2: name and hours: JW | Observer 3: name and hours: EW | Total hours worked: 2:49

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 Pot Pr	2 Pot Pu	3 Cer De	4 [illegible]	5 Nitella	6 Pot Zo	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1 H	7	M	P			3	1																				
2 H	9	↓	↓			2																					
3	8					3		1																			
4	6					2		1																			
5	6					2		2																			
6	5					3		1	1																		
7	8					2		1																			
8	10					2																					
9	8.5					2																					
* 10 H	9					1																					
11 H	9					1		1																			
12 H	8					3		1																			
13	7					2		1		1																	
↑ 14	6					3		1	1																		
* 15	shallow/shore																										
16	3								3		1																
17	8					1		2																			
* 18	8					1																					
19	10					1																					
20	10					3																					
21	10.5					2																					
22	11					1																					
* 23	11					1																					
24	7.5					1																					
25	7					2		1																			
26	6.5					3																					
27	shallow/shore																										
28	5					3		1	[illegible]			1															
29	8.5					3																					
* 30	8.5					1																					

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 PotPr	2 PotPu	3 Cerpe	4 Nitella	5 fil algae	6 PotZo	7 Hetpu	8 MyrOg	9 RanAq	10	11	12	13	14	15	16	17	18	19	20	21
31	9					2																					
32	10					2																					
33	8.5					1																					
34	9					1																					
35	10.5					1																					
36	8					1		1	1																		
37	7					3																					
38	1					1						1															
39	8	S				3																					
40	9					1																					
41	10					1																					
42	10.5					1																					
43	9					1																					
44	10					1																					
45	9.5					1																					
46	8					3																					
47	6					3		1																			
48	shallow terrestrial																										
49				8		3																					
50				9.5		2																					
51				9		2																					
52				9		2																					
53				10		1																					
54				10		1																					
55				9.5		1																					
56				8		2																					
57				2.5		2		1	1				V														
58				3		1		1	1					1													
59				5.5		3		1																			
60				8		2																					

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 PotPr	2 PotPu	3 CerDe	4 NitUl	5 FiL	6 PotZo	7 HetBu	8 NyMOd	9 RanAq	10 NuAv	11 MyrSi	12 PotRi	13 LemTr	14	15	16	17	18	19	20	21
61	8					2																					
62	10					1																					
63	10	R							1																		
64	10					1					1																
65	2.5				1		1	1					V		1	1											
66	9					3																					
67	10					1																					
68	11					1																					
69	13																										
70	12																										
71	7.5					2																					
72	12																										
73	14																										
74	15																										
75	9	R								1																	
76	13.5																										
77	8	S				1																					
78	5	R																									
79	5	R/S				1											V										
80	5				1		1																				
81	3				1					1								1									
82	10				1													1									
83	12																										
84	12																										
85	11				1																						
86	10																										
87	10				1																						
88	9.5				1																						
89	4				1		1																				
90	shore																										

Observer 1: name and hours:					Observer 2: name and hours:																	Observer 3: name and hours:										Total hours worked:
Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 PotPr	2 PotPu	3 Cerde	4 Nitflg	5 FL	6 PotZo	7 HetOl	8 MyrMod	9 RanAq	10 NupVa	11 MyrSi	12 PotRi	13 LemTr	14	15	16	17	18	19	20	21						
91	11																															
92	12.5																															
93	12.5																															
94	11.5																															
95	10																															
96	10																															
97	9					1																										
98	4	R				1		1																								
99	8					1																										
100	12																															
101	12																															
102	12																															
103	11					1																										
104	10																															
105	10.5																															
106	10																															
107	8					1																										
108	9																															
109	12.5																															
110	12																															
111	12																															
112	12																															
113	[redacted]2																															
114	10	S																														
115	10																															
116	4	R				2		1			1																					
117	13																															
118	12																															
119	12																															
120	11																															

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 PotPr	2 PotPu	3 CerDe	4 Nitella	5 fil	6 PotZo	7 HetDu	8 MyrHet	9 RanAq	10 NupVa	11 MyrSi	12 PotRi	13 ConTr	14	15	16	17	18	19	20	21
121	11.5																										
122	12																										
123	10.5																										
124	10.5					1																					
125	10					1																					
126	13																										
127	12																										
128	11																										
129	11.5																										
130	12																										
131	11.5																										
132	11.5																										
133	10																										
134	9					1																					
135	8	S				1																					
136	13																										
137	13																										
138	12.5																										
139	12																										
140	12																										
141	11.5																										
142	10.5																										
143	10.5																										
144	9.5																										
145	5	R																									
146	13																										
147	14																										
148	13																										
149	11.5																										
150	12																										

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 PotPe	2 PotPu	3 CerDe	4 NitFle	5 FiL	6 PotFo	7 HetPu	8 NymOd	9 RanFl	10 NupVa	11 MyrSi	12 PotRi	13 LemTr	14	15	16	17	18	19	20	21
151	12																										
152	11.5																										
153	12																										
154	11.5																										
155	11.5																										
156	9.5																										
157	4.5				1				1																		
158	14																										
159	13																										
160	12																										
161	12.5																										
162	12.5																										
163	12.5																										
164	12.5																										
165	12.5																										
166	13																										
167	11.5																										
168	11.5																										
169	11																										
170	11.5																										
171	10.5																										
172	11																										
173	11																										
174	10	R																									
175	14																										
176	13																										
177	13																										
178	13																										
179	12.5																										
180	12.5																										

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 PotPr	2 PotPu	3 Canpe	4 Nitella	5 FL	6 PotZo	7 HetRo	8 Nymod	9 RanAq	10 MyrSp	11 MyrSi	12 PotRi	13 CerDe	14	15	16	17	18	19	20	21
181	12.5																										
182	12.5																										
183	12																										
184	12																										
185	11.5																										
186	11.5																										
187	12																										
188	11.5																										
189	11.5																										
190	10																										
191	9.5					1																					
192	13																										
193	12																										
194	13																										
195	13																										
196	12																										
197	12																										
198	11.5																										
199	11.5																										
200	12																										
201	12																										
202	11																										
203	11																										
204	11.5																										
205	11.5																										
206	10.5					V																					
207	8.5					1																					
208	9.5					1																					
209	8.5					V																					
210	6					3						1															

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 PotPr	2 PotPu	3 CeDe	4 NitFle	5 FA	6 PotZo	7 HetDu	8 NyMod	9 RanAq	10 NupVa	11 MyrSi	12 PotRi	13 CauTy	14	15 Lemtri	16	17	18	19	20	21
211	8					2											1										
212	10.5					1																					
213	10					1																					
214	10					1																					
215	9.5					1																					
216	6					2		2																			
217	4	S				1		1									1										
218	8					1																					
219	10.5					1																					
220	10					1																					
221	9					1																					
222	8.5					1																					
223	7					1																					
224	8.5					1																					
225	3					1						1					1										
226	5					2		1									1										
227	10																										
228	9.5																										
229	9																										
230	9					1																					
231	8.5					1																					
232	8.5					1																					
233	3.5					3						1		V		V											
234	3					1		1	2								1										
235	9.5																										
236	8.5					2																					
237	8.5					1																					
238	8.5					1																					
239	7					2																					
240	6					1	1												1								

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 Pot Pr	2 Pot Pu	3 Cera De	4 Nitella	5 FL	6 Pot ZO	7 Het Du	8 Nym Od	9 Ran Aq	10 Nup Va	11 Myrs	12 Pot Ri	13 Con Ts	14 Ziz Aq	15	16	17	18	19	20	21
241	11.5																										
242	10.5																										
243	10					1																					
244	7	R				1																					
245	12					1			3																		
246	5					1			3																		
247	1								1					V		V		V	1	1							
248	10.5					1																					
249	9					1																					
250	6					2																					
251	7					3			2																		
252	3						V		3					V													
253	shallow																										
254	7					1			1																		
255	10					1																					
256	10								1			1															
257	8					1			1																		
258	3.5					V	V		2			1							1								
259	9					1			1																		
260	9								1			1															
261	9					1																					
262	6					V			3																		
263	shallow																										
264	5					1			3																		
265	7					1	V		2										1								
266	7.5								3			1															
267	3					3																					
268	shallow																										
269	5					1			2																		
270	4					2					1																

Big Blake Lake Polk County WBIC 2627000 **Date:**

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 Pot Pr	2 Pot Pu	3 Cer De	4 Nit Fle	5 FR	6 PotZo	7 HetDu	8 MynOd	9 RanAq	10 NupVa	11 MyrSi	12 PotRi	13 LenTr	14 ZizAq	15	16	17	18	19	20	21
271	2					1		1	1										1	✓							
272	1					1					1			1	1	1			1								
273	1								1																		
274	2																			1							
275	shallow																										
276																											
277																											
278																											
279																											
280																											
281																											
282																											
283																											
284																											
285																											
286																											
287																											
288																											
289																											
290																											
291																											
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293																											
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295																											
296																											
297																											
298																											
299																											
300																											

KH, JW, DC algae bloom

Big Blake Lake Polk County 2627000 9:00 AM – **Date:** 8/20/15

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotZo	3 EloCa	4 PotPu	5 LemMi	6 LemTr	7 PotPr	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	7.5						3	1																			
2	7.8						1																				
3	7.7						1	1	1																		
4	7.3									1																	
5	6.9									1																	
6	6.9											1															
7	8.4										V																
8	8.5										V																
9	8.4										V																
10	8.2						V																				
11	7.9																										
12	7.4																										
13	7.0						V																				
14	5.6						1																				
15	shallow																										
16	2.8						3	1																			
17	7.1																										
18	8.3																										
19	8.9																										
20	9.0						1	1																			
21	9.1										V																
22	8.8						V				V		V														
23	8.8						1	1																			
24	8.6										V																
25	8.1						1				V																
26	7.0						V						V														
27	shallow																										
28	6.5						3	1				1															
29	8.3						1					1															
30	9.0						1	1																			

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotZo	3 EloCa	4 PotPu	5 LemMi	6 LemTr	7 PotPe	8 NymOd	9 SpiEl	10 MyrSi	11 WolFia	12 SagGr	13 HetDu	14 UtrAm	15 Fil	16 RanTa	17	18	19	20	21
31	9.2																										
32	9.1										V																
33	10.4																										
34	9.5						1																				
35	9.4										V																
36	8.2										V																
37	7.8																										
38	2.5						1				V	1		1	V	1											
39	8.9	S					2	1				1															
40	9.1						1				V																
41	9.3																										
42	9.6										V																
43	9.8																										
44	9.5						1				V																
45	9.3										V					V											
46	8.7																										
47	7.5										V					V											
48	2.2	S					3	1			V	1				V	V										
49	8.8										V																
50	9.1										V																
51	9.3										V					V											
52	9.5																										
53	9.7										V					V											
54	9.6										V					V											
55	9.3										V					V											
56	7.5	S									V					V											
57	4.6						1	1				1		1					1	1	1	1						
58	6.3						1							V								1					
59	3.7	R									V																
60	8.5	S													V												

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotZo	3 EloCa	4 PotPu	5 LemMi	6 LemTr	7 PotPr	8 NyMod	9 SpEu	10 MyrSi	11 WolFi	12 SagGr	13 HetPa	14 ValAm	15 Fil	16 RanAq	17 NupVa	18	19	20	21
61	9.6									V																	
62	9.8																										
63	10.6									V																	
64	10.4									V																	
65	5.9																										
66	8.3									V																	
67	10.1																										
68	10.8									V																	
69	12.2									V																	
70	13.0									V	1		1		V							V					
71	7.6						V			V																	
72	11									V						V											
73	12.8									V																	
74	14.5																										
75	8.0																										
76	13.2																										
77	11.8																										
78	8.0	S																									
79	5.3	S																									
80	8.0						1																				
81	6.2																										
82	10.8									V						V											
83	11.8																										
84	11.9									V																	
85	11.4									V						V											
86	10.3															V											
87	9.3																										
88	9.7																										
89	4.2	R																									
90	shore																										

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotZo	3 EloCa	4 PotPu	5 LeuMi	6 LeuTr	7 PotPr	8 NymOd	9 SpEu	10 MyrSi	11 WolFi	12 SagGr	13 HetPu	14 ValAm	15 Fil	16 RanTa	17 NupVa	18	19	20	21
91	11.2																										
92	11.9																										
93	11.2																										
94	11.1																										
95	10.8																										
96	10.1																										
97	10.3																										
98	5.5	R									1																
99	10.2																										
100	11.6																										
101	11.5																										
102	10.9																										
103	10.7																										
104	10.6																										
105	10.9																										
106	10.8																										
107	6.6	R						1							1												
108	9.9																										
109	13.0																										
110	11.7																										
111	11.1																										
112	10.5																										
113	10.8																										
114	11.0																										
115	11.2																										
116	8.7	S																									
117	12.8																										
118	12.2																										
119	11.3																										
120	11.1																										

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotZo	3 EloCa	4 PotPu	5 LouMi	6 LemTr	7 PotPr	8 NymOd	9 SpE4	10 MyrSi	11 WoFfn	12 SagGr	13 HotPu	14 ValAm	15 TyL	16 RanAq	17	18	19	20	21
121	10.9																										
122	11.1																										
123	11.4																										
124	11.7																										
125	10.6																										
126	12.2																										
127	12.6																										
128	11.9																										
129	11.3																										
130	11.4																										
131	11.5																										
132	11.2																										
133	11.5																										
134	11.0																										
135	10.1																										
136	13.4																										
137	12.7																										
138	11.8																										
139	11.7																										
140	11.3																										
141	11.5																										
142	11.2																										
143	11.2																										
144	9.0	R																									
145	8.3	R					1	1																			
146	12.8																										
147	13.8																										
148	12.2																										
149	11.7																										
150	11.6																										

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotZo	3 FloCa	4 PotPu	5 LemMi	6 LemTr	7 PotPr	8 NymOd	9 SpTd	10 JuvrSi	11 UtriVu	12 SagGr	13 HetPu	14 ValAm	15 Fil	16 KanAq	17	18	19	20	21
151	11.5																										
152	11.2																										
153	11.8																										
154	12.2																										
155	11.2																										
156	10.3																										
157	10.0																										
158	14.5																										
159	13.0																										
160	12.1																										
161	11.6																										
162	11.8																										
163	11.6																										
164	11.9																										
165	12.2																										
166	12.2																										
167	12.0																										
168	12.0																										
169	11.8																										
170	12.2																										
171	11.8																										
172	11.2																										
173	10.8																										
174	11.1																										
175	13.5																										
176	12.5																										
177	12.1																										
178	12.2																										
179	12.1																										
180	11.8																										

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotFo	3 ElOCa	4 PotPu	5 LemMi	6 LemTr	7 PotPr	8 NymOd	9 SpaEu	10 MyrSi	11 WolRh	12 SagGr	13 HetOp	14 ValAm	15 FI	16 PanAq	17	18	19	20	21
181	11.8																										
182	11.5																										
183	11.3																										
184	11.3																										
185	11.0																										
186	11.1																										
187	10.7																										
188	10.6																										
189	10.2																										
190	10.0																										
191	10.0																										
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193	13.0																										
194	13.2																										
195	13.5																										
196	12.2																										
197	12.1																										
198	11.5																										
199	11.1																										
200	11.0																										
201	10.8																										
202	10.6																										
203	10.4																										
204	10.6																										
205	10.0																										
206	9.8																										
207	9.4																										
208	9.3																										
209	8.5						V																				
210	4.8	S					1																				

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotZo	3 ElOCa	4 PotPu	5 LemMi	6 LemTr	7 PotPr	8 NymOd	9 SpaEq	10 MyrSi	11 WolFra	12 SagGr	13 HetPer	14 UalAm	15 fil	16 RanFa	17 NupVa	18 PotRi	19 ChaFa	20	21
211	7.8	R																									
212	11.3																										
213	11.0																										
214	10.5																										
215	11.0																										
216	6.5					1					1				1												
217	7.3																										
218	5.0														1			1	1				1				
219	10.3																							1			
220	9.8																										
221	9.3										1																
222	9.0					1																					
223	8.9				1																						
224	8.5					1																					
225	6.1	R				V																					
226	5.7					1									1												
227	9.8																										
228	9.0					1				V	1																
229	8.6																										
230	8.5																										
231	8.5																										
232	8.4																										
233	7.8					2	1				1				V												
234	5.2					V							V		1					1							
235	9.7																										
236	8.6																										
237	8.5																										
238	8.4					1																					
239	8.4					1						V															
240	7.6					3	1				1																

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotZo	3 HloCa	4 PotPu	5 LemMi	6 LemTr	7 PotPr	8 NymOd	9 SpaEq	10 MyrSi	11 WolFa	12 SagGr	13 HetPu	14 UtrAm	15 FiL	16 RanAq	17 NupVa	18 PotEp	19 ZizPa	20	21
241	10.1																										
242	9.1																										
243	8.8																										
244	9.2					1					1																
245	4.6	R				1									V												
246	7.6					3					1																
247	2.0					3					1		1			V						1					
248	9.4																										
249	8.5					2	1																				
250	7.8																										
251	5.5					1																					
252	4.5					3	1				1				1												
253	shallow																										
254	7.0					1															1						
255	7.3					1	1				1																
256	6.2					1	1				1	1															
257	6.5					1	1				1																
258	5.0					2	2				1				V								1				
259	5.5					1					1																
260	7.1					1					1																
261	7.5					2	1				1																
262	5.0					3	1				1	1															
263	shallow																										
264	5.0					3																					
265	7.0					3	1				1																
266	7.0					1																					
267	4.6					3					1		V										-	V			
268	shallow																										
269	4.5					2				1	1					1					1						
270	2.5					1		1													1						

Observer 1: name and hours:	Observer 2: name and hours:	Observer 3: name and hours:	Total hours worked:

Site #	Depth (ft)	Dominant sediment type (M, S, R)	Rake pole (P) or rake rope (R)?	Total Rake Fullness	EWM 1,2,3	CLP 1,2,3	1 CerDe	2 PotZo	3 EloCa	4 PotPu	5 LemMi	6 LemTr	7 PotPr	8 NymOd	9 SpiEu	10 NymS	11 WolPa	12 SagGr	13 HetBu	14 ValAm	15 TiL	16 PanAm	17	18 PotPe	19 ZizAq	20	21
271	2.5						3	1				1									1						
272	2.0						2				1		1	1		1	1				2			V			
273	2.0						1				1		V				1				2						
274	2.0						1						V														
275	Shore																										
276	2.0						V		1		V			V									1				
277																											
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Appendix I

Modeling Data

Date: 7/12/2016 Scenario: 1938 Diatom Inferred TP Reconstruction
Lake Id: Big Blake Lake
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 2133.4 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 1422.3 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 1479.5 acre-ft/year
Areal Water Load <qs>: 7.1 ft/year
Lake Flushing Rate <p>: 0.79 1/year
Water Residence Time: 1.27 year
Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3
Observed growing season mean phosphorus (GSM): 36.05 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	490.1	0.50	1.00	3.00	56.9	99	198	595
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	744.7	0.10	0.30	0.50	25.9	30	90	151
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	56.9	0.05	0.10	0.25	0.7	1	2	6
Wetlands	391.1	0.10	0.10	0.10	4.5	16	16	16
Forest	450.6	0.05	0.09	0.18	4.7	9	16	33
Lake Surface	208.0	0.10	0.30	1.00	7.2	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	0.0				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	361.2	768.5	1949.6	100.0
Total Loading (kg)	163.8	348.6	884.3	100.0
Areal Loading (lb/ac-year)	1.74	3.69	9.37	
Areal Loading (mg/m^2-year)	194.63	414.10	1050.61	
Total PS Loading (lb)	0.0	0.0	0.0	0.0

Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	342.6	712.8	1764.0	100.0
Total NPS Loading (kg)	155.4	323.3	800.2	100.0

Wisconsin Internal Load Estimator
Date: 7/12/2016 Scenario: 19

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 36.05 mg/m^3
Phosphorus Inflow Concentration: 191.0 mg/m^3
Areal External Loading: 414.1 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.74
Observed Phosphorus Retention Coefficient: 0.81
Internal Load: -52 Lb -24 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 0 mg/m^3
Hypolimnetic Volume: 0.0 acre-ft
Anoxia Sediment Area: 0.0 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 0 mg/m^3
Hypolimnetic Volume: 0.0 acre-ft
Anoxia Sediment Area: 0.0 acres
Time Period of Stratification: 1 days
Sediment Phosphorus Release Rate: 0 mg/m^2-day 0 lb/acre-day
Internal Load: 0 Lb 0 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 0 mg/m^3
Hypolimnetic Volume: 0 acre-ft
Anoxia Sediment Area: 0 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 0 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 0 acres
Time Period Between Observations: 1 days
Sediment Phosphorus Release Rate: 0 mg/m^2-day 0 lb/acre-day
Internal Load: 0 Lb 0 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area

Start of Anoxia Anoxic Sediment Area: 0 acre
End of Anoxia Anoxic Sediment Area: 0 acre
Phosphorus Release Rate As Calculated In Method 2: 0 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: 0 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 0.0 mg/m^2-day
Period of Anoxia: 0 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	0	0	0

Internal Load: (kg) 0 0 0

Internal Load Comparison (Percentages are of the Total Estimate Load)

Total External Load: 769 Lb 349 kg

	Lb	kg	%
From A Complete Mass Budget:	-52	-24	-7.2
From Growing Season In Situ Phosphorus Increases:	0	0	0
From In Situ Phosphorus Increases In The Fall:	0	0	0.0
From Phosphorus Release Rate and Anoxic Area:	0	0	0

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	10	49	124

Osgood, 1988 Lake Mixing Index: 3.0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	-52	0.0	0
Internal Load (kg):	-24	0.0	0
External Load (Lb):	361	769	1950
External Load (kg):	164	349	884
Total Load (Lb):	309	769	1950
Total Load (kg):	140	349	884

Phosphorus Prediction and Uncertainty Analysis Module

Date: 7/12/2016 Scenario: 15

Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3

Observed growing season mean phosphorus (GSM): 36.0 mg/m^3

Back calculation for SPO total phosphorus: 0.53 mg/m^3

Back calculation GSM phosphorus: 0.53 mg/m^3

% Confidence Range: 70%

Nurenberg Model Input - Est. Gross Int. Loading: 49 kg

Lake Phosphorus Model	**Low** Total P (mg/m^3)	**Most Likely** Total P (mg/m^3)	**High** Total P (mg/m^3)	**Predicted** -Observed (mg/m^3)	**% Dif.**
Walker, 1987 Reservoir	30	65	164	29	81
Canfield-Bachmann, 1981 Natural Lake	37	63	117	27	75
Canfield-Bachmann, 1981 Artificial Lake	32	51	84	15	42
Rechow, 1979 General	14	29	74	-7	-19
Rechow, 1977 Anoxic	67	142	360	106	294
Rechow, 1977 water load<50m/year	31	67	169	31	86
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	N/A	N/A	N/A	N/A	N/A
Vollenweider, 1982 Combined OECD	33	62	133	44	244
Dillon-Rigler-Kirchner	N/A	N/A	N/A	N/A	N/A
Vollenweider, 1982 Shallow Lake/Res.	27	53	121	35	194
Larsen-Mercier, 1976	N/A	N/A	N/A	N/A	N/A
Nurnberg, 1984 Oxic	50	76	151	40	111

Lake Phosphorus Model	**Confidence** Lower	**Confidence** Upper	**Parameter** Fit?	**Back** Calculation	**Model** Type

	Bound	Bound		(kg/year)	
Walker, 1987 Reservoir	37	130	FIT	3	GSM
Canfield-Bachmann, 1981 Natural Lake	20	181	FIT	1	GSM
Canfield-Bachmann, 1981 Artificial Lake	16	147	FIT	1	GSM
Rechow, 1979 General	16	59	FIT	6	GSM
Rechow, 1977 Anoxic	83	283	FIT	1	GSM
Rechow, 1977 water load<50m/year	37	135	P	3	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	N/A	N/A	N/A	N/A	N/A
Vollenweider, 1982 Combined OECD	30	122	FIT	1	ANN
Dillon-Rigler-Kirchner	N/A	N/A	N/A	N/A	N/A
Vollenweider, 1982 Shallow Lake/Res.	26	107	FIT	2	ANN
Larsen-Mercier, 1976	N/A	N/A	N/A	N/A	N/A
Nurnberg, 1984 Oxic	44	136	P	-187	ANN

Date: 3/4/2016 Scenario: 1938
Lake Id: Big Blake Lake
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 2133.4 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 1422.3 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 1479.5 acre-ft/year
Areal Water Load <qs>: 7.1 ft/year
Lake Flushing Rate <p>: 0.79 1/year
Water Residence Time: 1.27 year
Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3
Observed growing season mean phosphorus (GSM): 0.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low	Most Likely	High	Loading %	Low	Most Likely	High
		Loading (kg/ha-year)				Loading (kg/year)		
Row Crop AG	490.1	0.50	1.00	3.00	56.9	99	198	595
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	744.7	0.10	0.30	0.50	25.9	30	90	151
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	56.9	0.05	0.10	0.25	0.7	1	2	6
Wetlands	391.1	0.10	0.10	0.10	4.5	16	16	16
Forest	450.6	0.05	0.09	0.18	4.7	9	16	33
Lake Surface	208.0	0.10	0.30	1.00	7.2	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	0.0				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	361.2	768.5	1949.6	100.0
Total Loading (kg)	163.8	348.6	884.3	100.0
Areal Loading (lb/ac-year)	1.74	3.69	9.37	
Areal Loading (mg/m^2-year)	194.63	414.10	1050.61	
Total PS Loading (lb)	0.0	0.0	0.0	0.0
Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	342.6	712.8	1764.0	100.0
Total NPS Loading (kg)	155.4	323.3	800.2	100.0

Date: 7/12/2016 Scenario: 1955 Diatom Inferred TP
Lake Id: Big Blake Lake
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 2165.5 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 1443.7 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 1500.9 acre-ft/year
Areal Water Load <qs>: 7.2 ft/year
Lake Flushing Rate <p>: 0.80 1/year
Water Residence Time: 1.25 year
Observed spring overturn total phosphorus (SPO): 54.9 mg/m^3
Observed growing season mean phosphorus (GSM): 54.9 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	488.5	0.50	1.00	3.00	63.1	99	198	593
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	318.5	0.10	0.30	0.50	12.3	13	39	64
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	131.7	0.05	0.10	0.25	1.7	3	5	13
Wetlands	474.1	0.10	0.10	0.10	6.1	19	19	19
Forest	752.7	0.05	0.09	0.18	8.7	15	27	55
Lake Surface	208.0	0.10	0.30	1.00	8.1	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	0.0				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	346.6	691.3	1827.7	100.0
Total Loading (kg)	157.2	313.5	829.1	100.0
Areal Loading (lb/ac-year)	1.67	3.32	8.79	
Areal Loading (mg/m^2-year)	186.80	372.50	984.92	
Total PS Loading (lb)	0.0	0.0	0.0	0.0

Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	328.1	635.6	1642.2	100.0
Total NPS Loading (kg)	148.8	288.3	744.9	100.0

Wisconsin Internal Load Estimator
Date: 7/12/2016 Scenario: 22

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 54.87 mg/m^3
Phosphorus Inflow Concentration: 169.4 mg/m^3
Areal External Loading: 372.5 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.74
Observed Phosphorus Retention Coefficient: 0.68
Internal Load: 46 Lb 21 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 0 mg/m^3
Hypolimnetic Volume: 0.0 acre-ft
Anoxia Sediment Area: 0.0 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 0 mg/m^3
Hypolimnetic Volume: 0.0 acre-ft
Anoxia Sediment Area: 0.0 acres
Time Period of Stratification: 1 days
Sediment Phosphorus Release Rate: 0 mg/m^2-day 0 lb/acre-day
Internal Load: 0 Lb 0 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 0 mg/m^3
Hypolimnetic Volume: 0 acre-ft
Anoxia Sediment Area: 0 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 0 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 0 acres
Time Period Between Observations: 1 days
Sediment Phosphorus Release Rate: 0 mg/m^2-day 0 lb/acre-day
Internal Load: 0 Lb 0 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area

Start of Anoxia Anoxic Sediment Area: 0 acre
End of Anoxia Anoxic Sediment Area: 0 acre
Phosphorus Release Rate As Calculated In Method 2: 0 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: 0 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 0.0 mg/m^2-day
Period of Anoxia: 0 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	0	0	0

Internal Load: (kg) 0 0 0

Internal Load Comparison (Percentages are of the Total Estimate Load)

Total External Load: 691 Lb 314 kg

	Lb	kg	%
From A Complete Mass Budget:	46	21	6.2
From Growing Season In Situ Phosphorus Increases:	0	0	0
From In Situ Phosphorus Increases In The Fall:	0	0	0.0
From Phosphorus Release Rate and Anoxic Area:	0	0	0

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	33	44	115

Osgood, 1988 Lake Mixing Index: 3.0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	46	0.0	0
Internal Load (kg):	21	0.0	0
External Load (Lb):	347	691	1828
External Load (kg):	157	314	829
Total Load (Lb):	393	691	1828
Total Load (kg):	178	314	829

Phosphorus Prediction and Uncertainty Analysis Module

Date: 7/12/2016 Scenario: 16

Observed spring overturn total phosphorus (SPO): 54.9 mg/m^3

Observed growing season mean phosphorus (GSM): 54.9 mg/m^3

Back calculation for SPO total phosphorus: 0.47 mg/m^3

Back calculation GSM phosphorus: 0.47 mg/m^3

% Confidence Range: 70%

Nurenberg Model Input - Est. Gross Int. Loading: 44 kg

Lake Phosphorus Model	**Low** Total P (mg/m^3)	**Most Likely** Total P (mg/m^3)	**High** Total P (mg/m^3)	**Predicted** -Observed (mg/m^3)	**% Dif.**
Walker, 1987 Reservoir	30	60	159	5	9
Canfield-Bachmann, 1981 Natural Lake	35	58	112	3	5
Canfield-Bachmann, 1981 Artificial Lake	31	48	81	-7	-13
Rechow, 1979 General	13	26	69	-29	-53
Rechow, 1977 Anoxic	63	126	334	71	129
Rechow, 1977 water load<50m/year	30	60	158	5	9
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	44	89	234	34	62
Vollenweider, 1982 Combined OECD	32	56	125	1	2
Dillon-Rigler-Kirchner	22	43	114	-12	-22
Vollenweider, 1982 Shallow Lake/Res.	26	48	113	-7	-13
Larsen-Mercier, 1976	40	80	212	25	46
Nurnberg, 1984 Oxic	46	67	139	12	22

Lake Phosphorus Model	**Confidence** Lower	**Confidence** Upper	**Parameter** Fit?	**Back** Calculation	**Model** Type

	Bound	Bound		(kg/year)	
Walker, 1987 Reservoir	35	124	FIT	2	GSM
Canfield-Bachmann, 1981 Natural Lake	18	167	FIT	1	GSM
Canfield-Bachmann, 1981 Artificial Lake	15	138	FIT	1	GSM
Rechow, 1979 General	15	54	FIT	6	GSM
Rechow, 1977 Anoxic	75	259	FIT	1	GSM
Rechow, 1977 water load<50m/year	34	124	FIT	2	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	44	192	FIT	2	SPO
Vollenweider, 1982 Combined OECD	28	113	FIT	1	ANN
Dillon-Rigler-Kirchner	26	89	P	3	SPO
Vollenweider, 1982 Shallow Lake/Res.	24	98	FIT	2	ANN
Larsen-Mercier, 1976	49	164	P Pin	2	SPO
Nurnberg, 1984 Oxic	39	123	P	-168	ANN

Date: 3/4/2016 Scenario: 1955
Lake Id: Big Blake Lake
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 2165.5 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 1443.7 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 1500.9 acre-ft/year
Areal Water Load <qs>: 7.2 ft/year
Lake Flushing Rate <p>: 0.80 1/year
Water Residence Time: 1.25 year
Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3
Observed growing season mean phosphorus (GSM): 0.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	488.5	0.50	1.00	3.00	63.1	99	198	593
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	318.5	0.10	0.30	0.50	12.3	13	39	64
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	131.7	0.05	0.10	0.25	1.7	3	5	13
Wetlands	474.1	0.10	0.10	0.10	6.1	19	19	19
Forest	752.7	0.05	0.09	0.18	8.7	15	27	55
Lake Surface	208.0	0.10	0.30	1.00	8.1	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	0.0				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	346.6	691.3	1827.7	100.0
Total Loading (kg)	157.2	313.5	829.1	100.0
Areal Loading (lb/ac-year)	1.67	3.32	8.79	
Areal Loading (mg/m^2-year)	186.80	372.50	984.92	
Total PS Loading (lb)	0.0	0.0	0.0	0.0

Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	328.1	635.6	1642.2	100.0
Total NPS Loading (kg)	148.8	288.3	744.9	100.0

Date: 3/4/2016 Scenario: 1974
Lake Id: Big Blake Lake
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 2142.3 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 1428.2 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 1485.4 acre-ft/year
Areal Water Load <qs>: 7.1 ft/year
Lake Flushing Rate <p>: 0.79 1/year
Water Residence Time: 1.26 year
Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3
Observed growing season mean phosphorus (GSM): 0.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	392.2	0.50	1.00	3.00	55.2	79	159	476
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	270.4	0.10	0.30	0.50	11.4	11	33	55
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	89.7	0.30	0.50	0.80	6.3	11	18	29
Rural Res (>1 Ac)	89.7	0.05	0.10	0.25	1.3	2	4	9
Wetlands	378.9	0.10	0.10	0.10	5.3	15	15	15
Forest	921.6	0.05	0.09	0.18	11.7	19	34	67
Lake Surface	208.0	0.10	0.30	1.00	8.8	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	0.0				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	320.6	633.8	1621.7	100.0
Total Loading (kg)	145.4	287.5	735.6	100.0
Areal Loading (lb/ac-year)	1.54	3.05	7.80	
Areal Loading (mg/m^2-year)	172.74	341.52	873.92	
Total PS Loading (lb)	0.0	0.0	0.0	0.0

Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	302.0	578.1	1436.2	100.0
Total NPS Loading (kg)	137.0	262.2	651.4	100.0

Date: 3/4/2016 Scenario: 1996
Lake Id: Big Blake Lake
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 2119.1 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 1412.7 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 1469.9 acre-ft/year
Areal Water Load <qs>: 7.1 ft/year
Lake Flushing Rate <p>: 0.79 1/year
Water Residence Time: 1.27 year
Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3
Observed growing season mean phosphorus (GSM): 0.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	416.6	0.50	1.00	3.00	54.7	84	169	506
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	204.5	0.10	0.30	0.50	8.1	8	25	41
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	200.0	0.30	0.50	0.80	13.1	24	40	65
Rural Res (>1 Ac)	4.2	0.05	0.10	0.25	0.1	0	0	0
Wetlands	421.1	0.10	0.10	0.10	5.5	17	17	17
Forest	872.6	0.05	0.09	0.18	10.3	18	32	64
Lake Surface	208.0	0.10	0.30	1.00	8.2	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	0.0				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	352.9	679.3	1713.3	100.0
Total Loading (kg)	160.1	308.1	777.1	100.0
Areal Loading (lb/ac-year)	1.70	3.27	8.24	
Areal Loading (mg/m^2-year)	190.15	366.08	923.25	
Total PS Loading (lb)	0.0	0.0	0.0	0.0

Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	334.3	623.7	1527.7	100.0
Total NPS Loading (kg)	151.6	282.9	693.0	100.0

Date: 3/28/2016 Scenario: BBL 2013 Direct Drainage
Lake Id: Big Blake Lake
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 550.0 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 366.7 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 126018.4 acre-ft/year
Areal Water Load <qs>: 605.9 ft/year
Lake Flushing Rate <p>: 67.32 1/year
Water Residence Time: 0.01 year
Observed spring overturn total phosphorus (SPO): 46.4 mg/m^3
Observed growing season mean phosphorus (GSM): 80 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	123	0.50	1.00	3.00	0.7	25	50	149
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	38	0.10	0.30	0.50	0.1	2	5	8
HD Urban (1/8 Ac)	19	1.00	1.50	2.00	0.2	8	12	15
MD Urban (1/4 Ac)	113	0.30	0.50	0.80	0.3	14	23	37
Rural Res (>1 Ac)	46	0.05	0.10	0.25	0.0	1	2	5
Wetlands	35	0.10	0.10	0.10	0.0	1	1	1
Forest	176	0.05	0.09	0.18	0.1	4	6	13
Lake Surface	208.0	0.10	0.30	1.00	0.3	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	164.4				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.99	8.22	26.30	0.1

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	139.2	16383.7	745.9	100.0
Total Loading (kg)	63.1	7431.6	338.4	100.0
Areal Loading (lb/ac-year)	0.67	78.77	3.59	
Areal Loading (mg/m^2-year)	75.02	8828.81	401.97	
Total PS Loading (lb)	0.0	16092.8	0.0	98.2

Total PS Loading (kg)	0.0	7299.7	0.0	98.2
Total NPS Loading (lb)	118.5	217.1	502.4	1.7
Total NPS Loading (kg)	53.7	98.5	227.9	1.7

Wisconsin Internal Load Estimator
Date: 3/28/2016 Scenario: 5

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 69.64 mg/m^3
Phosphorus Inflow Concentration: 47.8 mg/m^3
Areal External Loading: 8828.8 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.07
Observed Phosphorus Retention Coefficient: -0.46
Internal Load: 8694 Lb 3943 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 84.9 mg/m^3
Hypolimnetic Volume: 1175.95 acre-ft
Anoxia Sediment Area: 97.12 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 135 mg/m^3
Hypolimnetic Volume: 1175 acre-ft
Anoxia Sediment Area: 97.12 acres
Time Period of Stratification: 90 days
Sediment Phosphorus Release Rate: 2.0 mg/m^2-day 5.57E-003 lb/acre-day
Internal Load: 160 Lb 73 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 84.9 mg/m^3
Hypolimnetic Volume: 1175.95 acre-ft
Anoxia Sediment Area: 97.12 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 135 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 97.12 acres
Time Period Between Observations: 14 days
Sediment Phosphorus Release Rate: 34.3 mg/m^2-day 9.32E-002 lb/acre-day
Internal Load: 416 Lb 189 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area

Start of Anoxia Anoxic Sediment Area: 97.12 acre
End of Anoxia Anoxic Sediment Area: 97.12 acre
Phosphorus Release Rate As Calculated In Method 2: 2.0 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: 2.0 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 18.2 mg/m^2-day
Period of Anoxia: 90 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	143	333	570

Internal Load: (kg) 65 151 259

Internal Load Comparison (Percentages are of the Total Estimate Load)

Total External Load: 16384 Lb 7432 kg

	Lb	kg	%
From A Complete Mass Budget:	8694	3943	34.7
From Growing Season In Situ Phosphorus Increases:	160	73	1.0
From In Situ Phosphorus Increases In The Fall:	416	189	2.5
From Phosphorus Release Rate and Anoxic Area:	333	151	2.0

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	26	45	3

Osgood, 1988 Lake Mixing Index: 3.0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	8694	287.8	333
Internal Load (kg):	3943	130.5	151
External Load (Lb):	139	16384	746
External Load (kg):	63	7432	338
Total Load (Lb):	8833	16671	1079
Total Load (kg):	4006	7562	489

Phosphorus Prediction and Uncertainty Analysis Module

Date: 3/28/2016 Scenario: 5

Observed spring overturn total phosphorus (SPO): 46.4 mg/m^3

Observed growing season mean phosphorus (GSM): 80.0 mg/m^3

Back calculation for SPO total phosphorus: 46.87 mg/m^3

Back calculation GSM phosphorus: 80.81 mg/m^3

% Confidence Range: 70%

Nurenberg Model Input - Est. Gross Int. Loading: 45 kg

Lake Phosphorus Model	**Low** Total P (mg/m^3)	**Most Likely** Total P (mg/m^3)	**High** Total P (mg/m^3)	**Predicted** -Observed (mg/m^3)	**% Dif.**
Walker, 1987 Reservoir	0	43	2	-37	-46
Canfield-Bachmann, 1981 Natural Lake	0	44	2	-36	-45
Canfield-Bachmann, 1981 Artificial Lake	0	40	2	-40	-50
Rechow, 1979 General	0	38	2	-42	-53
Rechow, 1977 Anoxic	0	42	2	-38	-48
Rechow, 1977 water load<50m/year	N/A	N/A	N/A	N/A	N/A
Rechow, 1977 water load>50m/year	0	36	2	-44	-55
Walker, 1977 General	0	43	2	-3	-6
Vollenweider, 1982 Combined OECD	1	34	3	-29	-46
Dillon-Rigler-Kirchner	0	43	2	-3	-6
Vollenweider, 1982 Shallow Lake/Res.	0	28	2	-35	-55
Larsen-Mercier, 1976	0	43	2	-3	-6
Nurnberg, 1984 Oxic	1	45	2	-35	-44

Lake Phosphorus Model	**Confidence** Lower	**Confidence** Upper	**Parameter** Fit?	**Back** Calculation	**Model** Type

	Bound	Bound		(kg/year)	
Walker, 1987 Reservoir	14	72	Tw	13845	GSM
Canfield-Bachmann, 1981 Natural Lake	14	127	L	14021	GSM
Canfield-Bachmann, 1981 Artificial Lake	12	115	FIT	16290	GSM
Rechow, 1979 General	12	65	FIT	15863	GSM
Rechow, 1977 Anoxic	14	70	FIT	14226	GSM
Rechow, 1977 water load<50m/year	N/A	N/A	N/A	N/A	N/A
Rechow, 1977 water load>50m/year	14	57	FIT	16677	GSM
Walker, 1977 General	12	79	FIT	8174	SPO
Vollenweider, 1982 Combined OECD	9	64	Tw	16275	ANN
Dillon-Rigler-Kirchner	14	72	P L p	8091	SPO
Vollenweider, 1982 Shallow Lake/Res.	7	52	Tw	19477	ANN
Larsen-Mercier, 1976	15	71	P Pin p	8174	SPO
Nurnberg, 1984 Oxic	14	80	L	13517	ANN

Water and Nutrient Outflow Module
Date: 3/28/2016 Scenario: 3
Average Annual Surface Total Phosphorus: 69.64mg/m^3
Annual Discharge: 1.26E+005 AF => 1.55E+008 m^3
Annual Outflow Loading: 22749.9 LB => 10319.3 kg

Expanded Trophic Response Module
Date: 3/28/2016 Scenario: 4
Total Phosphorus: 69.64 mg/m^3
Growing Season
Chlorophyll a: 93.9 mg/m^3
Secchi Disk Depth: 1.75 m
Chlorophyll a Nuisance Frequency
Chla Mean Min: 5
Chla Mean Max: 100
Chla Mean Increment: 5
Chla Temporal CV: 0.62
Chla Nuisance Criterion: 20

Mean	Freq %	ml	z	v	w	x
5	0.5	1.4	2.546	0.016	0.541	0.005
10	7.7	2.1	1.428	0.144	0.678	0.077
15	21.9	2.5	0.774	0.296	0.795	0.219
20	37.8	2.8	0.310	0.380	0.907	0.378
25	52.0	3.0	-0.050	0.398	0.984	0.480
30	63.5	3.2	-0.344	0.376	0.897	0.365
35	72.3	3.4	-0.593	0.335	0.835	0.277
40	79.0	3.5	-0.808	0.288	0.788	0.210
45	84.1	3.6	-0.998	0.242	0.751	0.159
50	87.9	3.7	-1.168	0.202	0.720	0.121
55	90.7	3.8	-1.322	0.167	0.695	0.093
60	92.8	3.9	-1.462	0.137	0.673	0.072
65	94.4	4.0	-1.591	0.112	0.654	0.056
70	95.6	4.1	-1.711	0.092	0.637	0.044
75	96.6	4.1	-1.822	0.076	0.623	0.034
80	97.3	4.2	-1.926	0.062	0.609	0.027

85	97.8	4.3	-2.024	0.051	0.598	0.022
90	98.3	4.3	-2.116	0.043	0.587	0.017
95	98.6	4.4	-2.203	0.035	0.577	0.014
100	98.9	4.4	-2.286	0.029	0.568	0.011

Expanded Trophic Response Module
Date: 3/28/2016 Scenario: 5
Total Phosphorus: 69.64 mg/m^3
Growing Season
Chlorophyll a: 93.9 mg/m^3
Secchi Disk Depth: 1.75 m
Carlson TSI Equations:
TSI (Total Phosphorus): 65 TSI (Chlorophyll a): 75 TSI (Secchi Disk Depth): 52

Expanded Trophic Response Module
Date: 3/28/2016 Scenario: 6
Total Phosphorus: 69.64 mg/m^3
Growing Season
Chlorophyll a: 93.9 mg/m^3
Secchi Disk Depth: 1.75 m
Wisconsin Statewide Prediction Equations:

	Natural Lakes		Impoundments	
	Stratified	Mixed	Stratified	Mixed
Secchi Disk Depth using Chlorophyll a:	0.7	0.5	0.9	0.5
Secchi Disk Depth using Total Phosphorus:	1.3	0.8	0.9	0.9
Chlorophyll a using Total Phosphorus:	14.6	20.7	36.9	22.4

Expanded Trophic Response Module
Date: 3/28/2016 Scenario: 7
Total Phosphorus: 69.64 mg/m^3
Growing Season
Chlorophyll a: 93.9 mg/m^3
Secchi Disk Depth: 1.75 m
Wisconsin Regional Prediction Equations:

		Stratified		Mixed	
	Region	Seepage	Drainage	Seepage	Drainage
Use Chlorophyll a To Predict Secchi Disk Depth (m)	South	0.6	0.6	0.5	0.4
	Central	1.2	0.5	0.1	No Data
	North	0.9	0.6	0.7	0.9
Use Total Phosphorus To Predict Secchi Disk Depth (m)	South	1.2	0.8	0.6	0.6
	Central	2.7	0.4	0.6	No Data
	North	1.8	1.0	1.1	0.8
Use Total Phosphorus To Predict Chlorophyll a (mg/m^3))	South	15.0	44.8	22.2	28.8
	Central	13.5	120.6	21.2	No Data
	North	8.2	19.8	16.3	12.3

Date: 4/4/2016 Scenario: Big Blake 2013 Direct Drainage
Lake Id: Big Blake Lake
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 550.0 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 366.7 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 126018.4 acre-ft/year
Areal Water Load <qs>: 605.9 ft/year
Lake Flushing Rate <p>: 67.32 1/year
Water Residence Time: 0.01 year
Observed spring overturn total phosphorus (SPO): 46.4 mg/m^3
Observed growing season mean phosphorus (GSM): 80.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	123.0	0.50	1.00	3.00	0.7	25	50	149
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	38.0	0.10	0.30	0.50	0.1	2	5	8
HD Urban (1/8 Ac)	19.0	1.00	1.50	2.00	0.2	8	12	15
MD Urban (1/4 Ac)	113.0	0.30	0.50	0.80	0.3	14	23	37
Rural Res (>1 Ac)	46.0	0.05	0.10	0.25	0.0	1	2	5
Wetlands	35.0	0.10	0.10	0.10	0.0	1	1	1
Forest	176.0	0.05	0.09	0.18	0.1	4	6	13
Lake Surface	208.0	0.10	0.30	1.00	0.3	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	164.4				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.99	8.22	26.30	0.1

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	139.2	16383.7	745.9	100.0
Total Loading (kg)	63.1	7431.6	338.4	100.0
Areal Loading (lb/ac-year)	0.67	78.77	3.59	
Areal Loading (mg/m^2-year)	75.02	8828.81	401.97	
Total PS Loading (lb)	0.0	16092.8	0.0	98.2

Total PS Loading (kg)	0.0	7299.7	0.0	98.2
Total NPS Loading (lb)	118.5	217.1	502.4	1.7
Total NPS Loading (kg)	53.7	98.5	227.9	1.7

Wisconsin Internal Load Estimator
Date: 4/4/2016 Scenario: 11

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 69.64 mg/m^3
Phosphorus Inflow Concentration: 47.8 mg/m^3
Areal External Loading: 8828.8 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.07
Observed Phosphorus Retention Coefficient: -0.46
Internal Load: 8694 Lb 3943 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 62.3 mg/m^3
Hypolimnetic Volume: 1029.20 acre-ft
Anoxia Sediment Area: 156.89 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 78.8 mg/m^3
Hypolimnetic Volume: 223.01 acre-ft
Anoxia Sediment Area: 67.99 acres
Time Period of Stratification: 45 days
Sediment Phosphorus Release Rate: -2.8 mg/m^2-day -7.62E-003 lb/acre-day
Internal Load: -127 Lb -57 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 62.3 mg/m^3
Hypolimnetic Volume: 1029.20 acre-ft
Anoxia Sediment Area: 156.89 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 135 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 67.99 acres
Time Period Between Observations: 30 days
Sediment Phosphorus Release Rate: 17.0 mg/m^2-day 4.63E-002 lb/acre-day
Internal Load: 513 Lb 233 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area

Start of Anoxia Anoxic Sediment Area: 156.89 acre
End of Anoxia Anoxic Sediment Area: 67.99 acre
Phosphorus Release Rate As Calculated In Method 2: -2.8 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: -2.8 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 7.1 mg/m^2-day
Period of Anoxia: 45 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	83	193	330

Internal Load: (kg) 37 87 150

Internal Load Comparison (Percentages are of the Total Estimate Load)

Total External Load: 16384 Lb 7432 kg

	Lb	kg	%
From A Complete Mass Budget:	8694	3943	34.7
From Growing Season In Situ Phosphorus Increases:	-127	-57	-0.8
From In Situ Phosphorus Increases In The Fall:	513	233	3.0
From Phosphorus Release Rate and Anoxic Area:	193	87	1.2

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	0	0	0

Osgood, 1988 Lake Mixing Index: 0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	0	0	0
Internal Load (kg):	0	0	0
External Load (Lb):	0	0	0
External Load (kg):	0	0	0
Total Load (Lb):	0	0	0
Total Load (kg):	0	0	0

Wisconsin Internal Load Estimator

Date: 4/4/2016 Scenario: 12

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 69.64 mg/m^3
Phosphorus Inflow Concentration: 47.8 mg/m^3
Areal External Loading: 8828.8 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.07
Observed Phosphorus Retention Coefficient: -0.46
Internal Load: 8694 Lb 3943 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia

Average Hypolimnetic Phosphorus Concentration: 62.3 mg/m^3
Hypolimnetic Volume: 1029.20 acre-ft
Anoxia Sediment Area: 156.89 acres

Just Prior To The End of Stratification

Average Hypolimnetic Phosphorus Concentration: 78.8 mg/m^3
Hypolimnetic Volume: 223.01 acre-ft
Anoxia Sediment Area: 67.99 acres
Time Period of Stratification: 45 days
Sediment Phosphorus Release Rate: -2.8 mg/m^2-day -7.62E-003 lb/acre-day
Internal Load: -127 Lb -57 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia

Average Hypolimnetic Phosphorus Concentration: 62.3 mg/m^3
Hypolimnetic Volume: 1029.20 acre-ft
Anoxia Sediment Area: 156.89 acres

Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 135 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 67.99 acres
Time Period Between Observations: 30 days
Sediment Phosphorus Release Rate: 17.0 mg/m^2-day 4.63E-002 lb/acre-day
Internal Load: 513 Lb 233 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area
Start of Anoxia Anoxic Sediment Area: 156.89 acre
End of Anoxia Anoxic Sediment Area: 67.99 acre
Phosphorus Release Rate As Calculated In Method 2: -2.8 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: -2.8 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 7.1 mg/m^2-day
Period of Anoxia: 45 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	83	193	330
Internal Load: (kg)	37	87	150

Internal Load Comparison (Percentages are of the Total Estimate Load)
Total External Load: 16384 Lb 7432 kg

	Lb	kg	%
From A Complete Mass Budget:	8694	3943	34.7
From Growing Season In Situ Phosphorus Increases:	-127	-57	-0.8
From In Situ Phosphorus Increases In The Fall:	513	233	3.0
From Phosphorus Release Rate and Anoxic Area:	193	87	1.2

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	26	45	3

Osgood, 1988 Lake Mixing Index: 3.0
Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	8694	193.1	193
Internal Load (kg):	3943	87.6	87
External Load (Lb):	139	16384	746
External Load (kg):	63	7432	338
Total Load (Lb):	8833	16577	939
Total Load (kg):	4006	7519	426

Phosphorus Prediction and Uncertainty Analysis Module
Date: 4/4/2016 Scenario: 9
Observed spring overturn total phosphorus (SPO): 46.4 mg/m^3
Observed growing season mean phosphorus (GSM): 80.0 mg/m^3
Back calculation for SPO total phosphorus: 46.87 mg/m^3
Back calculation GSM phosphorus: 80.81 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 45 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir	0	43	2	-37	-46
Canfield-Bachmann, 1981 Natural Lake	0	44	2	-36	-45
Canfield-Bachmann, 1981 Artificial Lake	0	40	2	-40	-50
Rechow, 1979 General	0	38	2	-42	-53
Rechow, 1977 Anoxic	0	42	2	-38	-48
Rechow, 1977 water load<50m/year	N/A	N/A	N/A	N/A	N/A
Rechow, 1977 water load>50m/year	0	36	2	-44	-55
Walker, 1977 General	0	43	2	-3	-6
Vollenweider, 1982 Combined OECD	1	34	3	-29	-46
Dillon-Rigler-Kirchner	0	43	2	-3	-6
Vollenweider, 1982 Shallow Lake/Res.	0	28	2	-35	-55
Larsen-Mercier, 1976	0	43	2	-3	-6
Nurnberg, 1984 Oxic	1	45	2	-35	-44

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir	14	72	Tw	13845	GSM
Canfield-Bachmann, 1981 Natural Lake	14	127	L	14021	GSM
Canfield-Bachmann, 1981 Artificial Lake	12	115	FIT	16290	GSM
Rechow, 1979 General	12	65	FIT	15863	GSM
Rechow, 1977 Anoxic	14	70	FIT	14226	GSM
Rechow, 1977 water load<50m/year	N/A	N/A	N/A	N/A	N/A
Rechow, 1977 water load>50m/year	14	57	FIT	16677	GSM
Walker, 1977 General	12	79	FIT	8174	SPO
Vollenweider, 1982 Combined OECD	9	64	Tw	16275	ANN
Dillon-Rigler-Kirchner	14	72	P L p	8091	SPO
Vollenweider, 1982 Shallow Lake/Res.	7	52	Tw	19477	ANN
Larsen-Mercier, 1976	15	71	P Pin p	8174	SPO
Nurnberg, 1984 Oxic	14	80	L	13517	ANN

Water and Nutrient Outflow Module
Date: 4/4/2016 Scenario: 7
Average Annual Surface Total Phosphorus: 69.64mg/m^3
Annual Discharge: 1.26E+005 AF => 1.55E+008 m^3
Annual Outflow Loading: 22749.9 LB => 10319.3 kg

Expanded Trophic Response Module
Date: 4/4/2016 Scenario: 21
Total Phosphorus: 69.64 mg/m^3
Growing Season
Chlorophyll a: 93.90 mg/m^3
Secchi Disk Depth: 1.75 m
Carlson TSI Equations:
TSI (Total Phosphorus): 65 TSI (Chlorophyll a): 75 TSI (Secchi Disk Depth): 52

Expanded Trophic Response Module
Date: 4/4/2016 Scenario: 22

Total Phosphorus: 69.64 mg/m^3
Growing Season
Chlorophyll a: 93.90 mg/m^3
Secchi Disk Depth: 1.75 m

Wisconsin Statewide Prediction Equations:

	Natural Lakes		Impoundments	
	Stratified	Mixed	Stratified	Mixed
Secchi Disk Depth using Chlorophyll a:	0.7	0.5	0.9	0.5
Secchi Disk Depth using Total Phosphorus:	1.3	0.8	0.9	0.9
Chlorophyll a using Total Phosphorus:	14.6	20.7	36.9	22.4

Expanded Trophic Response Module
Date: 4/4/2016 Scenario: 23
Total Phosphorus: 69.64 mg/m^3
Growing Season
Chlorophyll a: 93.90 mg/m^3
Secchi Disk Depth: 1.75 m

Wisconsin Regional Prediction Equations:

		Stratified		Mixed	
	Region	Seepage	Drainage	Seepage	Drainage
Use Chlorophyll a To Predict	South	0.6	0.6	0.5	0.4
Secchi Disk Depth (m)	Central	1.2	0.5	0.1	No Data
	North	0.9	0.6	0.7	0.9
Use Total Phosphorus To	South	1.2	0.8	0.6	0.6
Predict Secchi Disk Depth (m)	Central	2.7	0.4	0.6	No Data
	North	1.8	1.0	1.1	0.8
Use Total Phosphorus To	South	15.0	44.8	22.2	28.8
Predict Chlorophyll a (mg/m^3))	Central	13.5	120.6	21.2	No Data
	North	8.2	19.8	16.3	12.3

Expanded Trophic Response Module
Date: 4/4/2016 Scenario: 24
Total Phosphorus: 69.64 mg/m^3
Growing Season
Chlorophyll a: 93.90 mg/m^3
Secchi Disk Depth: 1.75 m

Chlorophyll a Nuisance Frequency
Chla Mean Min: 5
Chla Mean Max: 100
Chla Mean Increment: 5
Chla Temporal CV: 0.62
Chla Nuisance Criterion: 20

Mean	Freq %	ml	z	v	w	x
5	0.5	1.4	2.546	0.016	0.541	0.005
10	7.7	2.1	1.428	0.144	0.678	0.077
15	21.9	2.5	0.774	0.296	0.795	0.219
20	37.8	2.8	0.310	0.380	0.907	0.378
25	52.0	3.0	-0.050	0.398	0.984	0.480
30	63.5	3.2	-0.344	0.376	0.897	0.365
35	72.3	3.4	-0.593	0.335	0.835	0.277

40	79.0	3.5	-0.808	0.288	0.788	0.210
45	84.1	3.6	-0.998	0.242	0.751	0.159
50	87.9	3.7	-1.168	0.202	0.720	0.121
55	90.7	3.8	-1.322	0.167	0.695	0.093
60	92.8	3.9	-1.462	0.137	0.673	0.072
65	94.4	4.0	-1.591	0.112	0.654	0.056
70	95.6	4.1	-1.711	0.092	0.637	0.044
75	96.6	4.1	-1.822	0.076	0.623	0.034
80	97.3	4.2	-1.926	0.062	0.609	0.027
85	97.8	4.3	-2.024	0.051	0.598	0.022
90	98.3	4.3	-2.116	0.043	0.587	0.017
95	98.6	4.4	-2.203	0.035	0.577	0.014
100	98.9	4.4	-2.286	0.029	0.568	0.011

Date: 3/16/2016 Scenario: 2013 LTHIA
Lake Id: Big Blake Lake
Watershed Id: 1

Hydrologic and Morphometric Data

Tributary Drainage Area: 20066.1 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 13377.4 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 13434.6 acre-ft/year
Areal Water Load <qs>: 64.6 ft/year
Lake Flushing Rate <p>: 7.18 1/year
Water Residence Time: 0.14 year
Observed spring overturn total phosphorus (SPO): 46.4 mg/m^3
Observed growing season mean phosphorus (GSM): 82.8 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	1023.8	0.50	1.00	3.00	24.8	207	414	1243
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	4790.6	0.10	0.30	0.50	34.8	194	582	969
HD Urban (1/8 Ac)	4.3	1.00	1.50	2.00	0.2	2	3	3
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	691.9	0.05	0.10	0.25	1.7	14	28	70
Wetlands	1496.3	0.10	0.10	0.10	3.6	61	61	61
Forest	10759.2	0.05	0.09	0.18	23.5	218	392	784
Lake Surface	208.0	0.10	0.30	1.00	1.5	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	164.4				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.99	8.22	26.30	0.5

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	1669.0	3682.4	8304.2	100.0
Total Loading (kg)	757.1	1670.3	3766.8	100.0
Areal Loading (lb/ac-year)	8.02	17.70	39.92	
Areal Loading (mg/m^2-year)	899.40	1984.34	4474.95	
Total PS Loading (lb)	0.0	0.0	0.0	0.0

Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	1648.3	3608.6	8060.6	99.5
Total NPS Loading (kg)	747.7	1636.8	3656.3	99.5

Wisconsin Internal Load Estimator
Date: 3/16/2016 Scenario: 1

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 69.64 mg/m^3
Phosphorus Inflow Concentration: 100.8 mg/m^3
Areal External Loading: 1984.3 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.40
Observed Phosphorus Retention Coefficient: 0.31
Internal Load: 327 Lb 149 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 73.68 mg/m^3
Hypolimnetic Volume: 1175.95 acre-ft
Anoxia Sediment Area: 97.12 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 73.68 mg/m^3
Hypolimnetic Volume: 1175.95 acre-ft
Anoxia Sediment Area: 97.12 acres
Time Period of Stratification: 90 days
Sediment Phosphorus Release Rate: 0.0 mg/m^2-day 0.00E+000 lb/acre-day
Internal Load: 0 Lb 0 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 73.68 mg/m^3
Hypolimnetic Volume: 1175.95 acre-ft
Anoxia Sediment Area: 97.12 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 78.8 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 97.12 acres
Time Period Between Observations: 30 days
Sediment Phosphorus Release Rate: 6.4 mg/m^2-day 1.73E-002 lb/acre-day
Internal Load: 166 Lb 75 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area

Start of Anoxia Anoxic Sediment Area: 97.12 acre
End of Anoxia Anoxic Sediment Area: 97.12 acre
Phosphorus Release Rate As Calculated In Method 2: 0.0 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: 0.0 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 3.2 mg/m^2-day
Period of Anoxia: 90 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	143	333	570

Internal Load: (kg) 65 151 259

Internal Load Comparison (Percentages are of the Total Estimate Load)

Total External Load: 3682 Lb 1670 kg

	Lb	kg	%
From A Complete Mass Budget:	327	149	8.2
From Growing Season In Situ Phosphorus Increases:	0	0	0.0
From In Situ Phosphorus Increases In The Fall:	166	75	4.3
From Phosphorus Release Rate and Anoxic Area:	333	151	8.3

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	36	63	146

Osgood, 1988 Lake Mixing Index: 3.0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	327	82.8	333
Internal Load (kg):	149	37.5	151
External Load (Lb):	1669	3682	8304
External Load (kg):	757	1670	3767
Total Load (Lb):	1996	3765	8637
Total Load (kg):	906	1708	3918

Phosphorus Prediction and Uncertainty Analysis Module

Date: 3/16/2016 Scenario: 2

Observed spring overturn total phosphorus (SPO): 46.4 mg/m^3

Observed growing season mean phosphorus (GSM): 82.8 mg/m^3

Back calculation for SPO total phosphorus: 70.34 mg/m^3

Back calculation GSM phosphorus: 70.48 mg/m^3

% Confidence Range: 70%

Nurenberg Model Input - Est. Gross Int. Loading: 63 kg

Lake Phosphorus Model	**Low** Total P (mg/m^3)	**Most Likely** Total P (mg/m^3)	**High** Total P (mg/m^3)	**Predicted** -Observed (mg/m^3)	**% Dif.**
Walker, 1987 Reservoir	25	56	127	-27	-33
Canfield-Bachmann, 1981 Natural Lake	35	69	136	-14	-17
Canfield-Bachmann, 1981 Artificial Lake	31	57	102	-26	-31
Rechow, 1979 General	26	56	127	-27	-33
Rechow, 1977 Anoxic	40	87	197	4	5
Rechow, 1977 water load<50m/year	30	66	149	-17	-21
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	34	75	170	29	63
Vollenweider, 1982 Combined OECD	27	53	102	-12	-19
Dillon-Rigler-Kirchner	24	53	119	7	15
Vollenweider, 1982 Shallow Lake/Res.	22	45	91	-20	-31
Larsen-Mercier, 1976	33	73	166	27	58
Nurnberg, 1984 Oxic	31	64	141	-19	-23

Lake Phosphorus Model	**Confidence** Lower	**Confidence** Upper	**Parameter** Fit?	**Back** Calculation	**Model** Type

	Bound	Bound		(kg/year)	
Walker, 1987 Reservoir	32	104	FIT	2096	GSM
Canfield-Bachmann, 1981 Natural Lake	21	199	FIT	1685	GSM
Canfield-Bachmann, 1981 Artificial Lake	18	164	FIT	2189	GSM
Rechow, 1979 General	31	105	FIT	2090	GSM
Rechow, 1977 Anoxic	50	160	FIT	1347	GSM
Rechow, 1977 water load<50m/year	36	123	P	1783	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	36	148	FIT	1558	SPO
Vollenweider, 1982 Combined OECD	25	100	FIT	2393	ANN
Dillon-Rigler-Kirchner	30	97	P	2234	SPO
Vollenweider, 1982 Shallow Lake/Res.	21	85	FIT	2842	ANN
Larsen-Mercier, 1976	43	134	P Pin	1601	SPO
Nurnberg, 1984 Oxic	33	122	P	1836	ANN

Water and Nutrient Outflow Module
Date: 3/16/2016 Scenario: 1
Average Annual Surface Total Phosphorus: 69.64mg/m^3
Annual Discharge: 1.34E+004 AF => 1.66E+007 m^3
Annual Outflow Loading: 2436.5 LB => 1105.2 kg

Expanded Trophic Response Module
Date: 3/16/2016 Scenario: 1
Total Phosphorus: 69.78 mg/m^3
Growing Season
Chlorophyll a: 93.90 mg/m^3
Secchi Disk Depth: 1.75 m
Chlorophyll a Nuisance Frequency
Chla Mean Min: 5
Chla Mean Max: 100
Chla Mean Increment: 5
Chla Temporal CV: 0.62
Chla Nuisance Criterion: 20

Mean	Freq %	ml	z	v	w	x
5	0.5	1.4	2.546	0.016	0.541	0.005
10	7.7	2.1	1.428	0.144	0.678	0.077
15	21.9	2.5	0.774	0.296	0.795	0.219
20	37.8	2.8	0.310	0.380	0.907	0.378
25	52.0	3.0	-0.050	0.398	0.984	0.480
30	63.5	3.2	-0.344	0.376	0.897	0.365
35	72.3	3.4	-0.593	0.335	0.835	0.277
40	79.0	3.5	-0.808	0.288	0.788	0.210
45	84.1	3.6	-0.998	0.242	0.751	0.159
50	87.9	3.7	-1.168	0.202	0.720	0.121
55	90.7	3.8	-1.322	0.167	0.695	0.093
60	92.8	3.9	-1.462	0.137	0.673	0.072
65	94.4	4.0	-1.591	0.112	0.654	0.056
70	95.6	4.1	-1.711	0.092	0.637	0.044
75	96.6	4.1	-1.822	0.076	0.623	0.034
80	97.3	4.2	-1.926	0.062	0.609	0.027

85	97.8	4.3	-2.024	0.051	0.598	0.022
90	98.3	4.3	-2.116	0.043	0.587	0.017
95	98.6	4.4	-2.203	0.035	0.577	0.014
100	98.9	4.4	-2.286	0.029	0.568	0.011

Date: 4/4/2016 Scenario: Big Blake 2013 L-THIA
Lake Id: Big Blake Lake
Watershed Id: 1

Hydrologic and Morphometric Data

Tributary Drainage Area: 20066.1 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 13377.4 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 13434.6 acre-ft/year
Areal Water Load <qs>: 64.6 ft/year
Lake Flushing Rate <p>: 7.18 1/year
Water Residence Time: 0.14 year
Observed spring overturn total phosphorus (SPO): 46.4 mg/m^3
Observed growing season mean phosphorus (GSM): 80 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	1023.8	0.50	1.00	3.00	24.8	207	414	1243
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	4790.6	0.10	0.30	0.50	34.8	194	582	969
HD Urban (1/8 Ac)	4.3	1.00	1.50	2.00	0.2	2	3	3
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	691.9	0.05	0.10	0.25	1.7	14	28	70
Wetlands	1496.3	0.10	0.10	0.10	3.6	61	61	61
Forest	10759.2	0.05	0.09	0.18	23.5	218	392	784
Lake Surface	208.0	0.10	0.30	1.00	1.5	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	164.4				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.99	8.22	26.30	0.5

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	1669.0	3682.4	8304.2	100.0
Total Loading (kg)	757.1	1670.3	3766.8	100.0
Areal Loading (lb/ac-year)	8.02	17.70	39.92	
Areal Loading (mg/m^2-year)	899.40	1984.34	4474.95	
Total PS Loading (lb)	0.0	0.0	0.0	0.0

Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	1648.3	3608.6	8060.6	99.5
Total NPS Loading (kg)	747.7	1636.8	3656.3	99.5

Wisconsin Internal Load Estimator
Date: 4/4/2016 Scenario: 13

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 69.64 mg/m^3
Phosphorus Inflow Concentration: 100.8 mg/m^3
Areal External Loading: 1984.3 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.40
Observed Phosphorus Retention Coefficient: 0.31
Internal Load: 327 Lb 149 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 62.3 mg/m^3
Hypolimnetic Volume: 1029.20 acre-ft
Anoxia Sediment Area: 156.89 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 78.8 mg/m^3
Hypolimnetic Volume: 223.01 acre-ft
Anoxia Sediment Area: 67.99 acres
Time Period of Stratification: 45 days
Sediment Phosphorus Release Rate: -2.8 mg/m^2-day -7.62E-003 lb/acre-day
Internal Load: -127 Lb -57 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 62.3 mg/m^3
Hypolimnetic Volume: 1029.20 acre-ft
Anoxia Sediment Area: 156.89 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 135 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 67.99 acres
Time Period Between Observations: 30 days
Sediment Phosphorus Release Rate: 17.0 mg/m^2-day 4.63E-002 lb/acre-day
Internal Load: 513 Lb 233 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area

Start of Anoxia Anoxic Sediment Area: 156.89 acre
End of Anoxia Anoxic Sediment Area: 67.99 acre
Phosphorus Release Rate As Calculated In Method 2: -2.8 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: -2.8 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 7.1 mg/m^2-day
Period of Anoxia: 45 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
Internal Load: (Lb)	83	193	330

Internal Load: (kg) 37 87 150

Internal Load Comparison (Percentages are of the Total Estimate Load)

Total External Load: 3682 Lb 1670 kg

	Lb	kg	%
From A Complete Mass Budget:	327	149	8.2
From Growing Season In Situ Phosphorus Increases:	-127	-57	-3.6
From In Situ Phosphorus Increases In The Fall:	513	233	12.2
From Phosphorus Release Rate and Anoxic Area:	193	87	5.0

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	0	0	0

Osgood, 1988 Lake Mixing Index: 0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	0	0	0
Internal Load (kg):	0	0	0
External Load (Lb):	0	0	0
External Load (kg):	0	0	0
Total Load (Lb):	0	0	0
Total Load (kg):	0	0	0

Wisconsin Internal Load Estimator

Date: 4/4/2016 Scenario: 14

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 69.64 mg/m^3
Phosphorus Inflow Concentration: 100.8 mg/m^3
Areal External Loading: 1984.3 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.40
Observed Phosphorus Retention Coefficient: 0.31
Internal Load: 327 Lb 149 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia

Average Hypolimnetic Phosphorus Concentration: 62.3 mg/m^3
Hypolimnetic Volume: 1029.20 acre-ft
Anoxia Sediment Area: 156.89 acres

Just Prior To The End of Stratification

Average Hypolimnetic Phosphorus Concentration: 78.8 mg/m^3
Hypolimnetic Volume: 223.01 acre-ft
Anoxia Sediment Area: 67.99 acres
Time Period of Stratification: 45 days
Sediment Phosphorus Release Rate: -2.8 mg/m^2-day -7.62E-003 lb/acre-day
Internal Load: -127 Lb -57 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia

Average Hypolimnetic Phosphorus Concentration: 62.3 mg/m^3
Hypolimnetic Volume: 1029.20 acre-ft
Anoxia Sediment Area: 156.89 acres

Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 135 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 67.99 acres
Time Period Between Observations: 30 days
Sediment Phosphorus Release Rate: 17.0 mg/m^2-day 4.63E-002 lb/acre-day
Internal Load: 513 Lb 233 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area
Start of Anoxia Anoxic Sediment Area: 156.89 acre
End of Anoxia Anoxic Sediment Area: 67.99 acre
Phosphorus Release Rate As Calculated In Method 2: -2.8 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: -2.8 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 7.1 mg/m^2-day
Period of Anoxia: 45 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	83	193	330
Internal Load: (kg)	37	87	150

Internal Load Comparison (Percentages are of the Total Estimate Load)
Total External Load: 3682 Lb 1670 kg

	Lb	kg	%
From A Complete Mass Budget:	327	149	8.2
From Growing Season In Situ Phosphorus Increases:	-127	-57	-3.6
From In Situ Phosphorus Increases In The Fall:	513	233	12.2
From Phosphorus Release Rate and Anoxic Area:	193	87	5.0

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	36	66	142

Osgood, 1988 Lake Mixing Index: 3.0
Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	327	193.1	193
Internal Load (kg):	149	87.6	87
External Load (Lb):	1669	3682	8304
External Load (kg):	757	1670	3767
Total Load (Lb):	1996	3876	8497
Total Load (kg):	906	1758	3854

Phosphorus Prediction and Uncertainty Analysis Module
Date: 4/4/2016 Scenario: 10
Observed spring overturn total phosphorus (SPO): 46.4 mg/m^3
Observed growing season mean phosphorus (GSM): 80.0 mg/m^3
Back calculation for SPO total phosphorus: 46.87 mg/m^3
Back calculation GSM phosphorus: 80.81 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 66 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir	25	56	127	-24	-30
Canfield-Bachmann, 1981 Natural Lake	35	69	136	-11	-14
Canfield-Bachmann, 1981 Artificial Lake	31	57	102	-23	-29
Rechow, 1979 General	26	56	127	-24	-30
Rechow, 1977 Anoxic	40	87	197	7	9
Rechow, 1977 water load<50m/year	30	66	149	-14	-18
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	34	75	170	29	63
Vollenweider, 1982 Combined OECD	27	53	102	-10	-16
Dillon-Rigler-Kirchner	24	53	119	7	15
Vollenweider, 1982 Shallow Lake/Res.	22	45	91	-18	-28
Larsen-Mercier, 1976	33	73	166	27	58
Nurnberg, 1984 Oxic	31	65	141	-15	-19

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir	32	104	FIT	2403	GSM
Canfield-Bachmann, 1981 Natural Lake	21	199	FIT	1983	GSM
Canfield-Bachmann, 1981 Artificial Lake	18	164	FIT	2659	GSM
Rechow, 1979 General	31	105	FIT	2396	GSM
Rechow, 1977 Anoxic	50	160	FIT	1545	GSM
Rechow, 1977 water load<50m/year	36	123	P	2044	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	36	148	FIT	1038	SPO
Vollenweider, 1982 Combined OECD	25	100	FIT	2124	ANN
Dillon-Rigler-Kirchner	30	97	P	1489	SPO
Vollenweider, 1982 Shallow Lake/Res.	21	85	FIT	2542	ANN
Larsen-Mercier, 1976	43	134	P Pin	1067	SPO
Nurnberg, 1984 Oxic	34	122	P	2115	ANN

Water and Nutrient Outflow Module

Date: 4/4/2016 Scenario: 8

Average Annual Surface Total Phosphorus: 69.64mg/m^3

Annual Discharge: 1.34E+004 AF => 1.66E+007 m^3

Annual Outflow Loading: 2436.5 LB => 1105.2 kg

Date: 3/4/2016 Scenario: 2013
Lake Id: Big Blake Lake
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 2150.7 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 1433.8 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 1491.0 acre-ft/year
Areal Water Load <qs>: 7.2 ft/year
Lake Flushing Rate <p>: 0.80 1/year
Water Residence Time: 1.26 year
Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3
Observed growing season mean phosphorus (GSM): 0.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	390.5	0.50	1.00	3.00	52.3	79	158	474
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	159.2	0.10	0.30	0.50	6.4	6	19	32
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	240.0	0.30	0.50	0.80	16.1	29	49	78
Rural Res (>1 Ac)	9.7	0.05	0.10	0.25	0.1	0	0	1
Wetlands	347.8	0.10	0.10	0.10	4.7	14	14	14
Forest	1003.6	0.05	0.09	0.18	12.1	20	37	73
Lake Surface	208.0	0.10	0.30	1.00	8.4	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	0.0				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	347.4	666.2	1667.4	100.0
Total Loading (kg)	157.6	302.2	756.3	100.0
Areal Loading (lb/ac-year)	1.67	3.20	8.02	
Areal Loading (mg/m^2-year)	187.22	359.01	898.54	
Total PS Loading (lb)	0.0	0.0	0.0	0.0

Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	328.9	610.5	1481.9	100.0
Total NPS Loading (kg)	149.2	276.9	672.2	100.0

Date: 3/17/2016 Scenario: 2014 Bloom
Lake Id: Big Blake Lake
Watershed Id: 1

Hydrologic and Morphometric Data

Tributary Drainage Area: 20066.1 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 13377.4 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 13434.6 acre-ft/year
Areal Water Load <qs>: 64.6 ft/year
Lake Flushing Rate <p>: 7.18 1/year
Water Residence Time: 0.14 year
Observed spring overturn total phosphorus (SPO): 46.4 mg/m^3
Observed growing season mean phosphorus (GSM): 82.8 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	1023.8	0.50	1.00	3.00	24.8	207	414	1243
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	4790.6	0.10	0.30	0.50	34.8	194	582	969
HD Urban (1/8 Ac)	4.3	1.00	1.50	2.00	0.2	2	3	3
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	691.9	0.05	0.10	0.25	1.7	14	28	70
Wetlands	1496.3	0.10	0.10	0.10	3.6	61	61	61
Forest	10759.2	0.05	0.09	0.18	23.5	218	392	784
Lake Surface	208.0	0.10	0.30	1.00	1.5	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	164.4				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.99	8.22	26.30	0.5

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	1669.0	3682.4	8304.2	100.0
Total Loading (kg)	757.1	1670.3	3766.8	100.0
Areal Loading (lb/ac-year)	8.02	17.70	39.92	
Areal Loading (mg/m^2-year)	899.40	1984.34	4474.95	
Total PS Loading (lb)	0.0	0.0	0.0	0.0

Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	1648.3	3608.6	8060.6	99.5
Total NPS Loading (kg)	747.7	1636.8	3656.3	99.5

Wisconsin Internal Load Estimator
Date: 3/17/2016 Scenario: 3

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 69.64 mg/m^3
Phosphorus Inflow Concentration: 100.8 mg/m^3
Areal External Loading: 1984.3 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.40
Observed Phosphorus Retention Coefficient: 0.31
Internal Load: 327 Lb 149 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 73.68 mg/m^3
Hypolimnetic Volume: 1175.95 acre-ft
Anoxia Sediment Area: 97.12 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 78.8 mg/m^3
Hypolimnetic Volume: 1175.95 acre-ft
Anoxia Sediment Area: 97.12 acres
Time Period of Stratification: 90 days
Sediment Phosphorus Release Rate: 0.2 mg/m^2-day 5.71E-004 lb/acre-day
Internal Load: 16 Lb 7 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 73.68 mg/m^3
Hypolimnetic Volume: 1175.95 acre-ft
Anoxia Sediment Area: 97.12 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 140 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 97.12 acres
Time Period Between Observations: 14 days
Sediment Phosphorus Release Rate: 39.3 mg/m^2-day 1.07E-001 lb/acre-day
Internal Load: 477 Lb 216 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area

Start of Anoxia Anoxic Sediment Area: 97.12 acre
End of Anoxia Anoxic Sediment Area: 97.12 acre
Phosphorus Release Rate As Calculated In Method 2: 0.2 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: 0.2 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 19.8 mg/m^2-day
Period of Anoxia: 90 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	143	333	570

Internal Load: (kg)	65	151	259

Internal Load Comparison (Percentages are of the Total Estimate Load)

Total External Load: 3682 Lb 1670 kg

	Lb	kg	%
From A Complete Mass Budget:	327	149	8.2
From Growing Season In Situ Phosphorus Increases:	16	7	0.4
From In Situ Phosphorus Increases In The Fall:	477	216	11.5
From Phosphorus Release Rate and Anoxic Area:	333	151	8.3

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	0	0	0

Osgood, 1988 Lake Mixing Index: 0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	0	0	0
Internal Load (kg):	0	0	0
External Load (Lb):	0	0	0
External Load (kg):	0	0	0
Total Load (Lb):	0	0	0
Total Load (kg):	0	0	0

Date: 3/29/2016 Scenario: 2014 direct drainage
Lake Id: Big Blake Lake
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 550.0 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 366.7 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 222649.0 acre-ft/year
Areal Water Load <qs>: 1070.4 ft/year
Lake Flushing Rate <p>: 118.94 1/year
Water Residence Time: 0.01 year
Observed spring overturn total phosphorus (SPO): 38.7 mg/m^3
Observed growing season mean phosphorus (GSM): 40 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	123.0	0.50	1.00	3.00	0.4	25	50	149
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	38.0	0.10	0.30	0.50	0.0	2	5	8
HD Urban (1/8 Ac)	19.0	1.00	1.50	2.00	0.1	8	12	15
MD Urban (1/4 Ac)	113.0	0.30	0.50	0.80	0.2	14	23	37
Rural Res (>1 Ac)	46.0	0.05	0.10	0.25	0.0	1	2	5
Wetlands	35.0	0.10	0.10	0.10	0.0	1	1	1
Forest	176.0	0.05	0.09	0.18	0.0	4	6	13
Lake Surface	208.0	0.10	0.30	1.00	0.2	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	164.4				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.99	8.22	26.30	0.1

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	139.2	29497.6	745.9	100.0
Total Loading (kg)	63.1	13380.0	338.4	100.0
Areal Loading (lb/ac-year)	0.67	141.82	3.59	
Areal Loading (mg/m^2-year)	75.02	15895.57	401.97	
Total PS Loading (lb)	0.0	29206.7	0.0	99.0

Total PS Loading (kg)	0.0	13248.1	0.0	99.0
Total NPS Loading (lb)	118.5	217.1	502.4	0.9
Total NPS Loading (kg)	53.7	98.5	227.9	0.9

Wisconsin Internal Load Estimator
Date: 3/29/2016 Scenario: 6

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 38.04 mg/m^3
Phosphorus Inflow Concentration: 48.7 mg/m^3
Areal External Loading: 15895.6 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.04
Observed Phosphorus Retention Coefficient: 0.22
Internal Load: -5181 Lb -2350 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 37.7 mg/m^3
Hypolimnetic Volume: 44.08 acre-ft
Anoxia Sediment Area: 13.44 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 51.0 mg/m^3
Hypolimnetic Volume: 44.08 acre-ft
Anoxia Sediment Area: 13.44 acres
Time Period of Stratification: 60 days
Sediment Phosphorus Release Rate: 0.2 mg/m^2-day 6.03E-004 lb/acre-day
Internal Load: 2 Lb 1 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 37.7 mg/m^3
Hypolimnetic Volume: 44.08 acre-ft
Anoxia Sediment Area: 13.44 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 24.7 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 13.44 acres
Time Period Between Observations: 14 days
Sediment Phosphorus Release Rate: 72.2 mg/m^2-day 1.96E-001 lb/acre-day
Internal Load: 121 Lb 55 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area

Start of Anoxia Anoxic Sediment Area: 13.44 acre
End of Anoxia Anoxic Sediment Area: 13.44 acre
Phosphorus Release Rate As Calculated In Method 2: 0.2 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: 0.2 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 36.2 mg/m^2-day
Period of Anoxia: 60 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	13	31	53

Internal Load: (kg) 6 14 24

Internal Load Comparison (Percentages are of the Total Estimate Load)

Total External Load: 29498 Lb 13380 kg

	Lb	kg	%
From A Complete Mass Budget:	-5181	-2350	-21.3
From Growing Season In Situ Phosphorus Increases:	2	1	0.0
From In Situ Phosphorus Increases In The Fall:	121	55	0.4
From Phosphorus Release Rate and Anoxic Area:	31	14	0.1

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	0	0	0

Osgood, 1988 Lake Mixing Index: 0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	0	0	0
Internal Load (kg):	0	0	0
External Load (Lb):	0	0	0
External Load (kg):	0	0	0
Total Load (Lb):	0	0	0
Total Load (kg):	0	0	0

Phosphorus Prediction and Uncertainty Analysis Module

Date: 3/29/2016 Scenario: 6

Observed spring overturn total phosphorus (SPO): 38.7 mg/m^3

Observed growing season mean phosphorus (GSM): 40.0 mg/m^3

Back calculation for SPO total phosphorus: 39.1 mg/m^3

Back calculation GSM phosphorus: 40.4 mg/m^3

% Confidence Range: 70%

Nurenberg Model Input - Est. Gross Int. Loading: 0 kg

Lake Phosphorus Model	**Low** Total P (mg/m^3)	**Most Likely** Total P (mg/m^3)	**High** Total P (mg/m^3)	**Predicted** -Observed (mg/m^3)	**% Dif.**
Walker, 1987 Reservoir	0	46	1	6	15
Canfield-Bachmann, 1981 Natural Lake	0	45	1	5	13
Canfield-Bachmann, 1981 Artificial Lake	0	42	1	2	5
Rechow, 1979 General	0	39	1	-1	-3
Rechow, 1977 Anoxic	0	43	1	3	8
Rechow, 1977 water load<50m/year	N/A	N/A	N/A	N/A	N/A
Rechow, 1977 water load>50m/year	0	32	1	-8	-20
Walker, 1977 General	0	45	1	6	16
Vollenweider, 1982 Combined OECD	0	35	2	-4	-10
Dillon-Rigler-Kirchner	0	47	1	8	21
Vollenweider, 1982 Shallow Lake/Res.	0	29	1	-10	-25
Larsen-Mercier, 1976	0	45	1	6	16
Nurnberg, 1984 Oxic	0	47	1	7	18

Lake Phosphorus Model	**Confidence** Lower	**Confidence** Upper	**Parameter** Fit?	**Back** Calculation	**Model** Type

	Bound	Bound		(kg/year)	
Walker, 1987 Reservoir	15	78	Tw	11794	GSM
Canfield-Bachmann, 1981 Natural Lake	14	130	L	11551	GSM
Canfield-Bachmann, 1981 Artificial Lake	13	121	FIT	12459	GSM
Rechow, 1979 General	12	67	qs	13709	GSM
Rechow, 1977 Anoxic	15	72	FIT	12553	GSM
Rechow, 1977 water load<50m/year	N/A	N/A	N/A	N/A	N/A
Rechow, 1977 water load>50m/year	13	51	FIT	16938	GSM
Walker, 1977 General	12	83	FIT	11749	SPO
Vollenweider, 1982 Combined OECD	9	66	Tw	15698	ANN
Dillon-Rigler-Kirchner	16	79	P L qs p	11024	SPO
Vollenweider, 1982 Shallow Lake/Res.	8	54	Tw	19512	ANN
Larsen-Mercier, 1976	16	75	P Pin p	11723	SPO
Nurnberg, 1984 Oxic	14	84	L qs	11601	ANN

Water and Nutrient Outflow Module
Date: 3/29/2016 Scenario: 4
Average Annual Surface Total Phosphorus: 38.04mg/m^3
Annual Discharge: 2.23E+005 AF => 2.75E+008 m^3
Annual Outflow Loading: 22047.5 LB => 10000.7 kg actual discharge 3.35e+8

Expanded Trophic Response Module
Date: 3/29/2016 Scenario: 8
Total Phosphorus: 38.04 mg/m^3
Growing Season
Chlorophyll a: 26.55 mg/m^3
Secchi Disk Depth: 1.57 m
Carlson TSI Equations:
TSI (Total Phosphorus): 57 TSI (Chlorophyll a): 63 TSI (Secchi Disk Depth): 53

Expanded Trophic Response Module
Date: 3/29/2016 Scenario: 9
Total Phosphorus: 38.04 mg/m^3
Growing Season
Chlorophyll a: 26.55 mg/m^3
Secchi Disk Depth: 1.57 m
Wisconsin Statewide Prediction Equations:

	Natural Lakes		Impoundments	
	Stratified	Mixed	Stratified	Mixed
Secchi Disk Depth using Chlorophyll a:	1.3	0.9	1.3	0.9
Secchi Disk Depth using Total Phosphorus:	1.6	1.1	1.3	1.0
Chlorophyll a using Total Phosphorus:	10.5	13.9	19.9	14.7

Expanded Trophic Response Module
Date: 3/29/2016 Scenario: 10
Total Phosphorus: 38.04 mg/m^3
Growing Season
Chlorophyll a: 26.55 mg/m^3
Secchi Disk Depth: 1.57 m
Wisconsin Regional Prediction Equations:

		Stratified		Mixed	
	Region	Seepage	Drainage	Seepage	Drainage
Use Chlorophyll a To Predict Secchi Disk Depth (m)	South	1.1	1.0	0.7	0.7
	Central	1.8	1.1	0.5	No Data
	North	1.5	1.1	1.2	1.1
Use Total Phosphorus To Predict Secchi Disk Depth (m)	South	1.6	1.2	0.7	0.8
	Central	2.8	0.7	0.9	No Data
	North	2.1	1.5	1.4	1.1
Use Total Phosphorus To Predict Chlorophyll a (mg/m^3))	South	10.2	21.7	13.8	17.1
	Central	9.4	49.0	14.4	No Data
	North	7.4	12.2	11.8	11.2

Expanded Trophic Response Module
Date: 3/29/2016 Scenario: 11
Total Phosphorus: 38.04 mg/m^3
Growing Season
Chlorophyll a: 26.55 mg/m^3
Secchi Disk Depth: 1.57 m
Chlorophyll a Nuisance Frequency
Chla Mean Min: 5
Chla Mean Max: 100
Chla Mean Increment: 5
Chla Temporal CV: 0.62
Chla Nuisance Criterion: 20

Mean	Freq %	ml	z	v	w	x
5	0.5	1.4	2.546	0.016	0.541	0.005
10	7.7	2.1	1.428	0.144	0.678	0.077
15	21.9	2.5	0.774	0.296	0.795	0.219
20	37.8	2.8	0.310	0.380	0.907	0.378
25	52.0	3.0	-0.050	0.398	0.984	0.480
30	63.5	3.2	-0.344	0.376	0.897	0.365
35	72.3	3.4	-0.593	0.335	0.835	0.277
40	79.0	3.5	-0.808	0.288	0.788	0.210
45	84.1	3.6	-0.998	0.242	0.751	0.159
50	87.9	3.7	-1.168	0.202	0.720	0.121
55	90.7	3.8	-1.322	0.167	0.695	0.093
60	92.8	3.9	-1.462	0.137	0.673	0.072
65	94.4	4.0	-1.591	0.112	0.654	0.056
70	95.6	4.1	-1.711	0.092	0.637	0.044
75	96.6	4.1	-1.822	0.076	0.623	0.034
80	97.3	4.2	-1.926	0.062	0.609	0.027
85	97.8	4.3	-2.024	0.051	0.598	0.022
90	98.3	4.3	-2.116	0.043	0.587	0.017
95	98.6	4.4	-2.203	0.035	0.577	0.014
100	98.9	4.4	-2.286	0.029	0.568	0.011

Date: 4/4/2016 Scenario: Big Blake 2014 Direct Drainage
Lake Id: Big Blake Lake
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 550.0 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 366.7 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 222649.0 acre-ft/year
Areal Water Load <qs>: 1070.4 ft/year
Lake Flushing Rate <p>: 118.94 1/year
Water Residence Time: 0.01 year
Observed spring overturn total phosphorus (SPO): 38.7 mg/m^3
Observed growing season mean phosphorus (GSM): 40.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	123.0	0.50	1.00	3.00	0.4	25	50	149
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	38.0	0.10	0.30	0.50	0.0	2	5	8
HD Urban (1/8 Ac)	19.0	1.00	1.50	2.00	0.1	8	12	15
MD Urban (1/4 Ac)	113.0	0.30	0.50	0.80	0.2	14	23	37
Rural Res (>1 Ac)	46.0	0.05	0.10	0.25	0.0	1	2	5
Wetlands	35.0	0.10	0.10	0.10	0.0	1	1	1
Forest	176.0	0.05	0.09	0.18	0.0	4	6	13
Lake Surface	208.0	0.10	0.30	1.00	0.2	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	164.4				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.99	8.22	26.30	0.1

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	139.2	29497.6	745.9	100.0
Total Loading (kg)	63.1	13380.0	338.4	100.0
Areal Loading (lb/ac-year)	0.67	141.82	3.59	
Areal Loading (mg/m^2-year)	75.02	15895.57	401.97	
Total PS Loading (lb)	0.0	29206.7	0.0	99.0

Total PS Loading (kg)	0.0	13248.1	0.0	99.0
Total NPS Loading (lb)	118.5	217.1	502.4	0.9
Total NPS Loading (kg)	53.7	98.5	227.9	0.9

Wisconsin Internal Load Estimator
Date: 4/4/2016 Scenario: 9

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 38.04 mg/m^3
Phosphorus Inflow Concentration: 48.7 mg/m^3
Areal External Loading: 15895.6 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.04
Observed Phosphorus Retention Coefficient: 0.22
Internal Load: -5181 Lb -2350 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 55.8 mg/m^3
Hypolimnetic Volume: 901.8 acre-ft
Anoxia Sediment Area: 137.47 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 55.8 mg/m^3
Hypolimnetic Volume: 901.8 acre-ft
Anoxia Sediment Area: 137.47 acres
Time Period of Stratification: 30 days
Sediment Phosphorus Release Rate: 0.0 mg/m^2-day 0.00E+000 lb/acre-day
Internal Load: 0 Lb 0 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 55.8 mg/m^3
Hypolimnetic Volume: 901.8 acre-ft
Anoxia Sediment Area: 137.47 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 24.7 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 137.47 acres
Time Period Between Observations: 30 days
Sediment Phosphorus Release Rate: -0.3 mg/m^2-day -8.20E-004 lb/acre-day
Internal Load: -11 Lb -5 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area

Start of Anoxia Anoxic Sediment Area: 137.47 acre
End of Anoxia Anoxic Sediment Area: 137.47 acre
Phosphorus Release Rate As Calculated In Method 2: 0.0 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: 0.0 mg/m^2-day
Average of Methods 2 and 3 Release Rates: -0.2 mg/m^2-day
Period of Anoxia: 14 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
Internal Load: (Lb)	31	73	126

Internal Load: (kg) 14 33 57

Internal Load Comparison (Percentages are of the Total Estimate Load)

Total External Load: 29498 Lb 13380 kg

	Lb	kg	%
From A Complete Mass Budget:	-5181	-2350	-21.3
From Growing Season In Situ Phosphorus Increases:	0	0	0.0
From In Situ Phosphorus Increases In The Fall:	-11	-5	0.0
From Phosphorus Release Rate and Anoxic Area:	73	33	0.2

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	0	0	0

Osgood, 1988 Lake Mixing Index: 0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	0	0	0
Internal Load (kg):	0	0	0
External Load (Lb):	0	0	0
External Load (kg):	0	0	0
Total Load (Lb):	0	0	0
Total Load (kg):	0	0	0

Wisconsin Internal Load Estimator

Date: 4/4/2016 Scenario: 10

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 38.04 mg/m^3
Phosphorus Inflow Concentration: 48.7 mg/m^3
Areal External Loading: 15895.6 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.04
Observed Phosphorus Retention Coefficient: 0.22
Internal Load: -5181 Lb -2350 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia

Average Hypolimnetic Phosphorus Concentration: 55.8 mg/m^3
Hypolimnetic Volume: 901.8 acre-ft
Anoxia Sediment Area: 137.47 acres

Just Prior To The End of Stratification

Average Hypolimnetic Phosphorus Concentration: 55.8 mg/m^3
Hypolimnetic Volume: 901.8 acre-ft
Anoxia Sediment Area: 137.47 acres
Time Period of Stratification: 30 days
Sediment Phosphorus Release Rate: 0.0 mg/m^2-day 0.00E+000 lb/acre-day
Internal Load: 0 Lb 0 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia

Average Hypolimnetic Phosphorus Concentration: 55.8 mg/m^3
Hypolimnetic Volume: 901.8 acre-ft
Anoxia Sediment Area: 137.47 acres

Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 24.7 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 137.47 acres
Time Period Between Observations: 30 days
Sediment Phosphorus Release Rate: -0.3 mg/m^2-day -8.20E-004 lb/acre-day
Internal Load: -11 Lb -5 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area
Start of Anoxia Anoxic Sediment Area: 137.47 acre
End of Anoxia Anoxic Sediment Area: 137.47 acre
Phosphorus Release Rate As Calculated In Method 2: 0.0 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: 0.0 mg/m^2-day
Average of Methods 2 and 3 Release Rates: -0.2 mg/m^2-day
Period of Anoxia: 14 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	31	73	126
Internal Load: (kg)	14	33	57

Internal Load Comparison (Percentages are of the Total Estimate Load)
Total External Load: 29498 Lb 13380 kg

	Lb	kg	%
From A Complete Mass Budget:	-5181	-2350	-21.3
From Growing Season In Situ Phosphorus Increases:	0	0	0.0
From In Situ Phosphorus Increases In The Fall:	-11	-5	0.0
From Phosphorus Release Rate and Anoxic Area:	73	33	0.2

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	-8	47	1

Osgood, 1988 Lake Mixing Index: 3.0
Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	-5181	-5.6	73
Internal Load (kg):	-2350	-2.5	33
External Load (Lb):	139	29498	746
External Load (kg):	63	13380	338
Total Load (Lb):	-5042	29492	819
Total Load (kg):	-2287	13377	372

Phosphorus Prediction and Uncertainty Analysis Module
Date: 4/4/2016 Scenario: 8
Observed spring overturn total phosphorus (SPO): 38.7 mg/m^3
Observed growing season mean phosphorus (GSM): 40.0 mg/m^3
Back calculation for SPO total phosphorus: 39.1 mg/m^3
Back calculation GSM phosphorus: 40.4 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 47 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir	0	46	1	6	15
Canfield-Bachmann, 1981 Natural Lake	0	45	1	5	13
Canfield-Bachmann, 1981 Artificial Lake	0	42	1	2	5
Rechow, 1979 General	0	39	1	-1	-3
Rechow, 1977 Anoxic	0	43	1	3	8
Rechow, 1977 water load<50m/year	N/A	N/A	N/A	N/A	N/A
Rechow, 1977 water load>50m/year	0	32	1	-8	-20
Walker, 1977 General	0	45	1	6	16
Vollenweider, 1982 Combined OECD	0	35	2	-4	-10
Dillon-Rigler-Kirchner	0	47	1	8	21
Vollenweider, 1982 Shallow Lake/Res.	0	29	1	-10	-25
Larsen-Mercier, 1976	0	45	1	6	16
Nurnberg, 1984 Oxic	0	47	1	7	18

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir	15	78	Tw	11794	GSM
Canfield-Bachmann, 1981 Natural Lake	14	130	L	11551	GSM
Canfield-Bachmann, 1981 Artificial Lake	13	121	FIT	12459	GSM
Rechow, 1979 General	12	67	qs	13709	GSM
Rechow, 1977 Anoxic	15	72	FIT	12553	GSM
Rechow, 1977 water load<50m/year	N/A	N/A	N/A	N/A	N/A
Rechow, 1977 water load>50m/year	13	51	FIT	16938	GSM
Walker, 1977 General	12	83	FIT	11749	SPO
Vollenweider, 1982 Combined OECD	9	66	Tw	15698	ANN
Dillon-Rigler-Kirchner	16	79	P L qs p	11024	SPO
Vollenweider, 1982 Shallow Lake/Res.	8	54	Tw	19512	ANN
Larsen-Mercier, 1976	16	75	P Pin p	11723	SPO
Nurnberg, 1984 Oxic	14	84	L qs	11552	ANN

Water and Nutrient Outflow Module
Date: 4/4/2016 Scenario: 6
Average Annual Surface Total Phosphorus: 38.04mg/m^3
Annual Discharge: 2.23E+005 AF => 2.75E+008 m^3
Annual Outflow Loading: 22047.5 LB => 10000.7 kg

Expanded Trophic Response Module
Date: 4/4/2016 Scenario: 16
Total Phosphorus: 38.04 mg/m^3
Growing Season
Chlorophyll a: 26.54 mg/m^3
Secchi Disk Depth: 1.57 m
Carlson TSI Equations:
TSI (Total Phosphorus): 57 TSI (Chlorophyll a): 63 TSI (Secchi Disk Depth): 53

Expanded Trophic Response Module
Date: 4/4/2016 Scenario: 17

Total Phosphorus: 38.04 mg/m^3
Growing Season
Chlorophyll a: 26.54 mg/m^3
Secchi Disk Depth: 1.57 m

Wisconsin Statewide Prediction Equations:

	Natural Lakes		Impoundments	
	Stratified	Mixed	Stratified	Mixed
Secchi Disk Depth using Chlorophyll a:	1.3	0.9	1.3	0.9
Secchi Disk Depth using Total Phosphorus:	1.6	1.1	1.3	1.0
Chlorophyll a using Total Phosphorus:	10.5	13.9	19.9	14.7

Expanded Trophic Response Module
Date: 4/4/2016 Scenario: 18
Total Phosphorus: 38.04 mg/m^3
Growing Season
Chlorophyll a: 26.54 mg/m^3
Secchi Disk Depth: 1.57 m

Wisconsin Regional Prediction Equations:

		Stratified		Mixed	
	Region	Seepage	Drainage	Seepage	Drainage
Use Chlorophyll a To Predict Secchi Disk Depth (m)	South	1.1	1.0	0.7	0.7
	Central	1.8	1.1	0.5	No Data
	North	1.5	1.1	1.2	1.1
Use Total Phosphorus To Predict Secchi Disk Depth (m)	South	1.6	1.2	0.7	0.8
	Central	2.8	0.7	0.9	No Data
	North	2.1	1.5	1.4	1.1
Use Total Phosphorus To Predict Chlorophyll a (mg/m^3))	South	10.2	21.7	13.8	17.1
	Central	9.4	49.0	14.4	No Data
	North	7.4	12.2	11.8	11.2

Expanded Trophic Response Module
Date: 4/4/2016 Scenario: 19
Total Phosphorus: 38.04 mg/m^3
Growing Season
Chlorophyll a: 26.54 mg/m^3
Secchi Disk Depth: 1.57 m
Other Prediction Equations:
Rast and Lee, 1978:: Chlorophyll a = 8.7 mg/m^3 Secchi Disk Depth = 1.3 m
Bartsch and Gaksatter, 1978:: Chlorophyll a = 12.1 mg/m^3

User Defined: Chlorophyll a - Total Phosphorus Regression::
Use Total Phosphorus To Predict Chlorophyll a = 0.0 x 38.04^0.0 = 0.0 mg/m^3
Use Chlorophyll a To Predict Secchi Disk Depth = 0.0 x 26.54^0.0 = 0.0 m

Expanded Trophic Response Module
Date: 4/4/2016 Scenario: 20
Total Phosphorus: 38.04 mg/m^3
Growing Season
Chlorophyll a: 26.54 mg/m^3
Secchi Disk Depth: 1.57 m
Chlorophyll a Nuisance Frequency

Chla Mean Min: 5
Chla Mean Max: 100
Chla Mean Increment: 5
Chla Temporal CV: 0.62
Chla Nuisance Criterion: 20

Mean	Freq %	ml	z	v	w	x
5	0.5	1.4	2.546	0.016	0.541	0.005
10	7.7	2.1	1.428	0.144	0.678	0.077
15	21.9	2.5	0.774	0.296	0.795	0.219
20	37.8	2.8	0.310	0.380	0.907	0.378
25	52.0	3.0	-0.050	0.398	0.984	0.480
30	63.5	3.2	-0.344	0.376	0.897	0.365
35	72.3	3.4	-0.593	0.335	0.835	0.277
40	79.0	3.5	-0.808	0.288	0.788	0.210
45	84.1	3.6	-0.998	0.242	0.751	0.159
50	87.9	3.7	-1.168	0.202	0.720	0.121
55	90.7	3.8	-1.322	0.167	0.695	0.093
60	92.8	3.9	-1.462	0.137	0.673	0.072
65	94.4	4.0	-1.591	0.112	0.654	0.056
70	95.6	4.1	-1.711	0.092	0.637	0.044
75	96.6	4.1	-1.822	0.076	0.623	0.034
80	97.3	4.2	-1.926	0.062	0.609	0.027
85	97.8	4.3	-2.024	0.051	0.598	0.022
90	98.3	4.3	-2.116	0.043	0.587	0.017
95	98.6	4.4	-2.203	0.035	0.577	0.014
100	98.9	4.4	-2.286	0.029	0.568	0.011

Date: 3/17/2016 Scenario: 2014L-THIA
Lake Id: Big Blake Lake
Watershed Id: 1

Hydrologic and Morphometric Data

Tributary Drainage Area: 20066.1 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 13377.4 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 13434.6 acre-ft/year
Areal Water Load <qs>: 64.6 ft/year
Lake Flushing Rate <p>: 7.18 1/year
Water Residence Time: 0.14 year
Observed spring overturn total phosphorus (SPO): 38.7 mg/m^3
Observed growing season mean phosphorus (GSM): 40.6 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	1023.8	0.50	1.00	3.00	24.8	207	414	1243
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	4790.6	0.10	0.30	0.50	34.8	194	582	969
HD Urban (1/8 Ac)	4.3	1.00	1.50	2.00	0.2	2	3	3
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	691.9	0.05	0.10	0.25	1.7	14	28	70
Wetlands	1496.3	0.10	0.10	0.10	3.6	61	61	61
Forest	10759.2	0.05	0.09	0.18	23.5	218	392	784
Lake Surface	208.0	0.10	0.30	1.00	1.5	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	164.4				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.99	8.22	26.30	0.5

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	1669.0	3682.4	8304.2	100.0
Total Loading (kg)	757.1	1670.3	3766.8	100.0
Areal Loading (lb/ac-year)	8.02	17.70	39.92	
Areal Loading (mg/m^2-year)	899.40	1984.34	4474.95	
Total PS Loading (lb)	0.0	0.0	0.0	0.0

Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	1648.3	3608.6	8060.6	99.5
Total NPS Loading (kg)	747.7	1636.8	3656.3	99.5

Wisconsin Internal Load Estimator
Date: 3/17/2016 Scenario: 2

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 40.58 mg/m^3
Phosphorus Inflow Concentration: 100.8 mg/m^3
Areal External Loading: 1984.3 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.40
Observed Phosphorus Retention Coefficient: 0.60
Internal Load: -734 Lb -333 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 44.82 mg/m^3
Hypolimnetic Volume: 44.08 acre-ft
Anoxia Sediment Area: 13.44 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 55.8 mg/m^3
Hypolimnetic Volume: 44.08 acre-ft
Anoxia Sediment Area: 13.44 acres
Time Period of Stratification: 60 days
Sediment Phosphorus Release Rate: 0.2 mg/m^2-day 4.97E-004 lb/acre-day
Internal Load: 1 Lb 1 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 44.82 mg/m^3
Hypolimnetic Volume: 44.08 acre-ft
Anoxia Sediment Area: 13.44 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 57.6 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 13.44 acres
Time Period Between Observations: 14 days
Sediment Phosphorus Release Rate: 171.5 mg/m^2-day 4.66E-001 lb/acre-day
Internal Load: 288 Lb 131 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area

Start of Anoxia Anoxic Sediment Area: 13.44 acre
End of Anoxia Anoxic Sediment Area: 13.44 acre
Phosphorus Release Rate As Calculated In Method 2: 0.2 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: 0.2 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 85.8 mg/m^2-day
Period of Anoxia: 60 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	13	31	53

Internal Load: (kg) 6 14 24

Internal Load Comparison (Percentages are of the Total Estimate Load)

Total External Load: 3682 Lb 1670 kg

	Lb	kg	%
From A Complete Mass Budget:	-734	-333	-24.9
From Growing Season In Situ Phosphorus Increases:	1	1	0.0
From In Situ Phosphorus Increases In The Fall:	288	131	7.3
From Phosphorus Release Rate and Anoxic Area:	31	14	0.8

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	7	65	138

Osgood, 1988 Lake Mixing Index: 3.0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	-734	144.6	31
Internal Load (kg):	-333	65.6	14
External Load (Lb):	1669	3682	8304
External Load (kg):	757	1670	3767
Total Load (Lb):	935	3827	8335
Total Load (kg):	424	1736	3781

Phosphorus Prediction and Uncertainty Analysis Module

Date: 3/17/2016 Scenario: 3

Observed spring overturn total phosphorus (SPO): 38.7 mg/m^3

Observed growing season mean phosphorus (GSM): 40.6 mg/m^3

Back calculation for SPO total phosphorus: 39.09 mg/m^3

Back calculation GSM phosphorus: 40.99 mg/m^3

% Confidence Range: 70%

Nurenberg Model Input - Est. Gross Int. Loading: 65 kg

Lake Phosphorus Model	**Low** Total P (mg/m^3)	**Most Likely** Total P (mg/m^3)	**High** Total P (mg/m^3)	**Predicted** -Observed (mg/m^3)	**% Dif.**
Walker, 1987 Reservoir	25	56	127	15	37
Canfield-Bachmann, 1981 Natural Lake	35	69	136	28	69
Canfield-Bachmann, 1981 Artificial Lake	31	57	102	16	39
Rechow, 1979 General	26	56	127	15	37
Rechow, 1977 Anoxic	40	87	197	46	113
Rechow, 1977 water load<50m/year	30	66	149	25	62
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	34	75	170	36	93
Vollenweider, 1982 Combined OECD	27	53	102	13	33
Dillon-Rigler-Kirchner	24	53	119	14	36
Vollenweider, 1982 Shallow Lake/Res.	22	45	91	5	13
Larsen-Mercier, 1976	33	73	166	34	88
Nurnberg, 1984 Oxic	31	65	141	24	59

Lake Phosphorus Model	**Confidence** Lower	**Confidence** Upper	**Parameter** Fit?	**Back** Calculation	**Model** Type

	Bound	Bound		(kg/year)	
Walker, 1987 Reservoir	32	104	FIT	1219	GSM
Canfield-Bachmann, 1981 Natural Lake	21	199	FIT	893	GSM
Canfield-Bachmann, 1981 Artificial Lake	18	164	FIT	1051	GSM
Rechow, 1979 General	31	105	FIT	1215	GSM
Rechow, 1977 Anoxic	50	160	FIT	784	GSM
Rechow, 1977 water load<50m/year	36	123	P	1037	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	36	148	FIT	866	SPO
Vollenweider, 1982 Combined OECD	25	100	FIT	1202	ANN
Dillon-Rigler-Kirchner	30	97	P	1242	SPO
Vollenweider, 1982 Shallow Lake/Res.	21	85	FIT	1493	ANN
Larsen-Mercier, 1976	43	134	P Pin	890	SPO
Nurnberg, 1984 Oxic	34	122	P	1020	ANN

Expanded Trophic Response Module
Date: 3/17/2016 Scenario: 2
Total Phosphorus: 40.58 mg/m^3
Growing Season
Chlorophyll a: 26.55 mg/m^3
Secchi Disk Depth: 1.58 m
Chlorophyll a Nuisance Frequency
Chla Mean Min: 5
Chla Mean Max: 100
Chla Mean Increment: 5
Chla Temporal CV: 0.62
Chla Nuisance Criterion: 20

Mean	Freq %	ml	z	v	w	x
5	0.5	1.4	2.546	0.016	0.541	0.005
10	7.7	2.1	1.428	0.144	0.678	0.077
15	21.9	2.5	0.774	0.296	0.795	0.219
20	37.8	2.8	0.310	0.380	0.907	0.378
25	52.0	3.0	-0.050	0.398	0.984	0.480
30	63.5	3.2	-0.344	0.376	0.897	0.365
35	72.3	3.4	-0.593	0.335	0.835	0.277
40	79.0	3.5	-0.808	0.288	0.788	0.210
45	84.1	3.6	-0.998	0.242	0.751	0.159
50	87.9	3.7	-1.168	0.202	0.720	0.121
55	90.7	3.8	-1.322	0.167	0.695	0.093
60	92.8	3.9	-1.462	0.137	0.673	0.072
65	94.4	4.0	-1.591	0.112	0.654	0.056
70	95.6	4.1	-1.711	0.092	0.637	0.044
75	96.6	4.1	-1.822	0.076	0.623	0.034
80	97.3	4.2	-1.926	0.062	0.609	0.027
85	97.8	4.3	-2.024	0.051	0.598	0.022
90	98.3	4.3	-2.116	0.043	0.587	0.017
95	98.6	4.4	-2.203	0.035	0.577	0.014
100	98.9	4.4	-2.286	0.029	0.568	0.011

Date: 4/4/2016 Scenario: Big Blake 2014 L-THIA
Lake Id: Big Blake Lake
Watershed Id: 1

Hydrologic and Morphometric Data

Tributary Drainage Area: 20066.1 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 13377.4 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 13434.6 acre-ft/year
Areal Water Load <qs>: 64.6 ft/year
Lake Flushing Rate <p>: 7.18 1/year
Water Residence Time: 0.14 year
Observed spring overturn total phosphorus (SPO): 38.7 mg/m^3
Observed growing season mean phosphorus (GSM): 40.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	1023.8	0.50	1.00	3.00	24.8	207	414	1243
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	4790.6	0.10	0.30	0.50	34.8	194	582	969
HD Urban (1/8 Ac)	4.3	1.00	1.50	2.00	0.2	2	3	3
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	691.9	0.05	0.10	0.25	1.7	14	28	70
Wetlands	1496.3	0.10	0.10	0.10	3.6	61	61	61
Forest	10759.2	0.05	0.09	0.18	23.5	218	392	784
Lake Surface	208.0	0.10	0.30	1.00	1.5	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	164.4				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.99	8.22	26.30	0.5

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	1669.0	3682.4	8304.2	100.0
Total Loading (kg)	757.1	1670.3	3766.8	100.0
Areal Loading (lb/ac-year)	8.02	17.70	39.92	
Areal Loading (mg/m^2-year)	899.40	1984.34	4474.95	
Total PS Loading (lb)	0.0	0.0	0.0	0.0

Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	1648.3	3608.6	8060.6	99.5
Total NPS Loading (kg)	747.7	1636.8	3656.3	99.5

Wisconsin Internal Load Estimator
Date: 4/4/2016 Scenario: 15

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 38.04 mg/m^3
Phosphorus Inflow Concentration: 100.8 mg/m^3
Areal External Loading: 1984.3 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.40
Observed Phosphorus Retention Coefficient: 0.62
Internal Load: -827 Lb -375 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 55.8 mg/m^3
Hypolimnetic Volume: 901.8 acre-ft
Anoxia Sediment Area: 137.47 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 55.8 mg/m^3
Hypolimnetic Volume: 901.8 acre-ft
Anoxia Sediment Area: 137.47 acres
Time Period of Stratification: 30 days
Sediment Phosphorus Release Rate: 0.0 mg/m^2-day 0.00E+000 lb/acre-day
Internal Load: 0 Lb 0 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 55.8 mg/m^3
Hypolimnetic Volume: 901.8 acre-ft
Anoxia Sediment Area: 137.47 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 62.2 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 137.47 acres
Time Period Between Observations: 30 days
Sediment Phosphorus Release Rate: 4.9 mg/m^2-day 1.33E-002 lb/acre-day
Internal Load: 180 Lb 82 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area

Start of Anoxia Anoxic Sediment Area: 137.47 acre
End of Anoxia Anoxic Sediment Area: 137.47 acre
Phosphorus Release Rate As Calculated In Method 2: 0.0 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: 0.0 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 2.4 mg/m^2-day
Period of Anoxia: 14 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	31	73	126

Internal Load: (kg) 14 33 57

Internal Load Comparison (Percentages are of the Total Estimate Load)

Total External Load: 3682 Lb 1670 kg

	Lb	kg	%
From A Complete Mass Budget:	-827	-375	-29.0
From Growing Season In Situ Phosphorus Increases:	0	0	0.0
From In Situ Phosphorus Increases In The Fall:	180	82	4.7
From Phosphorus Release Rate and Anoxic Area:	73	33	2.0

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	5	63	139

Osgood, 1988 Lake Mixing Index: 3.0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	-827	89.9	73
Internal Load (kg):	-375	40.8	33
External Load (Lb):	1669	3682	8304
External Load (kg):	757	1670	3767
Total Load (Lb):	842	3772	8377
Total Load (kg):	382	1711	3800

Phosphorus Prediction and Uncertainty Analysis Module

Date: 4/4/2016 Scenario: 11

Observed spring overturn total phosphorus (SPO): 38.7 mg/m^3

Observed growing season mean phosphorus (GSM): 40.0 mg/m^3

Back calculation for SPO total phosphorus: 39.1 mg/m^3

Back calculation GSM phosphorus: 40.4 mg/m^3

% Confidence Range: 70%

Nurenberg Model Input - Est. Gross Int. Loading: 63 kg

Lake Phosphorus Model	**Low** Total P (mg/m^3)	**Most Likely** Total P (mg/m^3)	**High** Total P (mg/m^3)	**Predicted** -Observed (mg/m^3)	**% Dif.**
Walker, 1987 Reservoir	25	56	127	16	40
Canfield-Bachmann, 1981 Natural Lake	35	69	136	29	73
Canfield-Bachmann, 1981 Artificial Lake	31	57	102	17	43
Rechow, 1979 General	26	56	127	16	40
Rechow, 1977 Anoxic	40	87	197	47	118
Rechow, 1977 water load<50m/year	30	66	149	26	65
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	34	75	170	36	93
Vollenweider, 1982 Combined OECD	27	53	102	14	36
Dillon-Rigler-Kirchner	24	53	119	14	36
Vollenweider, 1982 Shallow Lake/Res.	22	45	91	6	15
Larsen-Mercier, 1976	33	73	166	34	88
Nurnberg, 1984 Oxic	31	64	141	24	60

Lake Phosphorus Model	**Confidence** Lower	**Confidence** Upper	**Parameter** Fit?	**Back** Calculation	**Model** Type

	Bound	Bound		(kg/year)	
Walker, 1987 Reservoir	32	104	FIT	1201	GSM
Canfield-Bachmann, 1981 Natural Lake	21	199	FIT	878	GSM
Canfield-Bachmann, 1981 Artificial Lake	18	164	FIT	1031	GSM
Rechow, 1979 General	31	105	FIT	1198	GSM
Rechow, 1977 Anoxic	50	160	FIT	772	GSM
Rechow, 1977 water load<50m/year	36	123	P	1022	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	36	148	FIT	866	SPO
Vollenweider, 1982 Combined OECD	25	100	FIT	1192	ANN
Dillon-Rigler-Kirchner	30	97	P	1242	SPO
Vollenweider, 1982 Shallow Lake/Res.	21	85	FIT	1481	ANN
Larsen-Mercier, 1976	43	134	P Pin	890	SPO
Nurnberg, 1984 Oxic	33	122	P	1007	ANN

Water and Nutrient Outflow Module

Date: 4/4/2016 Scenario: 9

Average Annual Surface Total Phosphorus: 30.04mg/m^3

Annual Discharge: 1.34E+004 AF => 1.66E+007 m^3

Annual Outflow Loading: 1050.9 LB => 476.7 kg

Date: 4/4/2016 Scenario: 2015 Direct Drainage
Lake Id: Big Blake Lake
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 550.0 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 366.7 acre-ft
Lake Surface Area <As>: 208.0 acre
Lake Volume <V>: 1872.0 acre-ft
Lake Mean Depth <z>: 9.0 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 159737.5 acre-ft/year
Areal Water Load <qs>: 768.0 ft/year
Lake Flushing Rate <p>: 85.33 1/year
Water Residence Time: 0.01 year
Observed spring overturn total phosphorus (SPO): 25.2 mg/m^3
Observed growing season mean phosphorus (GSM): 50 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	123.0	0.50	1.00	3.00	0.4	25	50	149
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	38.0	0.10	0.30	0.50	0.0	2	5	8
HD Urban (1/8 Ac)	19.0	1.00	1.50	2.00	0.1	8	12	15
MD Urban (1/4 Ac)	113.0	0.30	0.50	0.80	0.2	14	23	37
Rural Res (>1 Ac)	46.0	0.05	0.10	0.25	0.0	1	2	5
Wetlands	35.0	0.10	0.10	0.10	0.0	1	1	1
Forest	176.0	0.05	0.09	0.18	0.1	4	6	13
Lake Surface	208.0	0.10	0.30	1.00	0.2	8	25	84

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	164.4				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.99	8.22	26.30	0.1

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	139.2	24685.4	745.9	100.0
Total Loading (kg)	63.1	11197.2	338.4	100.0
Areal Loading (lb/ac-year)	0.67	118.68	3.59	
Areal Loading (mg/m^2-year)	75.02	13302.36	401.97	
Total PS Loading (lb)	0.0	24394.5	0.0	98.8

Total PS Loading (kg)	0.0	11065.3	0.0	98.8
Total NPS Loading (lb)	118.5	217.1	502.4	1.1
Total NPS Loading (kg)	53.7	98.5	227.9	1.1

Wisconsin Internal Load Estimator
Date: 4/4/2016 Scenario: 7

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 41.9 mg/m^3
Phosphorus Inflow Concentration: 56.8 mg/m^3
Areal External Loading: 13302.4 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.06
Observed Phosphorus Retention Coefficient: 0.26
Internal Load: -5016 Lb -2275 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 25.6 mg/m^3
Hypolimnetic Volume: 215.66 acre-ft
Anoxia Sediment Area: 65.75 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 73.6 mg/m^3
Hypolimnetic Volume: 662.03 acre-ft
Anoxia Sediment Area: 121.03 acres
Time Period of Stratification: 74 days
Sediment Phosphorus Release Rate: 1.9 mg/m^2-day 5.18E-003 lb/acre-day
Internal Load: 117 Lb 53 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 25.6 mg/m^3
Hypolimnetic Volume: 215.66 acre-ft
Anoxia Sediment Area: 65.75 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 30.5 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 121.03 acres
Time Period Between Observations: 30 days
Sediment Phosphorus Release Rate: 5.6 mg/m^2-day 1.53E-002 lb/acre-day
Internal Load: 140 Lb 64 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area

Start of Anoxia Anoxic Sediment Area: 65.75 acre
End of Anoxia Anoxic Sediment Area: 121.03 acre
Phosphorus Release Rate As Calculated In Method 2: 1.9 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: 1.9 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 3.8 mg/m^2-day
Period of Anoxia: 74 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	113	263	451

Internal Load: (kg) 51 119 205

Internal Load Comparison (Percentages are of the Total Estimate Load)

Total External Load: 24685 Lb 11197 kg

	Lb	kg	%
From A Complete Mass Budget:	-5016	-2275	-25.5
From Growing Season In Situ Phosphorus Increases:	117	53	0.5
From In Situ Phosphorus Increases In The Fall:	140	64	0.6
From Phosphorus Release Rate and Anoxic Area:	263	119	1.1

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	0	0	0

Osgood, 1988 Lake Mixing Index: 0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	0	0	0
Internal Load (kg):	0	0	0
External Load (Lb):	0	0	0
External Load (kg):	0	0	0
Total Load (Lb):	0	0	0
Total Load (kg):	0	0	0

Wisconsin Internal Load Estimator

Date: 4/4/2016 Scenario: 8

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 41.9 mg/m^3
Phosphorus Inflow Concentration: 56.8 mg/m^3
Areal External Loading: 13302.4 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.06
Observed Phosphorus Retention Coefficient: 0.26
Internal Load: -5016 Lb -2275 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia

Average Hypolimnetic Phosphorus Concentration: 25.6 mg/m^3
Hypolimnetic Volume: 215.66 acre-ft
Anoxia Sediment Area: 65.75 acres

Just Prior To The End of Stratification

Average Hypolimnetic Phosphorus Concentration: 73.6 mg/m^3
Hypolimnetic Volume: 662.03 acre-ft
Anoxia Sediment Area: 121.03 acres
Time Period of Stratification: 74 days
Sediment Phosphorus Release Rate: 1.9 mg/m^2-day 5.18E-003 lb/acre-day
Internal Load: 117 Lb 53 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia

Average Hypolimnetic Phosphorus Concentration: 25.6 mg/m^3
Hypolimnetic Volume: 215.66 acre-ft
Anoxia Sediment Area: 65.75 acres