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	Low	Most Likely	High	Loading %	Low	Most Likely	High
	(ac)	Loading (kg/ha-year)				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	Low	Most Likely	High	Loading %
	(m^3/year)	(kg/year)	(kg/year)	(kg/year)	

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
	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
	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
	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
	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

Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 69.1 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: 13.5 mg/m^2-day 3.66E-002 lb/acre-day
Internal Load: 337 Lb 153 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: 7.7 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:	337	153	1.3
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
	-11	54	2

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

	Low	Most Likely	High
Internal Load (Lb):	-5016	227.1	263
Internal Load (kg):	-2275	103.0	119
External Load (Lb):	139	24685	746
External Load (kg):	63	11197	338
Total Load (Lb):	-4877	24913	1009
Total Load (kg):	-2212	11300	458

Phosphorus Prediction and Uncertainty Analysis Module
Date: 4/4/2016 Scenario: 7
Observed spring overturn total phosphorus (SPO): 25.2 mg/m^3
Observed growing season mean phosphorus (GSM): 50.0 mg/m^3
Back calculation for SPO total phosphorus: 25.45 mg/m^3
Back calculation GSM phosphorus: 50.51 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 54 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	52	2	2	4
Canfield-Bachmann, 1981 Natural Lake	0	52	2	2	4
Canfield-Bachmann, 1981 Artificial Lake	0	47	2	-3	-6
Rechow, 1979 General	0	45	1	-5	-10
Rechow, 1977 Anoxic	0	50	2	0	0
Rechow, 1977 water load<50m/year	N/A	N/A	N/A	N/A	N/A
Rechow, 1977 water load>50m/year	0	41	1	-9	-18
Walker, 1977 General	0	51	2	26	103
Vollenweider, 1982 Combined OECD	1	39	2	1	3
Dillon-Rigler-Kirchner	0	53	2	28	111
Vollenweider, 1982 Shallow Lake/Res.	0	33	1	-5	-13
Larsen-Mercier, 1976	0	51	2	26	103
Nurnberg, 1984 Oxic	1	54	2	4	8

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir	17	88	Tw	10924	GSM
Canfield-Bachmann, 1981 Natural Lake	16	150	L	10639	GSM
Canfield-Bachmann, 1981 Artificial Lake	15	135	FIT	11743	GSM
Rechow, 1979 General	14	78	qs	12436	GSM
Rechow, 1977 Anoxic	17	84	FIT	11266	GSM
Rechow, 1977 water load<50m/year	N/A	N/A	N/A	N/A	N/A
Rechow, 1977 water load>50m/year	16	65	FIT	13842	GSM
Walker, 1977 General	14	93	FIT	5563	SPO
Vollenweider, 1982 Combined OECD	10	74	Tw	10815	ANN
Dillon-Rigler-Kirchner	18	89	P L qs p	5347	SPO
Vollenweider, 1982 Shallow Lake/Res.	9	62	Tw	13492	ANN
Larsen-Mercier, 1976	18	84	P Pin p	5557	SPO
Nurnberg, 1984 Oxic	16	96	L qs	10524	ANN

Water and Nutrient Outflow Module
Date: 4/4/2016 Scenario: 5
Average Annual Surface Total Phosphorus: 41.87mg/m^3
Annual Discharge: 1.60E+005 AF => 1.97E+008 m^3
Annual Outflow Loading: 17384.4 LB => 7885.5 kg

Expanded Trophic Response Module
Date: 4/4/2016 Scenario: 12
Total Phosphorus: 41.8 mg/m^3
Growing Season
Chlorophyll a: 46.78 mg/m^3
Secchi Disk Depth: 1.72 m
Carlson TSI Equations:
TSI (Total Phosphorus): 58 TSI (Chlorophyll a): 68 TSI (Secchi Disk Depth): 52

Expanded Trophic Response Module
Date: 4/4/2016 Scenario: 13

Total Phosphorus: 41.8 mg/m^3
Growing Season
Chlorophyll a: 46.78 mg/m^3
Secchi Disk Depth: 1.72 m

Wisconsin Statewide Prediction Equations:

	Natural Lakes		Impoundments	
	Stratified	Mixed	Stratified	Mixed
Secchi Disk Depth using Chlorophyll a:	1.0	0.7	1.1	0.7
Secchi Disk Depth using Total Phosphorus:	1.6	1.0	1.2	1.0
Chlorophyll a using Total Phosphorus:	11.1	14.8	21.9	15.7

Expanded Trophic Response Module
Date: 4/4/2016 Scenario: 14
Total Phosphorus: 41.8 mg/m^3
Growing Season
Chlorophyll a: 46.78 mg/m^3
Secchi Disk Depth: 1.72 m

Wisconsin Regional Prediction Equations:

		Stratified		Mixed	
	Region	Seepage	Drainage	Seepage	Drainage
Use Chlorophyll a To Predict	South	0.9	0.8	0.6	0.6
Secchi Disk Depth (m)	Central	1.5	0.8	0.2	No Data
	North	1.2	0.8	0.9	1.0
Use Total Phosphorus To	South	1.5	1.1	0.7	0.7
Predict Secchi Disk Depth (m)	Central	2.8	0.6	0.8	No Data
	North	2.0	1.4	1.4	1.0
Use Total Phosphorus To	South	10.8	24.3	14.9	18.5
Predict Chlorophyll a (mg/m^3))	Central	10.0	56.4	15.3	No Data
	North	7.5	13.1	12.4	11.4

Expanded Trophic Response Module
Date: 4/4/2016 Scenario: 15
Total Phosphorus: 41.8 mg/m^3
Growing Season
Chlorophyll a: 46.78 mg/m^3
Secchi Disk Depth: 1.72 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: 3/18/2016 Scenario: 2015 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): 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	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: 3/18/2016 Scenario: 4

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 41.87 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: 0.58
Internal Load: -687 Lb -312 kg

Method 2 - From Growing Season In Situ Phosphorus Increases

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 56.8 mg/m^3
Hypolimnetic Volume: 31.72 acre-ft
Anoxia Sediment Area: 8.96 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 73.6 mg/m^3
Hypolimnetic Volume: 7.46 acre-ft
Anoxia Sediment Area: 8.96 acres
Time Period of Stratification: 95 days
Sediment Phosphorus Release Rate: -0.4 mg/m^2-day -1.22E-003 lb/acre-day
Internal Load: -3 Lb -2 kg

Method 3 - From In Situ Phosphorus Increases In The Fall

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 56.8 mg/m^3
Hypolimnetic Volume: 31.72 acre-ft
Anoxia Sediment Area: 8.96 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: 8.96 acres
Time Period Between Observations: 14 days
Sediment Phosphorus Release Rate: 134.4 mg/m^2-day 3.65E-001 lb/acre-day
Internal Load: 150 Lb 68 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area

Start of Anoxia Anoxic Sediment Area: 8.96 acre
End of Anoxia Anoxic Sediment Area: 8.96 acre
Phosphorus Release Rate As Calculated In Method 2: -0.4 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: -0.4 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 67.0 mg/m^2-day
Period of Anoxia: 95 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
Internal Load: (Lb)	14	32	56

Internal Load: (kg) 6 15 25

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

Total External Load: 3682 Lb 1670 kg

	Lb	kg	%
From A Complete Mass Budget:	-687	-312	-22.9
From Growing Season In Situ Phosphorus Increases:	-3	-2	-0.1
From In Situ Phosphorus Increases In The Fall:	150	68	3.9
From Phosphorus Release Rate and Anoxic Area:	32	15	0.9

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	9	63	138

Osgood, 1988 Lake Mixing Index: 3.0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	-687	73.5	32
Internal Load (kg):	-312	33.3	15
External Load (Lb):	1669	3682	8304
External Load (kg):	757	1670	3767
Total Load (Lb):	982	3756	8337
Total Load (kg):	445	1704	3781

Phosphorus Prediction and Uncertainty Analysis Module

Date: 3/18/2016 Scenario: 4

Observed spring overturn total phosphorus (SPO): 25.2 mg/m^3

Observed growing season mean phosphorus (GSM): 50.0 mg/m^3

Back calculation for SPO total phosphorus: 25.45 mg/m^3

Back calculation GSM phosphorus: 50.51 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	6	12
Canfield-Bachmann, 1981 Natural Lake	35	69	136	19	38
Canfield-Bachmann, 1981 Artificial Lake	31	57	102	7	14
Rechow, 1979 General	26	56	127	6	12
Rechow, 1977 Anoxic	40	87	197	37	74
Rechow, 1977 water load<50m/year	30	66	149	16	32
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	34	75	170	50	198
Vollenweider, 1982 Combined OECD	27	53	102	15	40
Dillon-Rigler-Kirchner	24	53	119	28	111
Vollenweider, 1982 Shallow Lake/Res.	22	45	91	7	19
Larsen-Mercier, 1976	33	73	166	48	190
Nurnberg, 1984 Oxic	31	64	141	14	28

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

	Bound	Bound		(kg/year)	
Walker, 1987 Reservoir	32	104	FIT	1502	GSM
Canfield-Bachmann, 1981 Natural Lake	21	199	FIT	1139	GSM
Canfield-Bachmann, 1981 Artificial Lake	18	164	FIT	1386	GSM
Rechow, 1979 General	31	105	FIT	1498	GSM
Rechow, 1977 Anoxic	50	160	FIT	966	GSM
Rechow, 1977 water load<50m/year	36	123	P	1278	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	36	148	FIT	564	SPO
Vollenweider, 1982 Combined OECD	25	100	FIT	1127	ANN
Dillon-Rigler-Kirchner	30	97	P	808	SPO
Vollenweider, 1982 Shallow Lake/Res.	21	85	FIT	1406	ANN
Larsen-Mercier, 1976	43	134	P Pin	579	SPO
Nurnberg, 1984 Oxic	33	122	P	1286	ANN

Water and Nutrient Outflow Module
Date: 3/18/2016 Scenario: 2
Average Annual Surface Total Phosphorus: 41.87mg/m^3
Annual Discharge: 1.34E+004 AF => 1.66E+007 m^3
Annual Outflow Loading: 1465.0 LB => 664.5 kg

Expanded Trophic Response Module
Date: 3/18/2016 Scenario: 3
Total Phosphorus: 41.87 mg/m^3
Growing Season
Chlorophyll a: 46.79 mg/m^3
Secchi Disk Depth: 1.52 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 2015 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): 25.2 mg/m^3
Observed growing season mean phosphorus (GSM): 50.0 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: 16

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 41.9 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: 0.58
Internal Load: -686 Lb -311 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 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: 69.1 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 121 acres
Time Period Between Observations: 30 days
Sediment Phosphorus Release Rate: 13.5 mg/m^2-day 3.66E-002 lb/acre-day
Internal Load: 337 Lb 153 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 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: 7.7 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: 3682 Lb 1670 kg

	Lb	kg	%
From A Complete Mass Budget:	-686	-311	-22.9
From Growing Season In Situ Phosphorus Increases:	117	53	3.1
From In Situ Phosphorus Increases In The Fall:	337	153	8.4
From Phosphorus Release Rate and Anoxic Area:	263	119	6.7

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	9	67	144

Osgood, 1988 Lake Mixing Index: 3.0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	-686	227.1	263
Internal Load (kg):	-311	103.0	119
External Load (Lb):	1669	3682	8304
External Load (kg):	757	1670	3767
Total Load (Lb):	983	3910	8567
Total Load (kg):	446	1773	3886

Phosphorus Prediction and Uncertainty Analysis Module

Date: 4/4/2016 Scenario: 12

Observed spring overturn total phosphorus (SPO): 25.2 mg/m^3

Observed growing season mean phosphorus (GSM): 50.0 mg/m^3

Back calculation for SPO total phosphorus: 25.45 mg/m^3

Back calculation GSM phosphorus: 50.51 mg/m^3

% Confidence Range: 70%

Nurenberg Model Input - Est. Gross Int. Loading: 67 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	6	12
Canfield-Bachmann, 1981 Natural Lake	35	69	136	19	38
Canfield-Bachmann, 1981 Artificial Lake	31	57	102	7	14
Rechow, 1979 General	26	56	127	6	12
Rechow, 1977 Anoxic	40	87	197	37	74
Rechow, 1977 water load<50m/year	30	66	149	16	32
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	34	75	170	50	198
Vollenweider, 1982 Combined OECD	27	53	102	15	40
Dillon-Rigler-Kirchner	24	53	119	28	111
Vollenweider, 1982 Shallow Lake/Res.	22	45	91	7	19
Larsen-Mercier, 1976	33	73	166	48	190
Nurnberg, 1984 Oxic	32	65	141	15	30

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

	Bound	Bound		(kg/year)	
Walker, 1987 Reservoir	32	104	FIT	1502	GSM
Canfield-Bachmann, 1981 Natural Lake	21	199	FIT	1139	GSM
Canfield-Bachmann, 1981 Artificial Lake	18	164	FIT	1386	GSM
Rechow, 1979 General	31	105	FIT	1498	GSM
Rechow, 1977 Anoxic	50	160	FIT	966	GSM
Rechow, 1977 water load<50m/year	36	123	P	1278	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	36	148	FIT	564	SPO
Vollenweider, 1982 Combined OECD	25	100	FIT	1127	ANN
Dillon-Rigler-Kirchner	30	97	P	808	SPO
Vollenweider, 1982 Shallow Lake/Res.	21	85	FIT	1406	ANN
Larsen-Mercier, 1976	43	134	P Pin	579	SPO
Nurnberg, 1984 Oxic	34	122	P	1279	ANN

Water and Nutrient Outflow Module
Date: 4/4/2016 Scenario: 10
Average Annual Surface Total Phosphorus: 41.87mg/m^3
Annual Discharge: 1.34E+004 AF => 1.66E+007 m^3
Annual Outflow Loading: 1465.0 LB => 664.5 kg

Date: 7/26/2016 Scenario: Big Blake Lake combined 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: 169846.7 acre-ft/year
Areal Water Load <qs>: 816.6 ft/year
Lake Flushing Rate <p>: 90.73 1/year
Water Residence Time: 0.01 year
Observed spring overturn total phosphorus (SPO): 36.8 mg/m^3
Observed growing season mean phosphorus (GSM): 57.0 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	0.5	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	23580.3	745.9	100.0
Total Loading (kg)	63.1	10696.0	338.4	100.0
Areal Loading (lb/ac-year)	0.67	113.37	3.59	
Areal Loading (mg/m^2-year)	75.02	12706.86	401.97	
Total PS Loading (lb)	0.0	23289.4	0.0	98.8

Total PS Loading (kg)	0.0	10564.0	0.0	98.8
Total NPS Loading (lb)	118.5	217.1	502.4	1.2
Total NPS Loading (kg)	53.7	98.5	227.9	1.2

Wisconsin Internal Load Estimator
Date: 7/26/2016 Scenario: 24

Method 1 - A Complete Total Phosphorus Mass Budget
Method 1 - A Complete Total Phosphorus Mass Budget 49.85 mg/m^3
Phosphorus Inflow Concentration: 51.1 mg/m^3
Areal External Loading: 12706.9 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.06
Observed Phosphorus Retention Coefficient: 0.02
Internal Load: 769 Lb 349 kg

Method 2 - From Growing Season In Situ Phosphorus Increases
Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 62.3 mg/m^3
Hypolimnetic Volume: 715.6 acre-ft
Anoxia Sediment Area: 120.4 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 70 mg/m^3
Hypolimnetic Volume: 595.61 acre-ft
Anoxia Sediment Area: 108.82 acres
Time Period of Stratification: 50 days
Sediment Phosphorus Release Rate: -0.2 mg/m^2-day -4.18E-004 lb/acre-day
Internal Load: -8 Lb -4 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: 715.6 acre-ft
Anoxia Sediment Area: 120.4 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 62.3 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 108.82 acres
Time Period Between Observations: 30 days
Sediment Phosphorus Release Rate: 6.4 mg/m^2-day 1.74E-002 lb/acre-day
Internal Load: 196 Lb 89 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area
Start of Anoxia Anoxic Sediment Area: 120.4 acre
End of Anoxia Anoxic Sediment Area: 108.82 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: 3.1 mg/m^2-day
Period of Anoxia: 50 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	93	218	374

Internal Load: (kg) 42 99 170

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

Total External Load: 23580 Lb 10696 kg

	Lb	kg	%
From A Complete Mass Budget:	769	349	3.2
From Growing Season In Situ Phosphorus Increases:	-8	-4	0.0
From In Situ Phosphorus Increases In The Fall:	196	89	0.8
From Phosphorus Release Rate and Anoxic Area:	218	99	0.9

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	2	48	2

Osgood, 1988 Lake Mixing Index: 3.0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	769	94.0	218
Internal Load (kg):	349	42.7	99
External Load (Lb):	139	23580	746
External Load (kg):	63	10696	338
Total Load (Lb):	908	23674	964
Total Load (kg):	412	10739	437

Phosphorus Prediction and Uncertainty Analysis Module

Date: 7/26/2016 Scenario: 18

Observed spring overturn total phosphorus (SPO): 36.8 mg/m^3

Observed growing season mean phosphorus (GSM): 57.0 mg/m^3

Back calculation for SPO total phosphorus: 37.14 mg/m^3

Back calculation GSM phosphorus: 57.24 mg/m^3

% Confidence Range: 70%

Nurenberg Model Input - Est. Gross Int. Loading: 48 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	47	1	-10	-18
Canfield-Bachmann, 1981 Natural Lake	0	47	2	-10	-18
Canfield-Bachmann, 1981 Artificial Lake	0	43	2	-14	-25
Rechow, 1979 General	0	41	1	-16	-28
Rechow, 1977 Anoxic	0	45	1	-12	-21
Rechow, 1977 water load<50m/year	N/A	N/A	N/A	N/A	N/A
Rechow, 1977 water load>50m/year	0	36	1	-21	-37
Walker, 1977 General	0	46	1	9	24
Vollenweider, 1982 Combined OECD	1	36	2	-11	-23
Dillon-Rigler-Kirchner	0	48	2	11	30
Vollenweider, 1982 Shallow Lake/Res.	0	30	1	-17	-36
Larsen-Mercier, 1976	0	46	1	9	24
Nurnberg, 1984 Oxic	1	48	2	-9	-16

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

	Bound	Bound		(kg/year)	
Walker, 1987 Reservoir	16	80	Tw	12997	GSM
Canfield-Bachmann, 1981 Natural Lake	15	135	L	12877	GSM
Canfield-Bachmann, 1981 Artificial Lake	13	124	FIT	14320	GSM
Rechow, 1979 General	13	71	qs	14949	GSM
Rechow, 1977 Anoxic	15	76	FIT	13573	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	16923	GSM
Walker, 1977 General	13	84	FIT	8609	SPO
Vollenweider, 1982 Combined OECD	10	68	Tw	14943	ANN
Dillon-Rigler-Kirchner	16	81	P L qs p	8226	SPO
Vollenweider, 1982 Shallow Lake/Res.	8	56	Tw	18320	ANN
Larsen-Mercier, 1976	16	77	P Pin p	8598	SPO
Nurnberg, 1984 Oxic	14	86	L qs	12655	ANN

Date: 7/26/2016 Scenario: Big Blake Lake combined 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): 36.8 mg/m^3
Observed growing season mean phosphorus (GSM): 57.0 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: 7/26/2016 Scenario: 23

Method 1 - A Complete Total Phosphorus Mass Budget
Method 1 - A Complete Total Phosphorus Mass Budget 49.85 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: 0.51
Internal Load: -396 Lb -179 kg

Method 2 - From Growing Season In Situ Phosphorus Increases
Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 62.3 mg/m^3
Hypolimnetic Volume: 715.6 acre-ft
Anoxia Sediment Area: 120.04 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 70.0 mg/m^3
Hypolimnetic Volume: 595.61 acre-ft
Anoxia Sediment Area: 108.82 acres
Time Period of Stratification: 50 days
Sediment Phosphorus Release Rate: -0.2 mg/m^2-day -4.19E-004 lb/acre-day
Internal Load: -8 Lb -4 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: 715.6 acre-ft
Anoxia Sediment Area: 120.04 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 85 mg/m^3
Lake Volume: 1872.0 acre-ft
Anoxia Sediment Area Just Before Turnover: 108.82 acres
Time Period Between Observations: 30 days
Sediment Phosphorus Release Rate: 10.2 mg/m^2-day 2.77E-002 lb/acre-day
Internal Load: 311 Lb 141 kg

Method 4 - From Phosphorus Release Rate and Anoxic Area
Start of Anoxia Anoxic Sediment Area: 120.04 acre
End of Anoxia Anoxic Sediment Area: 108.82 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: 5.0 mg/m^2-day
Period of Anoxia: 50 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	93	218	373

Internal Load: (kg) 42 99 169

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

Total External Load: 3682 Lb 1670 kg

	Lb	kg	%
From A Complete Mass Budget:	-396	-179	-12.0
From Growing Season In Situ Phosphorus Increases:	-8	-4	-0.2
From In Situ Phosphorus Increases In The Fall:	311	141	7.8
From Phosphorus Release Rate and Anoxic Area:	218	99	5.6

Predicted Water Column Total Phosphorus Concentration (ug/l)

Nurnberg+ 1984 Total Phosphorus Model:	Low	Most Likely	High
	17	65	143

Osgood, 1988 Lake Mixing Index: 3.0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	-396	151.8	218
Internal Load (kg):	-179	68.9	99
External Load (Lb):	1669	3682	8304
External Load (kg):	757	1670	3767
Total Load (Lb):	1273	3834	8522
Total Load (kg):	578	1739	3866

Phosphorus Prediction and Uncertainty Analysis Module

Date: 7/26/2016 Scenario: 17

Observed spring overturn total phosphorus (SPO): 36.8 mg/m^3

Observed growing season mean phosphorus (GSM): 57.0 mg/m^3

Back calculation for SPO total phosphorus: 37.14 mg/m^3

Back calculation GSM phosphorus: 57.24 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	-1	-2
Canfield-Bachmann, 1981 Natural Lake	35	69	136	12	21
Canfield-Bachmann, 1981 Artificial Lake	31	57	102	0	0
Rechow, 1979 General	26	56	127	-1	-2
Rechow, 1977 Anoxic	40	87	197	30	53
Rechow, 1977 water load<50m/year	30	66	149	9	16
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	34	75	170	38	103
Vollenweider, 1982 Combined OECD	27	53	102	6	13
Dillon-Rigler-Kirchner	24	53	119	16	43
Vollenweider, 1982 Shallow Lake/Res.	22	45	91	-2	-4
Larsen-Mercier, 1976	33	73	166	36	98
Nurnberg, 1984 Oxic	31	65	141	8	14

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

	Bound	Bound		(kg/year)	
Walker, 1987 Reservoir	32	104	FIT	1702	GSM
Canfield-Bachmann, 1981 Natural Lake	21	199	FIT	1318	GSM
Canfield-Bachmann, 1981 Artificial Lake	18	164	FIT	1641	GSM
Rechow, 1979 General	31	105	FIT	1697	GSM
Rechow, 1977 Anoxic	50	160	FIT	1094	GSM
Rechow, 1977 water load<50m/year	36	123	P	1448	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	36	148	FIT	823	SPO
Vollenweider, 1982 Combined OECD	25	100	FIT	1469	ANN
Dillon-Rigler-Kirchner	30	97	P	1180	SPO
Vollenweider, 1982 Shallow Lake/Res.	21	85	FIT	1801	ANN
Larsen-Mercier, 1976	43	134	P Pin	845	SPO
Nurnberg, 1984 Oxic	34	122	P	1468	ANN

Water and Nutrient Outflow Module
Date: 7/26/2016 Scenario: 13
Average Annual Surface Total Phosphorus: 49.8mg/m^3
Annual Discharge: 1.34E+004 AF => 1.66E+007 m^3
Annual Outflow Loading: 1742.3 LB => 790.3 kg

Date: 7/26/2016 Scenario: L-THIA combined 15% reduction
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): 36.8 mg/m^3
Observed growing season mean phosphorus (GSM): 57.0 mg/m^3
% NPS Change: -15%
% 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	24.7	176	352	1057
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	34.7	165	494	824
HD Urban (1/8 Ac)	4.3	1.00	1.50	2.00	0.2	1	2	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	12	24	60
Wetlands	1496.3	0.10	0.10	0.10	3.6	51	51	51
Forest	10759.2	0.05	0.09	0.18	23.4	185	333	666
Lake Surface	208.0	0.10	0.30	1.00	1.8	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	164.4				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.99	8.22	26.30	0.6

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	1421.8	3141.1	7095.1	100.0
Total Loading (kg)	644.9	1424.8	3218.3	100.0
Areal Loading (lb/ac-year)	6.84	15.10	34.11	
Areal Loading (mg/m^2-year)	766.16	1692.66	3823.39	
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)	1401.0	3067.3	6851.6	99.4
Total NPS Loading (kg)	635.5	1391.3	3107.8	99.4

Phosphorus Prediction and Uncertainty Analysis Module
Date: 7/26/2016 Scenario: 21
Observed spring overturn total phosphorus (SPO): 36.8 mg/m^3
Observed growing season mean phosphorus (GSM): 57.0 mg/m^3
Back calculation for SPO total phosphorus: 37.14 mg/m^3
Back calculation GSM phosphorus: 57.24 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	23	50	114	-7	-12
Canfield-Bachmann, 1981 Natural Lake	30	60	120	3	5
Canfield-Bachmann, 1981 Artificial Lake	27	51	91	-6	-11
Rechow, 1979 General	22	48	109	-9	-16
Rechow, 1977 Anoxic	34	75	168	18	32
Rechow, 1977 water load<50m/year	25	56	127	-1	-2
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	29	64	145	27	73
Vollenweider, 1982 Combined OECD	24	46	90	-1	-2
Dillon-Rigler-Kirchner	20	45	101	8	22
Vollenweider, 1982 Shallow Lake/Res.	19	39	80	-8	-17
Larsen-Mercier, 1976	28	63	141	26	71
Nurnberg, 1984 Oxic	27	56	121	-1	-2

Lake Phosphorus Model	**Confidence** Lower Bound	**Confidence** Upper Bound	**Parameter** Fit?	**Back** Calculation (kg/year)	**Model** Type
Walker, 1987 Reservoir	28	93	FIT	1623	GSM
Canfield-Bachmann, 1981 Natural Lake	19	173	FIT	1318	GSM
Canfield-Bachmann, 1981 Artificial Lake	16	147	FIT	1641	GSM
Rechow, 1979 General	26	90	FIT	1697	GSM
Rechow, 1977 Anoxic	43	137	FIT	1094	GSM
Rechow, 1977 water load<50m/year	31	105	FIT	1448	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	31	126	FIT	823	SPO
Vollenweider, 1982 Combined OECD	22	87	FIT	1469	ANN
Dillon-Rigler-Kirchner	26	82	P	1180	SPO
Vollenweider, 1982 Shallow Lake/Res.	19	74	FIT	1801	ANN
Larsen-Mercier, 1976	37	114	P Pin	845	SPO
Nurnberg, 1984 Oxic	29	105	FIT	1468	ANN

Date: 7/26/2016 Scenario: L-THIA combined 20% reduction
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): 36.8 mg/m^3
Observed growing season mean phosphorus (GSM): 57.0 mg/m^3
% NPS Change: -20%
% 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	24.7	166	331	994
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	34.6	155	465	776
HD Urban (1/8 Ac)	4.3	1.00	1.50	2.00	0.2	1	2	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	11	22	56
Wetlands	1496.3	0.10	0.10	0.10	3.6	48	48	48
Forest	10759.2	0.05	0.09	0.18	23.3	174	314	627
Lake Surface	208.0	0.10	0.30	1.00	1.9	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	0.6

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	1339.4	2960.7	6692.1	100.0
Total Loading (kg)	607.5	1342.9	3035.5	100.0
Areal Loading (lb/ac-year)	6.44	14.23	32.17	
Areal Loading (mg/m^2-year)	721.75	1595.43	3606.21	
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)	1318.6	2886.9	6448.5	99.4
Total NPS Loading (kg)	598.1	1309.5	2925.0	99.4

Phosphorus Prediction and Uncertainty Analysis Module
Date: 7/26/2016 Scenario: 22
Observed spring overturn total phosphorus (SPO): 36.8 mg/m^3
Observed growing season mean phosphorus (GSM): 57.0 mg/m^3
Back calculation for SPO total phosphorus: 37.14 mg/m^3
Back calculation GSM phosphorus: 57.24 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	22	48	109	-9	-16
Canfield-Bachmann, 1981 Natural Lake	28	57	114	0	0
Canfield-Bachmann, 1981 Artificial Lake	26	48	88	-9	-16
Rechow, 1979 General	20	45	102	-12	-21
Rechow, 1977 Anoxic	32	70	159	13	23
Rechow, 1977 water load<50m/year	24	53	120	-4	-7
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	27	61	137	24	65
Vollenweider, 1982 Combined OECD	23	44	86	-3	-6
Dillon-Rigler-Kirchner	19	42	96	5	14
Vollenweider, 1982 Shallow Lake/Res.	18	37	76	-10	-21
Larsen-Mercier, 1976	27	59	133	22	60
Nurnberg, 1984 Oxic	26	53	114	-4	-7

Lake Phosphorus Model	**Confidence** Lower Bound	**Confidence** Upper Bound	**Parameter** Fit?	**Back** Calculation (kg/year)	**Model** Type
Walker, 1987 Reservoir	27	89	FIT	1595	GSM
Canfield-Bachmann, 1981 Natural Lake	18	164	FIT	1318	GSM
Canfield-Bachmann, 1981 Artificial Lake	15	138	FIT	1641	GSM
Rechow, 1979 General	24	84	FIT	1697	GSM
Rechow, 1977 Anoxic	41	129	FIT	1094	GSM
Rechow, 1977 water load<50m/year	29	99	FIT	1448	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	29	120	FIT	823	SPO
Vollenweider, 1982 Combined OECD	21	83	FIT	1469	ANN
Dillon-Rigler-Kirchner	24	78	P	1180	SPO
Vollenweider, 1982 Shallow Lake/Res.	18	71	FIT	1801	ANN
Larsen-Mercier, 1976	35	107	P Pin	845	SPO
Nurnberg, 1984 Oxic	28	99	FIT	1468	ANN

Date: 7/26/2016 Scenario: L-THIA direct 30% reduction
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): 36.8 mg/m^3
Observed growing season mean phosphorus (GSM): 57.0 mg/m^3
% NPS Change: -30%
% 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	24.6	145	290	870
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	34.5	136	407	679
HD Urban (1/8 Ac)	4.3	1.00	1.50	2.00	0.2	1	2	2
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	10	20	49
Wetlands	1496.3	0.10	0.10	0.10	3.6	42	42	42
Forest	10759.2	0.05	0.09	0.18	23.3	152	274	549
Lake Surface	208.0	0.10	0.30	1.00	2.1	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	164.4				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.99	8.22	26.30	0.7

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	1174.5	2599.8	5886.0	100.0
Total Loading (kg)	532.8	1179.3	2669.9	100.0
Areal Loading (lb/ac-year)	5.65	12.50	28.30	
Areal Loading (mg/m^2-year)	632.93	1400.97	3171.84	
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)	1153.8	2526.0	5642.5	99.3
Total NPS Loading (kg)	523.4	1145.8	2559.4	99.3

Phosphorus Prediction and Uncertainty Analysis Module
Date: 7/26/2016 Scenario: 23
Observed spring overturn total phosphorus (SPO): 36.8 mg/m^3
Observed growing season mean phosphorus (GSM): 57.0 mg/m^3
Back calculation for SPO total phosphorus: 37.14 mg/m^3
Back calculation GSM phosphorus: 57.24 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	20	44	99	-13	-23
Canfield-Bachmann, 1981 Natural Lake	25	51	103	-6	-11
Canfield-Bachmann, 1981 Artificial Lake	23	44	80	-13	-23
Rechow, 1979 General	18	40	90	-17	-30
Rechow, 1977 Anoxic	28	62	140	5	9
Rechow, 1977 water load<50m/year	21	47	106	-10	-18
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	24	53	121	16	43
Vollenweider, 1982 Combined OECD	21	39	77	-8	-17
Dillon-Rigler-Kirchner	17	37	84	0	0
Vollenweider, 1982 Shallow Lake/Res.	16	33	68	-14	-30
Larsen-Mercier, 1976	23	52	117	15	41
Nurnberg, 1984 Oxic	23	47	101	-10	-18

Lake Phosphorus Model	**Confidence** Lower Bound	**Confidence** Upper Bound	**Parameter** Fit?	**Back** Calculation (kg/year)	**Model** Type
Walker, 1987 Reservoir	25	81	FIT	1537	GSM
Canfield-Bachmann, 1981 Natural Lake	16	147	FIT	1318	GSM
Canfield-Bachmann, 1981 Artificial Lake	14	127	FIT	1641	GSM
Rechow, 1979 General	22	75	FIT	1697	GSM
Rechow, 1977 Anoxic	36	114	FIT	1094	GSM
Rechow, 1977 water load<50m/year	26	87	FIT	1448	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	26	105	FIT	823	SPO
Vollenweider, 1982 Combined OECD	19	74	FIT	1469	ANN
Dillon-Rigler-Kirchner	21	68	P	1180	SPO
Vollenweider, 1982 Shallow Lake/Res.	16	63	FIT	1801	ANN
Larsen-Mercier, 1976	30	94	P Pin	845	SPO
Nurnberg, 1984 Oxic	24	88	FIT	1468	ANN