2018 Impaired Waters List

Summary of Public Comments and the WDNR's Responses

A public comment period on the Draft 2018 Impaired Waters List was held from November 15, 2017 to January 8, 2018. The original public comment period was schedule through December 29, 2017, but was extended in light of technical difficulties involving publishing the informational webinar materials. A total of 153 entities commented on the Draft 2018 Impaired Waters List. The following is a summary of comments and the Wisconsin Department of Natural Resources (WDNR) responses indicating any changes to the Draft 2018 Impaired Waters List. This attachment is submitted to EPA for their review of the 2018 Impaired Waters List. After the EPA has reviewed the list and this supporting documentation, additional changes may be made to ensure compliance with federal requirements.

This attachment contains:

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PUBLIC NOTICE OF THE PUBLIC COMMENT PERIOD

NEWS RELEASE, November 15, 2017

DNR assessed lakes and rivers remain healthy, department seeks public comment on proposed list of impaired waters

MADISON, Wis. – The majority of Wisconsin's lakes and rivers recently assessed by the Department of Natural Resources received a good bill of health, continuing a trend of improved surface water quality across the state.

At the same time the DNR is working to identify new waterways to target for pollution reduction plans. The department's recent assessment also included 240 new waters that meet the criteria for being classified as impaired, and is seeking public comment on the new listings.

"Long-term trend and satellite monitoring show that we are making progress with good overall water quality," said DNR Water Quality Bureau Director Sharon Gayan. "Wisconsin waters stay healthy through combined efforts including strong partnerships with citizens, lake associations, local government, permit holders and others implementing practices that protect and restore waters of the state. However, through expanded monitoring, we've identified lakes and rivers where more work is needed to improve water quality for fish to thrive and for people to enjoy them recreationally."

Over the past five years, Gayan said the DNR has completed assessments on more than 6,000 additional waterways. The vast majority, more than 80 percent of assessed waters, are in good condition. For the 2018 listing updates, 35 waterbodies are also proposed to be removed from the list, the highest number of delistings since 2010.

The impaired list identifies waters that need additional management attention. A majority of these new listings – 183 – are for lakes or river stretches that exceed new, more restrictive phosphorus standards that took effect in December 2010. Many of these new phosphorus listings are in areas with restoration plans already in development and were waters that had never been previously assessed for phosphorus.

"The listing does not necessarily mean that phosphorus levels in these waters got worse," said Gayan. "Phosphorus levels may be improving in some, but not enough yet to meet these new standards."

Gayan added that listing waters as "impaired" requires the state to develop restoration plans for them and also may make them eligible for state and federal cleanup funds, which can help speed improvements.
Public comments may be submitted by December 29, 2017, and can be emailed to DNR at DNRImpairedWaters@wisconsin.gov, or sent by U.S. mail to Ashley Beranek, DNR, Water Evaluation Section (WY/3), Box 7921, Madison, WI 53707. Comments postmarked or received by December 29, 2017, will be considered before submitting the final draft list to the U.S. Environmental Protection Agency for approval.

The Impaired Waters List is submitted to the U.S. Environmental Protection Agency every even-numbered year under Section 303(d) of the Clean Water Act (40 C.F.R. §130.7(b)). The department follows standard procedures to assess waterbodies against water quality standards, these are known as Wisconsin Consolidated Assessment and Listings Methods (WisCALM).

The 2018 list and other materials can be found on the DNR's website. You can also find more information about water quality and impaired waters by going to the DNR website at dnr.wi.gov, by searching for "impaired waters."

FOR MORE INFORMATION CONTACT: Sharon Gayan, Water Quality Bureau Director, 608-267-7499

LIST OF COMMENTERS

#	Commenter Name	Affiliation	Topic	Specifics
1	Matt Krueger	River Alliance of Wisconsin	Central Sands	Central Sands Trout Streams
2	Mike Kuhr	Wisconsin Trout Unlimited	Central Sands	Bear Creek (292100), Big Roche-a-Cri Creek (1374100), Bird Creek (152300), Caves Creek (166100), Chaffee Creek (155900), Hartman Creek (263000), S Branch Tenmile Creek (1383200), Tagatz Creek (165800), Willow Creek (243700)
3	Matt Krueger	River Alliance of Wisconsin	Central Sands	Temperature Listings; Hydrologic Impact
4	Susan Benston	Kieser & Associates, LLC	GIS Data	Access
5	Amy Lutzke	Citizen	List Access	Access Format
6	Kent McDonough	Citizen	Specific Waterbody	Bad River (2891900)
7	Cheryl Nenn	Milwaukee Riverkeeper	Specific Waterbody	Beaver Creek (20000), Crestwood Creek (19450), Noyes Creek (17700), Menomonee River (16000), Underwood Creek (16700)
8	Judie Barnes	Citizen	Specific Waterbody	Big Green River (1203900) Little Green River (1204000)
9	Cheryl Clemens	Harmony Environmental	Specific Waterbody	Big Lake (2615900)
10	Reesa Evans	Adams County Land & Water Conservation Dept.	Specific Waterbody	Goose Lake (103600)
11	Diane & John Fallon	Lake resident	Specific Waterbody	Lake Wisconsin (1260600)
12	Abby Badanes	Citizen	Specific Waterbody	LCO (2390800)
13	Adam Faitek	Citizen	Specific Waterbody	LCO (2390800)
14	Amy Rients	Citizen	Specific Waterbody	LCO (2390800)
15	Ana Hokeness	Citizen	Specific Waterbody	LCO (2390800)
16	Andrew Roberts	Citizen	Specific Waterbody	LCO (2390800)
17	Ann Girres	Citizen	Specific Waterbody	LCO (2390800)
18	Anne Badanes	Citizen	Specific Waterbody	LCO (2390800)
19	Anonymous	Citizen	Specific Waterbody	LCO (2390800)
20	Anonymous	Citizen	Specific Waterbody	LCO (2390800)
21	Barbara and Bill Hise	Citizen	Specific Waterbody	LCO (2390800)
22	Bernard Bouquet	Citizen	Specific Waterbody	LCO (2390800)
23	Billy O'Brien	Citizen	Specific Waterbody	LCO (2390800)
24	Bryant Hokeness	Citizen	Specific Waterbody	LCO (2390800)
25	Carrie Badanes	Citizen	Specific Waterbody	LCO (2390800)

26	Christine and Todd Bedwell	Citizen	Specific Waterbody	LCO (2390800)
27	Chuck Buth	Citizen	Specific Waterbody	LCO (2390800)
28	Clifford Boxleitner	Citizen	Specific Waterbody	LCO (2390800)
29	Cynthia Janacek	Citizen	Specific Waterbody	LCO (2390800)
30	Dean Peltonen	Citizen	Specific Waterbody	LCO (2390800)
31	Deb Tamondong	Citizen	Specific Waterbody	LCO (2390800)
32	Debra Lozoff Swaden	Citizen	Specific Waterbody	LCO (2390800)
33	Dennis Rajtora	Citizen	Specific Waterbody	LCO (2390800)
34	Don & Mary Roberts	Citizen	Specific Waterbody	LCO (2390800)
35	Douglas Seylar	Citizen	Specific Waterbody	LCO (2390800)
36	E. Bruggeman	Citizen	Specific Waterbody	LCO (2390800)
37	Earl Emerick	Citizen	Specific Waterbody	LCO (2390800)
38	Edmond Packee	Citizen	Specific Waterbody	LCO (2390800)
39	Erica Faitek	Citizen	Specific Waterbody	LCO (2390800)
40	Greg & Lydia Toogood	Citizen	Specific Waterbody	LCO (2390800)
41	Holly Piper	Citizen	Specific Waterbody	LCO (2390800)
42	James Klabough	Citizen	Specific Waterbody	LCO (2390800)
43	Jan Bates	Citizen	Specific Waterbody	LCO (2390800)
44	Janice Buth	Citizen	Specific Waterbody	LCO (2390800)
45	Jeff Gauthier	Citizen	Specific Waterbody	LCO (2390800)
46	Jeff Janacek	Citizen	Specific Waterbody	LCO (2390800)
47	Jerry Hanson	Citizen	Specific Waterbody	LCO (2390800)
48	Jim and Karen Porath	Citizen	Specific Waterbody	LCO (2390800)
49	Jim Bates	Citizen	Specific Waterbody	LCO (2390800)
50	Jim Coors	Citizen	Specific Waterbody	LCO (2390800)
51	Jim Haugen	Citizen	Specific Waterbody	LCO (2390800)
52	Jim Paine	Citizen	Specific Waterbody	LCO (2390800)
53	Joe Moelter	Citizen	Specific Waterbody	LCO (2390800)
54	John & Barb Seaberg	Citizen	Specific Waterbody	LCO (2390800)
55	John & Ruth Pechacek	Citizen	Specific Waterbody	LCO (2390800)
56	John and Andrea Terhune	Citizen	Specific Waterbody	LCO (2390800)
57	John Berg	Citizen	Specific Waterbody	LCO (2390800)
58	John Bihun	Citizen	Specific Waterbody	LCO (2390800)
59	John Coverdale	Citizen	Specific Waterbody	LCO (2390800)
60	John Seylar	Citizen	Specific Waterbody	LCO (2390800)

61	Joseph Felz	Citizen	Specific Waterbody	LCO (2390800)
62	Julie and Kurt Schroeder	Citizen	Specific Waterbody	LCO (2390800)
63	Kathryn and Richard Hassinger	Citizen	Specific Waterbody	LCO (2390800)
64	Kathryn Piper	Citizen	Specific Waterbody	LCO (2390800)
65	Kenneth Vesa	Citizen	Specific Waterbody	LCO (2390800)
66	Kristin McMahon	Citizen	Specific Waterbody	LCO (2390800)
67	Kristine Drew & Donald LaMagdeleine	Citizen	Specific Waterbody	LCO (2390800)
68	Laurie Pfiffner	Citizen	Specific Waterbody	LCO (2390800)
69	Linda Pulford	Citizen	Specific Waterbody	LCO (2390800)
70	Margaret Martens	Citizen	Specific Waterbody	LCO (2390800)
71	Marty Malinowski	Citizen	Specific Waterbody	LCO (2390800)
72	Mary and Dave Ciresi	Citizen	Specific Waterbody	LCO (2390800)
73	Mary Ann Churchill	Citizen	Specific Waterbody	LCO (2390800)
74	Mary Clayman	Citizen	Specific Waterbody	LCO (2390800)
75	Miki Odawa	Citizen	Specific Waterbody	LCO (2390800)
76	Mitchell Swaden	Citizen	Specific Waterbody	LCO (2390800)
77	Molly McMahon	Citizen	Specific Waterbody	LCO (2390800)
78	Ranee' Bihun	Citizen	Specific Waterbody	LCO (2390800)
79	Robert & Susan Edmundi	Citizen	Specific Waterbody	LCO (2390800)
80	Robert Janczak	Citizen	Specific Waterbody	LCO (2390800)
81	Robert McMahon, Jr.	Citizen	Specific Waterbody	LCO (2390800)
82	Robin Malinowski	Citizen	Specific Waterbody	LCO (2390800)
83	Russel Eflmelee	Citizen	Specific Waterbody	LCO (2390800)
84	Signe Schroeder	Citizen	Specific Waterbody	LCO (2390800)
85	Stephen Lillyblad	Citizen	Specific Waterbody	LCO (2390800)
86	Steven & Carol Broback	Citizen	Specific Waterbody	LCO (2390800)
87	Susan Kendrick	Citizen	Specific Waterbody	LCO (2390800)
88	Susan Thomas	Citizen	Specific Waterbody	LCO (2390800)
89	Terry Halbleib	Citizen	Specific Waterbody	LCO (2390800)
90	Tiffany Williams	Citizen	Specific Waterbody	LCO (2390800)
91	TJ Johnsrud & Jeri Mace	Citizen	Specific Waterbody	LCO (2390800)
92	Todd Ciresi	Citizen	Specific Waterbody	LCO (2390800)
93	Tom Orszulak & Brenda Landgrebe	Citizen	Specific Waterbody	LCO (2390800)

94	Vito Paine	Citizen	Specific Waterbody	LCO (2390800)
95	Gary Pulford	Courte Oreilles Lakes Association (COLA)	Specific Waterbody	LCO (2390800)
96	Rob Gales	Courte Oreilles Lakes Association (COLA)	Specific Waterbody	LCO (2390800)
97	Norbert A. Daleiden	Daleiden & Tremaine, LTD	Specific Waterbody	LCO (2390800)
98	Albert Zimmer	Lake resident	Specific Waterbody	LCO (2390800)
99	Andrew and Vicky Duoss	Lake resident	Specific Waterbody	LCO (2390800)
100	Art Malin	Lake resident	Specific Waterbody	LCO (2390800)
101	Bridget and Chad Grigsby	Lake resident	Specific Waterbody	LCO (2390800)
102	Cynthia Rost	Lake resident	Specific Waterbody	LCO (2390800)
103	Daniel Mackin	Lake resident	Specific Waterbody	LCO (2390800)
104	David Zimmer	Lake resident	Specific Waterbody	LCO (2390800)
105	Dean and Mary Shawbold	Lake resident	Specific Waterbody	LCO (2390800)
106	Douglas Orr	Lake resident	Specific Waterbody	LCO (2390800)
107	Gregory Barabas	Lake resident	Specific Waterbody	LCO (2390800)
108	Holly Vincent Bean	Lake resident	Specific Waterbody	LCO (2390800)
109	John Berglund	Lake resident	Specific Waterbody	LCO (2390800)
110	Katherine Orr Chiles	Lake resident	Specific Waterbody	LCO (2390800)
111	Kathleen Umland	Lake resident	Specific Waterbody	LCO (2390800)
112	Kevin Horrocks	Lake resident	Specific Waterbody	LCO (2390800)
113	Laura Evans	Lake resident	Specific Waterbody	LCO (2390800)
114	Leanna Hush O'Donnell	Lake resident	Specific Waterbody	LCO (2390800)
115	Lorrie Salzl Seylar	Lake resident	Specific Waterbody	LCO (2390800)
116	Mark Berglund	Lake resident	Specific Waterbody	LCO (2390800)
117	Richard H. Ford	Lake resident	Specific Waterbody	LCO (2390800)
118	Robert Brown Jr.	Lake resident	Specific Waterbody	LCO (2390800)
119	Sara Terwilliger Cyr	Lake resident	Specific Waterbody	LCO (2390800)
120	Steve Umland	Lake resident	Specific Waterbody	LCO (2390800)
121	Susan Horrocks	Lake resident	Specific Waterbody	LCO (2390800)
122	Terry Clark	Lake resident	Specific Waterbody	LCO (2390800)
123	Trudianne Temple	Lake resident	Specific Waterbody	LCO (2390800)
124	Twila Kaiser	Lake resident	Specific Waterbody	LCO (2390800)
125	William & Kimberly Aliber	Lake resident	Specific Waterbody	LCO (2390800)
126	William Wawak	Lake resident	Specific Waterbody	LCO (2390800)

127	*Unlegible name	Muskies Inc. Hayward Lakes Chapter	Specific Waterbody	LCO (2390800)
128	Allan Hoeft	Muskies Inc. Hayward Lakes Chapter	Specific Waterbody	LCO (2390800)
129	Allen Ely	Muskies Inc. Hayward Lakes Chapter	Specific Waterbody	LCO (2390800)
130	Bart Stanley	Muskies Inc. Hayward Lakes Chapter	Specific Waterbody	LCO (2390800)
131	Emmett Brown Jr.	Muskies Inc. Hayward Lakes Chapter	Specific Waterbody	LCO (2390800)
132	Jann Nelson	Muskies Inc. Hayward Lakes Chapter	Specific Waterbody	LCO (2390800)
133	Keith Thompson	Muskies Inc. Hayward Lakes Chapter	Specific Waterbody	LCO (2390800)
134	Larry Ramsiell	Muskies Inc. Hayward Lakes Chapter	Specific Waterbody	LCO (2390800)
135	Mark Laustrup	Muskies Inc. Hayward Lakes Chapter	Specific Waterbody	LCO (2390800)
136	Michael Outralt	Muskies Inc. Hayward Lakes Chapter	Specific Waterbody	LCO (2390800)
137	Mike Persson	Muskies Inc. Hayward Lakes Chapter	Specific Waterbody	LCO (2390800)
138	Robert Reinert	Muskies Inc. Hayward Lakes Chapter	Specific Waterbody	LCO (2390800)
139	Steve Truven	Muskies Inc. Hayward Lakes Chapter	Specific Waterbody	LCO (2390800)
140	Tom & Charolette Kerstes	Muskies Inc. Hayward Lakes Chapter	Specific Waterbody	LCO (2390800)
141	Vicky Hush	Propoerty Owner (POPCA)	Specific Waterbody	LCO (2390800)
142	Ellen Darling	Wimso Club	Specific Waterbody	LCO (2390800)
143	Timm Speerschneider	Wisconsin State Cranberry Growers Association (WSCGA)	Specific Waterbody	LCO (2390800)
144	Hugh Zimmer	Zimmer Companies, Inc.	Specific Waterbody	LCO (2390800)
145	Donna Keclik	Region 5 Environmental Protection Agency	Specific Waterbody	List
146	Todd Brennan	Alliance for the Great Lakes	Specific Waterbody	Lyons Park Creek (15950)
147	Tom Roberts	Citizen	Specific Waterbody	Pecatonica River (889100)
148	Chuck Halstenson	Slim Lake Association	Specific Waterbody	Slim Lake (2109300)
149	Dave Neuswanger	Quiet Lakes Improvement Association	Specific Waterbody	Teal Lake (2417000)
150	Meg Wise	Crawford Stewardship Project	Specific Waterbody	Unnamed Waterbody (5035112)
151	Kathy Aron	Wind Lake Management District	Specific Waterbody	Wind Lake (761700)
152	Todd Brennan	Alliance for the Great Lakes	WisCALM	Category Explanations
153	Bill James	University of Wisconsin-Stout, Center for Limnological Research and Rehabilitation	WisCALM	TSI Calculation Method

COMMENTS AND RESPONSES

Specific Waterbodies

BAD RIVER – (WBIC 2891900) "Saw article in Ironwood Globe looking for comments on impaired waters - is any agency addressing Bad River in Odanah?? This from what I've read and traveled over has to be the most polluted river in the midwest and maybe north America. It's brown as mud and smells - it was rated as one of the most polluted in the area but the gov't gives it a free pass year after year? What gives? Because it's in an Indian reservation?? Left wing leaning judges?? Or the WI DNR gives it a free pass? Can you please explain to me the free pass on pollution year after year??" **(Kent McDonough, Citizen)**

> **RESPONSE:** Just as the EPA delegates the Clean Water Act (CWA) obligations to the state of Wisconsin, it also delegates CWA obligations to many federally recognized tribal nations. The EPA recognizes the Bad River tribal government as the primary party for making environmental policy decisions and managing programs for reservations consistent with agency standards and regulations. Here is the EPA webpage for more information regarding environmental protection in Tribal lands: https://www.epa.gov/tribal. The Bad River is an example of shared water that elicits cooperative jurisdiction; where some of the river falls in State Land and some of the river falls in Bad River Tribal Land. The portion of the Bad River within the reservation was evaluated during the 2018 listing cycle and no impairment was found for total phosphorus or chloride. WDNR will not make an assessment decision on this portion of the river, but according to the data it is not impaired for those two pollutants. The rest of the Bad River was assessed for temperature and available biological data and neither indicated impairment based on the 2018 WisCALM listing thresholds for the Fish and Aquatic Life use. This water is meeting this designated use and is not considered impaired.

BIG GREEN RIVER & LITTLE GREEN RIVER – (WBICs 1203900 & 1204000) "I noticed that you have the Wisconsin River on the list from Grant County, but you do not have the Big Green River or the Little Green River. At the corner of Hwy. 133 and County C near Woodman, WI you would find a feedlot with hundreds of cattle on the banks of the Little Green River, shortly before it flows into the Big Green River, which flows into the Wisconsin river. This feedlot clearly shows up on Google maps. There are many springs and wetlands that are located in the feedlot within 50 to 100 feet of the river. I did notice that someone must have asked the owners to fence the river out of the feedlot, but that you allow this feedlot to exist within the watershed of these rivers is unbelievable. This is surely part of the problem with the contamination of the rivers. I support the DNR looking into cleaning up these rivers." **(Judie Barnes, Citizen)**

> **RESPONSE:** The Big Green River from its mouth to the Plum Valley Tributary was assessed during the 2018 listing cycle; total phosphorus sample data were nearly below the 2018 WisCALM listing thresholds for the Fish and Aquatic Life use. Available biological data did not indicate impairment (i.e. no macroinvertebrate or fish Index of Biotic Integrity (IBI) scored in the "poor" condition category). This water is meeting this designated use and is not considered impaired. A portion of the Little Green River (AU 13216) was assessed during the 2018 assessment cycle; a general assessment of fish found conditions to be good and supporting the Fish and Aquatic Life Designated Use.

The DNR, together with many partners throughout the basin, are working to improve water quality of the Wisconsin River, its reservoirs and tributaries. A Total Maximum Daily Load (TMDL) study and implementation plan is being conducted that will provide a strategic framework and prioritize resources for water quality improvement in the Wisconsin River Basin. The Wisconsin River TMDL study area spans Wisconsin's central corridor from the headwaters in Vilas County to Lake Wisconsin in Columbia County, covering 9,156 square miles, approximately 15 percent of the state.

Your concerns about the feedlot you mentioned have been brought to the attention of staff involved with agricultural runoff.

BIG LAKE – (WBIC 2615900) "This water was assessed during the 2018 listing cycle; new chlorophyll sample data exceeded 2018 WisCALM listing thresholds for the Recreation use. Total phosphorus data were clearly below Recreation use and Fish and Aquatic Life use listing thresholds.

See above. Can you please clarify Chlorophyll listing standards? How many samples are used?

Big Lake 2017 results
6/21/17: 4.08
7/24/17: 2.95
8/28/17: 1.92
These seem low to me.

Just one reading above 20 9/5/16

6/17/16: 8.72
7/21/16: 10.5
9/5/16: 24.1" **(Cheryl Clemens, Environmental Consultant, Harmony Environmental)**

RESPONSE: Based on current WisCALM methodology, chlorophyll-*a* (chl-*a*) analysis requires data from the past five years and specifically data from the growing season (July 15 – Sept 15). In order to do an assessment at least 6 samples are needed, 3 from each of two years or 2 from each of three years. Chl-*a* data is compared to two criteria, one protective of aquatic life and the other protective of recreation. For the aquatic life criteria comparison the mean and a 90% confidence interval of the chl-*a* concentration are calculated. For the recreation criteria comparison the percentage of days where chl-*a* concentration is above 20 µg/L is calculated. A 90% confidence interval around this percentage of days is also calculated. If the mean and confidence interval are above the criterion then the water is considered impaired (Figure 1).

Big Lake was listed for Excess Algal Growth impairment in 2014 based on chlorophyll-*a* data from 2006 – 2008 because the mean and confidence interval were above the criteria. Chlorophyll-*a* was assessed during the 2018 cycle based on data from 2014 – 2016. Comparison against the recreation criteria showed that this lake nearly exceeds criteria (Figure 2). The lake will remain on the list until the chl-*a* values are clearly below the criteria.

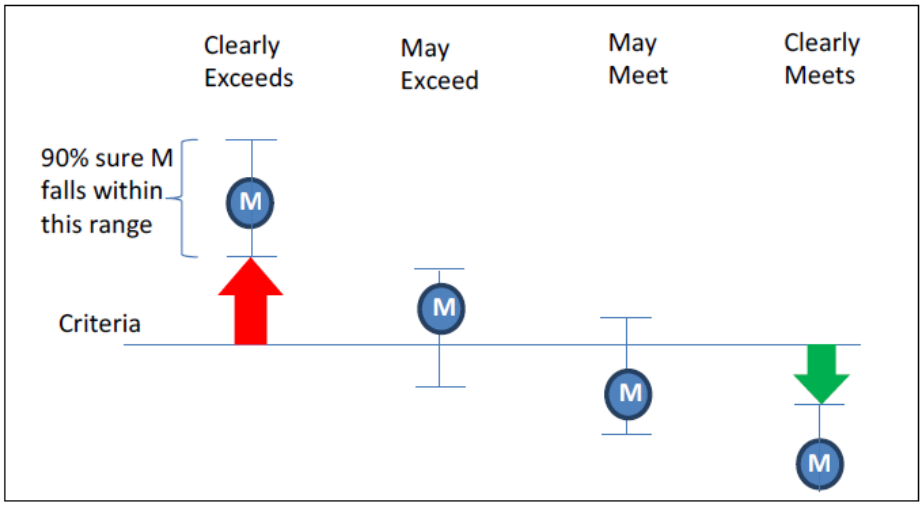


Figure 1. Figure from the 2018 WisCALM guidance document (page 26) illustrating the comparison of confidence intervals to the criteria for total phosphorus. If the lower 90% confidence interval is above the criteria then the data clearly exceeds. If the upper 90% confidence interval is below the criteria then the data clearly meets the criteria.

Name of Lake: Big Lake **WBIC:** 2615900 **County:** Polk

Natural Community: Shallow Lowland **Watershed:** Lower Apple River

FAL Impairment Threshhold: 27 ug/l

REC Impairment Threshhold: 30% days > 20 ug/L

Station ID: 493107 **Name:** Big Lake - Deep Hole

Months Used: 7 Earliest Month Used: Jul 2014 Latest Month Used: Sep 2016

FAL						REC			
Mean (ug/L)	Min (ug/L)	Max (ug/L)	90% CI (ug/L) Lower	Upper	Relation to Threshhold: FAL	% Days Exceed	90% CI (% days) Lower	Upper	Relation to Threshhold: REC
18.1	3.2	54.3	8.4	27.8	May Meet	45.8	23.3	69.8	May Exceed

Figure 2. Water quality assessment report for Big Lake (WBIC 2615900). Big Lake is a Shallow Lowland lake so the Fish and Aquatic Life (FAL) Impairment Threshold was ≥27 ug/L and >30% of days in sampling season having "nuisance algal blooms" (> 20ug/L) for the Recreation (REC) Use Impairment Threshold.

CENTRAL SANDS STREAMS

A) (WBICs 5015644, 152300, 166100, 155900, 263000, 1383200, 165800, 243700) "Thanks for the webinar today—it was helpful. I still have a question, though, and that is if you can offer any explanation as to why there are a number of Central Sands trout streams that are proposed to be listed for an "Unknown Pollutant," due to "Elevated Water Temperature." Specifically, I'm wondering about: Bear, Bird, Caves, Chaffee, Hartman, S Branch Tenmile, Tagatz, and Willow creeks." **(Matt Krueger, River Restoration Director, River Alliance of Wisconsin)**

RESPONSE A: For the waters you listed, each had continuous temperature data that was compared to the coldwater temperature criteria outlined in NR102 (acute) (Table 1). There was at least one month where >10% of samples exceeded the temperature criteria (minimum of 20 daily maximum temperature samples/month) for each of the waters. For this reason, these waters were

listed as impaired for temperature. For Hartman and Willow Creeks the phosphorus levels were also analyzed, but they were found to be clearly below the listing criteria. Because a definitive cause to the increased temperature of these waters was not clear, the pollutant was listed as "Unknown." The pollutant will need to be determined before a TMDL study can occur.

Table 1. Table from Wisconsin NR102.25 Ambient temperatures and water quality criteria for the protection of fish and other aquatic life.

Table 2
Ambient Temperatures and Water Quality Criteria for Temperature for Non–Specific Waters
(All values are expressed as degrees Fahrenheit)

	Cold[4]			Warm — Large[5]			Warm — Small[6]			LFF[7]		
Month	Ta[1]	SL[2]	A[3]	Ta	SL	A	Ta	SL	A	Ta	SL	A
JAN	35	47	68	33	49	76	33	49	76	37	54	78
FEB	36	47	68	33	50	76	34	50	76	39	54	79
MAR	39	51	69	36	52	76	38	52	77	43	57	80
APR	47	57	70	46	55	79	48	55	79	50	63	81
MAY	56	63	72	60	65	82	58	65	82	59	70	84
JUN	62	67	72	71	75	85	66	76	84	64	77	85
JUL	64	67	73	75	80	86	69	81	85	69	81	86
AUG	63	65	73	74	79	86	67	81	84	68	79	86
SEP	57	60	72	65	72	84	60	73	82	63	73	85
OCT	49	53	70	52	61	80	50	61	80	55	63	83
NOV	41	48	69	39	50	77	40	49	77	46	54	80
DEC	37	47	69	33	49	76	35	49	76	40	54	79

1 Ta = ambient temperature
2 SL = sub–lethal criteria
3 A = acute criteria
4 Cold = waters with a fish and aquatic life use designation of "cold water community"
5 Warm – Large = waters with a fish and aquatic life use designation of "warm water sport fish community" or "warm water forage fish community" and unidirectional 7Q10 flows ≥ 200 cfs (129 mgd)
6 Warm – Small = waters with a fish and aquatic life use designation of "warm sport fish community" or "warm water forage fish community "and uni–directional 7Q10 flows < 200 cfs (129 mgd)
7 LFF = waters with a fish and aquatic life use designation of "limited forage fish community"

B) "Thank you for the opportunity to provide the following comments on the Draft 2018 Impaired Waters List.

1. Thermal impacts on Central Sands streams

Several streams in the Central Sands region are on the Draft List due to "elevated water temperature." We suspect that these streams, which are fed by groundwater, are thermally impaired due to the proliferation of groundwater pumping by high-capacity wells in the Central Sands. Are other streams in the region not similarly affected? What about lakes that have been impacted by groundwater pumping—are there not thermal impacts on these waterbodies, as well? Were they considered for the Impaired Waters List?

2. Impaired water listing due to hydrologic alteration of lakes and streams

River Alliance and other organizations have previously submitted information and data to DNR showing that water levels of several Central Sands region lakes and streams were significantly low, some to the point of drying up. Subsequent anecdotal evidence and published scientific literature indicate these low water conditions are largely due to groundwater pumping. At the time of our submission, we were told that DNR did not yet have standards for, nor a tool to help make, determinations due to hydrological impairments, but that such a tool would be developed to make this determination. Seeing no listings for hydrologic impairments on this list, we're compelled to wonder

about the status is of this tool's development and implementation for the purposes of Impaired Waters designations." **(Matt Krueger, River Restoration Director, River Alliance of Wisconsin)**

RESPONSE B: The WDNR thanks you for your interest in the Central Sands stream listings. The Impaired Waters List is developed based on data that is collected by both the Department and public entities that choose to submit data during the public data solicitation period. Rivers, streams, and lakes with available data were evaluated for temperature impairment. In Adams, Waushara, and Marquette counties alone there were 28 cold water stream segments with sufficient data that did not exceed temperature criteria. The majority of the Central Sands listings, 8 of 9, are in these counties. Monitoring in these counties will continue.

The WDNR does not currently have standards or a tool to determine hydrologic impairment for impaired waters listing purposes. This standard is one to be developed but is currently stalled due to lack of staff time.

C) (WBICs 292100, 1374100, 152300, 166100, 155900, 263000, 1383200, 165800, 243700) "Thank you for the opportunity to provide comment on the Draft 2018 Impaired Waters List, which I submit on behalf of the State Council of Wisconsin Trout Unlimited. Wisconsin Trout Unlimited is a non-profit conservation organization comprised of 21 chapters in the state, representing over 5,000 members. We value our years-long partnership with the Department, and appreciate the important and valuable work the Department does to restore coldwater habitat and fisheries in Wisconsin.

The draft 2018 proposed lmpaired Waters List contains a number of trout streams located in the Central Sands region of the state, including Bear, Big Roche-a-Cri, Bird, Caves, Chaffee, Hartman, S Branch Tenmile, Tagatz, and Willow creeks. All of these waterbodies are listed for "elevated water temperature." The listing of these water bodies brings to bear some questions.

1. What is the cause of the elevated water temperatures in these streams? As you well know, brown trout and especially brook trout are very temperature-sensitive fish. Brook trout, as our only native trout and one that relies on cold, clean water, are of particular interest to our organization. Predicted climate change scenarios indicate brook trout will come under increasing stress in future years due to warming weather. Does Department data suggest a cause for the listing of these streams? Is it climate-change related? Or possibly related to the increasing usage of high-capacity wells in the Central Sands that has the effect of drawing down surface water levels in streams and area lakes?

2. Nine Central Sands trout streams are proposed to be listed. Does this indicate that other Central Sands streams the Department has data for are meeting water quality standards, hence their not being included on this list? Or, does the Department have insufficient data on other Central Sands trout streams to know whether they suffer from similar impairments of elevated water temperatures? If the latter, we would strongly encourage the Department to acquire the data on those other streams, to determine if the problem we're witnessing is one occurring on a region-wide basis.

3. If the proposed listing of these streams is approved for the final Impaired Waters list, the Department is then required to perform a Total Maximum Daily Load. As it appears on the list, the Department has assigned a "low" TMDL priority for these streams. We think there must be a considerably greater priority placed on addressing this problem, particularly, as we asked in #2 above,

if this is a more regional issue that we're witnessing. Region wide changes could have negative implications on the recreational angling economy. Recent studies show trout angling in the Driftless Area has an annual impact of $1.6 billion (source: 2016 Economic Impact of Trout Angling in the Driftless Area report). Another recent report by the American Sportfishing Association (ASA) concluded that recreational angling contributes $2.2 billion in economic activity annually in Wisconsin (Source: 2013 ASA Sportfishing in America).

4. What does a TMDL for waterbodies listed on the Impaired Waters List due to elevated water temperatures look like? There is clear precedent for TMDLs that address sedimentation or nutrient pollution, or heavy metals—science and experience have given us a clear (if sometimes difficult) path to progress on those impairments. Has the Department performed a TMDL for elevated water temperatures before? Since we are not aware of one, we're curious what this may look like, or whether there is precedent outside of Wisconsin for how such a TMDL would be orchestrated.

Thank you, again, for the opportunity to submit comments on this important process. We appreciate the Department's efforts on this." **(Mike Kuhr, Council Vice Chair, Wisconsin Trout Unlimited)**

RESPONSE C: The WDNR thanks you for your interest in the Central Sands stream listings. To each specific question:

1) The Department is unable to definitively list a cause to the temperature impairment at this time, which is why the listing does not identify a pollutant. The first priority, before creating a TMDL is to determine the cause/pollutant.

2) In Adams, Waushara, and Marquette counties alone there were 28 cold water stream segments with sufficient data that did not exceed temperature criteria. The majority of the Central Sands listings, 8 of 9, are in these counties. Monitoring in these counties will continue but it is highly unlikely that all cold water streams in the Central Sands can be sampled with current DNR resources.

3) TMDL priority determination is outlined in Wisconsin's Water Quality Restoration and Protection Prioritization Framework document. Total phosphorus (TP) and total suspended solids (TSS) are Wisconsin's two main priority pollutants right now because they comprise a majority of the current impaired waters listings. Based on the prioritization framework if a listing is for TSS or TP and a TMDL is in development then the priority is "high". If a listing is for TSS or TP and the water is in a priority area, which is determined using Wisconsin's Nutrient Strategy and Healthy Watersheds Assessment, then the TMDL priority is "medium". Other listings are marked as "low" priority unless specifically highlighted for TMDL work in a special project.

4) The Department has not previously developed a TMDL to address temperature impairment. However, the first step is to determine what is causing the elevated water temperature. Currently, the Department and its partners are conducting the Central Sands Lakes Study (CSLS) to fulfill requirements enacted in 2017 Wisconsin Act 10 ("Act 10"), specifically those in s. 281.34 (7m), Wis. Stats. The study will investigate the potential for groundwater

withdrawal-related impacts to Pleasant, Plainfield and Long lakes, located primarily in Waushara County in Wisconsin's Central Sands region. If significant impacts from groundwater withdrawals are identified, the department will evaluate special measures to address predicted impacts, complete an economic impact analysis, compile a decision document for public hearing and comment, and create final reports and recommendations for submission to the Wisconsin Legislature. A report on this study is due to the legislature in June 2021. This study will give us some information on hydrologic impacts to the area.

There are existing examples of temperature based TMDLs most of which are located in the Western United States where increasing water temperatures are common as a result of extensive impoundments and a naturally warmer climate than the Midwest.

GOOSE LAKE – (WBIC 103600) "I see that Goose Lake in Adams County is again proposed to be placed on the impaired waters list. I am kind of confused, because it was proposed in 2014, but after information I provided, that proposal was withdrawn. When I looked at the reason for the proposal, it said something like 'excess phosphorus'. I work with some diligent volunteers on Goose Lake who have regularly participated in Citizen Lake Monitoring since 2004. Goose Lake is a shallow, 3-lobed lake, two lobes of which are basically very shallow and boggy. As far as I know (having been working with the lake some 15 years), it does not stratify in the winter. Natural sponges are common. It has a number of high quality aquatic/wetland plants, such as *Cephalanthus occidentalis, Cladium marisicoides, Dulichium arundinaceum, Lynsimachia quadrifolia, Potamogeton oakesianus, Potamogeton obtusefolious, Schoenoplectus smithii, Schoenoplectus subterminalis*, and 5 species of Uricularia.

My understanding is that the phosphorus index for non-stratified lakes is 40 micrograms/liter. I took a look at the averages for total phosphorus since the regular testing started in 2004. The average TP for 2004-2017 for the testing season was 23.1 micrograms/liter. The average for the past 5 years is 21.8 micrograms/liter. Thus the phosphorus readings in Goose Lake don't seem to rise to the 'excess phosphorus' level for impaired listing. Chlorophyll-a, I might note, has remained extremely low by any measurement, with an average of 4.8 micrograms/liter for 2004-2017 and 4.9 for the last 5 years.

So I again say that I don't see why there is a proposal to list Goose Lake as 'impaired." Please reconsider this proposal." **(Reesa Evans, Certified Lake Manager, Adams County Land and Water Conservation Department)**

RESPONSE : Apologies for this happening again. When we assessed the lake in 2014 it was found, after your comments, that we assigned the wrong natural community, calling it a Deep Seepage lake when it should be a Shallow Seepage lake. A Deep Seepage lake has lower phosphorus listing criteria (20 µg/L) while a Shallow Seepage lake has higher phosphorus listing criteria (40 µg/L). For some reason the natural community hasn't been changed in the system and it was assessed as a Deep Seepage Lake again. The mean phosphorus level in Goose Lake (2012 – 2016) is 21 µg/L, which is clearly below the listing threshold of 40 µg/L. Goose Lake has been removed from the 2018 proposed listings.

LAC COURTE OREILLES – (WBIC 2390800) WDNR received 133 comments on Lac Courte Oreilles (LCO).

A) WDNR received 131 comments in support of LCO being added to the 2018 list for dissolved oxygen; however, commenters took exception to listing the cause of the impairment as "Unknown." Total Phosphorus was recommended as the actual cause of the low dissolved oxygen:

"I fully support the proposed designation of the entire Lac Courte Oreilles (LCO) lake by the WDNR as an Impaired Water due to low dissolved oxygen (DO). LCO is a rare, Outstanding Resource Water, and one of only five lakes in Wisconsin with a two-story fishery supporting both cisco and lake whitefish. The low DO has and will continue to result in the loss of habitat for these two fish species. The loss of these species will lead to a wholesale change in the ecology of LCO.

However, the WDNR listing indicates that the "Cause" of the impairment is "Unknown." We strongly disagree. A great deal of independent research, over many years, has been conducted on LCO and has documented the increase in Total Phosphorus and the corresponding incidences of low DO, including significant fish kills.

Phosphorus was cited as the "Cause" of the listing of Musky Bay, part of LCO, as an impaired water in 2014. LCO as a whole is impaired, and the cause is Total Phosphorus. LCO is the only water on the proposed 2018 Impaired Waters list with a "Cause" stated as "Unknown," while Total Phosphorus is stated as the cause of impairment for many of the other waters.

Please amend the WDNR 2018 Impaired Waters listing to clarify that Total Phosphorus is the cause of the impairment of Lac Courte Oreilles." **(Commenters 12-144)**

B) "I am providing the following written comments on behalf of the Wisconsin State Cranberry Growers Association ("V/SCGA") regarding the draft 2018 303(d) list of impaired waters. WSCGA represents approximately 160 of Wisconsin's cranberry growers who grow more than 85% of the state's cranberry crop. Cranberries are Wisconsin's largest fruit crop and Wisconsin leads the nation in cranberry production. It is estimated that the state's cranberry industry provides more then 3,400 jobs for Wisconsin residents and has a $1 billion impact on the state's economy. WSCGA objects to the listing of the entirety of Lac Courte Oreilles for low dissolved oxygen ("DO") due to the lack of and quality of data for the entire lake. To the extent that WDNR lists Lac Courte Oreilles for low DO, V/SCGA agrees that (1) the source category is appropriately identified as non-point; (2) the pollutant is unknown; and (3) the TMDL priority is low." **(Tim P. Speerschneider, DeWitt Ross & Stevens on behalf of the Wisconsin State Cranberry Growers Association)**

C) "I and my family strongly oppose the listing of Lac Courte Oreilles as Impaired because Of Low Dissolved Oxygen. If indeed the lake is impaired it is due to natural causes which are exempt from impairment listings. Please find and include in my full response to the proposed listing in the attached report, in draft form, LAC COURTE OREILLES, AN IMPAIRED LAKE? NOTE THE QUESTION MARK!
I have lived seasonally and permanently on Lac Courte Oreilles for 77 years. My memory goes back

to 1945/1946—I remember my first deer on County K at Mullaly Hill and I remember the end celebrations of World War II. I am a forester and soil scientist, specializing in silviculture and forest ecology. I have both industrial and academic experience—I was instrumental in initiating the Carnation Creek Study on Vancouver Island (salmon) while in industry and academically (U. Alaska Fairbanks) where I taught dendrology, silviculture, forest health, and ecosystem management.

I oppose listing Lac Courte Oreilles as impaired due to Low Dissolved Oxygen levels for a number of reasons including:

- Whitefish kills being not uncommon in the past,
- High water levels may be a major factor involving the ails of the lake,
- Low Dissolved Oxygen cannot be addressed by itself—Minnesota, for example, is looking at a combined standard that includes water temperature,
- Genetic adaptation of the fish to warmer waters,
- Climate change including warming and precipitation patterns.

I submit this statement and the report as my own ideas; the report was initially done for an attorney. He has not changed the report and that is why we are keeping it separate. I am more than willing to work with the Water Evaluation Section Lac Courte Oreilles problems as well as other waters. Please feel free to contact me by e-Mail or telephone if you have any questions about the report or concepts that I have raised." (**Edmond Packee, Certified Forester #568; Certified Professional Soil Scientist #1709**)

RESPONSE: WDNR thanks the commenters for their interest in the Lac Courte Oreilles impaired water listing. Lac Courte Oreilles was assessed during the 2018 listing cycle as a Two-Story Fishery lake and new dissolved oxygen (DO) data clearly exceeded the listing thresholds for the Fish and Aquatic Life Use. For the dissolved oxygen assessment the criterion of 5 mg/L, currently in Wisconsin Administrative Code NR 102.04(4)(a), was used. The Two-Story dissolved oxygen assessment method determines habitat availability for coldwater fish species based on temperature and dissolved oxygen levels. This method measures the "oxythermal layer thickness" (OLT) and states that at least 1 meter (3 feet) of OLT must have a DO > 5 mg/L and a temperature <66 F for whitefish (< 73 F for cisco) for fish survival. If the required OLT is not maintained throughout the summer for more than one in three years then the water is considered impaired. Using the thermal requirements for whitefish, the OLT was found to be insufficient every year for the past 5 years in LCO. Total phosphorus and chlorophyll-*a* sample data, on the other hand, clearly met the Fish and Aquatic Life and Recreation use thresholds. Therefore, the cause of the impairment was listed as "Unknown" because total phosphorus data does not support an impairment decision based on 2018 WisCALM methodologies.

This impairment listing was determined in conjunction with an in-depth analysis of whether a site specific total phosphorus criterion for LCO would be appropriate. An in-depth analysis was done of phosphorus and dissolved oxygen data dating back to 1975. Based on this analysis there does not appear to be a correlation between oxygen depletion and ambient phosphorus concentrations. In other words, ambient phosphorus is likely not driving oxygen depletion in LCO.

There is a strong but slow warming trend in the surface of the lake (about 0.05C/yr), which equates to approximately 2C (3.6F) increase since 1975 at the surface. There is no long term trend in water temperature in the lower layers of the lake (thermocline, hypolimnion, or bottom) and the OLT layer has not changed with this increase in temperature.

Based on the in-depth analysis of LCO data it appears that the largest contributor to low dissolved oxygen is Sediment Oxygen Demand (SOD). Sediment cores taken in January 2018 were analyzed for oxygen demand and it was found that SOD accounts for the majority of oxygen consumption in the hypolimnion (59%, 92%, and 75% in the East, Central, and West Basins, respectively). Based on sediment cores taken in 2012 by UW-Stout it was found that the sediment had high organic matter content (23 – 52%) and there were high iron levels. Future studies are needed to tease out which component, organic decomposition or oxidation of reduced substances (iron, methane, ammonium, nitrite, manganese, sulfide), is the main driver of SOD in LCO. With this evidence the dissolved oxygen listing will remain an "Unknown Pollutant".

LAKE WISCONSIN – (WBIC 1260600) "Please give higher priority to cleaning up Lake Wisconsin. We have been on the lake for almost 30 years, and the water quality has deteriorated considerably. There is green scum floating on the top of the water at least half of the time. It is not safe for swimming. It is probably not safe to eat the fish caught in it, although there have been no studies on that. Please devote some of your precious resources to cleaning up Lake Wisconsin." **(Diane and John Fallon, Citizens)**

RESPONSE: The DNR, together with many partners throughout the basin, are working to improve water quality of the Wisconsin River, its reservoirs and tributaries. The Total Maximum Daily Load (TMDL) study and implementation plan will provide a strategic framework and prioritize resources for water quality improvement in the Wisconsin River Basin. The Wisconsin River TMDL study area spans Wisconsin's central corridor from the headwaters in Vilas County to Lake Wisconsin in Columbia County, covering 9,156 square miles, approximately 15 percent of the state. To learn more about the Wisconsin TMDL and how it will help Lake Wisconsin please visit this website: http://dnr.wi.gov/topic/TMDLs/WisconsinRiver/.

Many aquatic plants appear hazardous, but are in actuality native species that are signs of a healthy ecosystem. However, if you suspect something to be a blue-green algae bloom (BGA), the safest strategy is to avoid contact. People can be exposed to high health risks by direct ingestion or through inhalation of water droplets containing algae. Skin contact can lead to irritation.

- Don't swim, boat, water ski, etc, in an area with an active bloom.
- Don't let children play with scum layers, even from shore.
- Don't let pets or livestock swim in or drink in waters with BGA, and wash pets off immediately.
- Don't treat BGA blooms with herbicides; toxins are released when algae dies.
- Always shower after swimming in waters with any BGA.
- Seek attention from your physician or veterinarian if you or your pets experience illness from blue-green algae exposure.

The DNR has been able to test fish from over 1,700 sites since the 1970s, focusing efforts on popular lakes and rivers and those near industrial centers. Because of the large amount of data we've gathered, we know how much mercury is generally found in different fish species. With that information, we determined the consumption advice for how many meals of certain species people can safely eat to reduce their risk of exposure to mercury. In addition, some waters have more restrictive advice due to higher concentrations of mercury or PCBs. Here is the current fish consumption advice for the Wisconsin River from the Wisconsin Dells to the Prairie du Sac Dam (including Lake Wisconsin) as of January 4, 2018:

Women up to age 50 (child bearing age) and children (under age 15) may safely eat:

- 1 Meal Per Week bluegill and sunfish, bullheads, crappies, inland trout, yellow perch

and

- 1 Meal Per Month bass, carp, catfish, lake sturgeon less than 70", pike, walleye, all other species and sizes
- 6 Meals Per Year lake sturgeon larger than 70"
- Do Not Eat muskies

All men (15 and older) and older women (50 and older) may safely eat:

- Unrestricted bluegill and sunfish, bullheads, crappies, inland trout, yellow perch
- 1 Meal Per Week bass, catfish, pike, walleye, all other species and sizes

and

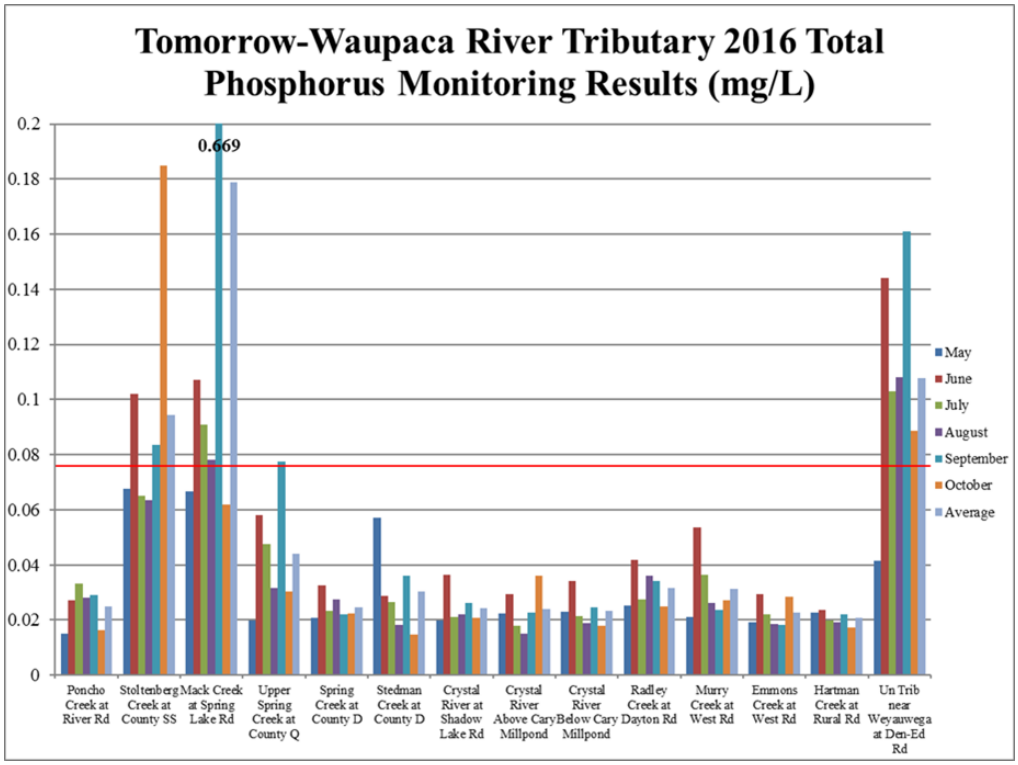
- 1 Meal Per Month carp, lake sturgeon less than 70", muskies
- 6 Meals Per Year lake sturgeon larger than 70"

The above advice is due to the Mercury and PCB pollutants. The DNR does not currently monitor for BGA-related toxins in fish. For the most up to date information, please visit the DNR Fish Advisory Query. (Link: http://dnr.wi.gov/fcsexternaladvqry/fishadvisorysrch.aspx)

LYONS PARK CREEK – "For the water below [Lyons Park Creek entry from the Draft 2018 Impaired Waters List] the location and county is not included, why is that?" **(Todd Brenna, Watershed Project Manager, Alliance for the Great Lakes)**

RESPONSE: This water is being delisted for fecal coliform and recreational restrictions because it is actually being "retired" from the DNR's database. The only water in Lyons Park is the Kinnickinnic River (WBIC 2601800), which is also listed for fecal coliform and recreational restrictions. The error was discovered during preparation of the 2018 Draft Impaired Waters List.

MACK CREEK – (WBIC 267300) "I am wondering if you intend to propose to add Mack Creek to the 2018 303d list? I do not see it in the current draft list that is available on line. It would make a good companion with Spring Lake." **(Nancy Turyk, University of Wisconsin-Stevens Point)**



RESPONSE: Mack Creek was not originally proposed for the 2018 impaired waters list because the lower 90th confidence value was not over the criterion of 75 µg/L. Listing protocols in WisCALM 2018 provide the opportunity for biologists to review assessments like this and decide if the water should be listed. In this case after the local biologist reviewed the 2016 total phosphorus data and calculations he recommended this water be listed for phosphorus, but with no specific impairment because both the fish and macroinvertebrate samples showed populations in good condition. This water was added to the proposed 2018 impaired waters list for total phosphorus (5P).

MILWAUKEE AREA STREAMS – (WBIC 2000, 19450, 17700, 16000, 16700) "On behalf of Milwaukee Riverkeeper, we submit the following comments on the WDNR's proposed 2018 303d Impaired Waters List. We support the listing of the following creeks, which we monitored in 2015-2017, for inclusion on the impaired waters list for chloride:

-Honey Creek
-South Branch Creek
-Indian Creek
-Brown Deer Creek
-North Branch Oak Creek
-Main Branch of the Oak Creek

However, we believe that 3 other creeks that we monitored should also be included on the 2018 list based on our chloride data:

-Beaver Creek (we observed 3 acutes and 2 chronic exceedances in 2017)
-Crestwood Creek (we observed 2 acute exceedances in 2017)
-Noyes Creek (we observed 3 acute exceedances in 2017).

We are not sure why these creeks were not included unless the data was too recent for the DNR's calculations. For your consideration, we are attaching two spreadsheets with data for these creeks—a clean version with the impairments listed and the raw data. We also support the listing of several of our creeks and rivers in the Milwaukee River Basin for phosphorus impairment as well as Noyes Creek for high water temperature.

As far as delistings, we question the removal of the Menomonee River (from river mile 24.82 to 30.14) for a phosphorus impairment. We have several sites for the Menomonee River in Washington County and they are all pretty patchy as far as complying with state standards for phosphorus. Also, we have questions on the proposed delisting for Underwood Creek (from mile 2.84 to 8.54) for an "unknown pollutant" causing biological impairment. Is this due to new biological data or new WisCALM guidance? This section of the Creek is also listed for several other impairments, so maybe this is an artifact of the old listing methodology?" **(Cheryl Nenn, Riverkeeper, Milwaukee Riverkeepers)**

> **RESPONSE:** Beaver Creek (WBIC 20000), Crestwood Creek (WBIC 19450), and Noyes Creek (WBIC 17700) were not listed as impaired for chloride on the 2018 Draft Impaired Waters List because analysis only included data from 2007 – 2016. The 2017 exceedances that you listed were not included in this round of assessments; however, please be sure to submit your data to the WDNR during the public data solicitation period for the next assessment cycle (2020), which should take place sometime in December 2018 or January 2019.
>
> The Menomonee River (WBIC 16000, miles 24.82-30.14) delisting is for the headwaters of the river. The total phosphorus values for the Menomonee River in Washington County do appear to vary, but the assessment methods include calculating confidence intervals around the mean. For the Menomonee River calculations the confidence interval allows us to be 80% sure that the total phosphorus mean is below the criterion. This method takes into consideration the variability in the system. This delisting was also reviewed by the regional biologist who agreed with the change.
>
> Underwood Creek (WBIC 16700, miles 2.84 - 8.54) was assessed during the 2018 listing cycle and available biological data did not indicate impairment. The original 2012 fIBI scores were artificially lower and the corrected fIBI scores show no impairment. The Degraded Biological Impairment was proposed for deletion, but total phosphorus and chloride listing additions were proposed. Thus, this section of the creek will remain listed; only this time for different reasons.

PECATONICA RIVER – (WBIC 889100) "Much greater attention needs to be paid to the water quality of the Pecatonica River watershed including Yellowstone Lake. These are certainly deserving of impaired status. I believe that there has been an over-riding sense in Lafayette County and surrounding areas that the only stake holder worth paying attention to is the short-term view of what might be best/easiest on the agricultural sector. These waters have great economic and recreational value that can really only be

realized by cleaning them up so that their potential as quality fisheries and sources of recreation as well as sustainable agriculture can be achieved over time. Attention is needed in the areas of education, regulation and enforcement so that farmers don't cultivate to the water's edge, apply fertilizers without soil testing to determine need, and follow regulations governing pesticide application to prevent drift and runoff." **(Tom Roberts, Citizen)**

> **RESPONSE:** WDNR thanks the commenter for their interest in the improvement of the Pecatonica River Watershed. In the Sugar-Pecatonica watershed there are 49 waters listed for total phosphorus, including Yellowstone Lake, and 31 waters listed for total suspended sediment, with some waters listed for both pollutants. There are a total of 102 pollutant listings in 79 waters in this watershed and about half of the listings were confirmed in the 2018 cycle assessments. For comparison there are 149 waters assessed as healthy in this watershed. In 2005, the Sugar Pecatonica Basin TMDL, which addresses the 19 sediment impairments listed at that time, was approved by the EPA.

SLIM LAKE – (WBIC 2109300) "I am the President of the Slim Lake Association and we have been very active with lake monitoring and education of our lake owners to help preserve SLIM Lake over the last 20 years. We are surprised to see Slim Lake added to the impaired lake listing this year. We have noticed an increase in weeds and algae. Any information you can supply to us on the data you have collected on SLIM Lake would be appreciated. Also any ideas on what we can and cannot do to help rid the weeds and preserve the Lake would be helpful. **(Chuck Halstenson, Slim Lake Association)**

> **RESPONSE:** The best way to find more information about a specific listing is to use our Impaired Waters Search Tool (Link: http://dnr.wi.gov/water/impairedSearch.aspx). Once you find the waterbody of interest in the table returned from the search tool query, you can click on the name of the waterbody to get more detailed information, including links to documents that support the listing proposals. Slim Lake was originally listed during the 2014 assessment cycle for total phosphorus (TP) where the mean TP concentration exceeded applicable TP criteria. Since then, TP data has not met the water quality standards required for delisting. Pamela Toshner is the regional lake biologist assigned to Slim Lake. She would be the best contact for assisting the Slim Lake Association with issues such as algae and aquatic plant management. Your Association might also be interested in applying for surface water grants which can be found on the WDNR website for Surface Water Grants (Link: https://dnr.wi.gov/Aid/SurfaceWater.html).

TEAL LAKE – (WBIC 2417000)

A) "Recently our Treasurer, Gayle Little, forwarded to me the attached newspaper clipping from the Sawyer County Record, which stated that Teal Lake is on the list of Impaired Waters submitted by WDNR to EPA in compliance with reporting procedures under Section 303(d) of the Clean Water Act. Until now, I was unaware that Teal Lake appeared on this list. Gayle and others were alarmed to see it in the newspaper, which did not specify the reason for the Impaired Waters listing. I initially speculated it was because of methyl mercury concentrations in sport fish -- similar to nearby Ghost Lake, which is part of our association. But after reviewing the attached detailed listing downloaded from WDNR's website, I see that Teal Lake is listed because of an "Unknown Pollutant" from an unknown source or sources that has resulted in "Excess Algal Growth." The "Excess Algal Growth" rationale for listing is perplexing to me. We have over 20 years of volunteer water quality monitoring

data (facilitated by WDNR) showing that nothing has changed in Teal Lake's meso-eutrophic state for more than two decades. Furthermore, our 2016 aquatic plant survey revealed Teal Lake has one of the highest Floristic Quality Indexes (FQI = 35.3) of any lake in northern Wisconsin (FQI average = 28.3). These are contra-indicators of "Excess Algal Growth," and I have seen no evidence (science-based or anecdotal) to suggest that Teal Lake is "impaired" in any way. In fact, I believe it is one of the healthiest aquatic ecosystems I have seen in northwestern Wisconsin. Below are two paragraphs that appear in the background section of our updated and approved 2017 Aquatic Plant Management Plan: "Among the 15,000 lakes and impoundments in Wisconsin, Teal Lake is one of only 103 to have "Outstanding Resource Water" (ORW) status under NR 102.10, Wisconsin Administrative Code. An ORW is a lake, stream, or flowage having excellent water quality, high recreational and aesthetic value, and high quality fishing. ORWs are free from point-source pollution. As a citizen volunteer working in cooperation with WDNR, QLA Past-President Jack Wellauer has recorded observations and collected surface water samples for laboratory analysis from the "deep hole" on Teal Lake since 2002 when he assumed the volunteer duties begun by Mary Witt in 1992. Between 1992 and 2016, Carlson's Trophic State Index (TSI; Carlson 1977) has ranged between 45 and 60, allowing us to classify Teal Lake as slightly eutrophic. (A "mesotrophic" lake of mid-range productivity would exhibit a TSI ranging between 40 and 50.) There has been no detectable upward or downward trend in TSI regardless of the metric used to calculate it during the past 24 years at Teal Lake (http://dnr.wi.gov/lakes/clmn/reports/tsigraph.aspx?stationid=583055)." "The slightly eutrophic status of Teal Lake was consistently predicted by all three metrics used to calculate TSI. Over the past 10 years (2007 through 2016), the average annual July-August ranges for these metrics were 4.7 to 8.6 feet for Secchi disk transparency (depth at which a black-and-white disk disappears from view at the surface), 26.4 to 34.2 micrograms per liter for total phosphorus concentration (the limiting nutrient for planktonic algae production), and 12.7 to 21.5 micrograms per liter for chlorophyll a concentration (direct indicator of ongoing production by planktonic algae)." In light of existing data, I am asking that WDNR examine Teal Lake's 303(d) listing to determine if it is appropriate. If there is more to this story than meets the eye, please share the rationale for listing so I can explain it to our Executive Committee and members. People are understandably concerned about their health and property values when an official document classifies their lake as "impaired," so we need to be able to either justify the listing, or suggest that an error be corrected. Thanks in advance for whatever you can do to help us resolve the status of this Outstanding Resource Water." **(Dave Neuswanger, President, Quiet Lakes Improvement Association)**

RESPONSE A: Teal Lake was listed in 2016 for Excess Algal Growth based on our criteria for chlorophyll-a (algae) under Recreational Use. Recreational Use covers swimming, fishing, and boating – uses where people will come in contact with the water. The algal criterion for recreation is that the lake does not exceed 20 ug/L chlorophyll-a (moderate algal levels) more than 30% of days. This criterion is an indicator of aesthetic suitability for swimming in the summer and is an approximate measure of safety.

To measure against the criteria of 30% of days a confidence interval (CI) around the mean is used. This is so that we're 90% sure that the mean is above or below the criteria. These are the Teal Lake values derived for 2016 and 2018:

Assessment Cycle	Data Used	Lower 90th CI	Mean	Upper 90th CI
2016	Jul 2010 – Aug 2014	40%	60%	79%
2018	Jun 2012 – Aug 2016	26%	45%	66%

In 2016 all three values were above the criteria of 30% so an impairment listing of "Excess Algal Growth" with "Unknown Pollutant" was added. In 2018 the lower 90th CI was below the criteria, but the mean and Upper 90th CI were still above. The lake isn't eligible for delisting until all three values are under 30%. The listing has an "Unknown" pollutant because phosphorus levels in Teal Lake are clearly below the listing threshold of 40 µg/L of phosphorus.

Even though the lake is now listed as impaired it is still okay to use and enjoy. As people have done on the lake before, follow common-sense precautions for safety when recreating. For a good rule of thumb, if you can wade knee-deep into water (without disturbing the sediment) and cannot see your feet because the water is green and opaque, you should stay out, and small children and dogs should be kept away from the water. If knee-deep water has good clarity, it's safer for swimming, but if there is a light dusting of blue-green algae on the surface it's more of a judgment call for you.

B) "Thanks for sharing the Department's rationale for listing Teal Lake as an impaired water for recreational use purposes. I do, however, have a follow-up question regarding the statistical analysis. (I have quite a bit of grad school training in limnology and advanced statistical methods, so please feel free to use technical jargon in your response for the sake of efficiency.)

I went online and read the incredible document that you apparently coordinated, entitled "Wisconsin 2014 Consolidated Assessment and Listing Methodology (WisCALM) -- Clean Water Act Section 305(b), 314, and 303(d) Integrated Reporting." Production of that document had to be a herculean effort by you and several former colleagues of mine who were involved in the process. In general, WisCALM helped me to understand the scope, complexity, and detailed processes for listing Wisconsin waters for one reason or another in compliance with provisions of the Clean Water Act.

However, I remain confused about the process for calculating mean (or median?) Chlorophyll a concentration, and the 90% CI on that test statistic (mean or median). Please refer to Section 4.5 on Lake Impairment Assessment for Recreational Use purposes (starting on page 33 of document or 39 of PDF). [Quoted 2014 WisCALM text omitted]

Now for my question: In the first paragraph, it is clear that in 2014 you stopped using a concentration threshold for CHL a (20 ug/L in this case) and started using an exceedance-frequency threshold (30% of days during which CHL a exceeded 20 ug/L). However, the text that follows (from WisCALM above) seems to describe the former procedure for determining whether a concentration threshold was exceeded by using a simple one-tailed t-test. Did the actual procedure for calculating a 90% CI for this single-ratio statistic (which I assume is a far more complex statistical procedure involving bootstrap re-sampling, etc.) get omitted during document revision when your analytical protocol for CHL a changed in 2014? If so, could you share the actual statistical procedure with me for

calculating a mean (or median?) exceedance frequency and the 90% CI on that mean (or median)? I tried to imagine how this was done, but I kept getting different (and lower) numbers than presented in your original reply.

For the 2018 assessment cycle, I have assumed you used volunteer water quality monitoring data collected by Past-President Jack Wellauer as it appears in the SWIMS database (June, July, and August samples during each summer for the five-year period from 2012 through 2016 -- a total of 15 samples. If I am not using the same data as you, please let me know.

Thanks in advance for any clarification you can provide. Before I even consider challenging the listing, I need to know that we are applying clearly understood statistical procedures to the same set of data." **(Dave Neuswanger, President, Quiet Lakes Improvement Association)**

RESPONSE B: 'A Statistical Approach for Performing Water Quality Impairment Assessments' describes the method (Robert D. Gibbons, Journal of the American Water Resources Association, 2003). Figure 1 sums it up, except that we are estimating the 30th percentile of chlorophyll a concentration, and using a 90% confidence interval.

In the case of Teal Lake, the mean TP for 2012-16 assessment periods (July 15 – Sept 15) was 19 ug/L, with a SD of 8 ug/L. Since the mean is only a fraction of 1 SD below the "nuisance" level (20 ug/L), the best estimate of the nuisance frequency is near 50% (45%). This is just a quantile of the T distribution.

To estimate the confidence interval around this value, we need to include K, the one-sided normal tolerance limit factor, in equation 1 in the Gibbons paper. K is a function of sample size, confidence level, and the desired quantile of the normal distribution, which makes for a large lookup table that I generated in R for this purpose. Given that the best estimate of the nuisance frequency is 45% and the sample size is fairly low (10), it seems reasonable that the 90% confidence interval is 26-66% in the 2018 assessment.

The WDNR is confident in this quantitative assessment of chlorophyll in Teal Lake – whether or not this trophic state is viewed as a problem by users of Teal Lake is another question. One can imagine that that the recent listing might be alarming given that the long monitoring record shows no significant changes, but this is just because the assessment methods changed. User perception of primary production in lakes depends not just on the amount of chlorophyll, but also macrophyte composition and spatial distribution, the presence/ absence of algal scums, and other visual aspects of water quality. As you suggest, the experience of change over time (or lack of change) probably contributes to the perception of whether or not water quality is impaired. It would be great if we could account for all of those factors in assessing each lake, but that would involve a lot of subjectivity, and probably could not be justified.

The QLIA should feel welcome to comment on these assessment methods when the next draft is released for public comment.

C) "Thanks for your thoughtful and helpful reply. I have no doubt that you have given careful and competent consideration to the assessment of trophic state in Wisconsin lakes. With the information

you provided (including the Gibbons paper and T-distribution table), we were able to duplicate your statistical analysis and determine the basis for our conflicting conclusions regarding the impairment of Teal Lake under WDNR criteria. I had advanced statistical training in graduate school, but I am a little rusty, so I enlisted the aid of my son, Dr. Jason Neuswanger, who currently works as a quantitative fish ecologist with South Fork Research near Seattle, Washington (full CV). We used Wolfram Mathematica 11.0 instead of R, but I think you'll agree that both packages produce credible results.

First, a point of clarification... In the 3rd paragraph of your response, you wrote, "the mean TP for 2012-16 assessment periods (July 15 – Sept 15) was 19 ug/L, with a SD of 8 ug/L." I have assumed you were referring to Chlorophyll-a here, and not Total Phosphorus (TP). But this statement was helpful, as was a later statement about your low sample size of 10, because it revealed you were using only data from July and August during the 2012-2016 assessment period. Previous correspondence with Ashley indicated her belief that WDNR was using all available data, including data collected in late June during all five years. I do not understand why these data would be excluded from such an analysis, because late June is clearly within the phytoplankton production and human recreation seasons. Regardless, we calculated the likelihood of impairment both ways -- with and without data from late June.

With both sets of data, we tested the null hypothesis that the true 30th percentile of the estimated population distribution of Chlorophyll-a concentration was at or below the 20 ug/L threshold level for impairment (see attached PDF for detailed analysis and graphics). Using July-August data only, it was a close call; but the lower bound of the 90% confidence interval was slightly lower than the threshold level, making it impossible to reject the null hypothesis and declare the lake impaired. Adding late-June data to the analysis, the decision was not close. The lower bound of the 90% confidence limit on the 30th percentile was 15.45 ug/L -- far below the impairment threshold.

For the sake of argument, let's assume that omitting data from late June can be justified, and that differences in statistical packages or rounding errors could have resulted in a slightly different lower bound for the 90% confidence interval, resulting in a conclusion of impairment. Even with these allowances, I would use several other facts, as encouraged by WisCALM guidance, to arrive at a conclusion of no impairment:

1) Among the 15,000 lakes and impoundments in Wisconsin, Teal Lake is one of only 103 to have "Outstanding Resource Water" (ORW) status under NR 102.10, Wisconsin Administrative Code. As you know, ORWs are lakes, streams, or flowages having excellent water quality, high recreational and aesthetic value, high quality fishing (naturally reproducing populations of walleye and muskellunge in this case), and are free from point-source pollution. Between 1992 and 2016, Carlson's Trophic State Index (TSI; Carlson 1977) has ranged between 45 and 60, allowing us to classify Teal Lake as slightly eutrophic. There has been no detectable upward or downward trend in TSI regardless of the metric used to calculate it during the past 24 years at Teal Lake (http://dnr.wi.gov/lakes/clmn/reports/tsigraph.aspx?stationid=583055)."

2) Our 2016 aquatic plant survey revealed that Teal Lake has one of the highest Floristic Quality

Indexes (FQI = 35.3) of any lake in northern Wisconsin (FQI average = 28.3). Such a healthy macrophyte community would not likely exist in a lake plagued by nuisance algae blooms during the summer season.

3) We seem to agree that Total Phosphorus concentrations in Teal Lake have been well below a level that would raise concerns about recreational impairment. With June data included, mean [Total P] = 27.8 ug/L with 90% confidence interval bounds at 24.8 and 30.7 ug/L. I'm sure you're aware that phosphorus is the primary limiting nutrient to phytoplankton production in most lakes, and that [Total P] is highly correlated with [CHL-A] in most lakes, making excessive Chlorophyll-a highly unlikely and contradictory to other metrics.

4) Finally, 2012 was a year of moderate to severe drought based on the Palmer Drought Severity Index, following several years of severe drought. That year, Teal Lake was functioning more like a seepage lake than a drainage lake. Secchi disk transparency was twice the usual depth because there was so little inflow from the wetland watershed that normally contributes tannins to stain the water a light brown color. WisCALM (page 8) states the following: "Best professional judgment may be used to determine whether data were collected from an extreme weather year and are considered unrepresentative of normal conditions. Information that is not considered representative of current conditions or was not collected according to WDNR's Quality Management Plan cannot be used in preparation of the Impaired Waters List." Therefore, under WDNR guidelines for assessment, it can be reasonably argued that 2012 data be excluded from this analysis, in which case even your July-August dataset would not come close to yielding a conclusion of impairment based on Chlorophyll-a concentration.

Matt, I am attaching a table (PDF) produced in Word that shows all the 2012-2016 data, some basic statistical analyses using the threshold concentration method (not the method you used to determine impairment based on Chlorophyll-a), and the Palmer Drought Severity Index from each year of data collection. I have checked and re-checked the numbers, so I think you can rely upon their accuracy as you consider my arguments.

Please mull this over, discuss with Ashley, and let me know if there is any way WDNR can withdraw Teal Lake from the List of Impaired Waters based on the information and rationale I have presented here. I know how busy you are, and how difficult it is to painstakingly analyze data from individual waters in a state like Wisconsin with thousands of waters to classify. But I know it will mean a lot to the people I serve that Teal Lake not be listed without good cause as an impaired water. Real estate values, tourism, and general peace of mind are all at stake here. Thanks in advance for any attention/resolution you can provide." **(Dave Neuswanger, President, Quiet Lakes Improvement Association)**

RESPONSE C: Thank you for the detailed analysis and explanation. Your (and Jason's) stats look good, so any disagreements I make below are based on interpretation. To some of your specific questions:

"*In the 3rd paragraph of your response, you wrote, "the mean TP for 2012-16 assessment periods*

(July 15 – Sept 15) was 19 ug/L, with a SD of 8 ug/L." I have assumed you were referring to Chlorophyll-a here, and not Total Phosphorus (TP)."
Yes, I meant chlorophyll-a there.

"*I do not understand why these data would be excluded from such an analysis, because late June is clearly within the phytoplankton production and human recreation seasons*."
The assessment period for chlorophyll is July 15-Sept 15. This period was selected because many lakes have a clear-water phase in June (see footnote 13 on page 24 of 2018 WisCALM).

"*With both sets of data, we tested the null hypothesis that the true 30th percentile of the estimated population distribution of Chlorophyll-a concentration was at or below the 20 ug/L threshold level for impairment (see attached PDF for detailed analysis and graphics). Using July-August data only, it was a close call; but the lower bound of the 90% confidence interval was slightly lower than the threshold level, making it impossible to reject the null hypothesis and declare the lake impaired."*
This is the correct conclusion based on 2012-16 data only. However, the previous assessment, which was based on 2010-14 data, found clear impairment. The way our listing/delisting works is that a waterbody is listed when the null hypothesis of "no impairment" is rejected at a 90% confidence level. Once a waterbody is listed as impaired, the null hypothesis becomes "impairment", and it can only be delisted when this hypothesis is rejected at the 90% confidence level. So the original impairment listing for Teal Lake was based on the 2010-14 data, and the subsequent assessment, though more ambiguous, did not allow for delisting.

"*We seem to agree that Total Phosphorus concentrations in Teal Lake have been well below a level that would raise concerns about recreational impairment. With June data included, mean [Total P] = 27.8 ug/L with 90% confidence interval bounds at 24.8 and 30.7 ug/L. I'm sure you're aware that phosphorus is the primary limiting nutrient to phytoplankton production in most lakes, and that [Total P] is highly correlated with [CHL-A] in most lakes, making excessive Chlorophyll-a highly unlikely and contradictory to other metrics."*
Most lakes would probably not exhibit nuisance algal conditions with TP in that range, but there is variability in chlorophyll production per unit phosphorus among lakes. The attached plot shows the TP:CHL relationship for all Wisconsin lakes for which we have at least 2 years of summer data. At ~30 ug/L TP, the range of mean chlorophyll is <5 to >20 ug/L, which would put Teal Lake near the upper edge of the data cloud. While the TP criterion of 40 ug/L is sufficient to prevent nuisance algal conditions in many shallow lakes, there are some lakes where a site-specific criterion might be needed. As with the TP criteria, the chlorophyll recreational impairment threshold was determined by evaluating relationships between user perception of water quality and chlorophyll across many lakes and identifying a level that should prevent perception of water quality problems by most people. In some lakes, this may be "too protective". In these cases, a higher site-specific criterion for chlorophyll may be proposed that documents that recreational uses are supported at current chlorophyll levels. The Department is currently developing administrative rules that will outline this process.

"*Therefore, under WDNR guidelines for assessment, it can be reasonably argued that 2012 data*

be excluded from this analysis, in which case even your July-August dataset would not come close to yielding a conclusion of impairment based on Chlorophyll-a concentration." To address your suggestion that drought influenced the 2010-14 chlorophyll assessment, I conducted a new analysis of the drivers of chlorophyll concentration in Teal Lake. I have attached the dataset and some model plots for your reference.

First, I downloaded precipitation estimates for the coordinates of Teal Lake from the NLDAS model, which is basically interpolated from weather stations (see https://disc.gsfc.nasa.gov/information/tools/5792db848234e53e821073fd/hydrology-data-rods for details). I then calculated a running 1-year mean annual precipitation (which I called PRCP365 in the model). I chose a 1-year lag because this is approximately the hydraulic residence time of Teal Lake. A plot of PRCP365 shows a similar pattern to the Palmer Index, but is more specific to the location of Teal Lake and tailored to the appropriate lag period.

Next, I merged the CHL data from the deep hole station with potential driver data, including:

- TP – total phosphorus, primary limiting nutrient for algal production
- PRCP365 – running 1-year mean annual precipitation, to model effects of hydrologic conditions
- DOY – day of year, to model seasonal patterns
- DY – decimal year, to model long-term trends

I then fit two generalized additive models (GAMs, https://cran.r-project.org/web/packages/mgcv/mgcv.pdf) to the data. GAMs are a type of regression model that can represent non-linear relationships and interactions. There were not enough data points to include all four potential drivers in one model. Based on data plots, TP and DOY have strong effects on CHL, so I included those variables in both models and then added PRCP365 to model 1 and DY to model 2. Here are the model formulas:

gam1 = gam(log(CHL) ~ te(log(TP), DOY, PRCP365, k=3), data=data)

gam2 = gam(log(CHL) ~ te(log(TP), DOY, DY, k=3), data=data)

The best way to visualize the GAM models is through contour plots, which show the expected value of CHL as contour lines across ranges of two of the predictor variables, and holding other predictors constant at their median values. The circles are samples, where the size is proportional to log(CHL). The top plot in gam1 shows that CHL is highest at high values of TP and around day 240 (end of August), which is not surprising. The key result in gam1 is shown in the next two plots, which show that PRCP365 has essentially no effect on CHL after controlling for TP and DOY. If anything, CHL actually decreases during drought in late summer into fall after controlling for TP. The gam2 plots suggest that there may have been a modest increase in CHL over the last 23 years, when controlling for TP and DOY.

The bottom line of this analysis is that precipitation doesn't appear to have a strong enough effect on CHL to warrant excluding data from drought years in the assessment. I know my interpretation conflicts with your personal observations and familiarity with the lake. There are certainly other ways that this analysis could be done.

One more thing – Teal Lake is actually classified as a shallow drainage lake based on the Lathrop/Lillie equation in WisCALM, so the TP criterion is 40 ug/L. The CHL criterion that was used for both recent assessments applies to all shallow lakes.

UNNAMED WATERBODY – (WBIC 5035112) "Thank you for taking comments on the 2018 draft Impaired Waters List. My name is Meg Wise and I am the water quality program coordinator at Crawford Stewardship Project. Our organization has been monitoring water quality for almost ten years and I am writing to agree that the Unnamed Local Water in Crawford County (Waters ID 5727823, WBIC 5035112) be added to the 2018 Impaired Waters List.

We have been monitoring the site above for about 9 seasons. The site is just north of Wauzeka near a feeder pig facility, which makes this a site of specific concern of ours as it is an important part of our mission to protect Crawford County from polluting industries and we have seen some concerning results. We have been conducting the basic Water Actions Volunteers parameters at this site but also have been testing for total phosphorus and E.coli. I have attached graphs that I put together with our phosphorus and E.coli results so you can see the patterns that we have been seeing over the years. There are also additional graphs available through the SWIMS database.

This site feeds right into the Wisconsin River, an already impaired river, where families regularly recreate. Giving more care and attention to the root of pollution in the Wisconsin River is important, which is why I strongly encourage the Unnamed Local Water in Crawford County (Waters ID 5727823, WBIC 5035112) be added to the 2018 Impaired Waters List." **(Meg Wise, Water Quality Program Coordinator, Crawford Stewardship Project)**

RESPONSE: Your comments in support of this proposed listing have been noted.

WIND LAKE – (WBIC 761700) "Wind Lake, in Racine County, should not be on the list of Impaired waters, or at the least, it should be placed on the Proposed Delistings. Please consult the USGS water quality data for long term (35 years) changes to the water quality of Wind Lake. Wind Lake DOES NOT have Low DO and Excess Algal Growth. Total Phosphorus concentrations for Wind Lake are now in the Mesotrophic range. We have not had any planktonic algal blooms in 4 years, and have had no HABs in the past 3-4 years." **(Kathy Aron, Executive Director, Wind Lake Management District)**

RESPONSE: In 2011, an alum treatment was conducted on Wind Lake that is likely impacting the total phosphorus and chlorophyll data. Additionally, the deep hole monitoring station from which this analysis was based on is very different from shallow areas of the lake. Based on the regional biologist's recommendations, it was decided that Wind Lake not be delisted since the alum treatment will likely be inactive in 1-2 years. It was recommended to reassess the lake during the 2020 assessment cycle.

General Comments

ACCESS TO GIS DATA – "My firm is consulting with Wisconsin dairies related to discharges to local waters. I am wondering if there is a way to obtain a GIS shapefile layer for download of the 2018 draft Impaired Waters (comparable to the existing 2016 layer). I did not find one on the state data site at this time." (Susan Benston, Kieser & Associates, LLC)

> **RESPONSE:** Thank you for your interest in the draft 2018 Impaired Waters list. Unfortunately, we are not be able to provide you with the requested GIS data at this time. As a result of the public comment period, there are listing changes underway so we do not have a complete data set to provide. With that said, we can definitely send you a finalized data set early next year (2018).

ACCESS TO DRAFT LIST – "I received this email newsletter today [Rock River Recovery –December Newsletter 12/01/2017] and was reading through it. I clicked on the link to the Draft 2018 Impaired Waters list. When I did it opened a page that said redirecting in the upper left of the screen but then it downloaded an Excel file to my computer. First of all, that was a little creepy having it download this file without giving it the permission to do so. But then when I clicked on it I got a security warning and an error message. I thought you might like to know so you can provide a link to the information in a safer and more accessible format. Thanks!" **(Amy Lutzke, Citizen)**

> **RESPONSE:** Thank you for letting us know about your trouble downloading the list. The list manager was made aware and has worked to make the excel document more accessible.

TSI CALCULATION METHODOLOGY – "I am working on the lake protection grant for the alum treatment for Long Lake. One of the scoring criteria evaluates whether or not lake status under WISCALM would change based on TSI as calculated [according to 2018 WisCALM page 17]. I can calculate TSI values based on current and predicted summer Chla and Secchi values that [Bill James] provided in [his] report. However, WISCALM status is based on July 15 to September 15 data and [his] predictions were described as June to September values. With secchi going from 1.8 to 3.3 m, I get TSI changing from 42.8 (good) to 51.5 (excellent). With Chla going from 44 to 17, I get TSI changing from 68 (fair) to 58 (fair). Ratings are for a shallow seepage lake. **(Cheryl Clemens, Harmony Environmental)**

"Maybe WISCALM needs to address this better? Usually empirical modeling uses a longer averaging mean." **(Bill James, University of Wisconsin-Stout)**

> **RESPONSE:** Thank you for your input on the Wisconsin Consolidated Assessment and Listing Methodology (WisCALM). The date range July 15 – September 15 is used for chlorophyll-a because this is the time period when lakes have the most aquatic plant growth due to nutrient input from spring runoff. The most accurate measure of productivity in a lake will be the chlorophyll-a levels rather than secchi and satellite data. Satellite and secchi disk data are used to measure water clarity and from there infer productivity, while chlorophyll-a is a physical measure of algae. WisCALM methods allow for the sampling range of the past 5 years to be used in the calculation in order to account for the average lake condition during the summer.

WISCALM – "Also the new format [of WisCALM] is easier to follow, so thanks. If you could make the Integrated Report (IR) Listing Categories on page 67 in PDF of WisCALM and the explanation for Placing Assessment Units in Categories, etc more prominent somewhere or explanatory, that would also help." **(Todd Brennan, Watershed Project Manager, Alliance for the Great Lakes)**

> **RESPONSE:** We are glad to hear that the new format is easier and greatly appreciate the feedback. We will add your feedback to our bank of redesign thoughts for the 2020 WisCALM.

EPA Comments

After my review of the waters on the proposed 2018 list I have a few questions.

1. Some of the waters you have identified on the 2018 list I did not find on the 2016 list. Please confirm that these are new waters or new pollutants

Official Waterbody Name	Counties	Water Type	WATERS ID	WBIC	Segment	Start Mile	End Mile	Length/ Size	Measurement Unit	DNR Category	Date Listed	Source Category	Pollutant	Impairment Indicator	Status	TMDL Priority	Listing Detail
Dell Creek	Juneau, Sauk	RIVER	6897810	1295200	5	15.82	19.25	3.43	MILES	Category 5P	4/1/2014	NPS	Total Phosphorus	Impairment Unknown	TMDL Development	High	Phosphorus Listed (5P)
Grant River	Grant	RIVER	6901615	956000	5	18.87	25.94	7.07	MILES	Category 5P	4/1/2014	NPS	Total Phosphorus	Impairment Unknown	303d Listed	Low	Phosphorus Listed (5P)
North Fork Juda Br	Green	RIVER	6876678	877700	2	1.68	3.8	2.12	MILES	Category 5A	4/1/1998	PS/ NPS	BOD	Low DO	303d Listed	Low	TMDL Needed (5A)
North Fork Juda Br	Green	RIVER	6876678	877700	2	1.68	3.8	2.12	MILES	Category 5A	4/1/1998	PS/ NPS	Total Phosphorus	Low DO, Degraded Biological Community	303d Listed	Medium	TMDL Needed (5A)
Rubicon River	Dodge, Washington	RIVER	6977678	856500	4	11.43	29	17.57	MILES	Category 5A	4/1/2012	NPS	Total Phosphorus	Water Quality Use Restrictions	303d Listed	Low	TMDL Needed (5A)
Tenmile Creek	Rusk, Barron	RIVER	6977820	2089400	2	3.24	21.12	17.88	MILES	Category 5A	4/1/2014	NPS	Total Phosphorus	Water Quality Use Restrictions	303d Listed	Low	TMDL Needed (5A)

2. Mendota County Park Beach is listed in 2018 having a WATERS ID as 6980949, however my records indicate the in 2016 the WATERS ID is 5475513. Please confirm which is correct

3. Two waters appear to be delisted by they are not on the delisting tab. Please confirm they should be delisted and if so please provide the rational for the delisting.

Local Waterbody Name 2016	WATERS ID (AU)	WBIC	Water Type	County	Start Mile	End Mile	Size (Miles or Acres)	Date Listed	Source Category	Pollutant	Impairment Indicator	Impaired Water Status	TMDL Creation Priority	Listing/Delisting Details
Wolf Valley Creek	14451	1811200	RIVER	Buffalo	0	3	3	4/1/1998	NPS	Sediment/Total Suspended Solids	Degraded Habitat	303d Listed	Low	TMDL Needed (5A)
Yeager Valley Creek	14445	1810200	RIVER	Buffalo	0	4	4	4/1/1998	NPS	Sediment/Total Suspended Solids	Degraded Habitat	303d Listed	Low	TMDL Needed (5A)

4. Was Lake Winnebago assessed for Public Water Supply use for the 2018 cycle. If yes, what was the result of the assessment.

RESPONSE: 1) These are all new waters created by splitting existing listed waters. These miles of water have been listed since the date provided, but now are defined as independent stretches.

2) The correct AU for Mendota County Park Beach is 6980949. The AU was remade because of glitches in WATERS.

3) These AUs are not up for delisting and are on the 2018 list.

4) Lake Winnebago was assessed for Public Water Supply Use. There was one exceedance of the WHO 1.0 ug/L microcystin-LR guideline value, but we have insufficient data to say that it is impaired (1 sample from 2011 of microcystin-LR). Our guidelines specify "Source waters with two or more excursions in a 3-year period above the WHO guideline for microcystin-LR (1.0 ug/L) will be identified as impaired and not supporting the PWS use." (WisCALM 2018, page 52). A more in-depth assessment will be done for the 2020 cycle with newly collected 2017 data.