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RECEIVED

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Bureau of Watershed Mgmt

Re: Lac Courte Oreilles Impaired Water Status

Dear Mr. Johnson:

On August 5, 2011, the United States Environmental Protection Agency (EPA) submitted a letter to you indicating that although it believed there was insufficient information to include Musky Bay on Wisconsin's 2008 303(d) list of impaired waters, it nevertheless strongly recommended that Wisconsin consider placing Musky Bay in Category 3 for the interim and develop a plan to obtain the needed information to make a final impaired water determination for Musky Bay. On November 28, 2011, I had a telephone conference with Tim Asplund. He confirmed that the Wisconsin Department of Natural Resources (WDNR) has now identified Musky Bay as Category 3 water. With that resolved and for the reasons stated below, the final and critical objective of the Courte Oreilles Lakes Association (COLA) and the Lac Courte Oreilles Band of Lake Superior Chippewa Indians (Tribe) is to have all of Lac Courte Oreilles (LCO), and not just Musky Bay, declared impaired for the *2012 listing* based on *nutrient (P) impairment* under Section 303(d) of the Clean Water Act (CWA)

LCO is designated as an outstanding resource water (ORW) under NR 102.10(1m)(a)17. LCO is one of less than 1% of Wisconsin lakes listed as an ORW. LCO is also classified as a stratified, two-story fishery lake under NR 106.06(4)(b)1 with a total phosphorus (TP) limit of 15 ppb. *The current level, however, of phosphorus in LCO is just 10 ppb.* NR 102.10(2) mandates that because LCO is an ORW that its water "may not be lowered in quality." That is consistent with the anti-degradation rule in NR 102.05(1). Of particular note, both the shallow lake (69 ppb) benchmark which the state is trying to apply to Musky Bay and the 30 ppb deep-lowland standard outlined in (Mansado, 2009, 2010), are illegal and unacceptable. Those standards are too liberal and fail to recognize the legally designated, non-degradation status of

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the LCO ecosystem. Those weaker standards would increase TP by one-and-a-half to three times before finally recognizing LCO as significantly “impaired.”

The stance of COLA and the Tribe has been consistent. (Wilson, 2007; Sivertson, 2009; Wilson and Tyrolt, 2009; Burgess, 2010; Burgess et. al., 2010). Their view has always been as stated previously in response to the draft WisCALM (WDNR, 2009) that *“P Standards Apply to Whole Lake.... Musky Bay should not be evaluated as a separate shallow lake with a separate watershed.... It is connected to main LCO via advective and dispersive flows. We believe that “cherry picking” of lake standards will be minimized in future implementation. Definitions should specify that lake standards will apply to all natural lake bays. To do otherwise, we believe in the case of LCO, violates the anti-degradation intent of the Clean Water Act.”* (Burgess, 2010).

COLA and the Tribe feel that the WisCALM (WDNR, 2009) methodology of using inter-lake (Tier 1) comparisons is inappropriate to the LCO system. The best non-degradation statistics should describe site specific, ambient conditions, and should be intra-lake, time series. Comparing LCO to supposedly similar lakes is simply not precise enough to detect early stages of degradation. The overriding objective in regulation of water quality for LCO is “non-degradation.” In WisCALM’s language and WDNR’s subsequent justification of methodology the term “consistency” is consistently parroted. But “consistency” is a desired condition of the administrative process NOT the objective of the regulation. To let the latter dominate the former is a classic case of form over function, rendering the entire process worthless. One size does not fit all. There are very few lakes strictly comparable with LCO. How many of the lakes in the deep-lowland data sets actually also support cold-water fisheries and/or have been legally designated ORW? We don’t know because WDNR has not disclosed the identity of the “reference waters.” We can only conclude that since their average TP is 30 ppb, then they must be considerably more eutrophic than LCO and unsuitable for “reference” within the context of non-degradation. WisCALM (WDNR, 2009) gives some limited lip service to “ad hoc” in the context of narrative standards, but otherwise seems blind to the fact that ORW waters are by their legal definition already “special.” At the heart of the matter is what we now know to be an inherent weakness in WisCALM (WDNR, 2009). There is a classic catch 22 buried in the two-tiered sampling program. It takes Tier 2 sampling to detect impairment. However, Tier 2 is not implemented until Tier 1 sampling detects or suspects a degradation problem. Yet Tier 1 sampling lacks the accuracy and precision to do so. The Category 3 designation justifies the sampling intensity and scope required, and is on par with and might exceed WDNR’s Tier 2.

Musky Bay and other bays are an integral part of LCO and are NOT self-contained, seepage lakes. Musky Bay accounts for about 5% of Lac Courte Oreilles surface area (Table 1), and about 1% of its volume. It is connected to main LCO by a 0.8 mile wide open-water connection promoting free interchange of water and nutrients. The bay is a major source of phosphorus loading and the primary production for the entire system. (Barr, 1998; Fitzpatrick et. al., 2003; Wilson, 2011). Pretending that Musky Bay is an independent entity flies in the face of basic limnology. The “bays” account for 1/3 of the total surface area of LCO proper. If shallow lake status is assigned to all the other bays in LCO, then one third (Table 1) of the lake actually has a phosphorus maximum of 68 ppb. If each bay is considered its own separate lake, does it not also by definition then become a “point source” for the main lake? This is a risky gamble which threatens to bust the integrity of the entire system. It is unlikely that any lake system can sustain concentrations at 10-15 ppb with any significant amount of 68 ppb TP effluent from its bays. When all LCO bays are allowed to degrade to small lake TP levels (Table 1), main-lake TP elevates to around 20 ppb. This is more than the 10 ppb for ORW or the 15 ppb for a two-story fishery. At the ridiculous end, application of a 30 ppb (deep-lowland) classification allows a 200+% change (relative to ORW) before it is detected as impairment.

Bay % total lake volume	Potential Whole Lake P (ppb)	Potential Increase over Non-Degradation- %
10	16 ppb	60%
15	19 ppb	90%
20	22 ppb	120%
30	26 ppb	160%
40	33 ppb	230%
50	39 ppb	290%

Table 1: Potential main-lake phosphorous degradation from impaired bays. Assumes P = 68 ppb for bays and 10 ppb for receiving main-lake waters. Also assumes total mixing, and does not account for sediment P, episodic events, or unequal flushing times/rates between basins. Though a very simplistic model, it does suggest that application of small-lake standards to each bay could be risky business, especially when the over-riding water quality objective is non-degradation of the whole system.

Additionally, in vivo, and in real time, Musky Bay is already polluting the western basin of LCO (Wilson, 2011; Barr Engineering, 1998). The west basin has recently and consistently shown TP concentrations of around 12 ppb and those levels seem to be increasing. The eastern basin has been at or below 10 ppb (Wilson, 2011). This is especially worrisome because the

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west basin's flushing time is much longer than that of the eastern basin. That dynamic provides a functional engine for degradation. We know (Barr Engineering, 1998; Wilson, 2011) that about half the phosphorous budget on Musky Bay comes from cranberry agriculture. This means that Musky Bay must be a significant point source for the entire system (Wilson, 2011). This, again, highlights the riskiness of the shallow-lake criterion.

Additionally, we can find no specific guidance in WisCALM (WDNR, 2009) which justifies application of separate standards to different parts of the same lake. This raises important questions. Shouldn't such a unilateral interpretation of "new" or "unwritten" guidance be subject to rigorous review? Who is/are the person or persons making this decision? And what is their rationale for doing so? Who reviews and approves said rationale? Were other functions consulted? Was it peer-reviewed for consistency with other state management and regulatory policy? Where is the public record detailing this decision? Transparency in government is good. We see none of that transparency here. What good does it do to have "criteria" if the interpretation and application of the criteria are arbitrarily manipulated to contradict the law?

A bay as its own separate entity is not consistent with current trends to manage on a macro level by lake chains or watersheds as the basic unit of management. For the last sixteen years WDNR waters functions have realigned and organized its human resources into basins, supposedly to better fit that design as well to foster internal integration and communication between functions. WisCALM (WDNR, 2009) appears to endorse the conservative approach to environmental protection with a "when in doubt list it" stance. However, the implementation of the bays-as-their-own-separate-entities and inter-lake reference waters massively depart from worst case/minimal risk environmental impact analysis.

The LCO Lake Management Plan (Wilson, February 21, 2011) adopts an ecosystem/watershed approach to preserving water quality. It recommends a "whole lake" TP standard. WDNR funded and has accepted the LCO Lake Management Plan. The Fishery Plan (Prattt and Neuswanger, 2006) identifies degraded muskellunge spawning habitat in Musky Bay as an obstacle to meeting fisheries objectives and recommends dredging as a solution. It appears that Fisheries in-pur was either not solicited, or completely ignored during the entire review process.

Besides water column phosphorous as a quantifiable parameter, phosphorus in the sediment should also have been addressed. There is enough sediment in Musky Bay, and enough phosphorus in it, to threaten water in the bay and the lake proper. It is bad science and resource management to assume that the huge reservoir of bottom phosphorus in Musky Bay cannot be mobilized into the water column. We certainly have the knowledge (Reid, 1961)

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that sediment phosphorous is normally sequestered in iron-humic, colloidal complexes. We also have the admonition that this is the case only under well oxygenated conditions. Under anoxic conditions, soluble phosphate is chemically mobilized into the water column. EPA says that they are unaware of any low oxygen levels in Musky Bay. We interpret that to mean that WDNR did not supply any of the existing data that documents low oxygen. In fact, a severe winter-kill occurred in Musky Bay in 2009, the first winterkill event on record for this site. Even under oxygenated conditions, physical/mechanical processes such as wind action, density currents, etc., can suspend high phosphate sediments from Musky Bay and move them out into the west basin.

There is major concern amongst limnologists and lake managers that the invasive curly leaf pondweed (CLP) may be a significant phosphorus pump (Roesler, 2009b; Waisell et. al., 1990; James et. al. 2007). This reasoning is often cited in aquatic nuisance control (ANC) programs as the primary justification for ANC. CLP has invaded Musky Bay because of the high phosphorus concentrations and is now the focus of an intense ANC. Interestingly, both agencies decline to list 303(d) impairment based on AIS. We believe that this is a mistake because CLP may turn out to be a player, if not a game-changer relative to phosphorus budget. Granting impaired water status will permit a TMDL study that will determine how, if at all, CLP influences the phosphorus budget in Musky Bay. In Craig Roesler's excellent 2009 overview of CLP and P budgets, he recommends more site specific research: "*Estimating CLP P mass requires lake-specific CLP biomass and P content measurement. Some studies estimate nearly 100% of CLP P is released to the water column during senescence, but this has not been clearly demonstrated...Further studies to assess CLP P release impacts on lakes need to accurately assess other P sources such as external inputs and sediment P.*" To that we say, "Amen!" There might even be a utility in CLP control as a means of reducing phosphorus in Musky Bay. Just don't continue spending thousands on ANC and then declaring in the 303(d) recommendations that AIS is really not a problem. The existing science says it likely is a problem (and possibly a solution). Minimize the environmental risk by declaring the system impaired now and do follow-up study. The former facilitates the latter.

WisCALM (WDNR, 2009) cites a multitude of parameters which might be useful in an impairment decision. Those index parameters include and are not necessarily limited to quantifiable indices like dissolved oxygen, pH, Chlorophyll A, water clarity, TSI, sediment, fish and invertebrate IBI, fish flesh toxicants, and qualitative ones like fish habitat and impediment to navigation. There is plenty of this data out there. Some of the data has been either performed by or funded by the WDNR and others such as the LCO Band of Ojibwe, US Forest Service and COLA. WDNR chose to focus only on phosphorous, and the EPA latently on plants and their navigation impediment. We have no way of knowing what information WDNR supplied to EPA. From EPA's response we can only conclude that it was limited,

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select, and exclusive. The EPA certainly seems unaware of the extensive nature of the existing data base. Yet, according to WisCALM(2009), "*Department regularly seeks information from partners and the public to use in assessment of waterbodies....*" COLA may have to request a complete listing of all the information which WDNR supplied to EPA.

WisCALM (WDNR, 2009) states: "*3...If the available data indicates impairment, or there is other supplemental information to support a listing, then the lake may be considered, based on biologist's best judgment.*" Evidently that decision did not include biologists in other water functions, such as fisheries. Roesler (2009) does not list degraded habitat, low D.O., eutrofication, sediment, or invasive species, as problems. Our information indicates that all these categories should have been considered. WisCALM (WDNR 2009) repeatedly uses the term "*staff*" and "*local biologist*" relative to data collection, proofing, and analysis. Though it never spells out which staff and what biologist, the tone of the document is "*local,*" "*integrated*" and "*multi-functional.*" The document states, "*Staff most familiar with the water body should be directly involved in the assessment decision.*"

We interpret this to mean all staff and all biologists on the local Waters Team, and not just Water Quality. This would also include Water Management and especially Fisheries. Yet, so far there has been a disappointing lack of functional integration. Neither the Fisheries nor the Water Management staff (or their files) were contacted or consulted in either formulation of WisCALM (WDNR, 2009), or the LCO impairment deliberations (David Neuswanger, personal communication, 2011; David Kafura personal communication, 2011). The Fisheries data base, despite its many weaknesses, could not have been consulted. If it had been, it should have noted the continued presence of coldwater fish (Pratt , 2009). That information, alone, is critical to LCO's proper classification as a deep-stratified-two story fishery (as opposed to just another deep, lowland lake). Most importantly, impairment of Musky Bay muskellunge spawning habitat, due to low oxygen at the sediment interface, is well documented in the scientific literature (Dombeck et. al., 1984, 1986), and the Fishery Management Plan (Pratt and Neuswanger, 2006). Fisheries is on record in the 2005-06 Zawistowski litigation as being in support of an impaired designation for Musky Bay. The record shows that the review fell short of adequate and was certainly not "*integrated,*" "*multi-functional,*" "*local*" or "*watershed-based.*"

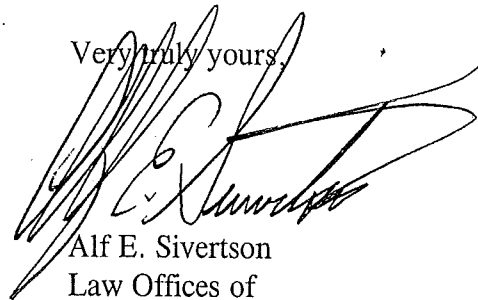
COLA and the Tribe have made great strides and are close eliminating phosphorous inputs from lawns, run-off, non-cranberry agriculture, and septic systems on LCO. Our riparian buffer efforts and support of zoning standards for impervious surfaces will become increasingly important, as climate change brings more episodic rain events. COLA and the Tribe are also working hard behind the scenes with the cranberry industry to install "holding

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ponds” and “closed system cultures.” There is already enough phosphorus sequestered in Musky Bay sediment to threaten water quality, even if all agricultural in-puts were eliminated today. Heroic management may eventually be needed to dredge Musky Bay and initiate a Lake Management District. Both will be extremely expensive and it is unlikely that funding can be obtained, without an impaired designation. In short, there are enough other threats to water quality and watershed integrity out there to keep us occupied, without having to worry about inadequate regulation of phosphorus. We cannot do it alone. We need the Agencies to properly regulate the system with standards which prevent further degradation, instead of pseudo- standards which sanction it.

In conclusion, the LCO system has been legally designated as non-degradation and the status of Musky Bay imperils that objective. The phosphorous standard for the lake as a whole, and all of its parts (LCO, each basin, each bay) should be universally interpreted as ORW at 10 ppb. Holding Musky Bay to a weaker (shallow lake), or the whole lake to a deep-lowland standard does not serve the over-riding system objective. Nor is it consistent with the best methodology, system limnology, traditional environmental risk analysis, watershed focus and management plans. WDNR also ignores a large volume of non-phosphorous water and habitat quality data, both external and in-house. Choosing a small-lake or deep-lowland criteria for LCO phosphorous is like commissioning fine art, but only with a “color between the lines” expectations. No one should be shocked if the painting falls well short of the Mona Lisa. In order to protect our Mona Lisa, COLA and the Tribe request that the WDNR declare all of LCO impaired for the 2012 listing based on nutrient (P) impairment.

Very truly yours,



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Enclosure

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