



## Ecological Research Partners LLC

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Duffy Dillon  
Brennen, Steil & Basting, S.C.  
One East Milwaukee Street, Janesville, WI 53547-1148

Project: Review Comments on WDNR May 30, 2014 Draft Order Rest Lake Dam

Dear Duffy:

The following are our comments on the Wisconsin Department of Natural Resources (WDNR) Draft Water Level Decision for the Rest Lake Dam dated May 30, 2014. The comments will be summarized using the numbering system in the draft order.

ORDER:

**(1)(b)** – It states that the, "*United States Geological Survey (USGS) gauges on the Bear River and Trout River or alternative calibrated gauges established and approved by the Department of Natural Resources (DNR or Department) shall be maintained and used to determine inflows to the Manitowish Chain.*" The order does not state who will be responsible for the cost of maintaining these gauging stations. Will WDNR continue to cover the cost? Will the Chippewa and Flambeau Improvement Company (CFIC) be responsible?

It also states that the, "*Inflows shall be calculated using USGS Adjusted Drainage-Area Ratio Method as published in USGS Scientific Investigations Report 2012-5135.*" The USGS report has two regression equations; one for falling and low lake stage, and one for rising and high lake stage. The report also used monthly adjustment coefficients. What exactly is the formula and method that will be required to used for regulatory purposes? What is CFIC to do if one or more of the gauge stations in not working?

In our report titled, *Water Budget Analysis of the Proposed Water Level Management Change for the Manitowish Waters Chain of Lakes, Wisconsin* (ERP, May 25, 2013), I pointed out that the comparison of estimated natural flows verses measured flow at the Rest Lake Dam using the USGS adjusted drainage-area ratio method had a poor correlation with at  $R^2$  value of 0.35.

How is WDNR going to factor this degree of error in the method when doing enforcement of the exact numbers outlined in the order?

Also what happens in the winter when the gauge may not be operated due to ice, or when the gauge may be down for maintenance or repair? How is CFIC to comply with the order in these situations?

(1)(f) – It states “Lake level shall be maintained within a normal operating range of 7'6” and 8'6”, rainfall, runoff, and operational capacity of the dam permitting.” This statement recognizes that weather plays a role in lake level. However, above in (1)(d) they state “At no time shall outflow from the dam be less than 57 cubic feet per second (cfs).” They need to recognize that in a very severe drought a 57 cfs level may not be possible without draining the pool.

Tables 1 and 2 – I would have to say that in my 37 years as a water resource manager I have never seen as complicated operation order as this one. I do not understand the rationale for a three tiered order based on inflow. Why not just set a single minimum outflow level?

#### FINDINGS OF FACT:

(6) – This is an odd finding of fact. “In 2002 concerns about possible adverse impacts on public resources expressed by a citizen to Trygve Solberg, then the Chairman of the Natural Resources Board, regarding the current operation of the Rest Lake Dam on the Manitowish River initiated a Department review and response.” The finding does not state who expressed the concern, or what the concerns were.

(28) – It states that “...the EA was certified by the Department on May 10, 2013.” The EA included four alternatives; current operations, the 1939 operating order, “Public Interest” river flow and lake stage, and passing inflows. The alternative outlined in the Draft Order is different from the “Public Interest” river flow and lake stage, and passing inflows alternatives outlined in the EA. While WDNR may consider it to be a hybrid of these two alternatives, we feel it is a unique alternative, and should have been addressed in the EA or at least an amendment to the EA.

(36) - It states that “CFIC has not operated the dam in compliance with the 1937/1939 operating order’s requirements: ...Instead, CFIC reduces flow to a minimum of 40 cfs to 50 cfs during this period to keep the Chain as full as possible (8'2"-8'6");...” This statement is not true based on the flow data collected by CFIC. As stated in our report titled, *Water Budget Analysis of the Proposed Water Level Management Change for the Manitowish Waters Chain of Lakes, Wisconsin* (ERP, May 25, 2013):

*“A review of the data provided by Xcel Energy illustrates that during most years this drop to 40 cfs does not take place. Mean monthly flows approaching 40 cfs occur less than 1% of the time. On a daily basis, flows below 40 cfs have only occurred 107 days out of 13,879 days (38-years) in the available record (an occurrence of 0.77% of the time). Daily values below 40 cfs occurred predominantly in August, September and October of 1976 and 2005, years of severe draught. No flows below 40 cfs have ever occurred in the spring during critical fish spawning periods.”*

(42) – This finding of fact identifies that wild rice is present in the Rest Lake Chain. Wild rice is a plant that generally does best in slow moving water, with rivers, flowages and lakes with inlets and outlets being optimal habitat. Wild Rice is an annual which grows from seed and therefore does best in areas with some disturbance that inhibits perennial vegetation that could inhibit this annual. One issue the WDNR does not address is will the more constant water levels proposed in the new order impact negatively on this important plant. This is a possibility that should be addressed.

(54 and 79) - The findings (#54) state, *"The annual draw down creates unstable shoreline conditions due to the lack of shoreline vegetation in the 0 to 3'6" depth. This is evidenced by the fact that more than half of the lakeshore properties use shoreline protection structures such as riprap or seawalls (See FOF 17 and 19, above: there are approximately 790 shoreline protection structures adjacent to approximately 1378 developed parcels)." Finding (#79) states, "Ongoing property damage due to erosion is evidenced by 790 shoreland protection structures, many of which are in areas of low wind wave energy, and not typically subject to wind wave caused erosion. A more stable water level will allow formation of shallow water vegetation, which buffers much of the effects of wind wave action."*

We can assume that people do not put in shore protection unless they have an erosion problem due to the high cost. If the 790 properties with shore protection are located in "areas of low wind wave energy" as stated by the WDNR, than perhaps the cause of the erosion is unstable banks caused by the elevated lake levels on the chain and highly erodible sandy soils. My observation is that many of the banks are naturally unstable and the cause of the erosion is not the lack of near shore vegetation. Increased lake levels in the winter may increase shore erosion on properties that do not have adequate shore protection.

(60) – The findings state, *"The order is expected to significantly reduce the frequency of downstream low flow conditions in the spring and to significantly reduce the frequency of flooding in the fall."* These expectations are based on models created from historical records and calibrated with historical data on precipitation, snowfall and storm events. It is highly likely (and a consensus opinion among climate scientists), that frequency and magnitude of extreme precipitation events (droughts and rainfalls) will increase as a result of climate change. To what extent have climate change and unpredictability been considered in making these conclusions? Have they been considered both for changing likelihood of spring flooding (e.g. heavy rains occurring on top of snow melts) and autumn droughts?

(65) – The findings state, *"Natural reproduction of Lake Sturgeon and Greater Redhorse is dependent on sufficient water levels and flows during the spring. Flows of 125 and 200 cfs or more between the dam and the Turtle-Flambeau Flowage will provide sufficient habitat with suitable depth, velocity, and rocky riffle substrate for sturgeon spawning."* The CFIC flow data from 1973 – 2011 shows that the dam is passing these optimum flows most years.

(66) – The findings state, *"The Current CFIC dam operations, which reduce spring outflows to 50 cfs or less in the Manitowish River, limits the available spawning habitat downstream of the dam for Lake Sturgeon and Greater Redhorse."* As outlined in our report titled, *Water Budget Analysis of the Proposed Water Level Management Change for the Manitowish Waters Chain of Lakes, Wisconsin* (ERP, May 25, 2013) this statement is not backed by the data from CFIC.

(66) - The new order increases the frequency of flows necessary for successful spawning by Lake Sturgeon and Greater Redhorse. The findings state, "Current CFIC dam operations, which reduce spring outflows to 50 cfs or less in the *Manitowish River*, limits the available spawning habitat downstream of the dam for Lake Sturgeon and Greater Redhorse."

These two comments oversimplify the complex relationships between temperature and flow in predicting the timing of fish spawning behavior. Fish populations from different regions respond differently, and the timing of fish migration and spawning is triggered by the interaction between changes in stream flow and changes in water temperature. For example, according to Priegel and Wirth (1971) sturgeon in the Wolf River respond differently in years when temperatures rise slowly and flows are high (spawning at 53°C), compared to years when flows are low and temperatures rise more rapidly (58-59°C). I suspect that the information from the Wolf River was used to make this statement about the Manitowish River. It would be nice to have data collected from the actual populations below the Rest Lake dam to know what their migratory and spawning triggers.

(68) - The findings state, "*Sturgeon aging data suggest that there have been six years of successful Lake Sturgeon spawning reproduction and recruitment in the TFF System. These years corresponded to years of high precipitation when the chain filled quickly and adequate flows were passed downstream of the dam.*"

This statement appears to argue that the high-flows caused by the heavy rainfall resulted in the mitigation of the negative effect of the dam on spawning. This may seem like a reasonable hypothesis, but these anecdotes do not provide data to demonstrate this hypothesis. In order to logically argue their case, the DNR should include data for other sturgeon populations in NW Wisconsin Region exposed to similar climate conditions, both with and without dams. For example, have other populations experienced a similar pattern in spawning success variation from year-to-year? Is precipitation the driving factor, and to what extent do populations below dams experience less-than-expected spawning success compared to undammed populations.

(73) - The findings state, "*Navigation of the Manitowish River downstream of the dam becomes difficult when flows are less than 80 cfs.*" While this may be true, the data shows that this condition only takes place about 8% of the days in the 38 year record from 1973 - 2011, only in late summer, and predominately during the severe droughts of 1976 and 2005 (two years in the 38 year record).

(77) - The finding discuss that permeant piers on the chain will need to be replaced under the proposed winter water level regime. What this finding does not address is the cost of replacement of these piers.

(78) - This finding addresses the issue of boathouses and that many may need to be replaced or structurally modified. Like finding (77), the WDNR did not address the cost of these improvements or whether or not under state mandated shoreland zoning that some of the improvements will or will not be allowed on some existing wet boathouses.

(86) - The findings discusses that the proposed one foot winter drawdown will still protect the shorelines on the Rest Lake Chain. Research by the U.S. Army Corps of Engineers (USACE) Cold Regions Research and Engineering Laboratory on large reservoirs have shown that

small drawdowns of one foot typically do little to reduce shore erosion by ice (<http://www.crrel.usace.army.mil/>).

(87) – The findings state, "*The Department has considered and expects the value of property and improvements to remain relatively stable, other factors being equal, as a result of this order.*" What economic analysis was this based on? Who conducted the analysis? Where is it published?

Tim Ehlinger and I would be happy to discuss our findings further with you at your convenience.

Sincerely,

Neal O'Reilly, Ph.D., PH  
Principal  
Ecological Research Partners