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To: Michigan Dam Safety Task Force

FOUR LAKES TASK FORCE COMMENT ON PROPOSED RECOMMENDATIONS

The Four Lakes Task Force appreciates the opportunity to provide direct input to the Michigan Dam Safety Task Force.

The Four Lakes Task Force (FLTF) is the Delegated Authority for Gladwin and Midland Counties under Part 307 of the Michigan Natural Resources and Environmental Protection Act. FLTF is a 501c (3) non-profit organization, with a board of directors comprised of representatives from each of the counties, and properties owner associations located on Secord, Smallwood, Wixom, and Sanford Lakes (the "Four Lakes"). The FLTF board is a sophisticated and experienced group of volunteers with professional backgrounds in science, engineering, finance, and other disciplines. This has been augmented with an operations and project team of engineers, hydrology and hydraulics consultants and environmental scientists. But it is the leadership and passion of each member of the FLTF board that makes FLTF unique in its mission to rescue, recover and restore the Four Lakes system to its legal level, which has been in place for almost 100 years.

The Four Lakes system is an important resource to Gladwin and Midland Counties and to over 6,500 lake property owners. The four dams that created the Four Lakes are hydrologically and hydraulically interrelated, and the restoration and continued operation of the dams and maintenance of the lake levels are of paramount importance to the environment, recreation, property values, and the public health, safety, and welfare of Gladwin and Midland counties and their residents.

In May 2019, the Gladwin and Midland County Circuit Courts established the normal levels for each of the Four Lakes (which was based on the historic water levels and conditions set forth in the FERC licenses) and approved the Four Lakes Special Assessment District. As noted above, Midland and Gladwin counties appointed FLTF as its Part 307 "Delegated Authority." Prior to the dam failures, FLTF and the counties of Midland and Gladwin proposed a financial model that would transition private ownership of the dams to public ownership and would have ensured public safety of the Four Lakes community and region. FLTF was to start the transition of ownership starting in June of 2020.

Unfortunately, because of the catastrophic events of May 19, 2020, the purchase of the dams did not take place. In June 2020, the Counties authorized the condemnation and taking of the properties from Boyce. After six months of battle through the Bankruptcy Court to rescue these properties, the condemnation occurred and FLTF acquired the property for the counties and is now in control of operations of the lakes, and as mentioned a major recovery and restoration effort was mobilized and is underway.

The dam stabilization and shoreline recovery effort alone will cost a staggering $40 million just to ensure public safety on an interim basis. This excludes the estimated multi-millions of dollars of property damage and loss surrounding and downstream of the Four Lakes. The restoration effort is currently estimated to require an additional $350 million to fully replace the Four Lakes and their ecosystem.

In 2019, the Four Lake system had an affordable path to sustainability, and now has become a symbol of what can go wrong. Our community has a legal right to and will retore the lakes and their ecosystems.

FLTF recommends three principles to guide Michigan Lake Systems

An effective safety program requires continuous and periodic project inspections and assessments. To be sustainable it must be system-focused and collaborative in the management of Michigan's Dams and Lakes. Dam safety information and risk communication must be accurate, timely and clear so individuals can understand risks to make informed decisions about their safety.

Applying three principles will improve the safety of dams and create sustainable inland lakes:

1. **Part 307 is the exclusive statutory basis for the governance of lake levels and provides a model for ensuring the financial sustainability and safety of dams.**
    - It is the state mechanism for transition from private to public ownership.
    - It provides a financial model to acquire, restore and maintain dams, lakes, and the ecosystem.

2. **Property owners ("Lake Community") around an inland lake that is supported by lake level structures (i.e., dams) must be active stakeholders in the State Dam Safety Program.**
    - The community must define the use and benefit to the public under Part 307.
    - The county and the community will secure funding for an acquisition and operations of the lake through a Special Assessment District and other sources of funds.
    - Therefore, the community must be an integral part of the solution to preserving and protecting the lakes, properties, and ecosystem

3. **Manage the lake ecosystem and dam infrastructure on a "Service Life Basis".**
    - Part 307 allows and provides a financial model for oversight by a county.
    - Part 315 should have key metrics based on the sustainable service life to keep dams safe and be flexible to move from prescriptive to risk-based, outcome-focused regulations.
    - These models exist and are practiced today.

What was the cause for the Edenville failure? That is the job of the independent forensic investigation committee and its work. It is clear there were past opportunities to intervene to prevent this failure that should have been clear to the owner and the regulator.

The Four Lakes have been in existence for almost 100 years. A review of the deeds and other conveyance documents in connection with hydroelectric dam and flowage rights indicates that properties were intended to be and remain as lakes. For almost 100 years, residential and recreational properties were permitted to be developed and now depend on a "lake ecosystem."

- The primary uses were established when the lakes were created.
- FERC sued Boyce's predecessor Wolverine Power to regulate the dams. After a 10-year legal battle, by 1998 all four dams came under FERC jurisdiction with licenses.
- By June 15, 2017, the FERC Director of the Division of Hydropower Administration and Compliance sent a letter to the licensee (Accession # 20170615-3024 (32220349)). The 46-page letter detailed eleven (11) years of licensee's noncompliant behavior, which had not resulted in a single penalty to that date.

The dam regulatory systems use permitting, orders and enforcement to make an owner comply. The systems are not biased to change or facilitate changes in ownership. That is a problem when private dams in most cases will outlive the organizations and people that run them.

IN 2002, INTERVENTION WAS NEEDED AND WAS MISSED

In 2002, the lake communities were alerted to financial problems associated with maintaining the Four Lakes' dams when the owner, Wolverine Power Corporation (which held the FERC license), was reported to have financial problems. A subsequent stock/loan exchange with Synex Energy Resources (a Vancouver-based engineering and consulting company) supported Wolverine Power Corporation, until it defaulted on its $1 million dollar loan. The dam properties were acquired by Synex. By 2006, all four hydroelectric dams were sold again when Boyce Hydro Power, LLC, purchased the interests of Synex.

At this point FERC should have "pressed pause." Edenville was a non-compliant hydroelectric dam, with a private dam owner that did not appear to have enough financial resources to maintain a sustainable service life of the dams. Unfortunately, the counties, while aware of the situation (that is, there was a new dam owner) were not privy to the full import of the situation and thus were not in a position to address the condition or safety of the dams. There was no transparency from 2002-2006, when the private ownership structure changed at least three times, and FERC implicitly or explicitly approved the transfer of ownership each time.

If the legal levels had been established and the Four Lakes Special Assessment District had existed in 2002-2006, this lake system would be working today, and we would have avoided the disaster of May 2020.

This is not only an example of what can happen to a FERC dam, but also an example of what could happen to many privately owned dams in Michigan. The regulations and energy markets have already pre-determined this for most of the 90 remaining FERC dams. The Michigan Dam Safety Task Force should position its recommendation to transfer ownership constructively based on the three principles noted.

Principle 1: Part 307 is the statutory basis for the governance of a lake.

Michigan common law does not require a private dam owner to maintain the existence of a dam or the artificial level of a lake. The case of *Goodrich v. McMillan*[1] established the rule that ownership of a dam does not impose a duty on the dam owner to maintain the water at an artificial level created by operation of a dam. Similarly, in *Drainage Board v. Village of Homer*[2], a dam owner was allowed to destroy a dam over the complaints of the riparian landowners that lowering the impoundment would diminish their ability to use sub-surface water for irrigation. The court stated that the riparian owners were continuously charged, by the very fact of the dam and its gates, with notice that the pond is artificial (as distinguished from natural level) and that its level may be lowered or returned to a natural state at any time by the dam owner. The harshness of the law created considerable uncertainty among lake front property owners and demonstrated the need for a public solution to preserving lakes that were created by the artificial impoundment of water.

Part 307 "Inland Lake Levels" of the Michigan Natural Resources and Environmental Protection Act, MCL 324.30701 et seq. ("Part 307", formally known as the Inland Lake Level Act) is the exclusive authority for establishing and maintaining the legal levels of a natural or artificial lake.

Part 307 Section 30701 defines the "Normal Level" of an inland lake as:

> *The level or levels of the water of an inland lake that provide the most benefit to the public; that best protect the public health, safety, and welfare; that best preserve the natural resources of the state; and that best preserve and protect the value of property around the lake.*[3]

The purpose of Part 307 is to provide for the control and maintenance of inland lake levels for the benefit

[1] *Goodrich v. McMillan*, 217 Mich. 630, 187 NW 368 (1922).
[2] *Drainage Board v. Village of Homer*, 351 Mich. 73; 87 NW2d 72 (1957)
[3] MCL 324.30701(h)

and welfare of the public.[4] The act essentially authorizes counties to make policy decisions related to the water levels of their inland lakes, and build and finance dams as necessary to maintain the desired lake levels.[5] However, it is the circuit court that ultimately has the authority to weigh competing factors in its determination of the normal levels of an inland lake. Section 30707 of Part 307, in pertinent part, provides:

(4) In a determination of the normal level of an inland lake, the court shall consider all of the following:
- (a) Past lake level records, including the ordinary high-water mark and seasonal fluctuations.
- (b) The location of septic tanks, drain fields, sea walls, docks, and other pertinent physical features.
- (c) Government surveys and reports.
- (d) The hydrology of the watershed.
- (e) Downstream flow requirements and impacts on downstream riparian rights.
- (f) Fisheries and wildlife habitat protection and enhancement.
- (g) Upstream drainage.
- (h) Riparian rights.
- (i) Testimony and evidence offered by all interested persons.
- (j) Other pertinent facts and circumstances. [6]

Moreover, once established, the circuit court has "continuing jurisdiction" over the lake levels, which means anything affecting the lake levels, including departures from the normal levels, should be presented to the circuit court for its consideration.

Part 307 also provides the financial model for sustainability of lake level structures and authorizes the establishment of a special assessment district to defray the costs in connection with administration, operation, maintenance and improvement of lake level structures.[7] Moreover, the special assessment district is authorized to issue municipal bonds, notes and lake level orders in anticipation of special assessments.[8] Acknowledging that dam improvements, if engineered properly, can have a useful life exceeding 40 years, Part 307 authorizes the Delegated Authority to finance improvements and assess private property, the State of Michigan, counties and local municipalities for up to 40 years.[9]

Finally, Part 307 authorizes the county to acquire dams and lake level structures by way of "gift, grant, purchase, or condemnation proceedings, an existing dam that may affect the normal level of the inland lake, sites for dams, or rights in land needed or convenient in order to implement" Part 307.[10]

Thus, Part 307 provides the statutory framework for transitioning private dams to public ownership, and a mechanism for long-term sustainability. Consequently, the Michigan Dam Safety Task Force recommendations associated with "permitting" and removal of dams should provide for the opportunity of a lake community to acquire and maintain dams utilizing Part 307.

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[4] *In re Martiny Lakes Project*, 381 Mich 180, 187; 160 NW2d 909 (1968); *Lenawee Board of Comm'rs v. Abraham*, 93 Mich App 774, 779; 287 NW2d 371 (1979).
[5] *In re Matter of Van Etten Lake*, 149 Mich App 517, 525; 386 NW 2d 572 (1986).
[6] MCL 324.30707(4).
[7] MCL 324.30711(1): "The county board may determine by resolution that the whole or a part of the cost of a project to establish and maintain a normal level for an inland lake shall be defrayed by special assessments against the following that are benefited by the project: privately owned parcels of land, political subdivisions of the state, and state-owned lands under the jurisdiction and control of the department. If the county board determines that a special assessment district is to be established, the delegated authority shall compute the cost of the project and prepare a special assessment roll."
[8] MCL 324.30705.
[9] *Id*., as amended 2020 PA 221.
[10] MCL 324.30708.

Removal of Dams AND Creating Sustainable Lakes

The EGLE Dam Safety website indicates there are 2,500 dams in the state; 813 of which are regulated by Part 315, and 235 of which have legal lake levels established under Part 307 (or the predecessor statute). There are also 99 hydroelectric dams in Michigan that are regulated by FERC under the Federal Power Act.

Dams that provide no environmental or economic value should be removed. But those dams that have created lake ecosystems with environmental and economic value should be preserved.

1. **For the 813 private dams Regulated by Part 315 only.** In addition to the monitoring and measuring plans being proposed. Including 10-year capital improvement plans going forward, should be expected of an owner as well. This would lead to an understand of the reinvestment needs and affordability long term to maintain the dam.

2. **For the 99 hydroelectric dams:** The development of large efficient power plants, the transmission grid, and changing market conditions combine to diminish the economic viability of the four hydroelectric plants on the Lakes. The "run for cash" and underinvestment in some dams puts them at risk of eventually failing or being abandoned.

   Part 307 section 6 states, "*If the department finds it expedient to have the normal level of an inland lake determined, the department may initiate by civil action on behalf of the state, in the court of any county in which the lake is located…*" This authority is seldom used.

   If the lake is a major natural resource under FERC control, this would seem to be a mechanism that would provide a model for EGLE to replicate the terms and conditions of the FERC license related to lake levels, and assure the environmental and safety considerations in the FERC license can be managed in the event of a transition to a county jurisdiction.

3. **For the 235 Dams that have lake level orders per Part 307**. Lakes with established legal levels under Part 307 are assumed to exist in perpetuity, and their continued existence can only be challenged through the circuit court. Any regulations should be written to acknowledge the legal structure afforded by Part 307 and the determinations by the circuit court.

   The State has a vehicle with Part 307 to help communities transfer dams to sustainable financial structures for repairs, with legal normal lake levels established. Outcome-based metrics and regulator engagement with a Part 307 Lake has predetermined outcomes are established by study.

Principle 2: A lake community as an active stakeholder in the State Dam Safety Program

The proposed Dam Safety Task Force recommendations in paragraph 1 in development of a Safety Culture, and the recommendations on Public Awareness miss a primary stakeholder that can champion dam safety: THE PUBLIC. To ensure the improvement of safety and sustainability of a dam, it is the lake community that has the primary interest, not just the regulator or the local government. It is FLTF's belief that if an inland lake is going to be sustained into the future, the lake community will need to step up to become the ultimate steward of the natural resources and safety.

Unfortunately, under the current transactional processes of regulations, community awareness on public safety always seems to come through a tragic event, followed by changes in regulatory structure, and can lead to less transparency to the public. While we applaud the Dam Safety Task Force's inclusion of Culture

and Public Awareness, it needs more CITIZEN engagement and transparency.

The community of Sanford Lake became aware of issues with Boyce Hydro on August 13, 2010, when (through word-of-mouth) the lake community communicated that the lake was being lowered because its embankment had a drainage problem. Sanford Lake was lowered and remained that way for the rest of that year. The Sanford Lake Association at the time was focused on a social and recreational experience. It was not structured to manage or intervene in this regulated process.

In January 2011, the dam owner representative, Lee Mueller, said publicly "he's not paying for an $83,000 repair project … It's a very simple concept, if you are a member of a golf club, you pay to keep the golf course in useable condition." Meaning, he wanted the lake property owners to assume the burden of repairing the dams. Really? A golf course? A small community group then paid the dam owner for the repairs and the lake level was brought up in the spring. The Sanford Lake Preservation Association (SLPA) was established and eventually became what it is known today as the Four Lakes Task Force.

Since the implementation of the FERC licenses, *the Four Lakes' community has implicitly accepted that its best interest was served by a private owner with oversight from FERC.* ***That proved to be a false premise in 2010.***

The primary function of the Four Lakes had become to support the economic wellbeing of the communities and the rich, diverse ecosystems that have developed around the Lakes.

The Lake Associations proactively engaged with Boyce and its regulators. Through this engagement, we reviewed the financial, repair and improvement plans. In 2013, the Sanford Lake Association hired Public Sector Consultants and published its "Economic Impact Assessment of Sanford Lake," which demonstrated to Midland County the value of the lake. This helped improve knowledge to the community, but more importantly it allowed the community to get access to data directly from the owner on finances, compliance, and improvement plans. It made us aware that the preservation of Sanford Lake was dependent more upon on the issues at the Edenville Dam upstream than our dam.

The Lake Associations of Wixom and Sanford lakes worked together, and the Sanford Lake Preservation Association became the Four Lakes Task Force in 2018, when FERC proposed the revocation of the license. Smallwood and Secord later became part of the Four Lakes Task Force when the fate of the FERC licenses was likely to be revoked. Yet even after all this happened, in late 2020, Boyce was still able to make claims publicly (in its bankruptcy filings) that dam repairs on the northern lakes were minor, and the dams could be viable for an owner or the community to purchase. In the end, the counties acquired the dams and related properties through condemnation, costing FLTF time and $1,576,000 to free itself of a failed system. An agency that wants public trust must take positions and be transparent! Letter writing with the owner does not achieve transparency.

Throughout this 10-year journey, there have been few government entities and agencies, other than the counties and our representatives, that have formally and specifically asked for our view. FLTF, the lake associations and their members over the years have developed informal networks, stayed engaged with our representatives, filed for CEII information, or negotiated with the owner for it, and conducted studies and environmental monitoring. The arcane forms of state, federal and court rules for public notification of permits or public appeals limited our progress and the public's transparent understanding of what was going on and how to gain a sense of control over its future.

We are disappointed that no matter how hard we tried, it was not enough to get to a transition of ownership and repair fast enough. But also, if FLTF had not taken the actions it had, these dams would still be in dispute, with no operational oversight and mounting liability and risk to the community. We have mobilized a significant recovery operation to improve the stability of the dams and shoreline and reduce public risk.

The community has the right to be assertive and not to treat this as a learning experience for the future. We are the canary in the coal mine, but unlike the canary, we are not going away; we have a legal right to exist.

Both the State and FERC have placed the environmental damage responsibility on Boyce. Prior to the dam failures, the Counties and FLTF had an affordable path forward to preserve the Four Lakes and fought with the federal government not to revoke the Edenville license until there was a transition plan on Edenville. Now, Boyce is insolvent and is shedding its obligations through bankruptcy. The federal government will likely soon shed their regulatory oversight of these dams. As a result, the Four Lakes community, the counties, and the state are left to contend with over $300 million to recover the Four Lakes and their ecosystem.

Remarkably, while the counties own the dams and related properties, Boyce is still the FERC licensee of the Sanford, Smallwood, and Secord Dams. The State cannot assume regulatory authority until the licenses are revoked or surrendered. There is repair activity underway with all the dams (some of which is being performed by EGLE). Both FERC and EGLE are in communication with FLTF engineers and contractors as they stabilize the dams.

Four Lakes Task Force has formally told FERC that hydropower is no longer economically viable, and the license is a burden to the community. **FERC is not considering a formal surrendering of the FERC licenses. Before this occurs, we have requested FERC convene a meeting with EPA, MDNR and EGLE with the Four Lake Taskforce to define responsibilities and create an interagency action plan for the future of these lakes.**

Four Lakes Task Force recommendations to the Dam Safety Task Force:

1. The State should require a private owner to have a Community Advisory Board that is selected and approved by the County that includes representatives from local government, such as townships, improvement boards, and Lake Associations. The Community Advisory Board's role would be to:
    a. Review the status of major repairs and compliance issues.
    b. Review Emergency Action Plan updates.
    c. Address community concerns on the environment and recreation.
    d. Provide a forum for the State to receive community input.

    It is a best practice in all aspects of private operations, but more importantly it puts "boots on the ground" with a structure to formally engage with the owner on understanding the dam owner's business and communicating community concerns.

2. Part 307 section 2 states, "a county board may delegate powers and duties under this part to that county's commissioner, road commission, or other delegated authority."
    a. For large communities with many small lakes a county water resource commissioner, county drain commissioner or county road commission is a logical location for this authority.
    b. On large lakes, with multiple ownership on a large river system, where the county resources are limited, we believe the governance structure such as FLTF is a good model to emulate.

    Providing models and guidance on governance structures would help communities understand the degree of complexity of their systems, and the resources needed to implement.

3. Consider improving other Part 307 factors in helping communities and counties in implementing Part 307 Normal Inland Lake Levels.

a. Streamline environmental permitting for lakes that have been in existence for many years with an established ecosystem.
b. Provide state financing opportunities and grants for construction of improvements in the context of Service Life Measurements.
c. Increase dollar amount in initial study which is currently at $10,000.
d. Provide state grant opportunities to complete the initial study.
e. Provide state financing opportunities for construction improvements in the context of Service Life Measurements similar to dam removal.
f. Allow for at-large assessments to the State for lakes with public access.

Principle 3: Managing the Lake Ecosystem and Dam Infrastructure on a Service Life Basis

Inflow Design Floods

One of the most significant recommendations of the Task Force is in a sub-paragraph:

> ***26.f, "Meet Federal Emergency Management Administration (FEMA)'s Model Dam Safety Program MDSP recommendation for Inflow Design Floods."***

FLTF highly supports this recommendation (and is following the 26.6 Inflow Design Flood recommendation of the Dam Safety Task Force).

The recommendations presented in the Federal Emergency Management Agency's publication, *FEMA P-94, August 2013, "Selecting and Accommodating Inflow Design Floods for Dams*," The publication provides a concise summary of the state-of-the-art practices and guidelines to establish design criteria for hydrologic and hydraulic safety.

This is a risked-based analytical approach to establish the hydrology of the region, and hydraulics needed for the dam and lake construction and should be codified. A point to note, Boyce and FERC battled for years on the compliance standard that will likely turn out to be incorrect.

These FEMA guidelines discourage using hazard classification systems based on the size of a dam (e.g., height) or establishing an inflow design flood (IDF) by arbitrarily using a percentage of a hydrologic event (e.g., 50% PMF), while recommending three rational options for establishing the IDF based on: 1) the hazard potential (prescriptive approach), 2) the incremental consequences of failure, or 3) the estimated risks associated with hydrologic events (risk-based approach). The three methodologies vary in complexity from a simple prescriptive approach to a fully risk-based approach to efficiently allocate resources to provide a desired level of public safety while protecting environmental and public benefits. For systems like the Four Lakes, it needs to be based on the system of the region.

A Risk-Based Approach to a System on a Service Life Basis

Given the complexities facing the restoration of the Four Lakes and the associated infrastructure of the four dams, FLTF followed FEMA's guidance and incorporated **the risk-based approach to manage the system on a service life basis**.

Cycle Analyses (LCA) of dams and their associated impoundments consider three distinct phases, construction, operation, and decommissioning when the function of the project no longer exists. This must be a continuous cycle, not a linear one. Rule-based enforcement, even on long-term licensing, seldom keeps up with long-cycle investments. The proper use of LCA can focus the community and the state on purpose and structural stability in a changing global environment.

For our purposes, the analysis requires a paradigm shift to address the situation where the commercial purpose (hydropower) is being supplanted with that of sustaining a rich, diverse ecosystem and the

associated public benefits for current and future generations. In short, we are talking about an analysis of maintaining the lake system in the operational phase into perpetuity.

A complete analysis would require addressing measures to protect and enhance the ecosystem, adapting to demographic changes and maintaining the lake infrastructure indefinitely. For today's subject dam safety, we will limit our comments to the critical issue at hand, FLTF's plan to maintain the operational phase of the dams' infrastructure indefinitely to support all these other aspects.

Let us start with Edenville because that is what so many people are familiar with. The left earthen embankment of the Tittabawassee side of the dam failed, not because it was overtopped, but because of inadequacies in the underlying design, maintenance, and safety monitoring. The embankment design reflected turn of the century knowledge of geotechnical engineering. The embankment proportions and construction materials do not meet current industry criteria and the embankment lacked adequate measures (such as a cutoff wall or a drainage system) to deal with internal seepage – resulting in failure. We will leave to the forensic investigators the question of whether a more robust maintenance program would have helped prevent failure. But for certain a rigorous safety monitoring program would have identified the design inadequacies and maintenance concerns.

Starting with the two upstream dams (Smallwood and Secord), the FLTF team is performing a complete analysis of the design basis of all earthen embankments as well as a thorough assessment of their condition. Our findings will inform the engineering and design measures required to rebuild the embankments to meet the latest applicable industry design criteria and achieve a 75-year service life – or longer.

Likewise, the concrete structures of all four dams face the challenges of aging and limitations of turn of the century technology. The Portland cement concrete is not air entrained, making it more susceptible to freeze-thaw damage. The hollow, barrel arched spillway design has proved to be troublesome, difficult to maintain, and is no longer used. The FLTF team is in the process of redesigning the Smallwood and Secord spillways to solid, concrete gravity structures. They are also engineering other improvements to extend the service life of the concrete structures to 75 years – or longer.

But perhaps the biggest challenge facing the FLTF engineering team is retrofitting the dams to safely deal with changes in environmental and demographic conditions. In the nearly 100 years or so since the dams were built, scientists tell us temperatures have and are increasing. Storms are becoming more intense, resulting in measurable increases in localized precipitation events. There have also been significant demographic changes over this period. Homes and businesses were built around the lakes and downstream of the dams. Roads and bridges were constructed, and communities sprung up where there was once wilderness. Combined, these factors tend to contribute to larger flood events and higher risks to public safety.

Fortunately, technology has kept pace with these developments and we have analytical tools to better understand the implications of these changes so we can design dams to safely accommodate their consequences. FEMA's publication, *FEMA P-94, August 2013, "Selecting and Accommodating Inflow Design Floods for Dams*," provides guidance on how to use these analytical tools.

All four FLTF dams are classified as high hazard potential. Using the high hazard potential approach, FEMA guidelines would dictate using the Probable Maximum Flood (PMF) as the IDF. The existing PMF is based on a 1993 EPRI Michigan/Wisconsin Regional Probable Maximum Precipitation (PMP) study. This is problematic because FLTF commissioned updated flood studies, which used this 1993 PMP as the basis, and the modeling could not be calibrated to the May 2020 event.

To avoid these problems, FLTF is using the site-specific PMP and risk-based approach outlined in the FEMA guidelines to establish the IDF for each of the four dams. This methodology consists of the following detailed, site-specific studies.

1. Develop a site-specific PMP. This entails using accurate update-to-date meteorological data and applying site-specific temporal/spatial patterns to perform site-specific analyses. Compared to the 1993 regional based PMP, this will result in less uncertainty and provide an up to date, more accurate representation of the PMP. The study will also derive the annual exceedance probability of rainfall and an uncertainty analysis of PMP depths, which will inform subsequent risk-based decision-making processes.
2. Update the PMF. The current HEC-HMS models will be updated using the site-specific PMP to develop updated inflow hydrographs for a range of floods up to the PMF for each dam.
3. Inundation Mapping. Route the inflow hydrographs through each dam to develop inundation mapping for a range of frequency of flows from the 100-year flood to the PMF.
4. Hydrologic Potential Failure Mode Assessment. Identify potential failure modes for each dam (overtopping, erosion, overstressing structural components, etc.) over the range of flood flows up to the PMF and assess their likelihood of occurrence.
5. Refine the Inundation Mapping. Use the hydrologic events identified with potential failure (step 4) to develop inundation maps over the range of potential failure mode flows for each dam.
6. Incremental Consequence of Failure Analysis. Incorporate up-to-date demographic and environmental data with the refined inundation mapping (step 5) for each dam to determine the consequences of failure for each failure mode flow.
7. Select the IDF. Apply established risk-based decision-making criteria to select the IDF based on consequences of failure for each dam (step 6).

Critical steps of the above analyses will be peer reviewed to increase our confidence level in the findings.

Using the risk-based approach to select the IDF will allow FLTF to establish spillway capacity requirements for each dam that reflect the latest meteorological information, demographic and environmental data, and state-of-art engineering principles. These steps will provide a solid foundation for sustaining the Four Lakes, their ecosystems and associated public benefits for future generations.

Emergency Actions and Post Recovery

Unfortunately, in the Four Lakes' case, this owner was not practicing a Risk-Based Service Life management process. While there are many responsible owners that are practicing good stewardship of their dams, many are likely not. FERC places the responsibility on the owner, but it was the Four Lakes community, and specifically the Emergency Action Managers, who pushed for more focus around this system. This is not a just relationship, between an owner and a regulator. It is a community plan that everyone should sign-off on; the State should be aware of that fact.

FLTF in general supports the approach and recommendations to the State Emergency Action Plan being proposed. FLTF has already engaged with Midland County and Gladwin County emergency managers and hired consultants and experts to assist our Operations Team to upgrade the Boyce plans, and support the county with more measurements, including engaging USGS.

Our experience is that Michigan does not have the "mussel reflexes" as states on the Gulf Coast or West Coast do, to have more frequent, large events or to leverage federal resources into a region.

Four Lakes Task Force would encourage factoring recovery into an Emergency Action Plan.
Dam failure creates significant erosion, debris, and downstream risks. Response to the private lakes and dams is not in the scope for FEMA or the U.S. Army Corps of Engineers. The only federal funding FLTF has identified for this recovery phase was the USDA Natural Resources Conservation Services (NRCS) resource management plan. However, the availability of these limited resources was not clear to the counties or the state at the time of the incident.

Four Lakes Task Force comment on the proposed recommendations 30 and 31 on Emergency Lake Drawdown:
This authority appears to already exist within Part 307. Part 307 Section 30722 describes the authority to drawdown a lake, and Part 315 Section 19 limits dam operations.

The challenge with any preemptive drawdown to avoid emergencies is it creates second-guessing. Criteria should be set, and impacts should be studied in a lake system. Nothing prevents the lake community and DSP from defining and agreeing to the parameters, and positive and negative impact, and actions that should be taken based on certain conditions under Part 307. These parameters can be built into the normal Legal Lake Level.

Restoring the Four Lakes of Gladwin and Midland Counties

The Gladwin and Midland County Circuit Courts established the normal lake levels for all Four Lakes, after a hearing in which both MDNR and EGLE had input and agreed. Prior to the May 2020 failures, FLTF provided an affordable plan to sustain the lakes, and MDNR and EGLE agreed. The cost of restoration post-failure is beyond the means of many of the property owners. The legal lake levels are still in effect, and it is incumbent on the State to assist with the restoration of these lakes.

We understand the Michigan Dam Safety Task Force was not chartered to address post-failures; however, the State and Federal governments have put the accountability of this failure on Boyce Hydro Power. It is not fair or just to place the burden of addressing the environmental damage on the innocent victims of this horrific disaster. FTLF and the communities we represent need help with the restoration of the Lake system from the State of Michigan and our Federal government.

In Summary

The Four Lakes are not the only example of what *can happen* to a private dam. This is an example of what *will happen* to every other dam in Michigan that was originally built for the purpose of generating hydropower electricity. This fate has been pre-determined for many hydropower dams which can no longer sustain the infrastructure to support the lakes, regulators, or market conditions.

The Michigan Dam Task Safety Force should consider a preamble to its recommendations that frames for the public, counties, legislators, and agencies the overarching principles related to how these recommendations should be implemented; principles that will address the current situation AND move to a sustainable system should include:

- Part 307 is the exclusive statutory basis for the governance of lake levels and provides a model for ensuring the financial sustainability and safety of dams.
- The lake community should be an active stakeholder in the State Dam Safety Program.
- The State should manage a lake's ecosystem and dam infrastructure on a Service Life Basis.

Part 307 of the Michigan Natural Resources and Protection Act is framed well in its ability to achieve the goals of Inland Lakes and Streams. Expanding the number of dams regulated under Part 307 should be a targeted goal of the State.

Thank you for the opportunity to comment.

Sincerely,

David Kepler
President
Four Lakes Task Force
Gladwin and Midland Counties' Delegated Authority of the Four Lakes Special Assessment District