Initial Overview of the GLMRIS Report

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Prepared by the Great Lakes Commission and
the Great Lakes and St. Lawrence Cities Initiative
with input from its consultants
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GLMRIS presents a range of options and technologies to prevent invasive species movement between the Great Lakes and Mississippi River basins via the Chicago Area Waterway System (CAWS). The report identifies eight alternatives and analyzes potential impacts and corresponding mitigation requirements for flood-risk management, natural resources, water quality and navigation. The alternatives range from the current electric barriers, commercial harvesting and monitoring, to full hydrologic separation with physical barriers, and a new technology called a "GLMRIS lock" that would permit barge traffic but use treated water in locks to remove invasive species. The study recognizes hydrologic separation as the most effective way to keep Asian carp out of the Great Lakes and mitigate flooding, but several assumptions also makes it the most expensive. Key elements of the alternatives include major expansion of Chicago's Tunnel and Reservoir Plan (TARP) system, removal of contaminated sediments in the Chicago and Calumet rivers, and the construction of a major water treatment plant to provide AIS free water for lockages and water quality enhancements. The costs range from $7.8 to $18.4 billion and time for implementation is between 10 and 25 years.

The following is a brief overview of the alternatives; see the summary report for a more complete description and the table on page ES-11 of the executive summary of the full report for the GLMRIS alternatives evaluation criteria.

Alternative	Cost	Years to Complete	Effectiveness	Key Structural Elements				
				GLMRIS Lock	*Electric Barrier*	*ANS Treatment Plant*	*Screened Sluice Gates*	*Physical Barrier*
No New Federal Action - Sustained Activities (baseline condition)	None	N/A	★					
Nonstructural control technologies	$68 M	Immediate	★★					
Mid-System Control Technologies without a Buffer Zone	$15.5 B	25 years	★★★	✔	✔	✔		
Control Technology Alternative with a Buffer Zone	$7.8 B	10 years	★★★	✔	✔	✔	✔	✔
Lakefront Hydrologic Separation	$18.4 B	25 years	★★★★			✔		✔
Mid-System Hydrologic Separation	$15.5 B	25 years	★★★★			✔		✔
Mid-System Separation Cal-Sag Open Control Technologies with a Buffer Zone	$15 B	25 years	★★★	✔	✔	✔	✔	✔
Mid-System Separation CSSC Open Control Technologies with Buffer Zone	$8.3 B	25 years	★★★	✔	✔	✔	✔	✔

Assessment of GLMRIS Assumptions and Methodologies

The Corps made key assumptions in GLMRIS that account for the significant costs and extensive implementation times for its alternatives, including design for a 500-year storm event, complete removal of contaminated sediments (as a cost of separation), and no discharges to Lake Michigan. They limit their recommendations to proven technologies and leave out potentially promising approaches that might be less costly (such as using CO_2 to treat lock chambers, currently being investigated). Planning to contain CSOs for a 500-year storm event is far above the design standard generally used for wastewater and stormwater systems. Consequently, the proposed combined sewer overflow (CSO) controls far exceed the typical standard of care and are not consistent with U.S. EPA's national CSO control policy (which allows four treated overflows per year).

The GLC-Cities Initiative *Restoring the Natural Divide* report used different assumptions in key areas that largely account for the lower cost estimate ($3.3 to $4.3 billion) for our mid-system separation alternative. These include planning for a 100-year storm event; allowing modest CSO discharges to Lake Michigan (as occur at present); improving wastewater treatment to allow discharge to the lake; and assuming that contaminated sediments will be remediated *regardless* of separation, and thus are not a cost of separation. Our report also included significant investments in harbor infrastructure to mitigate impacts to commercial navigation and improve benefits in this area. GLMRIS does not mitigate for navigation impacts and merely assumes that shippers will shift to a different mode.

The following are overarching observations on GLMRIS and an assessment of its assumptions and methodologies in key areas. It is important to recognize that differing assumptions significantly impact cost estimates for physical separation. It also is important to distinguish between costs directly related to the alternatives themselves versus those that are needed today or anticipated in the future to address existing problems related to water quality, flooding and transportation. For these reasons, we believe that effective solutions likely will not be as costly as projected in the GLMRIS report.

Overarching Observations on GLMRIS

- Physical separation is the most effective means of preventing aquatic invasive species (AIS) from crossing between the two watersheds (GLMRIS, pg. ES-11).
- Water quality in Lake Michigan continues to receive priority over the Mississippi River basin, as Illinois anti-degradation law requirements apply to discharges to Lake Michigan and not to discharges to the Mississippi River basin. The report does, however, recognize the difficulty of meeting those requirements (GLMRIS, p. 85).
- The assumption of no additional wastewater and CSO pollutants discharged to Lake Michigan drives much of the alternative elements and, thus, costs.
- Impacts and mitigation measures regarding CSO volumes and flooding were determined using the 500-year storm event (GLMRIS, p. 86).
- The mid-system hydrologic separation alternative "minimizes induced flooding impacts to the Chicago area." (GLMRIS, pg. ES-7) "Mid-System hydrologic separation alternative has the least adverse impact on overbank or basement flooding." (GLMRIS, App. B, p. 52)
- "Non-structural alternatives could be implemented quickly, while remaining elements of a primarily structural plan were being designed and constructed." (GLMRIS, pg. ES-6)
- Contaminated sediments are an important (and costly) impairment.
- "Mitigation for commercial navigation was not included as part of any GLMRIS Alternative." (GLMRIS p. 86) "Impacts to commercial navigation would not be mitigated, because no mitigation measures were identified that would effectively address the impacts." (GLMRIS, p, 159).
- Time to achieve full implementation of the separation alternatives is 25 years and is driven by construction of new CSO holding and treatment capacity. Time to implement the first phase of separation in the *Restoring the Natural Divide* report is 10 years.

Water Quality

GLMRIS maintains the current approach of protecting the Great Lakes that gives priority to the Great Lakes water quality relative to the Mississippi River. This approach – not allowing any discharge of CSOs or treated wastewater to Lake Michigan – accounts for approximately $12 billion of the $16 billion cost of the GLMRIS Mid-System Alternative. As an example, GLMRIS proposes to use tunnels to relocate wastewater treatment plant outfalls to the Mississippi River side of physical barriers and capture and treat CSO discharges (via new tunnels and reservoirs) up to the 500-year storm event. Furthermore, GLMRIS proposes to take Lake Michigan water, treat it to drinking water standards, and then use it to augment flows on both sides of physical barriers to dilute other pollutant sources and maintain water quality standards.

The CSO control program proposed by GLMRIS is driven by the assumption that CSOs cannot be discharged to Lake Michigan. Rather than capturing a small volume of CSOs for a short period of time, screening and

disinfecting it, and then discharging it, GLMRIS proposes to capture and treat all flows from all storms up to and including a 500-year storm and discharge them to the Mississippi River basin.

GLRMIS proposes that contaminated sediments exposed to the Great Lakes must be remediated as part of separation, while sediment remediation on the Mississippi River side of any physical barriers is not required (and, therefore, there are no project costs).

Flood Risk Management

GLMRIS states that the "Mid-System hydrologic separation alternative has least adverse impact on overbank or basement flooding" (GLMRIS, App. E, p. 52). Second storage reservoirs at both McCook and Thornton are primarily a water quality mitigation element, which is driven by the assumption that no additional wastewater or CSO flows can be discharged to Lake Michigan. It is difficult to determine the costs associated with maintaining water quality versus the costs associated with flood mitigation relative to the total cost of the tunnels and reservoirs.

GLMRIS baseline conditions assume that climate change, land use and green infrastructure would have negligible impact (GLMRIS, p. 46). The 500-year (24-hour duration) storm event was used for evaluation of overbank flood impacts (GLMRIS, App. B, p. 53). GLMRIS mitigation assumptions include Lake Michigan water levels at historic average levels with consideration given for historic high levels (GLMRIS, App. B, p. 53).

Transportation

GLMRIS did not include mitigation for commercial navigation for any GLMRIS alternative because no mitigation measures were identified that would effectively address the impacts. This was based on feedback from CAWS operators who indicated they would not likely use a multi-modal facility because of the additional re-handling costs and, as a result, that cargo would shift modes to rail or truck. Additionally, should operators desire to use a multi-modal facility, a similar facility currently operates in Joliet, Illinois. This unmitigated impact to commercial cargo operations was estimated at $250 million per year for the Mid-System hydrologic separation alternative (GLMRMIS, p. 159). Furthermore, GLMRIS assumed that recreational vessels would not be lifted or moved around a physical barrier based on the potential increased risk for ANS transfer. If similar assumptions for commercial and recreational transportation were made for alternatives in the *Restoring the Natural Divide* study, the cost of its mid-system alternative would be reduced by approximately $1 billion.

ANS Control Technologies

Nonstructural Alternatives: GLRMIS only used measures currently in use for the non-structural alternative. As a result, "The Nonstructural Alternative would not reduce the risk of establishment of the bighead or silver carp when compared to the No New Federal Action – Sustained Activities conditions." Additionally, regarding new or emerging technologies, GLMRIS states "As effective nonstructural measures are introduced, they should be considered for use under the Nonstructural Alternative" (GLMRIS, pg. 98).

Structural Alternatives: The GLMRIS Lock is intended "to allow for vessel transportation while reducing the risk to the maximum extent possible of passive drift GLMRIS species transferring during lockages" (GLMRIS, pg. 65). The GLMRIS Locks are coupled with ANS treatment plants and enhanced electric barriers. These treatment plants use a combination of screening, filtration, and UV radiation to produce 'ANS-free' water. While the effectiveness of electric barriers continues to be studied, GLMRIS states that enhanced electric barriers are currently considered the most effective technology (not including physical barriers) for preventing fish passage. Other technologies reviewed in GLMRIS, such as CO_2, were not considered as effective, their effectiveness was too uncertain, or they had unacceptable negative impacts.

With regard to electric barriers, a separate study, released by the Corps in late December, showed that the electric barriers are not stopping the movement of all fish. The Corps conducted a series of underwater sonar recordings in the area within the electric barrier that showed fish passing through the electric field in nearly two-thirds of the recordings. A related study showed that barges can sweep fish through the electric barrier.