BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
WATER QUALITY STANDARDS AND	)	
EFFLUENT LIMITATIONS FOR THE	)	
CHICAGO AREA WATERWAY SYSTEM	)	R08-9(C)
AND THE LOWER DES PLAINES RIVER:	)	(Rulemaking-Water)
Adm. Code Parts 301, 302, 303 and 304	)	

NOTICE OF FILING

To: John Therriault, Clerk
Illinois Pollution Control Board
James R. Thompson Center
100 West Randolph Street - Suite 11-500
Chicago, IL 60601

Marie Tipsord, Hearing Officer
Illinois Pollution Control Board
James R. Thompson Center
100 W. Randolph, Suite 11-500
Chicago, IL 60601-3218

Deborah J. Williams, Assistant Counsel
Stefanie N. Diers, Assistant Counsel
Illinois Environmental Protection Agency
1021 N. Grand Ave. East
P.O. Box 19276
Springfield, IL 62794

Persons included on the attached
SERVICE LIST

Please take notice that on March 5, 2012, we filed electronically with the Office of the Clerk of the Illinois Pollution Control Board the attached Final Comments on Subdocket C, a copy of which is served upon you.

CITGO PETROLEUM CORPORATION, and
PDV MIDWEST, LLC, Petitioners

By: _____

Jeffrey C. Fort
Ariel J. Tesher
SNR Denton US LLP
233 S. Wacker Drive
Suite 7800
Chicago, IL 60606-6404

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FINAL PRE-FIRST NOTICE COMMENTS ON SUBDOCKET C

CITGO PETROLEUM CORPORATION, and PDV MIDWEST, LLC, ("Lemont Refinery") submit these comments with respect to the "aquatic life uses" for the Chicago Area Waterway System. (1) The Board should recognize the reality of Aquatic Invasive Species ("AIS"), as a threat now in the Lower portion of the Chicago Sanitary and Ship Canal ("Lower CSSC"), and as to the measures being implemented and which may be implemented over the coming years to halt the spread of AIS through the Lower CSSC, in either direction through the CAWS, and (2) the record does not support an upgrade of the designated uses for the Lower CSSC as proposed by the Agency.[1] The CAWS may be substantially and permanently altered as a result of the AIS issue. In light of the substantial record that has been compiled, and in order to provide added clarity to our comment, we will begin with a Summary which outlines the Comment.

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[1] CITGO Petroleum Corporation operates and PDV Midwest Refining, LLC owns the Lemont Refinery located at river mile 296.8, just upstream of the Regulated Navigation Area and the Safety Zone as established by the Coast Guard. On February 3, 2012, the Illinois Pollution Control Board ("Board") issued an Order, through its Hearing Officer, setting out the recent history of extensions in "Subdocket C" and establishing a deadline of March 5, 2012 for "final pre-first notice comments." In accordance with the aforementioned, the Lemont Refinery submits the following Comments regarding the aquatic life uses which are the subject of Subdocket C.

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I. THE LOWER SANITARY AND SHIP CANAL OR AT LEAST THE REGULATED NAVIGATION AREA AND THE SAFETY ZONE, SHOULD NOT BE DESIGNATED AS "USE B".

This proceeding has been long, and there have been many disputed issues. However, one of the issues about which there has been no dispute is that the Lower Chicago Sanitary and Ship Canal ("Lower CSSC," defined as the reach from the Lockport Locks upstream to the confluence with the Cal-Sag Channel) cannot meet the general water quality standards expected by the Clean Water Act. As part of that conclusion, there are several undisputed facts which the Board should consider with respect to the Lower CSSC:

> (1) The Agency's original Petition, and the record here, show that the Lower Ship Canal is not a fishable or swimmable water.
>
> (2) The Lower CSSC is non-recreational, a unique category which, in the CAWS, is occupied only by the Lower CSSC[2]. *See* Statement of Reasons, filed by the Agency in R08-9 on Oct. 26, 2007, at 41-42 (hereinafter, the Agency "Proposal"); *see also* the Board's adoption of 35 Ill.Adm 303.227 in its Order in R08-9 (Subdocket A) of June 16, 2011 (hereafter June 16, 2011 Order).
>
> (3) The CDM review of the CAWS recommended two aquatic life uses: "'Modified Warm-water Aquatic Life' where a fishery consisting of some important sport fish species could exist and 'Limited Warm-water Aquatic Life' where straight-walled, deep-draft shipping channels limit the fisheries to primarily intolerant species." Agency Proposal at 95. Clearly, the Ship Canal is both non-recreational and appropriate for the latter category of aquatic uses.[3]
>
> (4) The Board summarized the conditions in the Lower Ship Canal with the following observation that is not only applicable to recreational uses, but also to aquatic life uses "the CSSC [is] potentially impaired for

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[2] In addition, a stretch of the Lower Des Plaines River, outside the CAWS, is also designated as non-recreational from its confluence with the Chicago Sanitary and Ship Canal to the Brandon Road Lock and Dam.

[3] These two categories ("Non-recreation" and "Limited Warm Water Aquatic Life") are virtually the same language as used for "Secondary Contact and Indigenous Aquatic Life Waters" in existing 35 IAC 302.402.

> polychlorinated biphenyls (PCBs) in fish tissue, ammonia (unionized) D.O., total nitrogen, oil and grease, total phosphorous and iron. The potential sources of impairment include flow regulation/modification, municipal point sources, CSO urban runoff during storm events, channelization and hydro-modification." June 16, 2011 Order at 39-40.
>
> (5) The electric fish barrier, accompanied by a Regulated Navigation Area (RNA) and a Safety Zone as designated by the Coast Guard, occupies part of the Lower CSSC[4]; and
>
> (6) The Great Lakes Commission has endorsed not only a physical barrier to separate the Great Lakes Basin form the Mississippi River basin but also recommended that one of the options for such a physical barrier might be at any point along the Lower CSSC.

Thus, the efforts of state, federal and international bodies, not merely under the Clean Water Act processes, will be focused on the Lower CSSC for many years to come.

The "Use B" category proposed by the Agency is not consistent with these facts relating to the Lower CSSC. Moreover, the proposed Use B is overbroad and would result in an "upgrade" of the designated uses of the Lower CSSC. We urge the Board not to include the Lower Ship Canal in the "Use B" as described by the Agency proposal. We further urge the Board to recognize the unique role that the Lower CSSC now plays in the battle to prevent AIS from spreading to Lake Michigan from the Illinois River System, or vice versa.

We will first review the evidence in the record showing the key role that a portion of the Lower CSSC is already playing in preventing the spread of AIS, and how that role may be expanded in the near future. We will then review the evidence as to why the uses of the Lower

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[4] The RNA and the Safety Zone are established by the Coast Guard, now an agency within the Department of Homeland Security. Attachment 2 contains an Exhibit A from Jim Huff's testimony filed February 2, 2011 which depicts these zones and their vicinity to the Lemont Refinery. The Exhibit B in Attachment 2 is the final action of the Coast Guard designating the boundaries of these areas, as described in Huff's exhibit. See "Safety Zone and Regulated Navigation Area, Chicago Sanitary and Ship Canal, Romeoville, IL," 76 Fed Reg 77121-77125 (December 12, 2011), adopting 33 CFR 165.923

Ship Canal should not be upgraded. We will conclude with a review of one way in which we believe the language a "Use C" should be developed for the Lower CSSC.

A. The Board Should Include As A Recognized Designated Use Of The Lower Ship Canal, And Perhaps Other Portions Of The CAWS, Preventing The Spread Of Aquatic Invasive Species Between The Great Lakes And The Mississippi River System.

We urge the Board include in its regulations with respect to the uses of the CAWS, and particularly the Lower Ship Canal, to recognize the significant new facts and changed circumstances that have occurred, and are likely to continue to be addressed in the Lower CSSC, and possibly other portions of the CAWS, over the next two decades. That is, the Board should recognize the threat of AIS, which includes but is not limited to Asian carp, and the ongoing efforts to achieve an ecological separation, and perhaps a physical separation, between the Great Lakes and the Mississippi River System. The Lower Ship Canal is "ground zero" in that effort today, and it will continue to be for decades to come.

Perhaps more than any other participant in this proceeding, the Lemont Refinery is acutely aware of the AIS issue, because the massive electric fish barrier is the immediate downstream "neighbor" of the refinery. See Attachment 2, Exhibit A. We asked the Board to hold a hearing on the Asian carp issue. The Lemont Refinery is exposed to the dangers of the Coast Guard-designated Black Zone, also known as the Safety Zone, being located at its outfall. As a result, it faces the risks of any boating mishap at the refinery potentially resulting in a human fatality due to the electric fish barrier. With the release of the Great Lakes Commission report, "Restoring the Natural Divide; Separating the Great Lakes and Mississippi River Basins in the Chicago Area Waterway System," the uses of the CAWS are even more likely to be

affected by the AIS issue. Indeed, there is a schedule of research, reporting, and potential implementation that is ongoing.

1. The Record In This Matter Contains Unrefuted Testimony Supporting A Recognized Use For The Measures To Battle AIS In The CAWS By Using The Lower Ship Canal And The "Electric Fish Barrier"

There is no controversy in this record but that the electric fish barrier, and other efforts to combat the spread of AIS, is a critical activity in the CAWS. In the Board's deliberation in the First Notice opinion on the recreational use standards in Docket A, the Board noted:

> "...The Board agrees with the District that the IEPA's proposal does not take into account recent information about the current preventative measures being considered and implemented by other state, federal and Canadian agencies for dealing with Asian carp in the CAWS. The Board notes that the CAWS UAA, which forms the foundation of the IEPA's proposal, is dated August 2007, predating the current litigation and draft Framework. The IEPA has not updated its proposal to address the Asian carp issue since litigation began or the draft Framework was published, except to file a response in opposition to motions by CITGO/PDV and Stepan to hold an additional hearing on Asian Carp."
>
> The Board recognizes that he Asian carp preventative measures may have a significant impact on the CAWS and LDPR; however, the Board does not believe that the Asian Carp issue impacts a decision on recreational uses. The Board must protect existing uses of the CAWS and LDPR and those current existing uses are reflected by the IEPA's proposal. Therefore the Board will continue to monitor the Asian Carp issue and will hold hearings on the issue as the issue relates to aquatic life issues, but the Board finds that the Asian Carp preventative measures do not at this time change the exiting uses."

R08-9 Opinion and Order, dated August 5, 2010, at 87-88. Based on the testimony presented in those hearings, it is clear that: (1) Asian carp have an adverse effect on the indigenous fisheries downstream, (2) the electric fish barrier has an adverse effect on the aquatic life (and human life) that may come into contact with the waters in which it is placed; and (3) to remove it would likely cause more harm—to the Great Lakes and to the CAWS—than the harm that occurs from its operation in the Lower CSSC.

On November 8 and 9, 2010, the Board did hold hearings on the Asian Carp issue. Pre-filed testimony was submitted and presented by Robin Garibay, Julia Wozniak. Greg Seegert, and Jennifer Wasik. That testimony described the threat of Asian carp and other AIS to the habitat in the LPDR and in the CAWS, and it particularly addressed the threat the Asian carp could cause were they to migrate to Lake Michigan. Recall that a lawsuit was pending, as it still is, brought by other Great Lakes states to halt any water discharge from the CAWS to Lake Michigan—all because of the Asian carp. Just last fall, the Seventh Circuit Court of Appeals, sitting in Chicago, issued a ruling in that case that, while affirming the denial of a preliminary injunction, sets the stage for a full trial on the merits. *Michigan v. United States Army Corps of Engineers*, ---F.3d.---, 2011 WL 3836457 (7th Cir. 2011). A copy of that decision, which includes an overview of the alleged facts, is Attachment 3.

During the testimony before the Board in November, 2010, the following facts were adduced:

Pursuant to the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 as amended by the National Invasive Species Act of 1996, the Army Corps of Engineers conducted a study and then selected an electric barrier which is "a non-lethal deterrent with a proven history, which does not overtly interfere with navigation in the [ship] canal." As a result, the Coast Guard issued a rule that established a Safety Zone and a Regulated Navigation Area for the electric fish barrier. *See* Pre-filed Testimony of Robin L. Garibay, REM, filed October 8, 2010, Exh. 420. This is a unique action, to combine a Safety Zone and a Regulated Navigation Area (RNA). *See* Transcript of November 8, 2010 hearing, at 96. The Safety Zone is an area of restricted waters within the RNA in which there are strict restrictions on boaters. *Id.* The RNA restricts the types of vessels permitted in the waters and the mechanisms for reporting and

obtaining permissions to pass through the waters. *Id.* The affected area of the Lower Ship Canal extends from mile 295.5 to mile 297.2. *See* Exhibit A to the Pre-filed Testimony of James E. Huff, filed Feb. 2, 2011, Exh. 437; Attachment 2, Exhibit A. The Safety Zone, also known as the Black Zone, abuts the Lemont Refinery such that the Refinery had to move its boat dock to a new location lest it be prevented from using its boats.[5]

Clearly this has an adverse effect on any aquatic life in the zone or the area. Indeed, the amount of electric current in this field is such that if a boater or crew falls into the water, no rescuer may jump in after them. Ms. Garibay explained the research that the United States Navy has conducted regarding the effect of the electric barrier on human life:

> To gain perspective on the electric shock risk posed to a person emerged near a fish barrier in the Canal such emersion could be compared to that of an individual submerged in very cold water. In cold water emersion, the victim's survival time would be likely be [sic] measured in tens of minutes. The same person emerged in the strongest electrical field of the fish barrier might survive for only minutes.[6]
>
> Transcript of November 8, 2010 hearing, at 97-98.

Nonetheless, the electric barrier is the best, although perhaps temporary, measure that can be taken to prevent the spread of Asian carp into Lake Michigan. As Ms. Garibay explained, the barrier is:

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[5] Ms. Garibay also provided testimony regarding the extreme nature of this "Black Zone," which poses a "serious risk of injury or death." As Ms. Garibay explained, the mere existence of the RNA requires extreme safety precautions prohibiting from its waters, among other things, personal watercraft, fishing, or even being outside the cabin of a boat while in the RNA. *See* Exh. 424; *see also* Attachment 2.

[6] As was later clarified in the record, these survival rates were based on lower voltage rates in effect at the time. Since then, the electricity in the barrier has been significantly increased by 2-4 times. *See* Transcript of November 8, 2010 hearing, at 99-100.

> an important, and currently overlooked, designated use … [and] that inattention to this use or unintended consequences from upgrading the aquatic use could reduce the effectiveness of invasive species control to prevent detrimental impacts to Lake Michigan. It would not be wise to discontinue these activities - or "use" of the Lower Ship Canal - in the foreseeable future.

Ms. Garibay recommended that the Board "recognize the design and operation of the invasive species controls as providing three specific benefits:"

> 1) A mechanism that prevents support for an upgraded designated aquatic life use;
>
> 2) A recognized designated use of the Lower Reach of the Ship Canal, specifically through operation of electric barriers to deter migration of Asian carp to the Great Lakes, and use of piscicides to allow maintenance of the barriers; and
>
> 3) Discontinued use of electric barriers and piscicides would cause more system wide environmental damage than leaving them in place.
>
> Exh. 420. at 14; *see* Transcript of November 8, 2010, at 58; *see also* Attachment 4 at 5.

She concluded,

> ENVIRON recommends that control measures for the prevention of the passing of invasive species or control of invasive species migration should be recognized as a designated use for the Lower Reach of the Ship Canal. This designated use should be recognized in the Illinois regulations for water quality standards. In a systemwide approach to the Great Lakes, this designated use in the CAWS is in full support of the intent of the Clean Water Act goals.
>
> *Id.* at 17; *see* Transcript of November 8, 2010 hearing, at 18, 87; *see also* Attachment 4 at p 8.[7]

James E. Huff, P.E., also testified the electric barrier and rotenone applications are "particularly unique hazards to aquatic life … designed to create *non-support* conditions for

[7] Ms Garibay also provided information in response to Board member Girard's questions concerning the impact on native fishes from the Asian carp spreading up the Illinois River. See Public Comment 553, submitted November 12, 2010.

aquatic life so as to prevent invasive species from entering and leaving the Great Lakes." Exh. 437 at 5-6. As Mr. Huff noted, the Agency's current proposed rules, which would group the RNA along with the rest of the Ship Canal as "Use B," would "upgrade the aquatic life use designation [and] directly conflict[] with the local, state, and federal existing use of these waters as a barrier to halt the spread of invasive species." *Id.* at 6.

Jennifer Wasik also testified at these hearings. She reported that there:

> are many ongoing studies exploring options to slow or stop Asian carp expansion upstream towards Lake Michigan. Other types of fish deterrent barriers, using lights, sound and bubbles are being evaluated. The *Great Lakes and Mississippi River Inter-basin Study* [discussed in more detail in the following section] will determine the feasibility of options such as physical or ecological separation of the basins and lock closures.
>
> *See* Pre-filed Testimony of Jennifer Wasik, filed October 8, 2010, Exh. 431, at 3.

After reviewing all of the measures being pursued to monitor for the Asian Carp, she commented:

> [i]t appears that nearly every precaution taken to prevent Asian carp from moving through the CAWS into Lake Michigan has potential negative consequences to resident fish populations. In an aquatic environment subject to planned fish kills and intensive electrofishing and netting, even the current resident fish population of tolerant and moderately tolerant species in the CAWS may be vulnerable.
>
> *Id.* at 7.

The same basic views were presented by Greg Seegert of EA Engineering. He presented seven ways in which the presence of Asian carp would create significant adverse effects to the native fish community. *See* Pre-filed Testimony of Gregg Seegert, filed October 8, 2010, Exh. 428, at 9-14; *see also* Transcript of November 8, 2010 hearing, at 151, 155-56. He also

reviewed the short term and the long term efforts underway to try to control the Asian carp, including the possible creation of a toxic zone at a MWRDGC plant or physical separation of the Illinois River and Lake Michigan Basins. *Id.* at 15.

We have included in Attachment 4 hereto, a summary of the risks and recommendations that are being pursued by other agencies, agencies over whom IEPA and USEPA have little control. However, the decisions made as a result of that process, and in the trial to be held in federal district court in Chicago, will affect what is done with the CAWS and particularly the Lower CSSC.

2. The Recommendation Of The Great Lakes Commission To Provide A Physical Barrier Between Lake Michigan And The Illinois River System Would Dramatically Alter The Uses Of The CAWS, Particularly In Several Designated Places, Including In The Immediate Vicinity Of The Lemont Refinery.

As the Board, and probably everyone in this proceeding knows, the diversion over a century ago of the Chicago River from flowing into Lake Michigan and sending sanitary wastewater into the newly constructed Chicago Sanitary and Ship Canal, and hence into the Illinois River system, was done for public health reasons. It has been called one of the engineering wonders of the modern world. It enabled Chicago to develop and thrive. That condition allowed the Board to develop special unique water quality standards for Lake Michigan. It provided for a means of managing wastewater and stormwater and it supported commerce to develop in Chicago.

But the Great Lakes Commission just released its report, "Restoring the Natural Divide. Separating the Great Lakes and Mississippi River Basins in the Chicago Area Waterway System." (Included as Attachment 5, attached hereto.) This report recommends a physical separation of the Great Lakes from the Mississippi River system in the CAWS. Moreover, the

Army Corps of Engineers is conducting the Great Lakes and Mississippi River Interbasin Study ("GLMRIS") which was authorized by Congress in 2007 and is scheduled for completion in 2015. The purpose of the GLMRIS is to identify how species may pass "between the Great lakes and Mississippi River watershed, existing AIS with the potential to pass through the CAWS and control measures, including separation, to prevent AIS transfer between the basins. … [T]he study will recommend an overall plan to prevent AIS transfers between the Mississippi River and Great Lakes systems…" Attachment 5 at 11. Thus, the issue of AIS controls in the CAWS is not an issue that will recede. It is an international and federal issue, not one that Illinois alone can decide. Indeed, it is not even an issue that U.S. EPA can decide. For the Lower CSSC, the AIS issue will dominate water quality decisions for decades to come.

We urge the Board consider what the physical separation in the CAWS would mean for the hydrology of the Lower CSSC, for the uses of the Lower CSSC, and for the appropriate water quality standards which are to be based on those uses. These measures could completely change the factors which the Board and participants such as the Lemont Refinery are now facing.

The Commission suggests three different conceptual approaches to the physical barrier. The "Down River Alternative" is to place a single barrier somewhere "between the confluence of the Chicago Sanitary and Ship Canal and the Cal-Sag Channel and the Lockport Lock." **The report does not pick a location, and essentially says that the barrier might be at any point on the Lower CSSC**. *See* Attachment 5, p, 16.

The Commission recognizes the importance of the electric fish barrier. Asian carp is "the most acute [aquatic invasive species] threat facing the Great Lakes today" *Id.* at 7. The electric barriers are "a key line of defense protecting the Great Lakes from Asian cap invading

through the CAWS." *Id.* at 8. That the Commission recommends spending over $3 billion shows the significance it attaches to battling the spread of AIS between the Great Lakes and the Mississippi River System.

If the "Near-Lake Alternative" is selected, the quantity of water flowing down the Lower CSSC would not change substantially from present conditions— under this option there is little water being diverted from the CAWS into Lake Michigan. With the "Mid-System Alternative," the flows from the North Side treatment plant and a large portion of the central Chicago area would be diverted back into the Lake. How much less flow there would be with this option against the present condition is unknown. But if the "Down River Alternative" were chosen, then all the wastewater from the MWDGC treatment plants at Stickney and Calumet would be diverted back to Lake Michigan. The quantity of natural flow and stormwater down stream of this barrier could be dramatically less, potentially altering the water quality standards and discharge limitations for industries and municipalities discharging into the Lower CSSC.

Until there is some certainty about which is the preferred strategy for "ecological separation," and how quickly it might develop and be implemented, the electric fish barrier will remain the principal AIS tool. It seems likely that other "temporary" or "experimental" measures such as rotenone will be needed to address AIS, and particularly the Asian Carp threat. Thus, the use of a portion of the Lower CSSC for the aquatic invasive species barrier is a key part of the current uses of the CAWS.

The Board should acknowledge the efforts underway, by a variety of federal, state, and local agencies, NGOs, and private citizens to block the passage of AIS from the Illinois River System into Lake Michigan, and vice versa. We do not understand the refusal of the Agency to

acknowledge this critical effort. Not only do both state and federal law require that this effort be recognized with respect to aquatic life use, but the considerable efforts of many agencies, of which neither USEPA nor IEPA are leaders, directly effect the CAWS and this issue. We urge the Board to take the broader view and build in recognition of this issue into the designated uses of the CAWS. Indeed, what would someone say if the Board refuses? That the Board does not care about preventing AIS from migrating to the Great Lakes, or from the Great Lakes into the Mississippi River System? We doubt that the Board would ignore this issue as a matter of policy. We now turn to the law.

3. Applicable Law Requires That The Uses Of The Lower Ship Canal For Aquatic Invasive Species Control, Including But Not Limited To The Electric Fish Barrier, Be Recognized By The Board.

Among the unique characteristics of one stretch the Ship Canal is the electric fish barrier and its associated Regulated Navigation Area ("RNA"). We urge the Board to recognize these unique characteristics in setting specific aquatic life use designations pursuant to 40 CFR 131.10(g) and 415 ILCS 5/27(a). The RNA is defined by the U.S. Coast Guard as the area of the Chicago Sanitary and Ship Canal from River Mile 295.5 to River Mile 297.2.

a. Federal law requires the electric fish barrier to be addressed under the Use Attainability Analysis.

The Board has described the analysis that is to be undertaken. The Board should follow the same analysis with respect to aquatic life under the Use Attainability Analysis for the Lower CSSC as it did for the recreational issue in Docket A. As stated by the Board, "[t]o remove a designated use or establish a use other than the CWA aquatic life and recreational goals, States must consider six Use Attainability Analysis (UAA) factors in order to adopt such a use." June 16, 2011 Board opinion at 6-7. Those factors are:

> **(1)** Naturally occurring pollutant concentrations prevent the attainment of the use; or **(2)** Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or **(3)** Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or **(4)** Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or **(5)** Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or **(6)** Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

Id. The Agency found that at least three of these criteria (specifically, factors 3, 4, and 5) apply to the Lower CSSC. See Exhibit 29, Attachment 1. The Agency explained that human caused conditions, hydrological modifications, and natural physical conditions all prevent the waterways from supporting aquatic life. We agree, and on that basis there is no reason to upgrade the uses of the Lower CSSC.

Since the time of the Agency's Proposal, the electric fish barrier and RNA have been expanded and the electric charge it emits has been repeatedly increased. Nonetheless, the Agency has not addressed this unique factor. Instead, it has failed to recognize the prevention of invasive species as an aquatic-life use for this stretch of the Ship Canal.

As described earlier in these Comments, Ms. Garibay's testimony makes quite clear that the electric fish barrier is within Factor 3 of 40 CFR § 131.10 and hence it should be recognized and taken into account by the Board.

b. Illinois law requires the electric fish barrier to be taken into account.

The Environmental Protection Act also requires that the Board "take into account the existing physical conditions, the character of the area involved, including the character of surrounding land uses, … the nature of the … receiving body of water, and the technical feasibility and economic reasonableness of measuring or reducing the particular type of pollution." 415 ILCS 5/27(a).

The electric fish barrier and RNA are existing physical conditions that, by design, affect the aquatic life of their segment of the Ship Canal. They are designed to kill fish and to prevent them from migrating to Lake Michigan. Indigenous fish are also killed in this context and in the occasional uses of rotenone to monitor for the spread of Asian Carp. Any efforts undertaken to increase water quality so as to support aquatic life in this stretch of the Ship Canal will fail to achieve any increase in fish populations, as the electric barrier will still kill fish. As a result, it is economically unreasonable to require increased water quality to support aquatic life with one hand while applying lethal[8] doses of electricity to destroy aquatic life with the other hand.

The Board should follow its analysis in Docket A to conclude that the Lower CSSC should have a use which recognizes the ongoing efforts of a large number of federal, state and local agencies to control AIS through the CAWS.

B. The Record Clearly Demonstrates That An Upgrade Of The Designated Uses Of The Lower Ship Canal Is Not Justified

[8] As described in testimony before the Board, the doses of electricity are lethal to both aquatic and human life. *See* Exh. 424; 75 Fed. Reg. 75147-48, 75150-51.

1. The Agency's initial evidence demonstrates that no upgrade is justified.

The original Petition and exhibits in this matter demonstrate that the Lower CSSC meets three different recognized exceptions, each of which justifies not upgrading the designated uses of the Lower CSSC. Those three exceptions are:

- Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
- Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or
- Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses.

See Agency Proposal at 48; 40 CFR § 131.10(g), (3), (4), (5). The Agency cited human caused conditions, hydrological modifications, and natural physical conditions each prevent the waterways from supporting a full aquatic life variety. The Agency noted, but did not elaborate that "In April 2002, an aquatic invasive species dispersal barrier was installed in the CSSC at Romeoville to prevent Asian carp and other invasive species' passage." *Id.* at 50.

Agency Exhibit 29 is a concise and graphic summary of the application of the Use Attainability Analysis factors to the CAWS and Lower Des Plaines River and showing the applicable exceptions with respect to aquatic life. (A copy of the Agency's Exhibit 29 is attached hereto as Attachment 1.)

2. The evidence submitted by the Lemont Refinery further demonstrates that no upgrade is justified.

The Lemont Refinery agrees with the Agency's observations, and provided additional testimony in support of the conclusion that the Lower Ship Canal is not appropriate to be designated for an upgraded use -- for recreational use or for aquatic life use.

As described earlier in this Comment, Robin Garibay of ENVIRON testified on behalf of the Lemont Refinery and focused on the attainable quality of aquatic life use in Lower Ship Canal. She stated:

> [i]n our view, effective water quality management strongly indicates that this upgrade recommendation [of IEPA to Use B] should not be followed by the Board. … [W]e believe that the Lower Reach of the Ship Canal cannot support the upgrade to an aquatic designated Use B. … Indeed, more recent information provides even greater reason why one of the factors, UAA Factor 3, due to the need to protect Lake Michigan against invasive species, is even more significant than when this proceeding began.
>
> Exh. 420 at 4; *see also* Transcript of November 8, 2010 hearing, at 19.

Ms. Garibay first reviewed Factors 4 and 5 and found a significant consistency in the testimony and exhibits that the Board had received in this proceeding with respect to the Lower Ship Canal. She testified, "[h]ighlights include:

- Habitat for supporting aquatic life is poor to very poor
- Richness and abundance of aquatic species is poor to very poor

"Attributes referenced by the researchers as contributing to the poor to very poor scores include:

- Canal depth and shape (square or rectangular cross-section) to accommodate navigation and flood control (i.e., deep draft steep vertical-wall)
- No sinuosity (the Ship Canal is a navigation canal)
- Absence of riffle-run, pool-glide characteristics (the Ship Canal is a navigation canal)
- Rapid changes in flow velocity and water level (4 to 6 feet in a 24-hr to 48-hr period) to accommodate flood control, including stormwater run-off, and maintain navigation
- Little or no fixed aquatic or overhanging riparian vegetation or other refugia for aquatic life
- Poor substrate material and silty substrates
- Presence of suspended sediments from navigation and flood control resuspension, stormwater runoff, and treated effluents

"Data in support of these attributes have been presented in 2007 and 2010 reports with the habitat and biological assessments summarized for the Lower Reach of the CSSC. The available information from these reports includes:

A. 2007 Qualitative Habitat Evaluation Index (QHEI) Scores are:

- 37 (Stephen St)
- 27 (Romeoville)
- 40.5 (Lockport)

"As referenced in 2007 report, QHEI scores less than 30 are indicative of very poor ability to support aquatic life and scores between 30 and 45 are indicated of a poor ability to support aquatic life.

B. 2010 Report of Primary QHEI Habitat Attributes[9] applicable to the Ship Canal:

- Off-channel Refuge: 4 (score), applicable to entire reach of Ship Canal (maximum score for CAWS is 8, and a higher score represents better habitat)
- Vertical Wall Banks: 35.5 miles is vertically walled with 78% of the walled banks due to construction of Ship Canal through limestone bedrock. The Ship Canal has a high percentage of vertical walls in the CAWS. Such extensive armoring removes natural interactions that would otherwise occur with an intact riparian zone greatly reducing the quality of aquatic habitat to support life history functions of fish and invertebrates
- Riprap-armored Banks: 3.3 miles, which is relatively few miles as compared to other CAWS
- Macrophyte Cover:
    - 0% (Stephen St)
    - < 2% (Lockport)

"The range for other CAWS is 0% to 13% submerged aquatic macrophyte cover; higher percentage coverage, the more supportive of aquatic life.

- Overhanging Vegetation:
    - ~2% (Stephen St)
    - ~3% (Lockport)

"The range of other CAWS is 0% to ~34% overhanging riparian vegetation, higher percentage overhanging vegetation, the more supportive of aquatic life.

- Bank Pocket Areas (score) with a maximum for CAWS of 20.
    - ~20 (Stephen St)
    - ~6 (Lockport)

Garibay noted that a higher score would be more supportive of aquatic life. *Id.* at 4-6.

[9] Primary habitat attributes for the CAWS as related to correlation with fish richness and/or abundance and may have some potential for improvement in the CAWS.

She then reviewed the biological assessment summaries for data generated between 1993 to 2002 for the 2007 report and 2001 to 2008 for the 2010 report:

- "2007 fish Index of Biological Integrity (IBI) = 17 (Lockport)

"IEPA considers IBI scores of greater than 41 to be indicative of a fully supported fish community and scores of less than 20 to be very poor.

- 2007 Macroinvertebrate Biotic Index (MBI)
- 10 (Lockport)

"IEPA considers MBI scores of less than 5.9 to be indicative of a fully supported macroinvertebrate community and values greater than 8.9 to be poor.

- 2010 Fish Richness = 2 to 9 species or taxa (Lockport) with more than 80% to all of the species classified as tolerant (to pollution) species. For example, gizzard shad, carp, and certain sunfishes, with their presence being noted to being consistent with only mobile species suited to the habitat conditions.
- 2010 Fish Abundance = 22 to 179 individuals, which is consistent with the presence of mobile species."

Id.

Ms. Garibay presented a review of the compiled information on sediment quality and water quality data for the Ship Canal. "Sediment quality for the Ship Canal exceeds published sediment threshold effect concentrations for 7 metals and 2 organic chemical families. Water quality, when compared to the upgraded water quality criteria for Illinois general aquatic use, is not been consistently attained for 10 constituents including DO, temperature and ammonia." *Id* at 7. She continued,

> "... the predominant factor impacting aquatic life and the ability of the lower reach of the Ship Canal in supporting aquatic life are related to the physical habitat characteristics inherent to the Canal. These physical habitat conditions will not change regardless and cannot be significantly improved regardless of proposed water quality criteria changes associated with the proposed upgrade to Aquatic Life Use B designation.
>
> "The habitat characteristics which result in poor to very poor attributes to support aquatic life are directly related to the main objectives of this manmade canal: to support commercial navigation and convey waters away from Lake Michigan. The waters conveyed away from Lake Michigan include stormwater from point sources and non-point sources, treated effluent, and non-contact cooling water.

> In operating the Ship Canal, there is mandatory management of the water level in the canal for navigation and flood control. The combination of operations and physical construction constrains shoreline habitat, causes drying and wetting of the limited shoreline habitat, encourages sediment scouring and resuspension, and does not allow for submerged or overhanging vegetation to be in-place. As noted in the Statement of Reason, these conditions are "irreversible", the design and operations of the lower reach of Canal are such that a biological condition that meets the Clean Water Act aquatic life goal are not maintainable.
>
> "The aquatic life in the lower reach of Ship Canal has been classified according to established species richness and abundance estimations relevant to the ecoregion as 'poor' to 'very poor', with low species richness. The fish species have been identified as mobile species that are predominately pollutant tolerant, with the habitat predominantly unsupportive of their early life stages. The macroinvertebrates are dominated by pollutant tolerant worms.
>
> *Id.* at 7-8.

She summarized the evidence on Factors 4 and 5 as follows:

> "As the design and operation of the Lower Reach of the Ship Canal are irreversible, the evaluation of the UAA Factor 4 - of hydrologic modification, including dams, - and Factor 5 - of physical conditions, including flow, depth, pools and riffles - would lead to a determination that an expectation of attainment of aquatic life use higher than the current use is extremely unlikely.
>
> "Moreover, based on the District's recently submitted "Habitat Improvement Report", and disregarding economic feasibility, the technically feasible options for improving habitat for the Ship Canal would not significantly impact the Ship Canal fisheries quality. We would assert that for the Lower Reach of the Ship Canal, habitat improvements identified in this report may not be technical feasible. Based on our evaluation of the Factors 4 and 5 the appropriate expectation of designated use for the Lower Reach of the Ship Canal is as it is currently designated for the support of indigenous aquatic life.
>
> *Id* at 8-9; *see also* Transcript of November 8, 2010 hearing, at 59-60, 80-81.

The testimony of Jim Huff is also supportive of the conclusions reached by Garibay with respect to the Lower Ship Canal. His testimony added a factor that the Agency had ignored—that the Lower Ship Canal serves to carry snow melt run off from most of the urban Chicago area.

> Stormwater runoff flows into the Lower Ship Canal, carrying with it pollutants from roads, parking lots and other surfaces. In the winter months, this stormwater carries road salt and other chemicals used by the state and municipalities to keep streets, highways and parking lots safe. While there are potential activities to reduce the amount of sodium chloride applied within the basin, there has been no demonstration that these reductions will be sufficient to achieve the proposed chloride water quality standard of 500 mg/L. When de-icing salts cause a spike in the chloride level, the Lemont Refinery loses its mixing zone for chlorides (and sulfates), as the Lower Ship Canal's upstream water quality exceeds the water quality standard for chlorides.
>
> Exh. 437 at 5; *see also* Transcript of March 9, 2011 hearing, at 35-36.

While the evidence concerning Factors 4 and 5 would clearly justify retaining the existing uses for the Lower CSSC, the third factor would also clearly justify retaining the current uses. As stated by Ms. Garibay:

> Our evaluation of human-caused conditions preventing an upgrade of aquatic life use designation shows that, if those measures were "remedied", that such would cause more environmental damage to correct. And this is particularly true with respect to the operation of the Lower Reach of the Ship Canal for invasive species control. As noted in the 2007 Statement of Reason, the operation of the Aquatic Invasive Species Dispersal Barrier, involves applying an electrical charge directly to the water at a t rate intended to prevent any fish from passing alive (pg 50, IEPA Statement of Reason). Since the 2007 Statement of Reason, the operations of the Lower Reach of the Ship Canal for invasive species control has escalated to include the operation of two barriers, not just one, and the repeated use of piscicides to further control fish encroachment and allow more frequent maintenance of the electric barriers. We believe that these operations, combined with managing water quality at current conditions, are an important, and currently overlooked, designated use of the Lower Reach of the Ship Canal. In addition, we believe that inattention to this use or unintended consequences from upgrading the aquatic use could reduce the effectiveness of invasive species control to prevent detrimental impacts to Lake Michigan. It would not be wise to discontinue these activities - or "use" of the Lower Ship Canal - in the foreseeable future.
>
> Exh. 420 at 9-10.

Thus, there is no justification to upgrade the designated uses of the Lower CSSC.

C. The Record Clearly Demonstrates That The Lower Ship Canal Has Substantially Different Characteristics And Uses Than Other Portions Of The Waters Formerly Designated As "Secondary Contact"

The Lemont Refinery discharges into the Lower CSSC. At the point of its discharge, the Lower CSSC can be described—as the Agency has stated and the Board has recognized—as an "effluent dominated" waterway. The uses of the Lower CSSC are demonstrably different than the use of the other bodies of water in the Chicago Area Water System ("CAWS") in this proceeding.

The Agency is proposing to designate the Lower CSSC as an Aquatic Life Use B Water. The is a very broad grouping of waterways which also includes the North Branch Chicago River, the Chicago River, South Branch Chicago River, the Calumet River to Torrence Avenue, the Lake Calumet Connecting Channel, and the Lower Des Plaines River from the Lower Ship Canal to the Brandon Road Lock and Dam. With the exception of the Lake Calumet Connecting Channel and the Lower CSSC, all of the waterways in this group are natural waterways. A proper consideration of the uniqueness of the artificially created and physically constrained Lower CSSC is lost by including it in this grouping. Aquatic Life Use B Waters are, "capable of maintaining aquatic life populations predominated by individuals of tolerant types that are adaptive to the unique physical conditions, flow patterns, and operational controls designed to maintain navigational use, flood control, and drainage functions in deep-draft, steep-walled shipping channels." (Agency's Statement of Reasons, p 49). The Agency has proposed statutory language which sets out the "Purpose" of these Aquatic Life Use B restrictions as protecting "the highest quality aquatic life ... that is attainable..." *See* Agency proposal for 35 Ill. Adm. Code 302.402.

As the Agency noted in its Statement of Reasons, "the environmental potential for the river was historically deemed to be limited to the point of hopelessness." Agency Proposal at 17. The Board has consistently recognized the challenges, variability, and uniqueness of the CAWS and Lower Des Plaines River and many of the same challenges and limitations that the Board recognized in the early 1970s remain valid today. This is particularly true for the Lower CSSC. As explained by Jim Huff:

> The Lower Ship Canal is typically 200 to 300 feet. wide with depths greater than 27 feet. (CDM, 2007). The construction of the Lower Ship Canal includes vertical walls and steep embankments. The Lower Ship Canal was completed as part of the greater Ship Canal in 1907 to divert pollutants away from Lake Michigan, the City of Chicago's primary water supply, and it was expanded in 1919 to its present form to increase navigation capabilities and provide additional waste dilution. With the potential exception of the Calumet-Sag Channel, there is no other water body in the CAWS which has the unique physical features, commercial shipping, discharge loadings, and lack of appropriate habitat for aquatic life, as the Lower Ship Canal. And none are so specifically associated with efforts to control the spread of invasive species.
>
> The aquatic habitat of the Lower Ship Canal is rated as "poor to very poor" (IEPA, 2006). Overall stream use is designated as *non-support* for fish consumption and aquatic life, which does not factor in the electric barrier or the periodic use of rotenone to kill all the fish. The identified causes of impairment were polychlorinated biphenyls (PCBs), iron, oil and grease, dissolved oxygen ("D.O."), total nitrogen, and total phosphorus. Identified sources of the impairment include combined sewer overflows, urban runoff/storm sewers, and impacts from hydrostructure flow regulation/ modification, municipal point source discharges, and other unknown sources.
>
> Stormwater runoff flows into the Lower Ship Canal, carrying with it pollutants from roads, parking lots and other surfaces. In the winter months, this stormwater carries road salt and other chemicals used by the state and municipalities to keep streets, highways and parking lots safe. While there are potential activities to reduce the amount of sodium chloride applied within the basin, there has been no demonstration that these reductions will be sufficient to achieve the proposed chloride water quality standard of 500 mg/L. When de-icing salts cause a spike in the chloride level, the Lemont Refinery loses its mixing zone for chlorides (and sulfates), as the Lower Ship Canal's upstream water quality exceeds the water quality standard for chlorides.

> In addition to the stormwater runoff impact, the electric barrier system and rotenone applications on the Lower Ship Canal are particularly unique hazards to aquatic life. Both these hazards, lying within the same reaches of the Lower Ship Canal as the Lemont Refinery, are designed to create *non-support* conditions for aquatic life so as to prevent invasive species from entering and leaving the Great Lakes. The Agency's proposal to upgrade the aquatic life use designation of the Lower Ship Canal directly conflicts with the local, state, and federal existing use of these waters as a barrier to halt the spread of invasive species. These barriers were authorized by Congress, with the full recognition on the part of federal and state biologists that any positive fish migration in the Lower Ship Canal was being sacrificed to protect the Great Lakes as well as the Mississippi River Basin from aquatic invasive species.
>
> These electric barriers will not only prevent the aquatic invasive species from migrating, but they will also prevent all other fish from migrating up or down the Lower Ship Canal at Lockport, effectively terminating the water body at this point from a biological perspective. Normally, preventing migration is not a desirable outcome, but it is certainly necessary in light of the greater goal of protecting the biological integrity of the Great Lakes and the Mississippi River Basin.
>
> Exh. 437 at 4-6; *see also* Transcript of March 9, 2011 hearing, at 35-36.

II. RECOMMENDED LANGUAGE TO REFLECT THE USES OF THE LOWER CSSC

The Lemont Refinery had previously proposed a separate "Use C" for the stretch of the Ship Canal at which the electric fish barrier and the RNA are located, as established by the Coast Guard. We stand by that proposal and urge the Board to consider it. However, in light of the fact that the Lower CSSC has the electric fish barrier and it may even become the locus of a permanent physical barrier to separate the Mississippi River system from the Great Lakes system, these uses for AIS control should be recognized. While other locations in the CAWS may become the location of the physical barrier, the entire reach of the Lower CSSCS is identified as the general area for the "Down-River Alternative." In light of the extreme differences that would occur to dischargers to the Lower CSSC if a permanent barrier were to be constructed at some point in the Lower Ship Canal, the Board should build this use, and potential dramatic changes, into its rules.

Therefore, in light of the Great Lakes Commission report and its support for a physical barrier—at some location in the CAWS to be determined at a later date—we would suggest the Board has three options:

- Suspend further consideration of the Dockets C and D as they relate to the Lower CSSC, until it becomes evident if there will be a physical barrier and, if so, where it is located and what effect that will have on the hydrology of the Lower CSSC;
- Recognize the use of the electric fish barrier in its present location and the possibility of a physical barrier being constructed at some point within the Lower CSSC; as a designated use of the CAWS to battle AIS; or
- In conjunction with the foregoing, add a process by which future stream segments could be added to the list of designated uses of the CAWS for the purposes of battling AIS which could be affected by an adjusted standard proceeding, that would include not only adding the use but also adjusting the water quality standards according to the added use.

The Lemont Refinery would support any one of these approaches. We have included as Attachment 6 our prior suggested "Use C" language with a modification to reflect the entire reach of the Lower CSSC being so designated.

III. CONCLUSION

The Lemont Refinery reiterates its proposal that at least the area of the RNA (and preferably the entire Lower CSSC) be set aside as a separate use category, or set aside under a separate subdocket. The Lower CSSC in general, and the RNA area in particular, are "less natural than most (if not all) of the other segments of the CAWS and Lower Des Plaines River," which is the language the Agency used in justifying a separate subdocket to address the South Fork of the South Branch Chicago River (also known as "Bubbly Creek"). *See* Reply of the Illinois Environmental Protection Agency, ¶11, Filed in R08-09(C) on Jan. 30, 2012. As the Agency, the MWRDGC, and the Environmental Groups have all noted with regard to Bubbly Creek, such uniquely non-natural water bodies are appropriately segregated into separate

subdockets to "facilitate the completion of the Board's determinations" in the rest of this proceeding.

WHEREFORE, the Lemont Refinery respectfully requests that the Board designate a Use C for the Lower CSSC. In the alternative, the Board should designate the RNA and the Black Zone, defined as the area of the Chicago Sanitary and Ship Canal from River Mile 295.5 to River Mile 297.2, as a separate aquatic use area, as a "Use C" segment. Such a designation would recognize the existing use of this stretch of the Ship Canal and prevent any actions that might negatively impact the efficacy of the electric barrier.

Dated: March 5, 2012

Respectfully submitted,

CITGO PETROLEUM CORPORATION, and
PDV MIDWEST, LLC, Petitioners

By: _____
Jeffrey C Fort

Jeffrey C. Fort
Ariel J. Tesher
SNR Denton US LLP
233 S. Wacker Drive, Suite 7800
Chicago, IL 60606-6404

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INDEX OF ATTACHMENTS

Attachment 1 - Agency's Exhibit 29

Attachment 2 (Exhibit A) from Jim Huff's testimony filed February 2, 2011 which depicts these zones and their vicinity to the Lemont Refinery

Attachment 2 (Exhibit B) the final action of the Coast Guard designating the boundaries of these areas, as described in Huff's exhibit. See "Safety Zone and Regulated Navigation Area, Chicago Sanitary and Ship Canal, Romeoville, IL," 76 Fed Reg 77121-77125 (December 12, 2011), adopting 33 CFR 165.923

Attachment 3 - *Michigan v. United States Army Corps of Engineers*, ---F.3d.---, 2011 WL 3836457 (7th Cir. 2011)

Attachment 4 - Excerpts from Garibay Testimony

Attachment 5 - "Restoring the Natural Divide. Separating the Great Lakes and Mississippi River Basins in the Chicago Area Waterway System." Published by the Great Lakes Commission

Attachment 6 - Suggested "Use C" language for the Lower CSSC

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
WATER QUALITY STANDARDS AND	)	
EFFLUENT LIMITATIONS FOR THE	)	
CHICAGO AREA WATERWAY SYSTEM	)	R08-9(C)
AND THE LOWER DES PLAINES RIVER:	)	(Rulemaking-Water)
Adm. Code Parts 301, 302, 303 and 304	)	

ATTACHMENTS TO FINAL COMMENTS ON SUBDOCKET C

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Jeffrey C. Fort
Ariel J. Tesher
Attorney for Petitioners
SNR Denton US LLP
233 S. Wacker Drive, Suite 7800
Chicago, IL 60606-6404

ATTACHMENT 1

UAA Factor Application to the Lower Des Plaines River and CAWS

UAA Factor Applications to CAWS and Lower Des Plaines River

Waterway			Recreational Use		Aquatic Life Use	
Reach	Beginning	Ending	UAA Factors	Attainable Use	UAA Factors	Attainable Use
Upper NSC	**Willmete PS**	**N. Side WRP**	**3**	Incidental Contact Recreation	**3, 4, and 5**	CAWS Aquatic Life Use A
Lower NSC	**N. Side WRP**	**NBr**	**3**	Incidental Contact Recreation	**3, 4 and 5**	CAWS Aquatic Life Use A
Upper NBr	**NSC**	**NBr Turning Bsn S**	**3**	Incidental Contact Recreation	**3, 4 and 5**	CAWS Aquatic Life Use A
Lower NBr	**NBr Turning Bsn S**	**ChgoR**	**3**	Incidental Contact Recreation	**3, 4 and 5**	CAWS & Brandon Pool Aquatic Life Use B
ChgoR	**Chgo Lock**	**NBr**	**3**	Incidental Contact Recreation	**3, 4 and 5**	CAWS & Brandon Pool Aquatic Life Use B
SBr	**ChgoR**	**CSSC**	**3**	Incidental Contact Recreation	**3, 4 and 5**	CAWS & Brandon Pool Aquatic Life Use B
SFk SBr	**Racine Ave. PS**	**SBr**	**3**	Incidental Contact Recreation	**3, 4 and 5**	CAWS & Brandon Pool Aquatic Life Use B
Upper CSSC	**SBr**	**CSC**	**3**	Incidental Contact Recreation	**3, 4 and,5**	CAWS & Brandon Pool Aquatic Life Use B
Lower CSSC	**CSC**	**LDPRBrand**	**3**	Non-Recreational	**3, 4 and 5**	CAWS & Brandon Pool Aquatic Life Use B

UAA Factor Applications to CAWS and Lower Des Plaines River

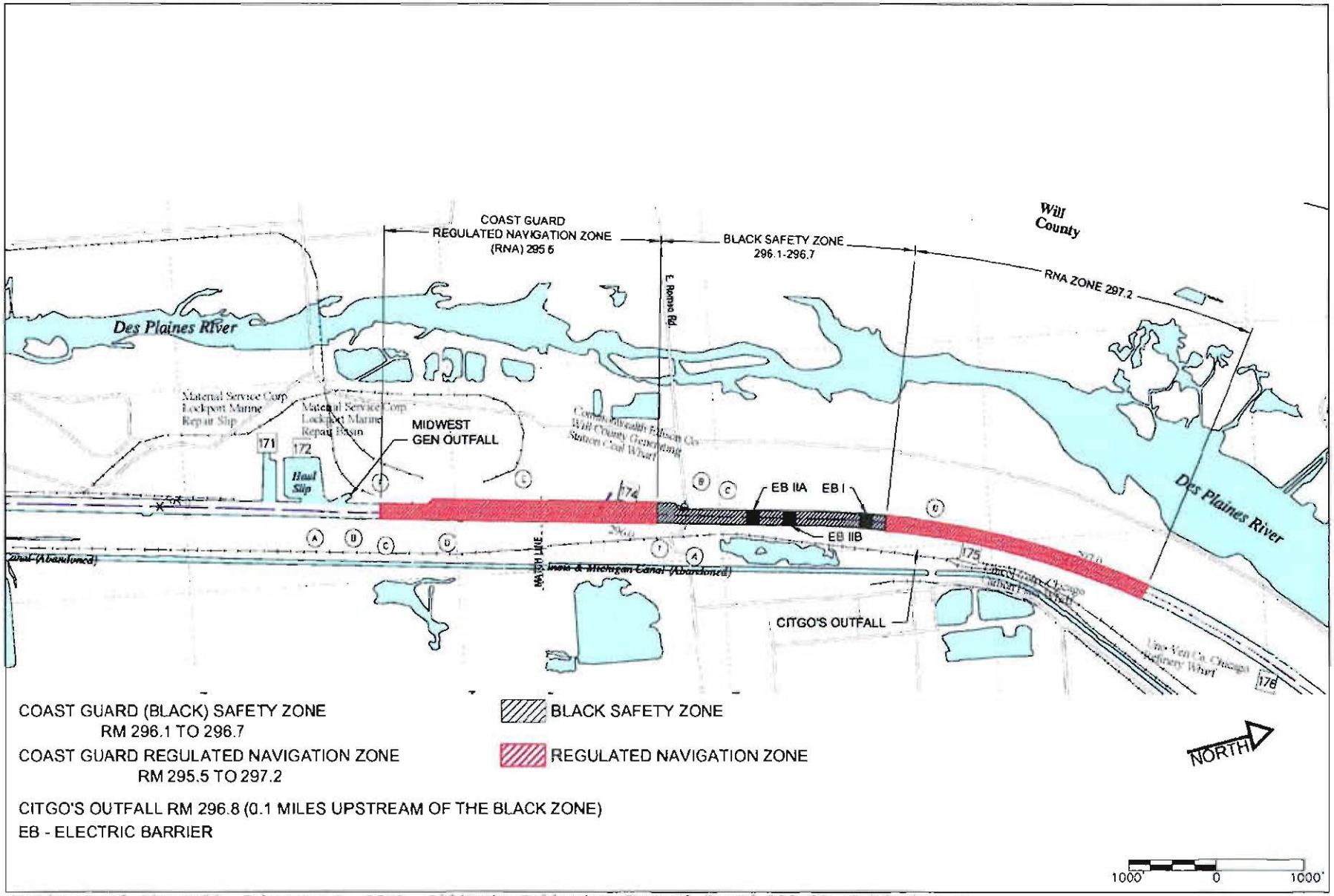
Waterway			Recreational Use		Aquatic Life Use	
Reach	Beginning	Ending	UAA Factors	Attainable Use	UAA Factors	Attainable Use
Upper CalR	**CalHbr**	**Torrence Ave.**	**3 and 4**	Non-Contact Recreation	**3, 4 and 5**	CAWS & Brandon Pool Aquatic Life Use B
Middle CalR	**Torrence Ave.**	**O'Brien L&D**	**3**	Incidental Contact Recreation	**3, 4 and 5**	CAWS Aquatic Life Use A
Lower CalR	**O'Brien L&D**	**Grand CalR**	**3**	Incidental Contact Recreation	**3, 4 and 5**	CAWS Aquatic Life Use A
LakeCal	**HbrVw GC**	**126th St.**	**3**	Incidental Contact Recreation	**4 and 5**	CAWS Aquatic Life Use A
LakeCal CC	**126th**	**CalR**	**3**	Incidental Contact Recreation	**3, 4 and 5**	CAWS & Brandon Pool Aquatic Life Use B
Little CalR	**Grand CalR**	**CSC**	**3**	Incidental Contact Recreation	**3, 4 and 5**	CAWS Aquatic Life Use A
Grand CalR	**Indiana Line**	**Little CalR**	**3**	Incidental Contact Recreation	**3, 4 and 5**	CAWS Aquatic Life Use A
CSC	**Little CalR**	**CSSC**	**3**	Incidental Contact Recreation	**3, 4 and5**	CAWS Aquatic Life Use A
LDPRBrand	**CSSC**	**Brandon L&D**	**3 and 4**	Non-Recreational	**3, 4 and 5**	CAWS & Brandon Pool Aquatic Life Use B

UAA Factor Applications to CAWS and Lower Des Plaines River

Waterway			Recreational Use		Aquatic Life Use	
Reach	Beginning	Ending	**UAA Factors**	**Attainable Use**	**UAA Factors**	**Attainable Use**
LDPRUpDres	**Brandon L&D**	**I-55**	**3**	Incidental Contact Recreation	**None**	Upper Dresden Is. Pool Aquatic Life Use
Factor 3: Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place						
Factor 4: Dams, diversions or other types of **hydrologic modifications preclude the attainment of the use**, and it is not feasible to restore the water body to its original condition **or to operate** such modifications in a way that would result in the attainment of the use						
Factor 5: Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles and the like, **unrelated to water quality, preclude attainment of aquatic life protection uses**						

ATTACHMENT 2 (Exhibit A)

Exhibit A



Testimony of Jim Huff, February 2, 2011, Illinois Pollution Control Board R08-09 (Subdocket C).

ATTACHMENT 2 (Exhibit B)

[Federal Register Volume 76, Number 238 (Monday, December 12, 2011)]
[Rules and Regulations]
[Pages 77121-77125]
From the Federal Register Online via the Government Printing Office [www.gpo.gov]
[FR Doc No: 2011-31706]

DEPARTMENT OF HOMELAND SECURITY

Coast Guard

33 CFR Part 165

[Docket No. USCG-2011-1108]
RIN 1625-AA11, 1624-AA00

Safety Zone and Regulated Navigation Area, Chicago Sanitary and Ship Canal, Romeoville, IL

AGENCY: Coast Guard, DHS.

ACTION: Final rule.

SUMMARY: The Coast Guard is establishing both a safety zone and a Regulated Navigation Area on the Chicago Sanitary and Ship Canal near Romeoville, IL. This final rule places navigational, environmental, and operational restrictions on all vessels transiting the navigable waters located adjacent to and over the U.S. Army Corps of Engineers' electrical dispersal fish barrier system.

DATES: This rule is effective in the CFR on December 12, 2011. This rule is effective with actual notice for purposes of enforcement at 5:30 p.m. on December 1, 2011.

ADDRESSES: Documents indicated in this preamble as being available in the docket are part of docket USCG-2011-1108 and are available online by going to http://www.regulations.gov, inserting USCG-2011-1108 in the ``Keyword'' box, and then clicking ``Search.'' They are also available for inspection or copying at the Docket Management Facility (M-30), U.S. Department of Transportation, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE., Washington, DC 20590, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: If you have questions on this rule, call

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CDR Scott Anderson, U.S. Coast Guard, Ninth District Prevention Department, Cleveland, OH, at (216) 902-6049 or email him at scott.e.anderson@uscg.mil. If you have questions on viewing or submitting material to the docket, call Renee V. Wright, Program Manager, Docket Operations, telephone (202) 366-9826.

SUPPLEMENTARY INFORMATION:

Regulatory Information

Under 5 U.S.C. 553(d)(3), the Coast Guard finds that good cause

exists for making this rule effective less than 30 days after publication in the Federal Register. A 30 day effective period is unnecessary in this case because the safety zone and regulated navigation area (RNA) established by this rule have been in effect and enforced on a temporary basis for the last twelve months. Also, a 30 day effective period would be against the public interest. Delaying the effective date of this final rule would delay its protective effects on the public against the dangers presented by the electrical dispersal barrier. Additionally, postponing the effective date of this final rule would delay its protective effects against the potential transport north of the barrier of carp eggs, gametes, or juvenile fish and thus, would be against the public's environmental interests.

Basis and Purpose

In response to the threat of Asian carp reaching the Great Lakes and devastating the Great Lakes commercial and sport fishing industries, the U.S. Army Corps of Engineers (USACE) began in 2002 the operation of a series of electrical barriers in the Chicago Sanitary and Ship Canal (CSSC). These barriers are located approximately 30 miles from Lake Michigan and create an electric field in the water by pulsing low voltage DC current through steel cables secured to the bottom of the canal. Currently, three electrical barriers are in operation. These barriers are meant to prevent and reduce the dispersal of Asian carp in the CSSC.

The Coast Guard's Ninth District Commander has determined that the electric current radiated from the electric barriers poses certain safety risks to commercial vessels, recreational boaters, and people on or in portions of the CSSC in the vicinity of the barriers. Consequently, the Coast Guard's Ninth District Commander has concluded that an RNA is necessary to mitigate such risks.

In addition to safety concerns about electric current in the water, concerns have also been raised about the potential transport of carp eggs, gametes, and juvenile fish in bilge, ballast, or other non-potable water from south of the barriers to waters north of the barriers. To address these concerns, the Coast Guard's Ninth District Commander has determined that a safety zone is necessary to mitigate the threat of such transportation.

For a fuller discussion on the history of the electrical dispersal barriers and the potential transportation of eggs, gametes, and juvenile fish across the barriers see 70 FR 76694, 75 FR 754, and 75 FR 75145, which were published on December 28, 2005, January 6, 2010, and December 2, 2010 respectively.

Background

To address the aforesaid safety risks, the Coast Guard's Ninth District Commander first established a permanent RNA on December 28, 2005 (70 FR 76694). That RNA is located at 33 CFR 165.923. Because the safety risks associated with the electrified water evolved as additional barriers came online and because awareness increased about the potential transportation of carp eggs, gametes, and juvenile fish, the Coast Guard's Ninth District Commander twice elected to temporarily put in place a new RNA and a new safety zone. The first temporary RNA and safety zone were established on January 6, 2010 (75 FR 754). The second temporary RNA and safety zone were established on December 2, 2010 (75 FR 75145). In each instance, the Coast Guard's Ninth District Commander suspended the permanent RNA created on December 28, 2005.

The electric barriers are still in operation, and there are no indications of that their use will be terminated in the foreseeable future. Also, the potential transportation of carp eggs, gametes, and juvenile fish via bilge, ballast, or other non-potable water has not been disproved. For these reasons, the Coast Guard's Ninth District Commander has decided to revise 33 CFR 165.923 and thus, make effective and enforceable at 5:30 p.m. on December 1, 2011 the requirements that

have been in place since December 2, 2010 via the aforesaid temporary interim rule (75 FR 75145).

Discussion of Rule

As stated above, the Coast Guard's Ninth District Commander has decided to revise 33 CFR 165.923 via this final rule, permanently putting in place an RNA on all waters located adjacent to, and over, the electrical dispersal barriers on the CSSC between mile marker 295.5 and mile marker 297.2. An RNA of this size is necessary to account for situations where a vessel inside the barrier could come into contact with a vessel outside the barrier possibly causing sparking greater than 1,200 feet beyond the Romeo Road Bridge or the aerial pipeline arch.

The RNA establishes vessel size, type, and operating requirements to include: (1) Vessels must be greater than twenty feet in length; (2) vessel must not be a personal watercraft of any kind (i.e. jet skis, wave runners, kayak, etc.); (3) all up-bound and downbound commercial tows that consist of barges carrying flammable liquid cargos (grade A through C, flashpoint below 140 degrees Fahrenheit, or heated to within 15 degrees Fahrenheit of flash point) must engage the services of a bow boat at all times until the entire tow is clear of the RNA; (4) vessels engaged in commercial service, as defined in 46 U.S.C. 2101(5), may not pass (meet or overtake) in the RNA and must make a SECURITE call when approaching the RNA to announce intentions and work out passing arrangements on either side; (5) commercial tows transiting the RNA must only be made up with wire rope to ensure electrical connectivity between all segments of the tow; (6) all vessels are prohibited from loitering in the RNA; (7) vessels may enter the RNA for the sole purpose of transiting to the other side and must maintain headway throughout the transit; (8) all vessels and persons are prohibited from dredging, laying cable, dragging, fishing, conducting salvage operations, or any other activity, which could disturb the bottom of the RNA; (9) all personnel on vessels transiting the RNA should remain inside the cabin, or as inboard as practicable. If personnel must be on open decks, they must wear a Coast Guard approved personal flotation device; (10) vessels may not moor or lay up on the right or left descending banks of the RNA; and, (11) towboats may not make or break tows if any portion of the towboat or tow is located in the RNA.

The rule also places a safety zone over a smaller portion of the same waterway. The safety zone will consist of all waters of the CSSC between mile marker 296.1 and mile marker 296.7. Vessels are prohibited from transiting the safety zone with non-potable water on board in any space except for water on board that will not be discharged on the other side of the safety zone. Vessels must notify and obtain permission from the Captain of the Port Sector Lake Michigan prior to transiting the safety zone if they intend to discharge any non-potable water attained on one-side of the safety zone on the other side of the zone. This includes water in void spaces being unintentionally introduced through cracks or other damage to the

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hull. The Captain of the Port Sector Lake Michigan maintains a telephone line that is manned 24 hours a day, seven days a week at 414-747-7182.

The requirements established in this rule are necessary for safe navigation of the RNA and to ensure the safety of vessels and their personnel as well as the public in general. The requirements are also necessary to protect against the harms presented by a potential invasion of Asian carp in Lake Michigan. Deviation from this final rule is prohibited unless specifically authorized by the Coast Guard's Ninth District Commander or his or her designated representatives. For the life of this RNA, the Coast Guard's Ninth District Commander designates as his or her representatives the Captain of the Port, Sector Lake

Michigan, and the Commanding Officer, Marine Safety Unit Chicago.

The safety zone and RNA will be enforced at all times. If, however, enforcement of the safety zone or RNA is at any time suspended, the Coast Guard's Ninth District Commander or his or her designated representatives will cause notice of the suspension to be made by all appropriate means to effect the widest publicity among the affected segments of the public.

Regulatory Analyses

We developed this rule after considering numerous statutes and executive orders related to rulemaking. Below we summarize our analyses based on 13 of these statutes or executive orders.

Regulatory Planning and Review

This rule is not a significant regulatory action under section 3(f) of Executive Order 12866, Regulatory Planning and Review, and does not require an assessment of potential costs and benefits under section 6(a)(3) of that Order. The Office of Management and Budget has not reviewed it under that Order.

This rule will affect commercial traffic transiting the electrical dispersal fish barrier system and surrounding waters. The USACE maintains data about the commercial vessels using the Lockport Lock and Dam, which provides access to the proposed RNA. According to USACE data, the commercial traffic through the Lockport Lock consisted of 147 towing vessels and 13,411 barges during 2007. Of those, 96 towing vessels and 2,246 barges were handling red flag cargo (i.e., those carrying hazardous, flammable, or combustible material in bulk).

Recreational vessels will also be affected under this rule. According to USACE data, recreational vessels made up 66 percent of the usage of the Lockport Lock and Dam in 2007. Operation and maintenance of the USACE fish barrier will continue to affect recreational vessels as they have in the past. The majority of these vessels will still be able to transit the RNA under this rule. The potential cost associated with this rule will include alternative transportation methods for vessels under 20 feet in length, bow boat assistance for red flag vessels and the potential costs associated with possible delays or inability to transit the safety zone for those vessels transporting non-potable water attained on one side of the barrier for discharge on the other.

We expect some provisions in this rule will not result in additional costs. These include the no loitering, the no mooring, and the PFD requirements. Similar to prior temporary interim rules, under this final rule vessels are prohibited from mooring or loitering in the RNA and all personnel in the RNA on open decks are required to wear a Coast Guard approved Type I personal flotation device. Most commercial and recreational operators will have required flotation devices on board as a result of other requirements and common safe boating practices. Based on the past temporary interim rules, we observed no information and received no data to confirm there were additional costs as a result of these provisions.

In addition, test results at the current operating parameters indicate that the majority of commercial and recreational vessels that regularly transit the CSSC will be permitted to enter the regulated navigation area and safety zone under certain conditions. Those vessels that will not be permitted to pass through the barrier may be permitted, on a case by case basis, to pass via a dead ship tow by a commercial vessel that is able to transit.

We expect the benefits of this rule will mitigate marine safety risks as a result of the operation and maintenance of the fish barriers by the USACE. This rule will allow commerce to continue through the waters adjacent to and over these barriers. This rule will also mitigate the possibility of an Asian Carp introduction into Lake Michigan, and the Great Lakes system, as a result of commerce through

the CSSC.

At this time, based on available information from past temporary interim rules, we anticipate that this rule will not be economically significant under Executive Order 12866 (i.e., have an annual effect on the economy of $100 million or more).

Small Entities

The Regulatory Flexibility Act (RFA) (5 U.S.C. 601-612) requires agencies to consider whether regulatory actions would have a significant economic impact on a substantial number of small entities. The term ``small entities'' comprises small businesses, not-for-profit organizations that are independently owned and operated and are not dominant in their fields, and governmental jurisdictions with populations of less than 50,000.

A final RFA analysis is not required under 5 U.S.C. 604(a) as this final rule was determined to be exempt from notice and comment rulemaking under 5 U.S.C. 553(b)(B) (see 75 FR 754). Nonetheless, the Coast Guard certifies under 5 U.S.C. 605(b), that this final rule will not have a significant economic impact on a substantial number of small entities.

Assistance for Small Entities

Under section 213(a) of the Small Business Regulatory Enforcement Fairness Act of 1996 (Pub. L. 104-121), we offer to assist small entities in understanding the rule so that they can better evaluate its effects on them and participate in the rulemaking process.

Small businesses may send comments on the actions of Federal employees who enforce, or otherwise determine compliance with, Federal regulations to the Small Business and Agriculture Regulatory Enforcement Ombudsman and the Regional Small Business Regulatory Fairness Boards. The Ombudsman evaluates these actions annually and rates each agency's responsiveness to small business. If you wish to comment on actions by employees of the Coast Guard, call 1-(888) REG-FAIR (1-(888) 734-3247). The Coast Guard will not retaliate against small entities that question or complain about this rule or any policy or action of the Coast Guard.

Collection of Information

This rule calls for no new collection of information under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501-3520).

Federalism

A rule has implications for federalism under Executive Order 13132, Federalism, if it has a substantial direct effect on State or local governments and would either preempt State law or impose a substantial direct cost of compliance on them. We have analyzed this rule under that Order and have determined that it does not have implications for federalism.

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Unfunded Mandates Reform Act

The Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1531-1538) requires Federal agencies to assess the effects of their discretionary regulatory actions. In particular, the Act addresses actions that may result in the expenditure by a State, local, or Tribal government, in the aggregate, or by the private sector of $100,000,000 or more in any one year. Though this rule will not result in such an expenditure, we do discuss the effects of this rule elsewhere in this preamble.

Taking of Private Property

This rule will not cause a taking of private property or otherwise have taking implications under Executive Order 12630, Governmental Actions and Interference with Constitutionally Protected Property Rights.

Civil Justice Reform

This rule meets applicable standards in sections 3(a) and 3(b)(2) of Executive Order 12988, Civil Justice Reform, to minimize litigation, eliminate ambiguity, and reduce burden.

Protection of Children

We have analyzed this rule under Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks. This rule is not an economically significant rule and does not create an environmental risk to health or risk to safety that may disproportionately affect children.

Indian Tribal Governments

This rule does not have Tribal implications under Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, because it does not have a substantial direct effect on one or more Indian Tribes, on the relationship between the Federal Government and Indian Tribes, or on the distribution of power and responsibilities between the Federal Government and Indian Tribes.

Energy Effects

We have analyzed this rule under Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use. We have determined that it is not a ``significant energy action'' under that order because it is not a ``significant regulatory action'' under Executive Order 12866 and is not likely to have a significant adverse effect on the supply, distribution, or use of energy. The Administrator of the Office of Information and Regulatory Affairs has not designated it as a significant energy action. Therefore, it does not require a Statement of Energy Effects under Executive Order 13211.

Technical Standards

The National Technology Transfer and Advancement Act (NTTAA) (15 U.S.C. 272 note) directs agencies to use voluntary consensus standards in their regulatory activities unless the agency provides Congress, through the Office of Management and Budget, with an explanation of why using these standards would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., specifications of materials, performance, design, or operation; test methods; sampling procedures; and related management systems practices) that are developed or adopted by voluntary consensus standards bodies.

This rule does not use technical standards. Therefore, we did not consider the use of voluntary consensus standards.

Environment

We have analyzed this rule under Department of Homeland Security Management Directive 023-01 and Commandant Instruction M16475.lD, which guide the Coast Guard in complying with the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321-4370f), and have concluded that this action is one of the category of actions which do not

individually or cumulatively have significant effect on the human environment. Therefore, this rule is categorically excluded, under section 2.B.2 Figure 2-1, paragraphs (27) and (34)(g) of the Instruction and neither an environmental assessment nor an environmental impact statement is required. This rule involves the establishing, disestablishing, or changing of a regulated navigation area and safety zone and thus, paragraphs (27) and (34)(g) of the Instruction apply. An environmental analysis checklist and a categorical exclusion determination are available in the docket where indicated under ADDRESSES.

List of Subjects in 33 CFR Part 165

Harbors, Marine safety, Navigation (water), Reporting and recordkeeping requirements, Security measures, Waterways.

For the reasons discussed in the preamble, the Coast Guard amends 33 CFR part 165 as follows:

PART 165--REGULATED NAVIGATION AREAS AND LIMITED ACCESS AREAS

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1. The authority citation for part 165 continues to read as follows:

Authority: 33 U.S.C. 1231; 46 U.S.C. Chapter 701, 3306, 3703; 50 U.S.C. 191, 195; 33 CFR 1.05-1, 6.04-1, 6.04-6, and 160.5; Pub. L. 107-295, 116 Stat. 2064; Department of Homeland Security Delegation No. 0170.1.

0
2. Revise Sec. 165.923 to read as follows:

Sec. 165.923 Safety Zone and Regulated Navigation Area, Chicago Sanitary and Ship Canal, Romeoville, IL.

(a) Safety Zone. (1) The following area is a safety zone: All waters of the Chicago Sanitary and Ship Canal located between mile marker 296.1 and mile marker 296.7.

(2) Regulations. (i) All vessels are prohibited from transiting the safety zone with any non-potable water on board if they intend to release that water in any form within, or on the other side of the safety zone. Non-potable water includes, but is not limited to, any water taken on board to control or maintain trim, draft, stability, or stresses of the vessel. Likewise, it includes any water taken on board due to free communication between the hull of the vessel and exterior water. Potable water is water treated and stored aboard the vessel that is suitable for human consumption.

(ii) Vessels with non-potable water onboard are permitted to transit the safety zone if they have taken steps to prevent the release, in any form, of that water in or on the other side of the safety zone. Alternatively, vessels with non-potable water onboard are permitted to transit the safety zone if they have plans to dispose of the water in a biologically sound manner.

(iii) Vessels with non-potable water aboard that intend to discharge on the other side of the zone must contact the Coast Guard's Ninth District Commander or his or her designated representatives prior to transit and obtain permission to transit and discharge. Examples of discharges that may be approved include plans to dispose of the water in a biologically sound manner or demonstrate through testing that the non-potable water does not contain potential live Silver or Asian carp, viable eggs, or gametes.

(iv) In accordance with the general regulations in Sec. 165.23 of this part, entry into, transiting, or anchoring within this safety zone

by vessels with non-potable water on board is prohibited unless authorized by the Coast Guard's Ninth District Commander, his or her

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designated representatives, or an on-scene representative.

(v) The Captain of the Port, Sector Lake Michigan, may further designate an ``on-scene'' representative. The Captain of the Port, Sector Lake Michigan, or the on-scene representative may be contacted via VHF-FM radio Channel 16 or through the Coast Guard Sector Lake Michigan Command Center at (414) 747-7182.

(b) Regulated Navigation Area. (1) The following is a regulated navigation area (RNA): All waters of the Chicago Sanitary and Ship Canal, Romeoville, IL located between mile marker 295.5 and mile marker 297.2.

(2) Regulations.

(i) The general regulations contained in 33 CFR 165.13 apply.

(ii) Vessels that comply with the following restrictions are permitted to transit the RNA:

(A) All up-bound and down-bound barge tows that consist of barges carrying flammable liquid cargos (Grade A through C, flashpoint below 140 degrees Fahrenheit, or heated to within 15 degrees Fahrenheit of flash point) must engage the services of a bow boat at all times until the entire tow is clear of the RNA.

(B) Vessels engaged in commercial service, as defined in 46 U.S.C. 2101(5), may not pass (meet or overtake) in the RNA and must make a SECURITE call when approaching the RNA to announce intentions and work out passing arrangements.

(C) Commercial tows transiting the RNA must be made up with only wire rope to ensure electrical connectivity between all segments of the tow.

(D) All vessels are prohibited from loitering in the RNA.

(E) Vessels may enter the RNA for the sole purpose of transiting to the other side and must maintain headway throughout the transit. All vessels and persons are prohibited from dredging, laying cable, dragging, fishing, conducting salvage operations, or any other activity, which could disturb the bottom of the RNA.

(F) Except for law enforcement and emergency response personnel, all personnel on vessels transiting the RNA should remain inside the cabin, or as inboard as practicable. If personnel must be on open decks, they must wear a Coast Guard approved personal flotation device.

(G) Vessels may not moor or lay up on the right or left descending banks of the RNA.

(H) Towboats may not make or break tows if any portion of the towboat or tow is located in the RNA.

(I) Persons on board any vessel transiting this RNA in accordance with this rule or otherwise are advised they do so at their own risk.

(c) Definitions. The following definitions apply to this section:

Bow boat means a towing vessel capable of providing positive control of the bow of a tow containing one or more barges, while transiting the RNA. The bow boat must be capable of preventing a tow containing one or more barges from coming into contact with the shore and other moored vessels.

Designated representative means the Captain of the Port Lake Michigan and Commanding Officer, Marine Safety Unit Chicago.

On-scene representative means any Coast Guard commissioned, warrant or petty officer who has been designated by the Captain of the Port, Sector Lake Michigan, to act on his or her behalf. The on-scene representative of the Captain of the Port, Sector Lake Michigan, will be aboard a Coast Guard, Coast Guard Auxiliary, or other designated vessel or will be on shore and will communicate with vessels via VHF-FM radio or loudhailer.

Vessel means every description of watercraft or other artificial contrivance used, or capable or being used, as a means of transportation on water. This definition includes, but is not limited

to, barges.

(d) Compliance. All persons and vessels must comply with this section and any additional instructions or orders of the Coast Guard's Ninth District Commander or his or her designated representatives. Any person on board any vessel transiting this RNA in accordance with this rule or otherwise does so at his or her own risk.

(e) Waiver. For any vessel, the Coast Guard's Ninth Coast Commander or his or her designated representatives may waive any of the requirements of this section, upon finding that operational conditions or other circumstances are such that application of this section is unnecessary or impractical for the purposes of vessel and mariner safety.

Dated: December 1, 2011.

M.N. Parks,

Rear Admiral, U.S. Coast Guard, Commander, Ninth Coast Guard District.

[FR Doc. 2011-31706 Filed 12-9-11; 8:45 am]
BILLING CODE 9110-04-P

ATTACHMENT 3

--- F.3d ----, 2011 WL 3836457 (C.A.7 (Ill.)), 73 ERC 1353
(Cite as: 2011 WL 3836457 (C.A.7 (Ill.)))

United States Court of Appeals,
Seventh Circuit.
State of MICHIGAN, et al., Plaintiffs–Appellants,
and
Grand Traverse Band of Ottawa and Chippewa Indians, Intervenor–Appellant,
v.
UNITED STATES ARMY CORPS OF ENGINEERS, et al., Defendants–Appellees,
and
City of Chicago, et al., Intervenors–Appellees.

No. 10–3891.
Argued May 5, 2011.
Decided Aug. 24, 2011.[FN*]
Opinion Published Sept. 13, 2011.

Background: States bordering the Great Lakes filed lawsuit against Army Corps of Engineers and municipal water reclamation district, which together owned and operated the Chicago Area Waterway System (CAWS), seeking preliminary injunction that would require the defendants to put in place additional physical barriers throughout the CAWS, implement new procedures to stop invasive non-native species of carp, and expedite a study of how best to separate the Mississippi and Great Lakes watersheds permanently. The United States District Court for the Northern District of Illinois, Robert M. Dow, Jr., J., 2010 WL 5018559, denied motion for a preliminary injunction, and the states appealed.

Holding: The Court of Appeals, Wood, Circuit Judge, held that although states established a good or even substantial likelihood of success on merits, balance of harms favored defendants.

Affirmed.

West Headnotes

[1] Nuisance 279 62

279 Nuisance
279II Public Nuisances
279II(A) Nature of Injury, and Liability Therefor
279k62 k. Public annoyance, injury, or danger. Most Cited Cases

A "public nuisance" is a substantial and unreasonable interference with a right common to the general public, usually affecting the public health, safety, peace, comfort, or convenience. Restatement (Second) Torts § 821B.

[2] Nuisance 279 61

279 Nuisance
279II Public Nuisances
279II(A) Nature of Injury, and Liability Therefor
279k61 k. Matters constituting public nuisances in general. Most Cited Cases

Federal common law of public nuisance extends to the environmental and economic destruction caused by the introduction of an invasive, non-native organism into a new ecosystem.

[3] United States 393 125(17)

393 United States
393IX Actions
393k125 Liability and Consent of United States to Be Sued
393k125(17) k. Declaratory judgment. Most Cited Cases

United States 393 125(18)

393 United States
393IX Actions
393k125 Liability and Consent of United States to Be Sued
393k125(18) k. Injunction. Most Cited Cases

Waiver of sovereign immunity contained in Administrative Procedure Act (APA) subjected Army Corps of Engineers (Corps) to the states' common-law claims for declaratory and injunctive relief to stop a non-native species of carp invading Lake

Michigan in numbers great enough to constitute a public nuisance. 5 U.S.C.A. § 702.

[4] United States 393 125(3)

393 United States
393IX Actions
393k125 Liability and Consent of United States to Be Sued
393k125(3) k. Necessity of waiver or consent. Most Cited Cases

Absent a waiver, sovereign immunity shields the federal government and its agencies from suit.

[5] United States 393 125(5)

393 United States
393IX Actions
393k125 Liability and Consent of United States to Be Sued
393k125(5) k. Mode and sufficiency of waiver or consent. Most Cited Cases

Waiver of sovereign immunity under Administrative Procedure Act (APA) applies when any federal statute authorizes review of agency action, as well as in cases involving constitutional challenges and other claims arising under federal law. 5 U.S.C.A. § 702.

[6] Federal Courts 170B 374

170B Federal Courts
170BVI State Laws as Rules of Decision
170BVI(A) In General
170Bk374 k. Matters of general jurisprudence; federal common law. Most Cited Cases

Federal common law is subject to the paramount authority of Congress.

[7] Nuisance 279 59

279 Nuisance
279II Public Nuisances
279II(A) Nature of Injury, and Liability Therefor
279k59 k. Nature and elements of public nuisance in general. Most Cited Cases

Congressional efforts to curb the migration of invasive species, and of invasive carp in particular, had not reached a sufficient level as to displace federal common law so as to preclude suit for declaratory and injunctive relief to stop a non-native species of carp invading Lake Michigan in numbers great enough to constitute a public nuisance.

[8] Nuisance 279 77

279 Nuisance
279II Public Nuisances
279II(C) Abatement and Injunction
279k77 k. Nature of remedy. Most Cited Cases

A court may grant equitable relief to abate a public nuisance that is occurring or to stop a threatened nuisance from arising.

[9] Nuisance 279 61

279 Nuisance
279II Public Nuisances
279II(A) Nature of Injury, and Liability Therefor
279k61 k. Matters constituting public nuisances in general. Most Cited Cases

Nuisance 279 79

279 Nuisance
279II Public Nuisances
279II(C) Abatement and Injunction
279k79 k. Grounds for proceedings for abatement. Most Cited Cases

Job of a court considering the merits of a public nuisance claim is simply to determine whether the activity complained of is a nuisance and, if so, whether it is sufficiently close to occurring that equitable relief is necessary to prevent it from happening.

[10] Injunction 212 138.18

212 Injunction
212IV Preliminary and Interlocutory Injunctions

212IV(A) Grounds and Proceedings to Procure
212IV(A)2 Grounds and Objections
212k138.18 k. Likelihood of success on merits. Most Cited Cases

Injunction 212 158

212 Injunction
212IV Preliminary and Interlocutory Injunctions
212IV(A) Grounds and Proceedings to Procure
212IV(A)4 Proceedings
212k156 Order on Application
212k158 k. Operation and effect. Most Cited Cases

Findings made at the preliminary injunction stage do not bind the district court as the case progresses; most significant difference between the preliminary injunction phase and the merits phase is that a plaintiff in the former position needs only to show a likelihood of success on the merits rather than actual success. Fed.Rules Civ.Proc.Rule 65, 28 U.S.C.A.

[11] Injunction 212 138.46

212 Injunction
212IV Preliminary and Interlocutory Injunctions
212IV(A) Grounds and Proceedings to Procure
212IV(A)3 Subjects of Relief
212k138.45 Public Officers, Boards and Municipalities; Schools and Colleges
212k138.46 k. In general. Most Cited Cases

States bordering the Great Lakes, which sought preliminary injunction that would require Army Corps of Engineers and municipal water reclamation district to implement new procedures to stop nonnative species of carp from invading Lake Michigan, established a good or even substantial likelihood of success on merits of their claim that the carp would invade Lake Michigan in numbers great enough to constitute a public nuisance. Fed.Rules Civ.Proc.Rule 65, 28 U.S.C.A.

[12] Environmental Law 149E 661

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek661 k. Finality. Most Cited Cases

Army Corps of Engineers' (Corps) operation of Chicago Area Waterway System (CAWS) in a manner that allegedly would let invasive carp into Lake Michigan, reliance on allegedly ineffective electric barriers, use of locks in areas where living and dead carp have been found, and denial of the states' requests for additional relief were not "final" agency actions within meaning of Administrative Procedure Act (APA); the "actions" were not discrete at all, and those that might be so classified did not represent the final outcome of any decisionmaking process by the Corps. 5 U.S.C.A. § 704.

[13] Administrative Law and Procedure 15A 704

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(B) Decisions and Acts Reviewable
15Ak704 k. Finality; ripeness. Most Cited Cases

Agency action is "final" within meaning of Administrative Procedure Act (APA) when it marks the consummation of the agency's decisionmaking process and determines legal rights or obligations. 5 U.S.C.A. § 704.

[14] Injunction 212 138.46

212 Injunction
212IV Preliminary and Interlocutory Injunctions
212IV(A) Grounds and Proceedings to Procure
212IV(A)3 Subjects of Relief
212k138.45 Public Officers, Boards and Municipalities; Schools and Colleges
212k138.46 k. In general. Most Cited Cases

States bordering the Great Lakes showed, to the degree necessary for preliminary relief, that irreparable harm would come to pass absent injunctive relief requiring Army Corps of Engineers and municipal water reclamation district, to take actions stopping

invasive non-native species of carp from invading Lake Michigan in numbers great enough to constitute a public nuisance. Fed.Rules Civ.Proc.Rule 65, 28 U.S.C.A.

[15] Injunction 212 138.6

212 Injunction
212IV Preliminary and Interlocutory Injunctions
212IV(A) Grounds and Proceedings to Procure
212IV(A)2 Grounds and Objections
212k138.6 k. Nature and extent of injury; irreparable injury. Most Cited Cases

For preliminary relief to be granted, the irreparable harm must be likely; there must be more than a mere possibility that the harm will come to pass, but the alleged harm need not be occurring or be certain to occur before a court may grant relief.

[16] Injunction 212 138.46

212 Injunction
212IV Preliminary and Interlocutory Injunctions
212IV(A) Grounds and Proceedings to Procure
212IV(A)3 Subjects of Relief
212k138.45 Public Officers, Boards and Municipalities; Schools and Colleges
212k138.46 k. In general. Most Cited Cases

Although states bordering the Great Lakes established a good or even substantial likelihood of success on merits of their claim that non-native species of carp would invade Lake Michigan in numbers great enough to constitute a public nuisance, and that they could cause irreparable harm, balance of harms favored Army Corps of Engineers and municipal water reclamation district, which together owned and operated the Chicago Area Waterway System (CAWS), and the public interests they represented to such an extent that preliminary injunction was not warranted; preliminary injunction requiring various elaborate measures would impose substantial costs and could impede other measures taken by agencies, yet would not assure much of a reduction in the risk of the invasive carp establishing themselves in Lake Michigan while suit was being adjudicated. Fed.Rules Civ.Proc.Rule 65, 28 U.S.C.A.

Robert P. Reichel (argued), Attorney, Office of the Attorney General of the State of Michigan, Environment, Natural Resources and Agriculture Division, Lansing, MI, J.B. Van Hollen, Attorney, Office of the Attorney General, Wisconsin Department of Justice, Madison, WI, Lori Swanson, Office of the Attorney General, St. Paul, MN, Richard Cordray, Attorney, Office of the Attorney General, Columbus, OH, Thomas W. Corbett, Jr., Attorney, Office of the Attorney General, Harrisburg, PA, for Plaintiffs–Appellants.

Michael T. Gray, Attorney, Department of Justice, Environment & Natural Resources Division, William M. Jay, Attorney, Department of Justice, Office of the Solicitor General, Washington, DC, Brendon O'Connor (argued), Ronald M. Hill, Attorney, Metropolitan Water Reclamation District of Greater Chicago, Chicago, IL, for Defendants–Appellees.

William C. Rastetter, Attorney, Olson, Bzdok & Howard, P.C., Traverse City, MI, for Plaintiff–Intervenor.

David L. Rieser (argued), Attorney, McGuirewoods LLP, Chicago, IL, Mara S. Georges, Myriam Z. Kasper, Attorneys, Office of the Corporation Counsel, Appeals Division, Stuart P. Krauskopf, Attorney, Law Offices of Stuart P. Krauskopf, Chicago, IL, for Intervenors–Appellees.

Before MANION, WOOD, and WILLIAMS, Circuit Judges.

WOOD, Circuit Judge.

***1** Ambitious engineering projects that began at the time that the City of Chicago was founded have established a waterway in northeastern Illinois that connects Lake Michigan to the Mississippi watershed. (Additional links between the Mississippi and the Great Lakes exist elsewhere, from northern Minnesota to New York.) The system of canals, channels, locks, and dams, with which we are concerned, known today as the Chicago Area Waterway System (or CAWS, as the parties call it in their briefs), winds from the mouth of the Chicago River and four other points on Lake Michigan to tributaries of the Mississippi River in Illinois. The navigable link has been a boon to industry and commerce, and it supports

transportation and recreation. Public health crises that once were common because the Chicago River emptied the City's sewage into the lake—the City's freshwater supply—vanished thanks to the Chicago Sanitary and Ship Canal, which reversed the flow of the Chicago River so that it now pulls water from the lake, into the CAWS, and down toward the Mississippi. During heavy rains and seasonal high waters in the region, the CAWS is used to control flooding.

This effort to connect the Great Lakes and Mississippi watersheds has not been without controversy. At the turn of the 20th century, Missouri sued in the Supreme Court to stop Illinois from opening the Sanitary and Ship Canal. An opinion by Justice Holmes rejected Missouri's challenge; the Court concluded that the state had not presented enough evidence to establish that the flow of sewage toward the Mississippi would create a public nuisance. *Missouri v. Illinois*, 200 U.S. 496, 26 S.Ct. 268, 50 L.Ed. 572 (1906); see also *Missouri v. Illinois*, 180 U.S. 208, 21 S.Ct. 331, 45 L.Ed. 497 (1901). Several years later a broader fight erupted among the states bordering the Great Lakes, and the Court began to issue decrees setting the maximum rate at which Illinois may divert water away from Lake Michigan and into the CAWS. *E.g., Wisconsin v. Illinois*, 449 U.S. 48, 101 S.Ct. 557, 66 L.Ed.2d 253 (1980); *Wisconsin v. Illinois*, 388 U.S. 426, 87 S.Ct. 1774, 18 L.Ed.2d 1290 (1967); *Wisconsin v. Illinois*, 311 U.S. 107, 61 S.Ct. 154, 85 L.Ed. 73 (1940); *Wisconsin v. Illinois*, 278 U.S. 367, 49 S.Ct. 163, 73 L.Ed. 426 (1929). Nor has opening a pathway between these bodies of fresh water come without costs. This appeal requires us to consider one of those costs: the environmental and economic harm posed by two invasive species of carp, commonly known as Asian carp, which have migrated up the Mississippi River and now are poised at the brink of this man-made path to the Great Lakes. The carp are voracious eaters that consume small organisms on which the entire food chain relies; they crowd out native species as they enter new environments; they reproduce at a high rate; they travel quickly and adapt readily; and they have a dangerous habit of jumping out of the water and harming people and property.

In an attempt to stop the fish, Michigan, Minnesota, Ohio, Pennsylvania, and Wisconsin, all states bordering the Great Lakes, filed this lawsuit against the U.S. Army Corps of Engineers (the Corps) and the Metropolitan Water Reclamation District of Greater Chicago (the District), which together own and operate the facilities that make up the CAWS. The plaintiff states allege that the Corps and the District are managing the CAWS in a manner that will allow invasive carp to move for the first time into the Great Lakes. The states fear that if the fish establish a sustainable population there, ecological disaster and the collapse of billion-dollar industries that depend on the existing ecosystem will follow. They say that the defendants' failure to close down parts of the CAWS to avert the crisis creates a grave risk of harm, in violation of the federal common law of public nuisance, see *American Electric Power Co., Inc. v. Connecticut*, —— U.S. ——, 131 S.Ct. 2527, 180 L.Ed.2d 435 (2011), and they advance a related claim against the Corps based on the Administrative Procedure Act (APA), 5 U.S.C. § 702. The states asked the district court for declaratory and injunctive relief and moved for a preliminary injunction that would require the defendants to put in place additional physical barriers throughout the CAWS, implement new procedures to stop invasive carp, and expedite a study of how best to separate the Mississippi and Great Lakes watersheds permanently. Other parties intervened to protect their interests—the Grand Traverse Band of Ottawa and Chippewa Indians on the side of the plaintiffs, and the City of Chicago, Wendella Sightseeing Company, and the Coalition to Save Our Waterways as defendants. The district court denied the motion for a preliminary injunction, and the states appealed immediately. See 28 U.S.C. § 1292(a)(1).

***2** We conclude that the court's decision to deny preliminary relief was not an abuse of discretion. Our analysis, however, differs in significant respects from that of the district court, which was persuaded that the plaintiffs had shown only a minimal chance of succeeding on their claims. We are less sanguine about the prospects of keeping the carp at bay. In our view, the plaintiffs presented enough evidence at this preliminary stage of the case to establish a good or perhaps even a substantial likelihood of harm—that is, a non-trivial chance that the carp will invade Lake Michigan in numbers great enough to constitute a public nuisance. If the invasion comes to pass, there is little doubt that the harm to the plaintiff states would be irreparable. That does not mean, however, that they are automatically entitled to injunctive relief. The defendants, in collaboration with a great number of agencies and experts from the state and federal governments, have mounted a full-scale effort

to stop the carp from reaching the Great Lakes, and this group has promised that additional steps will be taken in the near future. This effort diminishes any role that equitable relief would otherwise play. Although this case does not involve the same kind of formal legal regime that caused the Supreme Court to find displacement of the courts' common-law powers in *American Electric Power*, on the present state of the record we have something close to it. In light of the active regulatory efforts that are ongoing, we conclude that an interim injunction would only get in the way. We stress, however, that if the agencies slip into somnolence or if the record reveals new information at the permanent injunction stage, this conclusion can be revisited.

I

To justify a preliminary injunction, the plaintiff states must show that they are likely to succeed on the merits of their claims, that they are likely to suffer irreparable harm without an injunction, that the harm they would suffer without the injunction is greater than the harm that preliminary relief would inflict on the defendants, and that the injunction is in the public interest. *Winter v. Natural Res. Def. Council, Inc.*, 555 U.S. 7, 20, 129 S.Ct. 365, 172 L.Ed.2d 249 (2008). We will affirm the decision to deny a preliminary injunction unless the district court has abused its discretion. *Judge v. Quinn*, 612 F.3d 537, 557 (7th Cir.2010). As usual, we review questions of fact for clear error and questions of law *de novo. Girl Scouts of Manitou Council, Inc. v. Girl Scouts of United States of Am., Inc.*, 549 F.3d 1079, 1086–87 (7th Cir.2008).

II

We begin with the states' likelihood of succeeding on their common law public nuisance claim. The district court thought that the states had "at best, a very modest likelihood of success." For the reasons discussed below, we think that the district court underestimated the likely merit of the states' claim, particularly at this early stage of the case.

A

***3** The Supreme Court recently reminded us that when it said, "There is no federal general common law," in *Erie Railroad Co. v. Tompkins*, 304 U.S. 64, 78, 58 S.Ct. 817, 82 L.Ed. 1188 (1938), it did not close the door on federal common law entirely. *American Electric Power*, 131 S.Ct. at 2535–37. Instead, following *Erie*, a "keener understanding" of federal common law developed, under which federal courts "fill in 'statutory interstices,' and, if necessary, even 'fashion federal law' " in areas " 'within national legislative power.' " *Id.* at 2535 (quoting Henry J. Friendly, *In Praise of Erie—And of the New Federal Common Law*, 39 N.Y.U. L.Rev. 383 (1964)). In *American Electric Power*, the Court reaffirmed a long line of cases that have "approved federal common law suits brought by one State to abate pollution emanating from another State." 131 S.Ct. at 2535–36. These decisions reach at least as far back as the battle between Missouri and Illinois over sewage, see *Missouri v. Illinois, supra*, and they have continued from there, see *Georgia v. Tennessee Copper Co.*, 206 U.S. 230, 27 S.Ct. 618, 51 L.Ed. 1038 (1907), *New York v. New Jersey*, 256 U.S. 296, 41 S.Ct. 492, 65 L.Ed. 937 (1921), *New Jersey v. City of New York*, 283 U.S. 473, 51 S.Ct. 519, 75 L.Ed. 1176 (1931), *Illinois v. City of Milwaukee*, 406 U.S. 91, 92 S.Ct. 1385, 31 L.Ed.2d 712 (1972) (*Milwaukee I*), *City of Milwaukee v. Illinois*, 451 U.S. 304, 101 S.Ct. 1784, 68 L.Ed.2d 114 (1981) (*Milwaukee II*), and *American Electric Power*, 131 S.Ct. 2527. But it has been recognized for a much longer period that the equitable power of the courts extends to suits to abate public nuisances. See *United Steelworkers of America v. United States*, 361 U.S. 39, 60–61, 80 S.Ct. 1, 4 L.Ed.2d 12 (1959) (Frankfurter, J., concurring) (assembling examples from 16th century England to the turn of the 20th century in the United States).

It is our federal system that creates the need for a federal common law to govern interstate disputes over nuisances. *Tennessee Copper* explains that when the states joined the union and in so doing abandoned their right to abate foreign nuisances by force, "they did not thereby agree to submit to whatever might be done. They did not renounce the possibility of making reasonable demands on the ground of their still remaining quasi-sovereign interests; and the alternative to force is a suit in this court." 206 U.S. at 237, 27 S.Ct. 618. A state that wants to bring a lawsuit attacking a nuisance emanating from outside of its borders faces at least two legal difficulties: whom to sue, and what law to apply? If the offender is another state, then the Constitution permits an original action in the Supreme Court. U.S. CONST. art. III sec. 2, cl. 5. Whatever the venue, applicable law is a problem: the offending state owes no allegiance to the law of the plaintiff state, but the plaintiff state may rightly fear protectionism if the law of the offending state is

used. *Committee for Consideration of the Jones Falls Sewage Sys. v. Train,* 539 F.2d 1006, 1008 (4th Cir.1976) (*en banc*). Responding to this concern, the Court has concluded that in the context of interstate nuisances "where there is an overriding federal interest in the need for a uniform rule of decision or where the controversy touches basic interests of federalism," federal common law governs. *Milwaukee I,* 406 U.S. at 105 n. 6, 92 S.Ct. 1385. When evaluating claims based on the federal common law of nuisance, courts must be mindful that they do not have "creative power akin to that vested in Congress." *American Electric Power,* 131 S.Ct. at 2536.

1

***4** The states' public nuisance action here is based on allegations that non-native species of carp (specifically, bighead and silver carp) will migrate through waterworks operated by the defendants from rivers connected to the Mississippi into Lake Michigan and on to the other Great Lakes. "When we deal with air and water in their ambient and interstate aspects, there is a federal common law." *Milwaukee I,* 406 U.S. at 103, 92 S.Ct. 1385. We know that this body of law applies in a dispute about "the pollution of a body of water such as Lake Michigan bounded, as it is, by four States," *id.* at 105 n. 6, 92 S.Ct. 1385. But the Court has cautioned that it has never "held that a State may sue to abate any and all manner of pollution originating outside its borders." *American Electric Power,* 131 S.Ct. at 2536. The Corps and the District contend that the common law does not extend to the allegations in this case. They stress that they are not emitting "traditional pollutants"; all they have done, they say, is to operate facilities in the CAWS through which invasive species already living in local rivers might travel on their own. We can dismiss the latter part of this argument without much discussion: the defendants bear responsibility for nuisances caused by their operation of a manmade waterway between the Great Lakes and Mississippi watersheds. That they are not themselves physically moving fish from one body of water to the other does not mean that their normal operation of the CAWS cannot cause a nuisance. See, *e.g.,* RESTATEMENT (SECOND) TORTS § 834 ("One is subject to liability for a nuisance caused by an activity, not only when he carries on the activity but also when he participates to a substantial extent in carrying it on.") & cmt. (b) (defining "activity" to include acts "that create physical conditions that are harmful to neighboring land after the activity that created them has ceased").

[1][2] Similarly, we know of no rule saying that the defendants must emit a "traditional pollutant" in order for federal common law to apply. While it may be true that the introduction of an invasive species of fish into a new ecosystem does not fit the concept of nuisance as neatly as a spill of toxic chemicals into a stream, we do not think the Supreme Court has limited the concept of public nuisance as much as the defendants suggest. A public nuisance is defined as a substantial and unreasonable interference with a right common to the general public, usually affecting the public health, safety, peace, comfort, or convenience. RESTATEMENT (SECOND) TORTS § 821B; DAN B. DOBBS, THE LAW OF TORTS § 467, at 1334 (2000). It would be arbitrary to conclude that this type of action extends to the harm caused by industrial pollution but not to the environmental and economic destruction caused by the introduction of an invasive, non-native organism into a new ecosystem (assuming that the states have correctly forecast the depletion of the Great Lakes fishery and the corresponding damage to the multi-billion-dollar sports fishing industry). Public nuisance traditionally has been understood to cover a tremendous range of subjects:

> ***5** It includes interferences with the public health, as in the case of a hogpen, the keeping of diseased animals, or a malarial pond; with the public safety, as in the case of the storage of explosives, the shooting of fireworks in the streets, harboring a vicious dog, or the practice of medicine by one not qualified; with public morals, as in the case of houses of prostitution, illegal liquor establishments, gambling houses, indecent exhibitions, bullfights, unlicensed prize fights, or public profanity; with the public peace, as by loud and disturbing noises, or an opera performance which threatens to cause a riot; with the public comfort, as in the case of bad odors, smoke, dust and vibration; with public convenience, as by obstructing a highway or a navigable stream, or creating a condition which makes travel unsafe or highly disagreeable, or the collection of an inconvenient crowd; and in addition, such unclassified offenses as eavesdropping on a jury, or being a common scold.

KEETON, *et al.,* PROSSER AND KEETON ON TORTS § 90, at 643–45 (5th ed.1984) (citations

omitted). The Supreme Court's application of public nuisance principles to cases involving shared water resources reflects this broad understanding. For example, the Court has held that a change in one state's water-drainage system that causes flooding on another state's farms may create a public nuisance, see *North Dakota v. Minnesota*, 263 U.S. 365, 374, 44 S.Ct. 138, 68 L.Ed. 342 (1923); just as the industrial contamination of a body of water might, *Arizona Copper Co. v. Gillespie*, 230 U.S. 46, 57, 33 S.Ct. 1004, 57 L.Ed. 1384 (1913). In this vein, *American Electric Power* emphasized "that public nuisance law, like common law generally, adapts to changing scientific and factual circumstances." 131 S.Ct. at 2536. The types of invasive carp that are the concern in this case have been designated as injurious species by the U.S. Fish and Wildlife Service, see 50 C.F.R. § 16.13(a)(2)(v); this designation means that it is a federal crime under the Lacy Act to transport them around or into the United States, 16 U.S.C. §§ 3371–78. We conclude that the federal common law of public nuisance extends to the problem that the plaintiff states have identified.

The next question, which is raised only by the Corps, is whether the plaintiff states may state a claim based on the federal common law of public nuisance against the United States. The Corps asserts that "the States have shown no basis for recognizing a federal common-law public nuisance claim against a federal agency." But the Corps has not developed the argument much beyond this broad statement. Its brief moves instead to a discussion of whether federal common law has been displaced by congressional legislation and whether there is any role for the courts to play when agencies have taken concerted action to address a problem. These are two important issues that we will explore below, but neither point explains why a claim based on the federal common law of public nuisance cannot move forward against the United States. The plaintiff states have done little to counter the Corps's suggestion. They reply (unresponsively, in our view) that "the federal common law of public nuisance undoubtedly exists."

***6** The implications of finding that the United States has created a public nuisance strike us as potentially important and complex; this is not a topic that can be thrown on the table and then ignored. In this connection, it is telling that the Supreme Court went out of its way in *American Electric Power* to point out that it "ha[d] not yet decided whether private citizens ... or political subdivisions ... of a State may invoke the federal common law of nuisance to abate out-of-state pollution." 131 S.Ct. at 2536. It declined to answer that question because it thought it best to resolve the case on other grounds. But the Court's statement cautions us to tread carefully whenever we consider how far to push a theory of federal common law. This concern is less pressing for claims the Court has already recognized, such as those against state or local governmental entities or private parties. See, *e.g.*, *Missouri v. Illinois*, 200 U.S. 496, 26 S.Ct. 268 (states), *Milwaukee I*, 406 U.S. 91, 92 S.Ct. 1385 (political subdivisions); *Tennessee Copper*, 206 U.S. 230, 27 S.Ct. 618 (private citizens).

We have not discovered any case in which the Supreme Court has expressly authorized a public nuisance action against the United States in its sovereign capacity. A recent concurring opinion in the D.C. Circuit makes the same observation, noting that "the Court has not endorsed any federal common-law causes of action against the Government during the post-*Erie* period." *El–Shifa Pharm. Indus. Co. v. United States*, 607 F.3d 836, 853 (D.C.Cir.2010) (Kavanaugh, J., concurring). To understand common-law public nuisance in a way that would exclude suits against the United States would be faithful to the ancient origins of nuisance, where the term described the criminal act of infringing on the rights of the Crown, see William L. Prosser, *Private Action for Public Nuisance*, 52 Va. L.Rev. 997, 998 (1966); at least during that era, no one would have contemplated that the King or Queen could be the source of a nuisance. Whether this sort of sovereign prerogative has any place in modern American law, as a concept distinct from the sovereign immunity of the United States, is a separate question. Perhaps there is also a modern justification for the position that the federal common law of public nuisance cannot operate against the government: this area of federal common law exists to provide a uniform rule for interstate disputes that will serve the national interest, and it may be thought illogical to say that a federal actor, which in theory embodies the national interest, is at the same time violating a judge-made concept of that same interest.

On the other hand, there are respectable arguments in favor of applying public nuisance to the acts of federal agencies, depending on the activity in

which the agency is engaged. We have moved far beyond the Divine Right of Kings and the concept that the Crown can do no wrong. We may assume that an agency's effort to regulate private actors in a particular area would not give rise to a claim of public nuisance. But it is hard to see why the United States's ownership of a dam, power plant, or other facility should automatically foreclose a public nuisance claim brought by a state for harms created by the operation of that facility. If the facility were located in and owned by State A and it was damaging State B, then State B would be entitled to assert a common-law claim against State A (or one of its subdivisions or private citizens). Our case offers a good illustration of the point: the Corps and the District together operate facilities that are allegedly on the verge of creating a nuisance in waters of the plaintiff states; why should the plaintiffs be able to state a claim against the District but not the Corps?

***7** The possible inconsistencies that would be created by such a rule may be the reason that no court has expressed concern about the appearance of the Tennessee Valley Authority—a federally owned entity that was created by Congress and acts like a private corporation—as a defendant in a public nuisance lawsuit. See *American Electric Power*, 131 S.Ct. 2527; *North Carolina ex rel. Cooper v. TVA*, 615 F.3d 291 (4th Cir.2010); *North Carolina ex rel. Cooper v. TVA*, 515 F.3d 344 (4th Cir.2008). In fact, out of all public nuisance decisions we have identified from either the Supreme Court or the Courts of Appeals that involve a federal agency as a defendant, none contains a whisper of discussion about whether the claim runs against the United States. In addition to the cases just mentioned, *see Middlesex Cnty. Sewerage Auth. v. National Sea Clammers Ass'n*, 453 U.S. 1, 4 & n. 3, 101 S.Ct. 2615, 69 L.Ed.2d 435 (1981) (claims against the Environmental Protection Agency (EPA) and the Corps); *Committee for Consideration of Jones Falls Sewage Sys.*, 539 F.2d 1006 (claims against the EPA); *Massachusetts v. U.S. Veterans Admin.*, 541 F.2d 119 (1st Cir.1976) (claims against the Veterans Administration). Whether the plaintiffs' common-law action can proceed against the Corps is a question that may well require attention as this case proceeds. Given the parties' cursory exposition of the issue and our ultimate conclusion that preliminary relief is not warranted, we find it unnecessary to say more at this point. (We see this as a question relating to the plaintiffs' ability to state a claim; it does not implicate the court's jurisdiction, and so there is nothing to prevent our declining to reach it.) For now, we will assume that the states' federal common-law claim may proceed against all of the defendants.

B

[3] The defendants argue that two additional obstacles also diminish the states' likelihood of succeeding on their public nuisance claim. The first concerns the sovereign immunity of the United States. The Corps contends that even if it makes sense to apply public nuisance principles against the United States, the Corps is nevertheless not subject to suit because the United States has not waived its sovereign immunity for this kind of claim. The second argument, which we address below, is that congressional regulation of the invasive carp problem has displaced any role for federal common law.

[4] "Absent a waiver, sovereign immunity shields the Federal Government and its agencies from suit." *F.D.I.C. v. Meyer*, 510 U.S. 471, 475, 114 S.Ct. 996, 127 L.Ed.2d 308 (1994). The Corps takes the position that there is no such waiver of immunity for lawsuits against the United States that seek declaratory and injunctive relief based on a federal common-law tort. Whether this is correct depends on the interaction between section 702 of the APA and the Federal Tort Claims Act (FTCA), 28 U.S.C. § 1346(b).

[5] We begin with a look at the APA. Section 702 reads as follows:

> A person suffering legal wrong because of agency action, or adversely affected or aggrieved by agency action within the meaning of a relevant statute, is entitled to judicial review thereof. An action in a court of the United States seeking relief other than money damages and stating a claim that an agency or an officer or employee thereof acted or failed to act in an official capacity or under color of legal authority shall not be dismissed nor relief therein be denied on the ground that it is against the United States or that the United States is an indispensable party.

***8** 5 U.S.C. § 702. "The first and second sentences of § 702 play quite different roles." *Veterans for Common Sense v. Shinseki*, 644 F.3d 845, 866 (9th Cir.2011). The first supplies a right to seek review of agency action; the second, added by the 1976

amendments to the statute, provides a waiver of sovereign immunity. *Id.* The waiver covers actions that seek specific relief other than money damages; this aptly describes the plaintiffs' claim for declaratory and injunctive relief. See *Blagojevich v. Gates*, 519 F.3d 370, 371–72 (7th Cir.2008) (noting that § 702 "waived sovereign immunity for most forms of prospective relief"); see also *Bowen v. Massachusetts*, 487 U.S. 879, 893, 108 S.Ct. 2722, 101 L.Ed.2d 749 (1988) (construing § 702's waiver broadly and remarking that "complaints [for] declaratory and injunctive relief ... [are] certainly not actions for money damages"); *Veterans for Common Sense*, 644 F.3d at 864–65. Moreover, the waiver in § 702 is not limited to claims brought pursuant to the review provisions contained in the APA itself. The waiver applies when any federal statute authorizes review of agency action, as well as in cases involving constitutional challenges and other claims arising under federal law. *Blagojevich*, 519 F.3d at 372; *Czerkies v. U.S. Dep't of Labor*, 73 F.3d 1435, 1437–38 (7th Cir.1996) (*en banc*); see also *Veterans for Common Sense*, 644 F.3d at 867–68; *Trudeau v. Federal Trade Comm'n*, 456 F.3d 178, 186–87 (D.C.Cir.2006); *United States v. City of Detroit*, 329 F.3d 515, 520–21 (6th Cir.2003) (*en banc*); *Jaffee v. United States*, 592 F.2d 712, 718 (3d Cir.1979).

Although the United States has argued from time to time that the "final agency action" requirement of § 704 limits the waiver of immunity in § 702, it has not prevailed on that ground. *E.g.*, *Veterans for Common Sense*, 644 F.3d at 866–68; *Trudeau*, 456 F.3d at 186–87. The Corps wisely does not take that position here; as the Ninth Circuit explained recently, the conditions of § 704 affect the right of action contained in the first sentence of § 702, but they do not limit the waiver of immunity in § 702's second sentence. *Veterans for Common Sense*, 644 F.3d at 866–68. The only limitation on § 702 that requires our attention is the clause that says, "Nothing herein ... confers authority to grant relief if any other statute that grants consent to suit expressly or impliedly forbids the relief which is sought," 5 U.S.C. § 702(2), which Congress added to the statute at the same time that it introduced the waiver of sovereign immunity, see Pub.L. 94–574, 90 Stat. 2721 (Oct. 21, 1976). Pointing to this provision, the Corps frames an argument by negative implication: it says that when Congress enacted the FTCA in 1946, it did so against a backdrop of no tort liability for the United States; the FTCA waives the government's sovereign immunity in suits for money damages to the extent that a private person would be held liable under applicable state tort law, see 28 U.S.C. § 1346(b)(1); *Smith v. United States*, 507 U.S. 197, 201–02, 113 S.Ct. 1178, 122 L.Ed.2d 548 (1993); *Parrott v. United States*, 536 F.3d 629, 635 (7th Cir.2008); but while the FTCA authorizes actions for damages, it says nothing at all about injunctive relief; thus, the FTCA implicitly prohibits injunctive relief in tort suits against the United States; and because of § 702(2), the Corps's argument concludes, the plaintiffs cannot use the APA's waiver of immunity to assert a common-law tort claim against the United States.

***9** That argument reads too much into congressional silence. The FTCA authorizes various tort claims for damages against the government to the extent that state law would provide relief, and it spells out a number of explicit exceptions. *E.g.*, 28 U.S.C. § 2674 (barring punitive damages and interest before judgment); *id.* § 2680 (limiting the waiver, among other circumstances, where the alleged tort concerns the government's enforcement of a statute or a discretionary function). There is nothing in the statute suggesting that Congress meant to forbid all actions that were not expressly authorized. To the contrary, section 702(2) requires evidence, in the form of either express language or fair implication, that Congress meant to forbid the relief that is sought. The Corps's effort to transform silence into implicit prohibition would seriously undermine Congress's effort in the APA to authorize specific relief against the United States. When Congress amended the APA in 1976 it gave every indication that it intended to provide specific relief for all nonstatutory claims against the government. See *Trudeau*, 456 F.3d at 186–87 (noting that all the reports from Congress "identified as the measure's clear purpose elimination of the sovereign immunity defense in *all* equitable actions" and that "the Senate Report plainly indicated that Congress expected the waiver to apply to nonstatutory actions") (internal quotation marks and alterations removed); *Jaffee*, 592 F.2d at 718–19 (outlining the reasons for the amendments to § 702, the concern that some executive departments were hiding behind their immunity, and concluding, "It was therefore precisely for equitable actions under section 1331 that Congress enacted the amendments to section 702").

The D.C. Circuit has read the Tucker Act, which

it interprets as the exclusive remedy for contract claims against the government, to include an implicit prohibition against specific relief in contract actions against the United States and thus to prevent reliance on the APA's waiver of immunity in such cases. *Sharp v. Weinberger,* 798 F.2d 1521, 1523–24 (D.C.Cir.1986) (Scalia, J.). But the same court has since decided that, whatever the unspoken effect of the Tucker Act may be, the FTCA does not contain a comparable implicit ban against specific relief in tort cases against the government, and thus that plaintiffs in such cases may take advantage of the waiver in § 702 of the APA. *U.S. Info. Agency v. Krc,* 989 F.2d 1211, 1216 (D.C.Cir.1993). To the same effect, we recently explained that while "[t]he tort claims act doesn't authorize equitable relief.... [T]he Administrative Procedure Act does," and we went on to say that a plaintiff asserting a tort claim against a federal agency could take advantage of the APA to obtain equitable relief. *Robinson v. Sherrod,* 631 F.3d 839, 841 (7th Cir.2011).

If that were not reason enough to reject the Corps's immunity defense, there is more. By its terms, the FTCA does not apply to *any* federal common-law tort claim, no matter what relief is sought. As the Corps itself points out, state tort law—not federal law—is the source of substantive liability under the FTCA. See *Meyer,* 510 U.S. at 478–79, 114 S.Ct. 996; *Sobitan v. Glud,* 589 F.3d 379, 388–89 (7th Cir.2009); *cf. Smith,* 507 U.S. at 198, 113 S.Ct. 1178 (no FTCA claim for tort committed in Antarctica, a sovereignless entity not subject to either state law or the law of a foreign country). The states' tort claim is based entirely on federal common law, and so the claim would not be cognizable under the FTCA in the first place. *Meyer,* 510 U.S. at 478, 114 S.Ct. 996. And if the FTCA could never apply to the type of claim advanced, then there is no reason to think that it implicitly forbids a particular type of relief for a claim outside its scope. For all these reasons, we conclude that the waiver contained in § 702 of the APA subjects the Corps to the plaintiffs' common-law claims for declaratory and injunctive relief.

C

***10** The Corps and the District next contend that congressional regulation has displaced as a matter of law the federal common law on which the states rely. The district court rejected this argument on the ground that Congress had not done enough about the threat of invasive carp to qualify for displacement of the federal common-law claim. The defendants say this was error. As they see things, it is enough that Congress has passed legislation to stop the carp and that federal and state agencies are hard at work to address the problem. Because the parties disagree about the effect of *American Electric Power* and the way in which the displacement analysis should proceed, we begin with a few important principles.

[6] The doctrine of displacement rests on the premise that federal common law is subject to the paramount authority of Congress. *New Jersey v. New York,* 283 U.S. 336, 348, 51 S.Ct. 478, 75 L.Ed. 1104 (1931); see also *American Electric Power,* 131 S.Ct. at 2537 ("[I]t is primarily the office of Congress, not the federal courts, to prescribe national policy in areas of special federal interest."). " '[W]hen Congress addresses a question previously governed by a decision rested on federal common law ... the need for such an unusual exercise of law-making by federal courts disappears.' " *American Electric Power,* 131 S.Ct. at 2537 (quoting *Milwaukee II,* 451 U.S. at 314, 101 S.Ct. 1784). Displacement focuses on the relation between Congress and the federal courts—it is not a doctrine that is concerned with the relation between the federal courts and the executive branch. This is a distinction often neglected by courts, as well as by the parties to this case. Whether federal courts can or should play a role in the face of comprehensive agency action is a critical issue, which we address below, but executive action or lack thereof does not affect the displacement analysis. See *American Electric Power,* 131 S.Ct. at 2538–39 (rejecting the argument that an agency must have taken action before common law is displaced and explaining that the EPA's outright refusal to regulate emissions would not create a role for federal common law because "the delegation [of regulatory authority from Congress to the agency] is what displaces federal law"); *Milwaukee II,* 451 U.S. at 317–18, 324 n. 18, 101 S.Ct. 1784 (concluding that displacement had occurred because "*Congress* ... has occupied the field through the establishment of a comprehensive regulatory program supervised by an expert administrative agency," regardless of how thoroughly the agency has implemented that program) (emphasis added). Congress's decision to assign a particular problem to an executive agency or its description of an agency's role in addressing a problem may be evidence of displacement, but the ebb and flow of agency action neither diminishes nor increases the role of federal

common law. The important displacement question is whether Congress has provided a sufficient legislative solution to the particular interstate nuisance here to warrant a conclusion that this legislation has occupied the field to the exclusion of federal common law.

***11** [7] We readily concede that Congress has not been mute on the subject of the carp, but that simply underscores the critical question: how much congressional action is enough? In their supplemental memoranda filed after *American Electric Power* was decided, the defendants seize upon the statement from the opinion that we quoted above—that "the delegation is what displaces federal law." 131 S.Ct. at 2538. Their view is that all Congress must do to displace federal law is to indicate its intention to delegate a particular problem to an executive agency. They read *American Electric Power* as an enlargement of whatever displacement doctrine existed previously. But the defendants have taken the Court's statement out of context. The Court in that passage was responding to an argument that an agency must have acted pursuant to its statutory power before federal common law is displaced. See *id.* at 2538–39. The Court explained that this was not the case and that it is congressional action, not executive action, that guides the displacement analysis. In so ruling the Court did not establish a new test based solely on Congress's delegation of regulatory power; it simply pointed out that delegation is one type of congressional action that is evidence of displacement. "The test for whether congressional legislation excludes the declaration of federal common law," the Court said, "is simply whether the statute 'speak[s] directly to [the] question' at issue." *Id.* at 2537 (quoting *Mobil Oil Corp. v. Higginbotham*, 436 U.S. 618, 625, 98 S.Ct. 2010, 56 L.Ed.2d 581 (1978), and citing *Milwaukee II*, 451 U.S. at 315, 101 S.Ct. 1784, and *County of Oneida v. Oneida Indian Nation of N.Y.*, 470 U.S. 226, 236–37, 105 S.Ct. 1245, 84 L.Ed.2d 169 (1985)). Importantly, while Congress must have spoken to the particular question at issue, it is not necessary for us to find the same manifest congressional purpose that we would require in an analysis of whether Congress has preempted state law. *Id.* at 2537.

Earlier federal nuisance cases provide additional insight into the level of congressional action that is sufficient to displace federal common law. In *Milwaukee I*, where Illinois sued Milwaukee and other cities to stop them from dumping sewage into Lake Michigan, the Court decided that the federal common law of public nuisance had not been displaced, despite the fact that Congress had by that time "enacted numerous laws touching interstate waters." 406 U.S. at 101–07, 92 S.Ct. 1385. Laws that touched on the issue at hand were not enough, and thus the common-law action could move forward. At the same time, however, the Court foreshadowed that federal legislation "may in time pre-empt the field of federal common law of nuisance." *Id.* at 107, 92 S.Ct. 1385. Six months after *Milwaukee I*, Congress passed sweeping amendments to the Federal Water Pollution Control Act (FWPCA), and nine years after its first decision, the Court decided in *Milwaukee II* that those amendments displaced federal common law in the area. 451 U.S. at 317–18, 101 S.Ct. 1784. The Court viewed the amended statute as "a comprehensive regulatory program supervised by an expert administrative agency," and it noted that under that regulatory program "[e]very point source discharge is prohibited unless covered by a permit." *Id.* at 317–18, 101 S.Ct. 1784. This permitting requirement brought every potential interstate water polluter within Congress's administrative scheme; any discharge had to be done with the permission of the EPA or a qualifying state agency; and there were enforcement options available when polluters failed to meet the conditions of permits that had been issued. See *id.* at 310–11, 101 S.Ct. 1784.

***12** Most recently, *American Electric Power* held "that the Clean Air Act and the EPA actions it authorizes displace any federal common law right to seek abatement of carbon-dioxide emissions from fossil-fuel fired power plants." 131 S.Ct. at 2537. The Court found it important that the Clean Air Act requires the EPA to identify and establish performance standards for all carbon-dioxide emitters; the statute also "provides multiple avenues for enforcement," which include state agencies (operating under power delegated by EPA), the EPA itself, criminal proceedings against violators, and private enforcement in the event that the EPA or the states fail to regulate emissions. If the EPA has not acted, states and private parties may petition the agency for a rulemaking, after which parties have a right to review in federal court. *Id.* at 2537–38. The Court concluded with the observation that "[t]he Act itself thus provides a means to seek limits on emissions of carbon dioxide from domestic power plants—the same relief the

plaintiffs seek by invoking federal common law. We see no room for a parallel track." *Id.* at 2538.

For better or for worse, congressional efforts to curb the migration of invasive species, and of invasive carp in particular, have yet to reach the level of detail one sees in the air or water pollution schemes. In 1990, Congress passed the Aquatic Nuisance Prevention and Control Act in an attempt to stop the spread of zebra mussels and other nuisance species. See 16 U.S.C. §§ 4701 *et seq.* That statute established the Aquatic Nuisance Species Task Force and gave it the job of studying invasive species and implementing a program "to prevent introduction and dispersal of aquatic nuisance species" in the United States. See *id.* § 4722. In 1996, the National Invasive Species Act amended the 1990 law and directed the Corps and the task force to "investigate and identify environmentally sound methods for preventing and reducing the dispersal of aquatic nuisance species between the Great Lakes [basin] and the Mississippi River [basin] through the Chicago River Ship and Sanitary Canal," including any methods that could be incorporated in the normal operation of the CAWS. *Id.* § 4722(i)(3)(A). This mandate led to the construction of an underwater electric barrier in the Chicago Ship and Sanitary Canal. The barrier sits just upstream of the point where the CAWS empties into the Des Plaines River; it is designed to deter fish from moving in either direction through the canal. In 2003 the Corps, relying on the continuing authority given to the Secretary of the Army in 33 U.S.C. § 2309a, began construction of a second barrier next to the first. The barrier projects received an additional influx of cash from the District of Columbia Appropriations Act of 2005, Pub.L. 108–335, § 345, 118 Stat. 1352 (Oct. 18, 2004). In 2007, Congress passed the Water Resources Development Act, Pub.L. No. 110–114, § 3061(b)(1), 121 Stat. 1121 (Nov. 8, 2007), which allowed the Corps to upgrade its first barrier and officially authorized the construction of the already-in-progress second barrier. Finally, the Corps received more money to complete a third barrier as part of the American Reinvestment and Recovery Act of 2009.

***13** Sections 3061(b) and (d) of the Water Resources Development Act of 2007, *supra*, instructed the Corps to undertake two studies: a short-term examination of how the electric barrier systems might more effectively stop invasive species (this is the Efficacy Study, which so far consists of four interim reports, see http://www.lrc.usace.army.mil/AsianCarp/efficacy.htm); and a long-term study of how the Mississippi and Great Lakes basins might be separated on a more permanent basis (this is the Great Lakes and Mississippi River Interbasin Study or "GLMRIS," see http://glmris.anl.gov). In an appropriations bill for fiscal year 2009, Congress provided that "the Secretary of the Army shall implement measures recommended in the efficacy study, or provided in interim reports, authorized under section 3061 of the Water Resources Development Act of 2007 ... with such modifications or emergency measures as the Secretary of the Army determines to be appropriate, to prevent aquatic nuisance species from bypassing the Chicago Sanitary and Ship Canal Dispersal Barrier Project referred to in that section and to prevent aquatic nuisance species from dispersing into the Great Lakes." Energy and Water Development and Related Agencies Appropriations Act 2010, Pub.L. No. 111–85, § 126, 123 Stat. 2845, 2853 (Oct. 28, 2009). This authority—referred to informally as the Section 126 power—is set to expire on September 30, 2011. Department of Defense and Full–Year Continuing Appropriations Act 2011, Pub.L. No. 112–10, §§ 1101(a)(2), 1104, 1106, 125 Stat. 38, 103 (Apr. 15, 2011). Add to these measures the appropriation of funds so that the Corps can ensure proper operation of the CAWS, *e.g.*, Pub.L. No. 98–63, 97 Stat. 301, 311 (July 30, 1983); Pub.L. No. 97–88 § 107, 95 Stat. 1135, 1137 (Dec. 4, 1981); Pub.L. No. 79–525, 60 Stat. 634, 636 (July 24, 1946), and one has the whole of Congress's efforts to stop invasive species from moving through the CAWS. Recent legislative proposals targeted at halting invasive carp have failed in both Houses. *E.g.*, Close All Routes and Prevent Asian Carp Today Act of 2010 (CARP ACT), H.R. 4472, S. 2946.

Although this legislation demonstrates that Congress is aware of the problem of invasive species generally, and carp in particular, it falls far short of the mark set by the Clean Air Act or the Federal Water Pollution Control Act. Congress has not passed any substantive statute that speaks directly to the interstate nuisance about which the states are complaining. Most of the laws that we have summarized appropriate funds to the Corps for routine maintenance of the CAWS or for the electric barrier project. Apart from requiring the construction of these barriers and giving the Secretary of the Army temporary power to implement various recommendations, Congress has

ordered agencies (or, more commonly, informal task forces composed of various executive actors) only to study the invasive species problem and propose solutions. Beyond that, neither the Corps nor any other agency has been empowered actively to regulate the problem of invasive carp, and Congress has not required any agency to establish a single standard to deal with the problem or to take any other action. The narrow delegation that has taken place bears little resemblance to the regulatory power that the EPA wields under the Clean Air Act. Tellingly, Congress has not provided any enforcement mechanism or recourse for any entity or party negatively affected by the carp, and there is certainly no recourse to the courts under the minimal scheme that has been established. The district court was correct that the current state of congressional regulation is much closer to the situation examined in *Milwaukee I*—and perhaps even less extensive than that—than the regimes reviewed in *Milwaukee II* or *American Electric Power.*

D

***14** With these important preliminary questions out of the way, we are at last ready to consider whether the plaintiff states have presented enough evidence in support of their nuisance claim to establish that they are likely to succeed on the merits. The district court thought that the states failed to demonstrate more than a minimal chance of success. Before this court, the states contend that the district court misunderstood the elements of public nuisance. They point to the district judge's statement that the tort "contemplates an active—or, at least, an imminent—threat of injury" as evidence of that error. In their view, all they must show to win final relief in a trial on the merits is that there is a "significant threat" that the nuisance will occur. This is a distinction without a difference; the district court correctly understood the law of public nuisance. Nonetheless, for different reasons we think that the district judge may have underestimated the states' likelihood of success. We will elaborate on this point after a brief review of the governing law.

1

The district court began with the definition of public nuisance found in the *Restatement (Second) of Torts,* which has been a common reference point for courts considering cases arising under federal common law. See *Connecticut v. American Electric Power Co., Inc.*, 582 F.3d 309, 351 & n. 28 (2d Cir.2009), *rev'd on other grounds, American Electric Power,* 131 S.Ct. 2527 (explaining that "[t]he Restatement definition of public nuisance has ... been used in ... federal cases involving the federal common law of nuisance ... and the Restatement principles have served as the backbone of state nuisance law"). The *Restatement* provides that "[a] public nuisance is an unreasonable interference with a right common to the general public," RESTATEMENT (SECOND) OF TORTS § 821B(1), and it goes on to explain that conduct meets this standard when it interferes significantly with the public health, safety, peace, comfort, or convenience, *id.* § 821B(2)(a). We described above the reasons why the federal common law of public nuisance is available to redress the type of harm that the states have alleged. And all sides agree that if invasive carp were to achieve a sustainable population in the Great Lakes, the environmental and economic impact would qualify as an unreasonable interference with a public right. As the district court noted, the Corps and other agencies have repeatedly and publicly acknowledged the seriousness of the problem. The Corps, for example, has said that invasive carp "have the potential to damage the Great Lakes and confluent large riverine ecosystems," and that it regards "[t]he prevention of an inter-basin transfer of bighead and silver carp from the Illinois River to Lake Michigan [as] paramount in avoiding ecologic and economic disaster." As a result, the central question on the merits of the states' public nuisance claim will be whether the harm that the states have described is sufficiently close to occurring that the courts should order the defendants to take some new action that will be effective to abate the public nuisance. We stress at the outset an important point to which we will return: this question is one that will be resolved after a full trial on the merits, rather than at this preliminary stage of the case.

***15** [8] A court may grant equitable relief to abate a public nuisance that is occurring or to stop a threatened nuisance from arising. See *Tennessee Copper,* 206 U.S. at 238–39, 27 S.Ct. 618 (requiring the plaintiff to show that a defendant's actions "cause and threaten damage"). In *Missouri v. Illinois,* 200 U.S. at 518, 26 S.Ct. 268, the Court wrote that the threatened harm underlying the nuisance claim "must be shown to be real and immediate." We have read the Court's cases to say that "[t]he elements of a claim based on the federal common law of nuisance are simply that the defendant is carrying on an activity that is causing an injury or significant threat of

injury to some cognizable interest of the complainant," *Illinois v. City of Milwaukee,* 599 F.2d 151, 165 (7th Cir.1979), *rev'd on other grounds, Milwaukee II,* 451 U.S. 304, 101 S.Ct. 1784. Additional statements about averting threatened nuisances appear in the *Restatement,* see RESTATEMENT (SECOND) TORTS § 821B cmt. (i) ("[F]or damages to be awarded [in public nuisance cases] significant harm must have been actually incurred, while for an injunction harm need only be threatened and need not actually have been sustained at all."); *id.* § 821F cmt. (b) ("[E]ither a public or a private nuisance may be enjoined because harm is threatened that would be significant if it occurred."), and in other treatises, see, *e.g.,* 5 J. POMEROY, A TREATISE ON EQUITY JURISPRUDENCE AND EQUITABLE REMEDIES, § 1937 (§ 523), at 4398 (2d ed.1919) (noting that while "a mere possibility of a future nuisance will not support an injunction," relief will be warranted when "the *risk* of its happening is greater than a reasonable man would incur").

[9] The plaintiffs believe that the district court's "imminent threat" requirement is inconsistent with these principles, but we do not share that view. The district court reproduced *verbatim* the elements of the claim as we described them in *Illinois v. City of Milwaukee, supra.* Its discussion of "immediacy" did nothing more than flesh out the Court's requirement of a "real and immediate" threat in public nuisance cases. There is no meaningful legal difference for purposes of the ultimate resolution of a public nuisance claim between a threatened nuisance that is "imminent" and one that is "immediate," "significant," "real," an "unreasonable risk," or anything similar. The job of a court considering the merits of a public nuisance claim is simply to determine whether the activity complained of is a nuisance and, if so, whether it is sufficiently close to occurring that equitable relief is necessary to prevent it from happening.

2

We part company with the district court when it comes to the assessment of the states' likelihood of success on the merits. Here we think it critical to bear in mind the difference between preliminary or interim relief, on the one hand, and permanent relief, on the other. The principles that we just reviewed relate to the ultimate outcome of a public nuisance proceeding. This case has not yet reached that stage, and one consequence of its preliminary posture is that the states were not required to prove that they will ultimately win on the merits in order to secure preliminary relief.

***16** [10] "The propriety of preliminary relief and resolution of the merits are of course significantly different issues." *Parents Involved in Cmty. Schs. v. Seattle Sch. Dist. No. 1,* 551 U.S. 701, 721 n. 10, 127 S.Ct. 2738, 168 L.Ed.2d 508 (2007) (internal quotation marks omitted). This is the reason why findings made at the preliminary injunction stage do not bind the district court as the case progresses. *Cf. Guaranty Bank v. Chubb Corp.,* 538 F.3d 587, 591 (7th Cir.2008). The most significant difference between the preliminary injunction phase and the merits phase is that a plaintiff in the former position needs only to show "a likelihood of success on the merits rather than actual success." *Amoco Prod. Co. v. Village of Gambell,* 480 U.S. 531, 546 n. 12, 107 S.Ct. 1396, 94 L.Ed.2d 542 (1987); *cf. Chathas v. Local 134 Int'l Bhd. of Elec. Workers,* 233 F.3d 508, 513 (7th Cir.2000) ("A plaintiff cannot obtain a permanent injunction merely on a showing that he is likely to win when and if the merits are adjudicated."). In some cases, it is necessary to expedite an ultimate decision, and so courts sometimes consolidate the preliminary injunction hearing with the trial on the merits. See FED.R.CIV.P. 65(a)(2). But where such consolidation has not taken place—and it has not here—and the question is the propriety of preliminary relief, the Supreme Court has warned against "improperly equat[ing] 'likelihood of success' with 'success'...." *University of Texas v. Camenisch,* 451 U.S. 390, 394, 101 S.Ct. 1830, 68 L.Ed.2d 175 (1981); see also *Meridian Mut. Ins. Co. v. Meridian Ins. Group, Inc.,* 128 F.3d 1111, 1119 (7th Cir.1997). This is in keeping with the often-repeated rule that the threshold for establishing likelihood of success is low. *E.g., Cooper v. Salazar,* 196 F.3d 809, 813 (7th Cir.1999); *Brunswick Corp. v. Jones,* 784 F.2d 271, 275 (7th Cir.1986).

[11] We are concerned that the district court here may have lost sight of this distinction. By applying directly the law of public nuisance, the judge seems to have required the plaintiff states actually to show that they were entitled to permanent injunctive relief during the preliminary injunction hearing. The court concluded its discussion of the threat posed by invasive carp, for example, by saying that the states "ha[d] not made a convincing case" that the fish had

pushed into the CAWS in significant numbers; and it said that the plaintiffs had not "shown that the fish [are] anywhere near ... establishing a population in Lake Michigan." Because the states had not yet shown that the threat of nuisance was great enough in the final analysis to warrant an injunction to abate it, the district court seems to have assumed that they had also failed to show enough to obtain preliminary relief. To demonstrate the requisite likelihood of success, however, the states needed only to present a claim plausible enough that (if the other preliminary injunction factors cut in their favor) the entry of a preliminary injunction would be an appropriate step. The preliminary injunction, after all, is often seen as a way to maintain the *status quo* until merits issues can be resolved at trial. By moving too quickly to the underlying merits, the district court required too much of the plaintiffs and, correspondingly, gave too little weight to the strength of their claim at this stage of the case.

3

***17** We also question the inferences drawn by the district court from the facts that it so carefully found after evaluating five days of hearings, which included the testimony of expert witnesses and volumes of written materials on complex scientific and engineering issues. There is very little to criticize about the court's factual findings themselves. For instance, the district judge's decision to admit the expert testimony of Dr. David Lodge, who has been hired by the Corps and who testified for the states at the preliminary injunction hearing about his efforts to track invasive carp through the use of environmental DNA (eDNA) testing, reflects a proper application of Federal Rule of Evidence 702. (We agree that any lack of peer review of Dr. Lodge's work would go to the weight of his testimony, not to the court's ability to consider it. Moreover, the situation will be different at the merits phase, given Dr. Lodge's recent publication of his research. See Christopher L. Jerde, Andrew R. Mahon, W. Lindsay Chadderton & David M. Lodge, "*Sight Unseen " Detection of Rare Aquatic Species Using Environmental DNA*, 4 Conservation Letters 150 (April/May 2011).) We also see nothing to criticize in the district court's assessment that the electric barriers built by the Corps near the intersection of the Chicago Sanitary and Ship Canal and the Des Plaines River seem to have at least some deterrent effect on the movement of invasive carp toward the Great Lakes. In addition, we consider it significant, as the district judge did, that efforts to detect carp by techniques including netting, so-called electrofishing, and rotenone poisoning, have led to few signs of the carp.

Along the same lines, the district court was right to take into account the results of eDNA testing. Despite its skepticism about the reliability of the technique and its concern that the state of eDNA science "did not permit a reasonable inference that live Asian carp are in the [CAWS] ... in numbers that present an imminent threat," the court acknowledged that the eDNA evidence lent some support to the conclusion that there may be invasive carp above (*i.e.*, lakeside of) the Corps's electric barriers. Although we are less skeptical of the science than the district court, we too believe that caution in drawing inferences from the existence of carp DNA in the water is warranted. The eDNA technique, which tests water samples for markers matching a particular species, has a number of shortcomings: it is difficult, if not impossible, to know definitively whether a positive result signals a living specimen above the barrier (DNA may be shed by a dead or distant fish); a positive test does not reveal the number of live fish; and negative results do not necessarily signal the absence of carp. Efforts to corroborate eDNA results with traditional methods of capturing fish have not been successful thus far. On the other hand, the evidence is worth something. The eDNA technique detects carp when the fish are present in small numbers and in situations where the other fishing methods we described above might scare them away or simply miss them, and the large number of negative test results make sense given the sensitivity of the technique. In addition, the Corps and other agencies have voted with their feet: they have been using eDNA tests to manage the invasive carp crisis, and they have said that this testing will continue. (This is undoubtedly why the private intervenor-defendants are the primary critics of this methodology.) If the tests are good enough for expert agencies, it is hard to see why we should flatly forbid their consideration. A January 2011 report on eDNA sampling conducted in 2010 showed positive eDNA results in approximately a dozen locations throughout the CAWS, and experts have opined that these results indicate the presence of carp at multiple locations in the CAWS. On July 29, 2011, federal officials announced that they would begin daily efforts to find invasive carp around Lake Calumet, after multiple rounds of testing revealed carp DNA in that area. See Asian Carp Regional Coordinating Committee, Press Release, July 29, 2011,

http://asiancarp.org/news/asian-carp-r egional-coord inating-commi ttee-to-begi n-intensive-m onitoring-i n-lake-calume t-in-respons e-to-environ mental-dna-r esults; Tammy Webber, *Feds to Step Up Hunt for Asian Carp Near Chicago*, Chicago Tribune, July 29, 2011. The district court thought that this evidence, in combination with the discovery of two invasive carp specimens (one dead and one living) in the CAWS, supported a theory that invasive carp are present in the CAWS in "low numbers." This conclusion was reasonable. The carp may even be present in greater numbers, but for present purposes we do not need any more precision.

***18** Our greatest hesitation with respect to the district court's findings is over its conclusion that "it is far from certain that Asian carp can survive and reproduce in the Great Lakes." Given the record that was before Judge Dow, this prediction may have been sound at the time he ruled. The situation has been evolving rapidly since the preliminary injunction hearing, however, and so we think it worth mentioning that the newest publicly available evidence suggests that when and if the time comes, the carp are unlikely to have trouble establishing themselves in the Great Lakes. Before the district court there was testimony reflecting great uncertainty about how easily the carp could live and reproduce in this new habitat. A species typically requires multiple introductions before it takes root in a new ecosystem, and there has been a substantial debate, reflected in the literature, about whether the food supply and other features of the Great Lakes could support the carp. See generally Sandra L. Cooke & Walter R. Hill, *Can Filter–Feeding Asian Carp Invade the Laurentian Great Lakes? A Bioenergetic Modelling Exercise*, 55 Freshwater Biology 2138 (2010); Cynthia S. Kolar & David M. Lodge, *Ecological Predictions and Risk Assessment for Alien Fishes in North America*, 298 Science 1233 (2002). On April 28, 2011, however, the Obama Administration presented two pieces of what it called "bad news" at a meeting in Chicago on invasive carp: first, it said that while it was once thought that the carp could not establish breeding populations in Lake Michigan because of the low levels of plankton (the carp's normal food source) in the water, new evidence suggests that the fish will happily switch from eating plankton to consuming the green algae that now covers the lake floor (thanks to another invasive species, the zebra mussel); and (2) while experts had thought the carp need coastal rivers between 30 and 60 miles long to spawn, it turns out they can make do with much shorter breeding grounds. See, *e.g.*, *Asian Carp Possibly Hardier than Once Thought*, Chicago Tribune, Apr. 28, 2011. At this point, therefore, we must assume that once in the Great Lakes, the invasive carp would make it their home.

We need not explore the factual record further. As we have said, our review of the district court's findings is deferential, and we see nothing that demands correction. The critical point is that this record is not a static thing. The district court will undoubtedly have more evidence before it when it is time to rule on the request for a permanent injunction, and we are confident that the court will keep its mind open to the implications of any new information. For purposes of assessing the need for preliminary relief, the court relied on its findings that at best a limited number of invasive carp were present in the CAWS and its observation that the so-called invasion front was approximately 30 miles downstream of the CAWS (60 miles from Lake Michigan) as of the spring of 2009. On this basis, it reached the conclusion that while the potential for damage to the Great Lakes is high, the problem had not advanced far enough to present a threat to the plaintiff states. From that it drew the conclusion that the states had shown little likelihood of success on the merits.

***19** It is that final step that gives us trouble. As the district court rightly noted, the magnitude of the potential harm here is tremendous, and the risk that this harm will come to pass may be growing with every passing day. (It certainly has grown since the ill-fated day around 1970 when the carp escaped from various aquaculture facilities and began their march up the Mississippi River. See generally Wisconsin Dep't of Nat. Res., Bighead and Silver Carp (*Hypophthalmichthys nobilis* and *H. molitrix*), http://dnr.wi.gov/invasives/fact/asian_carp.htm.) Given the magnitude of the harm, we are inclined to give the benefit of the doubt to the states on the question whether they have shown enough of a risk of nuisance to satisfy the likelihood-of-success requirement at this preliminary stage. See *Van De Sande v. Van De Sande*, 431 F.3d 567, 570 (7th Cir.2005) ("The gravity of a risk involves not only the probability of harm, but also the magnitude of the harm if the probability materializes.") (citing *United States v. Carroll Towing Co.*, 159 F.2d 169, 173 (2d Cir.1947)). In addition, the nature of the threat—an ecological

harm—suggests that a broader perspective on the problem might be necessary. It is hard to see 60 miles of separation between the carp invasion front and the Great Lakes (and remember this was the estimated distance more than two years ago) as a particularly safe margin, even with functioning electric barriers to deter fish and efforts to reduce propagule pressure (the volume of invasive carp in the water downstream of the front). It is especially chilling to recall that in just 40 years the fish have migrated all the way from the lower Mississippi River to within striking distance of the lakes and have come to dominate the ecosystem in the process. Commercial harvesting of carp in the Mississippi basin increased from just over five tons to 55 tons in the three-year period from 1994 to 1997; there is evidence that by 1999 invasive carp made up 97% of the Mississippi's biomass; and as of 2007 commercial fishers were catching 12 tons of invasive carp *each day.* These numbers are sobering even apart from the hints that some of the fish may have made it into the CAWS already.

In our view, the proper inference to draw from the evidence is that invasive carp are knocking on the door to the Great Lakes. We need not wait to see fish being pulled from the mouth of the Chicago River every day before concluding that a threat of a nuisance exists. It is enough that the threat is substantial and that it may be increasing with each day that passes. Unlike many nuisances that can be eliminated after they are discovered, this one in all likelihood cannot be. The fact that it would be impossible to unring the bell in this case is another reason to be more open to a conclusion that the threat is real. In our view, the plaintiff states presented enough evidence to establish a good or even substantial likelihood of success on the merits of their public nuisance claim.

III

***20** Before moving on to the other preliminary injunction factors, there are some particular questions about the APA claim against the Corps that we must address. We turn again to § 702 of the APA, which authorizes a suit by "[a] person suffering legal wrong because of agency action, or adversely affected or aggrieved by agency action within the meaning of a relevant statute." 5 U.S.C. § 702. A reviewing court is required to "compel agency action unlawfully withheld or unseasonably delayed," 5 U.S.C. § 706(1), and to "set aside agency action ... found to be ... arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law," *id.* § 706(2)(A). The states do not ask us to compel the Corps to take action, at least as far as § 706(1) is concerned. *Norton v. Southern Utah Wilderness Alliance,* 542 U.S. 55, 64, 124 S.Ct. 2373, 159 L.Ed.2d 137 (2004), explains that "a claim under § 706(1) can proceed only where a plaintiff asserts that an agency failed to take a *discrete* agency action that it is *required to take* "; the states have named no action that they think the agency is required to take. We understand the states' argument as a request to set aside agency action that they regard as unlawful within the meaning of § 706(2)(A).

[12] The obvious starting point is to identify the final Corps action that the states assert has affected them. See 5 U.S.C. § 704; *Lujan v. National Wildlife Fed'n,* 497 U.S. 871, 882, 110 S.Ct. 3177, 111 L.Ed.2d 695 (1990). The states contend that five such actions fit the bill. They say that the Corps's (1) operation of the CAWS in a manner that will let invasive carp into Lake Michigan, (2) reliance on ineffective electric barriers, (3) use of locks in areas where living and dead carp have been found, (4) denial of the states' requests for additional relief, and (5) implementation of recommendations contained in the Corps's third interim report (which is part of the Efficacy Study we discussed in connection with our analysis of displacement, *supra*) are all final agency actions. The district court equivocated on the issue, but it seems to have agreed with the states in the end.

[13] There is a good chance that most of the "actions" named by the states are not "final agency actions" for purposes of the APA. "Agency action" is defined as "the whole or a part of an agency rule, order, license, sanction, relief or the equivalent or denial thereof, or failure to act," 5 U.S.C. § 551(13). The Supreme Court has explained that these categories all "involve circumscribed, discrete agency actions," *Norton,* 542 U.S. at 62, 124 S.Ct. 2373. Agency action is "final" when it marks the consummation of the agency's decisionmaking process and determines legal rights or obligations. *Bennett v. Spear,* 520 U.S. 154, 177–78, 117 S.Ct. 1154, 137 L.Ed.2d 281 (1997); see also *Western Illinois Home Health Care, Inc. v. Herman,* 150 F.3d 659, 662 (7th Cir.1998) (citing *Franklin v. Massachusetts,* 505 U.S. 788, 112 S.Ct. 2767, 120 L.Ed.2d 636 (1992), for the proposition that "[t]he core question is whether the agency has completed its decisionmaking process,

and whether the result of that process is one that will directly affect the parties"). Applying these standards, we cannot see why any of the "actions" that are numbered 1 through 4 on the states' list of complaints above should be considered final agency action. Most of the four "actions" are not discrete at all; and those that might be so classified do not represent the final outcome of any decisionmaking process by the Corps. The Corps's effort to implement its third interim report—which recommended the installation of screens over two gates that control water flow between the CAWS and Lake Michigan but which otherwise called for normal operation of lake-facing locks—is the only activity that may be suitable for an APA challenge. We need not evaluate that claim in any detail, however, because it is part of the states' larger request for relief based on the common law of public nuisance.

***21** Two types of plaintiffs are given a right of review in § 702: those suffering a "legal wrong," and those "adversely affected or aggrieved by agency action within the meaning of a relevant statute." In their briefs in this court, the states have not pointed to a single statute against which one might judge the Corps's behavior. (This is not surprising, given the dearth of pertinent federal legislation that we discussed in connection with displacement.) The Corps submits that this means that the states have no APA claim; the states respond their APA claim is "free-standing." Neither answer is satisfactory. We know that the states have not alleged that the Corps's actions failed to comply with some statutory provision, and so they must instead be asserting that they have suffered a "legal wrong" because of those actions. The only legal wrong that comes to mind, however, is the infliction of a common-law public nuisance. See *Lujan*, 497 U.S. at 883, 110 S.Ct. 3177 (distinguishing between legal wrongs and the failure of an agency to comply with a statutory provision); *Tennessee Electric Power Co. v. Tennessee Valley Authority*, 306 U.S. 118, 137, 59 S.Ct. 366, 83 L.Ed. 543 (1939) (explaining that "legal wrong" includes tortious invasions and interferences with property and contractual rights). See generally Antonin Scalia, *The Doctrine of Standing as an Essential Element of the Separation of Powers*, 17 SUFFOLK. U.L.REV.. 881, 887–90 (1983) (discussing the use of the term "legal wrong" in the APA and explaining that it "could only mean a wrong already cognizable in the courts"). The result is that the states' APA claim against the Corps sinks or swims (so to speak) with its public nuisance theory. Because they are indistinguishable, we address only the latter from this point on.

IV

To satisfy the second threshold requirement for preliminary injunctive relief, the states must establish that irreparable harm is likely without an injunction. *Judge v. Quinn*, 612 F.3d 537, 557 (7th Cir.2010). In the district court's view, this issue was the same as the question whether the states had shown a likelihood of success on the merits of their public nuisance claim. The states contend that it was error to conflate these inquiries. They are right. In this case, for example, the likelihood of success on the merits focuses on the threat of a nuisance, while the irreparable harm is concerned with the ability to correct that nuisance if it is created. Not every nuisance will give rise to irreparable harm. These two steps of the preliminary injunction analysis thus play different roles. The likelihood of success on the merits is an early measurement of the quality of the underlying lawsuit, while the likelihood of irreparable harm takes into account how urgent the need for equitable relief really is. Typically, these lines of inquiry will have some overlap, but they should not be treated as the same. With that in mind, we realize that the same evidence will inform both steps of the preliminary injunction analysis in this case. As long as the distinctions we have just mentioned remain clear, there is no harm in analyzing all of the evidence once rather than twice. As a result, the states' criticism of the district court is largely academic and provides no reason to reverse that court's decision.

***22** [14] Putting theory to one side, we have very little trouble concluding that the environmental and economic harm that the states have shown might come to pass would be genuinely irreparable if it did occur. The district court implied that this was the case when it discussed the magnitude of the potential harm. Last year in Supreme Court filings related to this litigation, the United States explained in a memorandum that it agreed with Michigan "that allowing a reproducing population of Asian carp to establish itself in Lake Michigan likely would be an irreparable injury." Memorandum in Opposition of the United States, at 43, Original Nos. 1, 2, and 3, http://www.supremecourt.gov/SpecMastRpt/US_Memorandum_in_Opposition.pdf; see also *id.* at 47 (calling the harm "grave and irreparable"). All of the other parties

seem to agree with this view. (To the extent that the defendants argue that there is no irreparable harm because the carp cannot establish a breeding population in Lake Michigan, they are avoiding the key question: what if the fish did establish a successful breeding group?) This near-unanimity on the question of irreparable injury makes sense. "Environmental injury, by its nature, can seldom be adequately remedied by money damages and is often permanent or at least of long duration, *i.e.,* irreparable." *Amoco Prod.,* 480 U.S. at 545, 107 S.Ct. 1396; *Sierra Club v. Franklin County Power of Illinois, LLC,* 546 F.3d 918, 936 (7th Cir.2008). Harms like those the states allege here are irreparable because they are difficult—if not impossible—to reverse. See *Hollingsworth v. Perry,* —— U.S. ——, 130 S.Ct. 705, 712, 175 L.Ed.2d 657 (2010) (per curiam).

[15] For preliminary relief to be granted, the irreparable harm must also be likely. That is, there must be more than a mere possibility that the harm will come to pass, *Winter,* 555 U.S. at 21–23, 129 S.Ct. 365, but the alleged harm need not be occurring or be certain to occur before a court may grant relief, *United States v. W.T. Grant Co.,* 345 U.S. 629, 633, 73 S.Ct. 894, 97 L.Ed. 1303 (1953); *United States v. Oregon State Med. Soc'y,* 343 U.S. 326, 333, 72 S.Ct. 690, 96 L.Ed. 978 (1952); *Bath Indus., Inc. v. Blot,* 427 F.2d 97, 111 (7th Cir.1970). Commentators describe the required level of certainty this way: "[A] preliminary injunction will not be issued simply to prevent the possibility of some remote future injury. A presently existing actual threat must be shown. However, the injury need not have been inflicted when application is made or be certain to occur." 11A CHARLES ALAN WRIGHT, ET AL., FEDERAL PRACTICE AND PROCEDURE § 2948.1, at 154–55 (2d ed.1995). Because the district court analyzed likelihood of success on the merits at the same time as it assessed the danger of irreparable harm, all of the reservations we had about the inferences drawn by the district court in the former context apply with equal force here.

As we have already pointed out, no one knows whether this irreparable harm will come to pass. The intense factual dispute we are witnessing here about the rate at which invasive carp are progressing makes evaluating its likelihood even more tricky. In our view, the district court required a level of proof too close to certainty when it assessed the danger of invasive carp escaping into Lake Michigan. Given the dire nature of the harm posed by the carp and their close proximity to the CAWS, we again will give the plaintiff states the benefit of the doubt. Just as they produced enough evidence to establish a likelihood of success on the merits warranting injunctive relief, so too have they shown, to the degree necessary for preliminary relief, that it is likely that irreparable harm will come to pass. This sets the stage for the dispositive issue: how must the harms the states have identified be balanced against those that the defendants will suffer should an injunction be granted?

V

***23** [16] The balancing process to which we now turn is a classic part of any preliminary injunction inquiry. See *Winter,* 555 U.S. at 24, 129 S.Ct. 365 ("A preliminary injunction is an extraordinary remedy never awarded as of right. In each case, courts must balance the competing claims of injury and must consider the effect on each party of the granting or withholding of the requested relief.") (internal quotation marks and citations omitted). How much of the danger forecast by the states would be avoided by the particular injunction they have asked for? And what harm would the injunction impose on the defendants? Typically, after we balance these party-specific equities, we evaluate whether the injunction would advance or impede the public interest. See, *e.g., Ferrell v. U.S. Dep't of Hous. and Urban Dev.,* 186 F.3d 805, 811 (7th Cir.1999). That additional analysis is not necessary in this case, however, because the parties themselves, with the exception of two interveners, are governmental entities that represent the interests of the public.

When it appears that preliminary relief may be burdensome, the Supreme Court has instructed courts to be careful as they balance the competing interests. *Winter,* 555 U.S. at 27, 129 S.Ct. 365; see also *Kartman v. State Farm Mut. Auto. Ins. Co.,* 634 F.3d 883, 892 (7th Cir.2011). In light of the multifarious ideas the states have for an injunction in this case, there can be no doubt that caution must be our word of the day. Even if a plaintiff's suit appears to have merit, an injunction should not necessarily issue if the harm to the defendant would substantially outweigh the benefit to the plaintiff. *MacDonald v. Chicago Park Dist.,* 132 F.3d 355, 357 (7th Cir.1997).

In the end we conclude that a preliminary injunc-

tion would cause significantly more harm that it would prevent. We reach this result for two reasons, which we summarize here before explaining the balance of harms in more detail. First, there are a number of problems with various line items in the plaintiffs' proposed package of relief. Taken together, these problems leave us doubting whether the proposed injunction would reduce by a significant amount the risk that invasive carp will gain a foothold in the Great Lakes between now and the time that a full trial on the merits is completed. It is clear, on the other side, that the requested measures would impose substantial costs on the defendants and the public interests they represent, as well as added expenses for commerce, recreation, and tourism. Second, as circumstances currently stand, there is a more fundamental reason that the states' requested injunction is unlikely to prevent much harm and actually may impose costs. The courts would not be acting alone. As we have explained, there is a powerful array of expert federal and state actors that are engaged in a monumental effort to stop invasive carp from entering the Great Lakes. The last thing we need is an injunction operating at cross-purposes with their efforts or imposing needless transactional costs that divert scarce resources from science to bureaucracy. Furthermore, from an institutional perspective courts are comparatively ill situated to solve this type of problem. The balance of harms favors the defendants and the public interests they represent to such an extent that we conclude that the district court's decision to deny preliminary relief was not an abuse of discretion.

A

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***24** It is best to begin by trying to understand precisely what preliminary relief the states would like. As the district court noted, their request has evolved as the case has moved forward. Indeed, their position has shifted even between their opening brief in this court and oral argument. The moving nature of the target complicates our job of evaluating the propriety of injunctive relief. Moreover, their request has been phrased at a high level of generality. They have given us the broad strokes of additional steps they would like us to order the defendants to take, but they have not furnished many details about how this relief would be implemented, on what schedule, at what cost, and on whose nickel. From time to time the states urge that the injunctive measures should be "consistent with public health and safety," but they do not say what precisely that means. This vagueness is unhelpful; it stands as an obstacle to the entry of an injunction that will satisfy Federal Rule of Civil Procedure 65(d). See *PMC, Inc. v. Sherwin–Williams Co.*, 151 F.3d 610, 619–20 (7th Cir.1998); see also *Patriot Homes, Inc. v. Forest River Hous., Inc.*, 512 F.3d 412, 414–15 (7th Cir.2008). When a plaintiff seeks relief of the type the states ask for here, we have required a more specific plan about the measures to be taken and the costs of implementing those measures. See *Jordan v. Wolke*, 593 F.2d 772, 774–75 (7th Cir.1978).

At this time, it is our understanding that the states believe that they are entitled to a preliminary injunction that would require the defendants to take these five steps:

a. *Closing the Locks.* Close and stop operating the locks at the Chicago River Controlling Works (the Controlling Works) and the O'Brien Lock and Dam (O'Brien), which sit at two of the five points of contact between the CAWS and Lake Michigan;

b. *Screens over Sluice Gates.* Install nine additional screens over sluice gates that are used to control water flow between the CAWS and the lake at the Controlling Works, O'Brien, and the Wilmette Pumping Station, a third contact point with Lake Michigan;

c. *Block Nets in the Rivers.* Place block nets to stop fish in the Little Calumet River, which connects the CAWS to the lake at the Burns Small Boat Harbor in Indiana, and if necessary in the Grand Calumet River, which runs between the CAWS and the Indiana Harbor and Canal (Burns Harbor and Indiana Harbor are last of the five contact points between the CAWS and Lake Michigan);

d. *Rotenone Poisoning.* Use rotenone to poison fish in the CAWS, especially in areas north of O'Brien.

e. *Accelerating GLMRIS.* Finish the part of the Great Lakes and Mississippi River Interbasin Study that relates to the CAWS, which Congress called for in the Water Resources Development Act of 2007, within 18 months.

The states have made two additional requests

that do not require discussion. They say that the defendants should use the best methods to stop, capture, and kill carp that are present in the CAWS. We see this as a more general statement of the specific measures we have just outlined. In addition, the states want the defendants to continue using monitoring techniques, including eDNA testing, to search for invasive carp. But the Corps and the other agencies working on this problem are continuing eDNA monitoring efforts. In July 2011, for example, three rounds of positive eDNA testing results led to a four-day hunt for invasive carp (none was found). This request asks for steps already being taken, and so we will not discuss it further.

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***25** Before we discuss the harm and benefit of the preliminary relief the states request, we must point out an error in the states' view of how the harms should be weighed. The states say that any harm the defendants might suffer because of the injunction pales "in comparison to the grave and truly irreparable harm that will occur if Asian carp establish a breeding population in the Great Lakes." But that is not the correct measure of the harm avoided by the states' proposed injunction. The states assume, without providing much explanation, that preliminary relief would stop invasive carp from ever reaching the Great Lakes. While that *may* be the effect that a perfectly designed permanent injunction would have, it is not an accurate measure of the harm that would be avoided by the states' proposed preliminary injunction. At this early point, the question is to what extent would the proposed measures decrease the risk of invasive carp establishing themselves in the Great Lakes between now and when the litigation concludes? Stepping back from the subject matter of this litigation, we note that in addition to the CAWS, the Corps has identified a total of 18 places in Minnesota, Wisconsin, Indiana, Ohio, and New York where invasive carp could move from the Mississippi basin into the Great Lakes. These pathways outside of the CAWS necessarily reduce the likelihood that the states' preliminary injunction will prevent carp from establishing themselves in the Great Lakes, because the states' proposed measures say nothing about these alternate routes. Even focusing exclusively on the CAWS, the states overlook similar limitations inherent in the steps they are proposing—limitations that would reduce the effectiveness of preliminary relief, as we now explain.

a. *Closing the Locks.* If the locks at the Controlling Works and O'Brien are closed, the states concede that the closure need not be permanent or unqualified; instead, they say, the locks may be opened if closure would put public health or safety at risk. We are not sure how that would work. The City of Chicago says that police and fire services use the locks routinely, as do Coast Guard boats. At one point, the states agreed that passage for emergency boats through the locks was needed for public safety. That sounds reasonable to us. Now, however, their injunction would allow the defendants to open the locks only when the District needs to release water from the CAWS into the lake to control flooding (during so-called "reversal" operations). The states' proposed injunction is made more effective by keeping the locks closed to all boat traffic, but in so doing, it increases the cost to emergency services. Even in its current iteration, the efficacy of the states' plan for closing the locks is compromised because any flooding that would require the defendants to conduct reversal operations decreases the chances that the carp will be stopped—when the locks are open, water pours out of the CAWS and into Lake Michigan. (This happened most recently on July 24, 2011, after nearly seven inches of rain fell in only two hours, see Michelle Gallardo, 2 *Locks Opened During Record Rainfall*, Chicago Tribune, July 25, 2011, http:// abclocal.go.com/wls/story?secti on=news/local&id=8270514. It also happened exactly one year before, on July 24, 2010.) A related complication concerns how effectively the locks stop fish even when they are closed. By most accounts, a watertight closure would require bulkheads to be installed on the locks. Without bulkheads, fish might slip through small openings. The states have been less than explicit about whether their ideal injunction would require bulkheads, but if it would, then all the risks of flooding come right back into the equation. Bulkheads take time to install and remove, which means that it would be very difficult to respond quickly to floods. In short, this aspect of the states' requested relief puts them into a bind: the risk of carp migration is reduced the most by closing the locks permanently with bulkheads; but that measure, as the states recognize, would dramatically escalate the costs imposed by flooding. While keeping the locks closed more often no doubt reduces the risk of fish migrating into Lake Michigan, it does not bring it down to zero. And this unquantified reduction in risk comes with an increased immediate burden on public health and safety

measures.

***26** b. *Screens over Sluice Gates.* The states encounter similar problems with their request that the defendants screen off nine additional sluice gates. The District operates these huge gates, which open and close to adjust the rate of water flow, as part of its diversion effort—the process of drawing water out of Lake Michigan and into the CAWS to maintain navigability and water quality. In addition, when heavy rains occur, sluice gates (like the locks) are opened to let water from the CAWS into the lake. There are eight sluice gates at the Controlling Works, four at O'Brien, and one in Wilmette. To prevent the migration of adult carp, the District already has installed four screens over sluice gates: two at the Controlling Works and two at O'Brien. The District uses the four screened-off gates for diversion; the other nine remain closed except during flooding.

Initially, the states wanted to force the defendants to close all of the gates, except when public health or safety might be harmed. They have revised that request so that now they ask for screens over the nine remaining sluice gates at these sites. This request would mitigate the risk of carp migration only (at best) during floods, for at other times the gates, unlike the locks, are closed anyway. Further reducing the effectiveness of this measure is the fact that in some flooding incidents where additional sluice gates must be opened, the locks must be opened as well. Screens over additional sluice gates would not do much good if fish could swim through open locks. Finally, all available evidence suggests that it will take a long time for the District to acquire additional property, to research feasible options for a system of screens that will not become clogged with debris during flooding, and to build those screens. This means that this portion of the states' preliminary injunction might not even be in place before the full trial on the merits has concluded. For all of these reasons, we think that installing screens over sluice gates will have at most a tiny effect on the odds of invasive carp making it to Lake Michigan.

c. *Block Nets in the Rivers.* The prospect of placing block nets in the Little Calumet and Grand Calumet Rivers strikes us as potentially the most effective element of the proposed relief. At the time of oral argument, the states asked that the Corps place block nets only in the Little Calumet River; at that point, a cofferdam in the Grand Calumet River prevented fish migration and alleviated the need for nets there. We will assume that were this dam removed, the states would ask the Corps to place nets in the Grand Calumet River as well. The Corps, however, has said that it is already looking at the possibility of installing nets in both waterways, but that it is concerned that flooding will increase as debris becomes caught in the nets. The states respond that block nets could be cut free and replaced with new nets if risks of flooding materialized. All of the parties are vague about the possibilities and implications of this plan. At this stage, it is enough to say that this step seems more promising than others when it comes to mitigating the risk that fish will appear in Lake Michigan. We take the Corps at its word that this option is under serious consideration and would be implemented if and when a feasible plan can be developed.

***27** d. *Rotenone Poisoning.* In contrast to the block net idea, the suggestion that the Corps use rotenone to poison fish in the CAWS seems untenable to us. Rotenone is a chemical that acts as a piscicide when it is released in a body of water. Though humans would not digest much of it if it were ingested, rotenone enters the bloodstream of a fish through the gills, causing death quickly. Rotenone dumped into a river kills the vast majority of fish living there; when dead, they usually float to the surface. The poison generally is less dangerous to other animals, but it is toxic and its toxicity varies depending on the species. See generally Cornell University, Resource Guide for Organic Insect and Disease Management, Material Fact Sheets—Rotenone, http://web.pppmb.cals.cornell.edu/resourceguide/mfs/11rotenone.php. It is unclear just how the states' proposal for rotenone use differs from what the Corps is already doing in the CAWS. We know that the states would like poison to be applied near O'Brien, but there is no indication how often or where else it might be used. In May 2010, the Corps and other agencies used the poison to search for fish in a two-mile stretch of the Little Calumet River. Dozens of tons of fish were killed, and no specimens of invasive carp were found. While poisoning may be an effective way to search for elusive carp in some circumstances, the record does not explain why ordering the Corps to poison the CAWS on a regular basis would be a sound step toward reducing the risk that invasive carp will migrate into the Great Lakes.

e. *Accelerating GLMRIS.* That brings us to the aspect of the proposed injunction that would require the Corps to accelerate its long-term study of ways in which it might permanently prevent the migration of invasive species (including, but not limited to, the carp) between the Great Lakes and the Mississippi basins. The states raise a side issue here, saying that the district court erred when it denied their request to expedite GLMRIS because it failed to make the findings required by Federal Rule of Civil Procedure 52(a)(2). The argument is frivolous. The district court explained its reasons for denying all of the relief that the states sought. The court had—and will continue to have as the case moves forward—the power to grant or deny equitable measures either in whole or in part. It did not need to discuss every facet of the relief requested.

According to the Corps, GLMRIS examines every potential pathway between the two watersheds and proposes solutions to stop migration through each one. Examination of the CAWS, which the Corps intends to finish by 2015, is just one portion of the study. The Corps adds that it has the power to implement solutions that are devised as the study progresses. The states would like the court to order the Corps to finish the CAWS portion of GLMRIS within 18 months. They are not the only ones who have criticized the study for taking too long; the City of Chicago and others have as well. See, *e.g.*, Dan Egan, *Chicago Urges Army Corps to Report on Carp Sooner*, Milwaukee Journal Sentinel, Apr. 10, 2011, http://www.jsonline.com/news/wisconsin/119547049.html. It may well be that faster action is appropriate if possible; and, as the Corps conceded during oral argument, it may be necessary for the Corps to implement measures devised through GLMRIS on a rolling basis. But we do not see how a preliminary injunction that would essentially ask the Corps to study harder and think faster would reduce the odds that invasive carp will establish themselves in the short term.

***28** When we take all five aspects of the states' proposed injunction together, we can say only that there is some evidence that the relief sought would reduce by an undefined amount the risk of carp establishing a breeding population in the Great Lakes. It is equally apparent, however, that the steps the states have proposed offer no assurance that they will block the carp over the short run or, over the long run, that they will save the Great Lakes ecosystem and the $7 billion industry that depends on that ecosystem. We must therefore turn to the other side of the equation: the harm that the proposed steps would inflict on the opponents of preliminary relief.

3

The states have adopted a rather insouciant attitude about the potential harm that their proposal might inflict. "[T]he federal government has made it clear that it is willing to spend significant resources to reduce this threat," the states write, "so the cost of a few bulkheads should not prove a serious impediment to protecting the Great Lakes." This tone continues throughout their briefs, with remarks like, "While the Corps asserts that the Coast Guard doesn't have the funds to [dock additional ships on both sides of locks that would be closed by the injunction], this is just a matter of money." Of course this dispute is in part a matter of money; but scoffing at the defendants' concerns about the costs of relief does not aid our assessment of the expense of the relief that the states want. It should go without saying in these straitened times that the federal and local governments do not have bottomless coffers. Indeed, 19 members of the plaintiff states' delegations to Congress recently voted against raising the federal borrowing limit. Nor do we understand why the states take this view when they apparently feel no obligation to contribute to the costs of averting this crisis. When we inquired at oral argument how the costs of the proposed injunction should be apportioned among the parties, the states informed us that their citizens would contribute to the costs by paying federal income taxes. This is not very helpful. Indeed, one might wonder why the federal government and the State of Illinois should be saddled with the entire cost of an injunction that is aimed at a problem that has been developing for four decades in a watershed that touches roughly half of the states in the Union.

To make matters worse, both sides throw around large numbers to make the case that the balance of harms favors their position. We have already explained why the proposed injunction is quite unlikely to prevent the states' forecasted $7 billion in harm. But the defendants invent similarly extreme costs. We are told repeatedly that almost $2 billion in cargo moves through locks in the CAWS each year. This, however, is not the cost that an injunction would impose on commercial shipping. If the locks were closed, cargo would have to be loaded from ships

onto ground transportation at some point along the journey. Estimates of the cost of off-loading range from about $70 million per year (from the plaintiffs' perspective) to $150 million (according to the Corps). The intervening defendant Coalition to Save Our Waterways, which represents various business interests, tells us that closing the locks would cost $4.7 billion. We find no support in the record for that astronomical estimate. The dollar value of the harm to either side is of course difficult to calculate, but we need not settle on a precise number to resolve this appeal.

***29** If the requested preliminary injunction were to issue, we can be sure that it would impose significant costs. First, we would have the expenses of implementing all of the measures that the states have recommended. In addition, funds that the defendants spend complying with the injunction likely would be diverted from other agency efforts to curb invasive carp. If we required the Corps to complete its long-term study within 18 months, the Corps suggests that it would not have time to study the problem comprehensively and that the study might not adequately support any proposed solutions. The prospect of closing the locks permanently, installing screens on sluice gates, and placing block nets in the CAWS increases the risk of flooding, which (to the extent that it occurs) would impose costs throughout the region. The states say that there are ways to avoid those costs. The locks, for example, could be opened at the District's discretion during flooding. But, as we have explained, this would be possible only if the states agreed that bulkheads were not necessary. (The states argue that bulkheads could be removed by a barge and crane to permit for flood relief. Even if that were possible, stationing barges at both locks would cost thousands of dollars per day.) Screens installed over sluice gates used during flooding could become clogged, and the states' suggestion that raking systems be installed to alleviate this concern is both untested and would require significant additional expenditures. Meanwhile, closing the locks to boat traffic would have a tremendous impact. Police and fire services on which the City of Chicago relies would not be able to move from the Chicago River and other points in the CAWS to Lake Michigan, which means that the city would have to establish redundant emergency response fleets on either side of the locks. The same goes for Coast Guard operations around the CAWS. Recreational and tourist vessels would be stopped. And last but certainly not least, closed locks would mean that all commercial shipping in the area between the Great Lakes and the Mississippi would have to find alternative routes.

We can stop there. This overview demonstrates that the preliminary injunction the states have requested would impose substantial costs, yet given the current state of the record, we are not convinced that the preliminary injunction would assure much of a reduction in the risk of the invasive carp establishing themselves in Lake Michigan in the near future. That the balance of harms at this stage of the litigation favors the defendants might be enough by itself to support a conclusion that preliminary relief is not warranted, even though we have concluded that the states have demonstrated a likelihood of success on the merits and a threat of irreparable harm. See *Hoosier Energy Rural Elec. Co-op. v. John Hancock Life Ins. Co.*, 582 F.3d 721, 725 (7th Cir.2009) (describing the relation between the harm prevented by the plaintiff's proposed injunction and the strength of a plaintiff's claim for preliminary relief). Even if one were to conclude that the harms are in equipoise, however, there is a final reason why preliminary injunctive relief is not warranted. As things now stand, the case for judicial intervention is refuted by the fact that the competent federal and state actors are actively pursuing an array of efforts to solve the problem of invasive carp.

B

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***30** While *American Electric Power* is a case about congressional displacement of federal common law, the Supreme Court took the opportunity to touch generally on the relative competence of courts and expert agencies when it comes to solving complex environmental problems. “It is altogether fitting that Congress designated an expert agency, here, EPA, as best suited to serve as primary regulator of greenhouse gas emissions,” the Court wrote, explaining further:

> The expert agency is surely better equipped to do the job than individual district judges issuing ad hoc, case-by-case injunctions. Federal judges lack the scientific, economic, and technological resources an agency can utilize in coping with issues of this order. Judges may not commission scientific studies or convene groups of experts for advice, or issue rules under notice-and-comment procedures

> inviting input by any interested person, or seek the counsel of regulators in the States where the defendants are located. Rather, judges are confined by a record comprising the evidence the parties present. Moreover, federal district judges, sitting as sole adjudicators, lack authority to render precedential decisions binding other judges, even members of the same court.

American Electric Power, 131 S.Ct. at 2539–40 (internal citation omitted). This limitation of the judiciary is a familiar feature of American law. See, *e.g.*, *Negusie v. Holder*, 555 U.S. 511, 129 S.Ct. 1159, 1171, 173 L.Ed.2d 20 (2009) (Stevens, J., concurring in part and dissenting in part); *Kelo v. City of New London*, 545 U.S. 469, 487–88, 125 S.Ct. 2655, 162 L.Ed.2d 439 (2005); *Lingle v. Chevron U.S.A., Inc.*, 544 U.S. 528, 544–45, 125 S.Ct. 2074, 161 L.Ed.2d 876 (2005); *Chevron, U.S.A., Inc. v. Natural Res. Def. Council, Inc.*, 467 U.S. 837, 865–66, 104 S.Ct. 2778, 81 L.Ed.2d 694 (1984); *Tennessee Valley Authority v. Hill*, 437 U.S. 153, 194–95, 98 S.Ct. 2279, 57 L.Ed.2d 117 (1978).

Our sister circuits have explored the impact of this inherent limitation of the judicial role in cases comparable to ours. The Second Circuit has written that "[c]ourts traditionally have been reluctant to enjoin as a public nuisance activities which have been considered and specifically authorized by the government." *New England Legal Found. v. Costle*, 666 F.2d 30, 33 (2d Cir.1981). In the same vein, the Fourth Circuit recently reversed a lower court's decision to enter an injunction that would have required the TVA to implement new emissions controls. *North Carolina, ex rel. Cooper*, 615 F.3d 291. The district court in that case entered an injunction after North Carolina sued the TVA for air pollution based on a state common-law public nuisance theory. The court of appeals concluded that granting "the injunction would encourage courts to use vague public nuisance standards to scuttle the nation's carefully created system for accommodating the need for energy production and the need for clear air." *Id.* at 296. Though the case involved a more robust regulatory scheme than the one that has been cobbled together for the invasive carp, the court's discussion is instructive insofar as it relates to the problems created when courts attempt to stop a nuisance at the same time that agencies are working to solve the problem. An approach that would allow the federal court and the EPA simultaneously to regulate a single emissions problem, said the Fourth Circuit, would result in multiple and perhaps contradictory decrees emanating from different branches of government and confusion about what standards should govern air pollution. *Id.* at 301–04. In addition, judicial action in the face of strong agency measures "would reorder the respective functions of courts and agencies." *Id.* at 304. Environmental problems require the balancing of many complicated interests, and agencies are better suited to weigh competing proposals and select among solutions. *Id.* at 305 ("[W]e doubt seriously that ... a judge holding a twelve-day bench trial could evaluate more than a mere fraction of the information that regulatory bodies can consider.").

***31** None of this means that courts can no longer craft remedies designed to abate a public nuisance. In light of the general approach the Supreme Court took in *American Electric Power*, however, it does mean that the court should not blind itself to other remedies that are available under the law or to other measures that are actively being pursued to solve the problem. Even if legal displacement like that found in *American Electric Power* does not exist, the practical effect of agency actions might add up to displace as a matter of fact any role that equity might otherwise play. Efforts of other branches of government might be so complete that additional action ordered by a court would risk undermining agency efforts to abate the nuisance. How much the equitable power of the court has been limited by agency action will be a factual question that turns on the quality and quantity of the agency's (or, as here, agencies') efforts. This kind of institutional consideration of the court's relative ability to craft meaningful relief fits naturally in the balance-of-harms analysis. For if an injunction might hamper agency efforts or can improve upon them only slightly, that is all the more reason to conclude that the equities tilt in favor of the defendant.

2

The record in this case leaves no doubt that federal and state agencies, executive officials, and working groups have mounted a tremendous effort to halt the migration of invasive carp. As we have already mentioned, the Aquatic Nuisance Prevention and Control Act of 1990 created the Aquatic Nuisance Species Task Force, which includes among other agencies the National Oceanic and Atmospheric Administration, the U.S. Fish and Wildlife Service, the

U.S. Geological Survey, and the EPA. This task force coordinates invasive species issues generally across the country. In addition, during the fall of 2009, 21 federal, state, and local agencies and other entities combined forces to form the Asian Carp Regional Coordinating Committee (the ACRCC), which is designed (as the name suggests) to track and to stop the migration of invasive carp. See generally Asian Carp Control, http://www.asiancarp.org/. The ACRCC counts as members those agencies that comprise the task force, the Corps and the District, the Coast Guard, the U.S. Department of Transportation, the White House Council on Environmental Quality, the Great Lakes Fishery Commission, the City of Chicago, and the state departments of natural resources of all of the plaintiff states, plus Illinois, Indiana, and New York.

In order to stop the invasive carp, the ACRCC has developed what it calls the "Asian Carp Control Strategy Framework," which is now in its third edition. The most recent document lists over 40 collaborative projects that the working group has designed to deal with invasive carp; many of these initiatives are underway or have been completed already. As the ACRCC describes it, the projects fall into eight categories:

***32** (1) targeted monitoring assessment activities above and below the electric barrier system, including enhanced monitoring above and below the barriers, electrofishing, and rapid response teams;

(2) commercial harvesting and removal actions below the electric barriers (which involves fishing and removal of fish in the Lockport area, where the CAWS connects to the Des Plaines River; creating new markets for the fish; and investigating certification requirements for invasive carp to be sold commercially);

(3) electric barrier actions and waterway separation measures (consisting of the construction of barriers between various waterways so that fish cannot move from one to the other during flooding; expedited construction of the now-completed third electric barrier; fish tagging to test the effectiveness of the barriers; and separation of various watersheds that pose risks);

(4) myriad studies on how best to separate the watersheds; the effectiveness of various measures; and risk modeling;

(5) research and technology development (including investigation of how fish move around the CAWS; food sources for invasive carp in the lakes and how those sources might be eliminated; the use of seismic technology to divert or kill invasive carp; attraction and repulsion pheromones of invasive carp; creation of toxin screens to kill fish; study of the weaknesses of carp to different toxins; physical barriers; reducing carp egg viability; and new detection methods, among other things);

(6) eDNA analysis and refinement (which involves monitoring and sampling for eDNA in the CAWS and increasing the effectiveness of eDNA testing);

(7) enforcement activities designed to prevent people from transferring carp between bodies of water; and

(8) work on funding, including the development of methods to pay for measures among the contributing groups.

In addition, the ACRCC has established three working groups: monitoring and rapid response; invasion control; and communication and outreach.

What we have described already reflects a substantial effort, but there is more. The Corps has been fulfilling the marching orders that it has received from Congress. In addition to the electric barriers and GLMRIS, which we have discussed in detail, we have mentioned the Corps's study of the effectiveness of its three electric barriers for stopping the movement of invasive carp through the CAWS. The final version of the Efficacy Study is due later this year, but there already have been four interim reports (numbered in typical bureaucratic fashion as Interim I, II, III, and IIIA), and the Corps has implemented measures pursuant to some of these reports. Interim I identified an area where the Des Plaines River and the Chicago Sanitary and Ship Canal are so close together that carp could wash between them during floods. (The plaintiffs had argued in their complaint that this area represented a huge problem.) The Corps has since built a fence to stop migration between these waterways, and that fence has already proven effective. Meanwhile, Interim II, which is not yet

completed, will set operational parameters for the three electric barriers so that they can most effectively deter the movement of invasive species. The Corps says that even though this study is not finished, it now operates the barriers at the maximum safe strength. In connection with its Interim III report, the Corps consulted a panel of experts about a number of potential changes to its operation of the CAWS. The report concluded that additional screens should be installed on sluice gates, and the District responded by adding screens to two gates at O'Brien, which supplemented the two it had installed months earlier at the Controlling Works. In addition, Interim III recommended that the District cease using the sluice gate at Wilmette for diversion, and it hypothesized that the District might be able to create "atoxic zones" in the CAWS that would be so toxic that no fish would ever be able to swim through them. Finally, the Corps in Interim IIIA recommended the construction of an acoustic, air-bubble, and strobe-light curtain (more or less a disco screen), which would be designed to frighten fish back toward the Mississippi. The disco screen has not been started, but the Corps represented to us at oral argument that it intends to undertake the project at some location downstream of the existing electric barriers.

***33** In addition to the measures outlined in the interim efficacy reports, the agencies continue to rely on traditional methods to monitor and kill invasive carp, including tracking, netting, electrofishing, and rotenone poisoning; and, as we have discussed, they have also continued eDNA testing throughout the CAWS. Where eDNA reveals a potential threat, the agencies have responded with days-long hunts for invasive carp. Continual fishing south of the CAWS reduces the propagule pressure that would otherwise push carp closer to Lake Michigan. Finally, the Obama Administration has named an "Asian carp czar," who is charged with leading the administration's effort to stop invasive carp. Recently, the administration announced plans to install a high-intensity water cannon that would deter fish by firing huge, underwater blasts of water across Chicago Ship and Sanitary Canal.

It is our understanding that the defendants and the agencies we have just discussed are actively pursuing the measures that we have just described. In addition, where the defendants have represented that future steps will be taken—whether a disco screen, the water gun, operating the electric barriers at optimal settings, considering the possibility of block nets in the CAWS, completing and implementing GLMRIS in phases, continuing to monitor aggressively with traditional and eDNA techniques, or any of the other actions we have highlighted—we have no reason at this point to assume that this work will not be done. Whatever happens, the plaintiff states will continue to have a seat at the table as these and future plans are made and implemented. We conclude that on this record, there is nothing that any preliminary injunction from the court could add that would protect the Great Lakes from invasive carp while this suit is being adjudicated any better than the elaborate measures we have just described. This tips the balance of harms decisively in favor of the defendants.

VI

We take very seriously the threat posed by the invasive species of carp that have come to dominate parts of the Mississippi River basin and now stand at the border of one of the most precious freshwater ecosystems in the world. Any threat to the irreplaceable natural resources on which we all depend demands the most diligent attention of government. As the case proceeds, the district judge should bear in mind that the risk of harm here depends upon both the probability of the harm and the magnitude of the problem that would result. In the end, however, the question whether the federal courts can offer meaningful equitable relief—either preliminary or permanent—to help abate a public nuisance in the face of agency action is factual in nature. It depends on the actual measures that the agencies have implemented already and those that they have committed to put in place going forward. Our ruling today is tied to our understanding of the current state of play. We recognize that the facts on the ground (or in the water) could change. The agencies currently working hard to solve the carp problem might find themselves unable to continue, for budgetary reasons, because of policy changes in Washington, D.C., or for some other reason. If that happens, it is possible that the balance of equities would shift. Similarly, new evidence might come to light which would require more drastic action, up to and including closing locks on Lake Michigan for a period of time. If either situation comes to pass, then the district court would have the authority to revisit the question whether an exercise of its equitable powers is warranted, taking into account the principles we have discussed in this opinion. As things stand now, however, preliminary relief

is not appropriate. The district court's judgment is AFFIRMED.

FN* This opinion was originally released in typescript on August 24, 2011.

C.A.7 (Ill.),2011.
Michigan v. U.S. Army Corps of Engineers
--- F.3d ----, 2011 WL 3836457 (C.A.7 (Ill.)), 73 ERC 1353

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ATTACHMENT 4

ATTACHMENT 4

Excerpts from Garibay testimony and references to Framework for Addressing Aquatic Invasive Species Threats to Lake Michigan from the CAWS [to be edited]

A. Human-Caused Condition: Invasive Species Prevention and Control

The Great Lakes Basin, the largest freshwater watershed in the world, also supports the most taxonomically invaded temperate freshwater ecosystem in the world (Mills et al. 1993). Previous invasions of alewife (Miller 1957), sea lamprey (Lawrie 1970) and more recent introductions of zebra mussels (Griffiths et al. 1991) and Eurasian ruffe (Pratt et al. 1992) represent but a fraction of the non-native biomass that have invaded this system, with significant ecological and economic impacts. These introductions, and their recognized consequences, have been a major driver for federal, state and transboundary actions that have been implemented to prevent future invasions of non-native species into the Great Lakes and to address the ecological and economic impacts of those that have already become established. To this end, the Great Lakes Fisheries Commission receives approximately $12 million annually from both the U.S. Department of State (State) and Canada for many years address invasive species issues affecting the Basin.

Strategies selected to prevent invasions of non-native species into the Great Lakes, such as Asian carp, include the electric barrier and the piscicide rotenone. An electric barrier at Romeoville, IL became operational in 2002 and provided an electrical field within the Ship Canal, through which fish will not pass. Additional electric barriers within the CAWS have since been installed to specifically prevent migration of to and from Lake Michigan of invasive species and allow for continuous deterrence within the CAWS during periods of maintenance. Directed funding through the State Department, through the US Army Corps of Engineers and

through other state funding supports the construction and maintenance of the second electrical barrier in the Lower Reach of the Ship Canal. The main objective of the funding of this barrier is preventing the potential spread of Asian carp into the Great Lakes system. The implementation of these strategic measures is in keeping with the broad recognition of the harm invasive species cause and is causing to the Great Lakes Basin, and is wholly consistent with the provisions of the National Invasive Species Management Plan, as mandated by Executive Order 13112. That Executive Order expressly directs federal efforts to prevent, control and minimize invasive species and their impacts (NISC 2008).

Recognition of the ecological and economic harm created by Asian carp established in the Mississippi and Illinois drainages highlights the need to assert maximum efforts to prevent the spread of the Asian carp into the Great Lakes, and thorough risk assessments have detailed the potential consequences of their introduction into the Great Lakes (see: http://www.fws.gov/contaminants/OtherDocuments/ ACBSRAFinalReport2005.pdf). Transboundary cooperation with Canada over this issue has heretofore been successful at minimizing the potential for spread, with recognition that invasive species can be interpreted as 'biological pollutants' under the Boundary Waters Treaty between the U.S. and Canada.

It is important that the State of Illinois and other agencies continue to support prevention of invasive species from migrating into Lake Michigan via the Ship Canal. Factors specific to the control of Asian carp in the Ship Canal include the following summary of recommendations and excerpts from the American Fisheries Society and the Asian Carp Regional Coordinating Committee (see: http://www.asiancarp.org):

- The installation of the electronic barrier in the CSSC demonstrates an understanding "that the artificial connection—known as the Chicago Waterway System—connects the Great

Lakes to the Illinois River, which connects to the Mississippi River. This waterway system provides the pathway for Asian carp to enter the Great Lakes".

- Asian carp consume plankton—algae and other microscopic organisms—stripping the food web of the key source of food for other small and big fish. Asian carp can grow to large sizes and a carp is capable of eating 5 to 20% of its body weight each day. Asian carp often compete directly with native fish. Their diet overlaps with native fishes in the Mississippi and Illinois Rivers.
- Between 1991 and 2000, as scientists watched the Asian carp spread in the Mississippi and Illinois Rivers, Asian carp abundances surged exponentially (Chick and Pegg 2001). Between 1994 and 1997, for instance, commercial catch of bighead carp in the Mississippi River increased from 5.5 tons to 55 tons (Chick and Pegg 2001). The commercial value of Asian carp is quite low and much less valuable than the native fish they replaced.

Not only are Asian carp consuming the aquatic resources in the Illinois River system, they would appear to pose a threat to the Great Lakes, according to the Coordinating Committee.

The Committee notes:

- The presence of Asian carp in the Great Lakes could cause declines in abundances of native fish species. Asian carp will compete with native fish for food—native fish like ciscos, bloaters, and yellow perch, which in turn, are fed upon by predator species including lake trout and walleye (Hansen 2010). Under the conditions found in some areas of the Great Lakes (such as water temperature and food abundance), Asian carp could outnumber all other native species, as is happening in parts of Illinois, Mississippi, and Missouri Rivers.
- The Great Lakes may offer the carp an abundant and varied food supply in portions of the Lakes. Bighead carp would consume zooplankton in the Great Lakes and silver carp would prey heavily on phytoplankton. This feeding could place the carp in direct competition with young and mature native species (Hansen 2010). More troubling is that Asian carp appear to be highly opportunistic when it comes to feeding. For instance, bighead carp diet in the Mississippi River is more varied than in their native range, showing the carp take advantage of the food that is present. By feeding on plankton, the Asian carp feed on the "low end" of the food web, and few people doubt that the carp would have significant negative impacts on the food web (Hansen 2010; Lodge 2010).

- Risk assessments carried out by officials from the U.S. Department of Interior (Kolar et al. 2005) and the Department of Fisheries and Oceans Canada (Mandrak and Cudmore 2004), indicate that the carp could tolerate the Great Lakes basin's climate, as the basin is

well within the fishes' native climate range. Mean annual air temperatures range between -2ºC and 22ºC for bighead carp and -6ºC and 24ºC for silver carp, a temperature span that would support Asian carp populations in much of the United States and Canada, including the Great Lakes.

- The Great Lakes may also offer the Asian carp suitable spawning habitat. The risk assessments show that the Asian carp require 30-60 miles of unimpeded rivers to spawn (Kolar et al. 2005; Mandrak and Cudmore 2004). The carp also thrive in areas with vegetated shorelines; areas that provide habitat for feeding. The Great Lakes basin contains numerous streams with suitable spawning habitat and large areas of vegetated shorelines, particularly large bays, wide river mouths, connecting channels (e.g., the Saint Marys River), wetlands, and lentic areas (areas of still waters). Ample habitat for spawning and feeding exists in all five of the Great Lakes, including Lake Superior.

Moreover, the Committee notes that ecologically there are several facets of Asian carp that confound typical control strategies including (see http://www.asiancarp.org/faq.asp):

- There are few North American fishes large enough to eat an adult Asian carp. White pelicans and eagles, however, have been seen feeding on juvenile or smaller adult Asian carps. Largemouth bass have often been observed feeding on small juvenile Asian carps, and many other native predators probably also feed on them before they grow too large. Asian carps produce many offspring which grow quickly and if conditions are good, they rapidly become too large to be eaten by North American predators.
- If Asian carp do get into the Great Lakes, there is also a potential that they adapt to the local food system and availability, shorter rivers for spawning, and other detrimental behavior as yet unforeseen.
- The CSSC is a manmade waterway that provides a direct connection between the Mississippi River system and Lake Michigan. Measures are being taken to prevent Asian carp from passing through the system.
- Other points of possible entry to the CSSC which are above the electric barrier are the low lying areas of land positioned between the Des Plaines River, and the Illinois and Michigan (I&M) Canal. During heavy rainfall events, these areas are prone to flooding. A significant rain could flood the banks, joining the Des Plaines with the CSSC or the I&M Canal with the CSSC, and allowing these fish to bypass the barrier and advance toward Lake Michigan. Construction of interim measures to address potential bypass of the barriers via the Des Plaines River and I&M Canal have recently been completed. The U.S. Army Corps of Engineers and others are continuing to investigate potential solutions to all bypass issues.

- Rotenone, a piscicide, is being used in some circumstances in the Chicago Area Waterway System as a tool for Rapid Response against Asian carp. The use of rotenone provides the highest level of certainty that Asian carp will not advance past the electric barrier while it is shut down temporarily for routine maintenance. Traditional fishing gear may not work. Silver carp are very good at avoiding nets and the extensive navigational traffic in the canal makes using nets for bighead carp ineffective. Nets would not remove all the fish and may miss the juveniles, which are of particular concern. The International Joint Commission funded an Asian carp sensitivity project at the U.S. Geological Survey Laboratory in Columbia, Missouri. Researchers determined that Asian carp are more sensitive to rotenone than to other piscicide chemicals that were tested.
- The electrical barrier is currently the best tool to stop large-scale movement of Asian carp from the Illinois River into the Great Lakes via the Chicago Sanitary and Ship Canal and tests conducted to date indicate the barriers are effective at deterring Asian carp. Without the electrical barrier system in place, Asian carp and other fish would have an unimpeded pathway from the Mississippi basin to the Great Lakes and vice versa. Though the barriers are very efficient, they are not immune to failures or disruptions in their electric fields. Some scientists and managers, therefore, believe that the electrical barrier is part, but not all, of the solution to keeping Asian carp out of the Great Lakes and other species from transferring into either basin.

The installation in 2002 (and later expansion) of the invasive species dispersal barrier in the Lower Reach of the Ship Canal to prevent passage of Asian carp and other similar invasive species to Lake Michigan and the Great Lakes system reflects of the recognition of US-Canada Boundary Waters Treaty implications and the state mandate and regional interest to protect Lake Michigan and the Great Lakes designated use and resources. The deterrent of Asian carp to Lake Michigan in the Lower Reach of the Ship Canal is an existing use, whether or not it is recognized in the water quality standards. While the installation and presence of the electrical fish barrier has been recognized as a mechanism that cannot support a recreational use within the lower reach of the Ship Canal (as shown by a inclusion of “non-recreational waters” in proposed Section 302.402 and CSSC identified in Section 303.227), the prevention of invasion of invasive species has not been similarly recognized.

It is the recommendation of Environ that the Board should recognize the design and operation of invasive species controls as:

- A mechanism that prevents support for an upgraded designated aquatic life use,
- A recognized designated use for the Lower Reach of the Ship Canal, specifically through operation of electrical barriers to deter migration of Asian carp to the Great Lakes, and use of piscicides to allow maintenance of the barriers, and
- Discontinued use of electrical barriers and piscicides would cause more systemwide environmental damage than leaving them in-place.

In our evaluation of the human-caused conditions (use of electric barrier and piscicides) preventing an upgrade of aquatic life use designation, it is easy to establish that if these conditions were "remedied" (i.e., the fish barrier were removed and no use were made of piscicides to prevent the spread of invasive species), there would be significant damage not only to aquatic life is in the Lower Reach of the Ship Canal, but also to Lake Michigan due to the introduction of Asian carp. However, another remedy - to allow an upgrade to aquatic life use designation from current designation to Aquatic Life Use B - would result in improvements of habitat and water quality conditions that are also related to human-caused conditions. Remedies to improve human-caused conditions (i.e. the introduction of Asian carp into the Mississippi and Illinois River Systems and the consequential efforts to stop their migration to Lake Michigan) would cause more environmental damage to correct as those remedies relate to the intended operation of the Lower Reach of the Ship Canal for invasive species control.

Efforts in support of preventing Asian Carp and other invasive fish species from entering the Great Lakes system include strategies that prevent or minimize conditions that would attract or be favorable to the target species. Available habitat and food resources are two key factors that often allow invasive species to become established. The actions that prevent or minimize available habitat and food resources to the Asian carp within the Lower Reach will support the

use of invasive species control and prevention of their migration upstream. The biological habitat of the Lower Reach is poor and considered irreversible because of navigation use and flood control severely limit habitat improvement options. Within sections of the Lower Reach where habitat improvement can take place, the anticipated effects are considered negligible with respect to benefits to the fishery based on the 2010 report by the District.

Conversely, improvements in the aquatic habitat are self-defeating due to Asian carp. They are primarily water column feeders where algae, zooplankton typically occur, and where migrating or re-suspended benthic macroinvertebrates or micro-crustaceans may occur. One of the threats to the Great Lakes is the potential for Asian carp to displace existing species by crowding and outcompeting them for planktonic food resources to a level that may be detrimental to the entire food web. Actions that prevent or minimize available food resources of the Asian Carp within the Lower Reach would support the use of invasive species control. Such actions could include habitat instream and shoreline habitat improvement. Since the implementation of the habitat improvement options in the Lower Reach was judged to have negligible benefit to the resident fishery, it is suggested that no habitat improvement options be implemented that would increase the reproduction or presence of algae and macroinvertebrates from existing conditions.

Similarly, water quality standards that may be more protective of aquatic life may benefit the plankton species and enhance the food resource and act as an attractant for Asian carp. Additional Asian carp in the Lower Reach would likely be detrimental to the resident fish populations, and is counter to the goal of invasive species control. One example is the proposed change in copper criteria from 1.0 mg/L (support of Indigenous Species stream classification) to a value of 0.36 mg/L (acute) and 0.022 mg/L (chronic) in support of Aquatic Life Use B waters

(calculated using an average hardness value of 260 mg/L for Lower Reach). For derivation of the Illinois copper criteria, the four organisms most sensitive to toxic effects are all invertebrates and include the cladocerans Ceriodaphnia reticulata (first), followed by Daphnia pulicaria, D. pulex, and D. magna as a group; the amphipod Gammarus pseudolimnaeus; and then the bryozoans (Plumatella emarginata and Lophopodella cartera). All of these organisms are potential plankton and select food resource for Asian carp that currently may or may not exist in the Lower Reach. Copper is just one example where the current water quality criteria change under the proposed upgrade to Aquatic Life Use B, and the basis for the lowering of criteria is driven by protecting planktonic species. Changing water quality so that the water conditions could accommodate a more productive plankton community could create a more abundant food source available to Asian carp, hence the Lower Reach of the Ship Canal water quality could be an attractant to an invasive and nuisance species. The point here is not to ignore protection and support of aquatic life in the Lower Reach, but to minimize conditions that would attract the Asian carp; minimize conditions that would benefit growth and reproduction of Asian carp; and maximize conditions that enhance the effectiveness of the invasive species barrier strategies.

ENVIRON recommends that control measures for the prevention of the passing of invasive species or control of invasive species migration should be recognized as a designated use for the Lower Reach of the Ship Canal. This designated use should be recognized in the Illinois regulations for water quality standards. In a systemwide approach to the Great Lakes, this designated use in the CAWS is in full support of the intent of the Clean Water Act goals.

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ATTACHMENT 5

RESTORING THE NATURAL DIVIDE

SEPARATING THE GREAT LAKES AND MISSISSIPPI RIVER BASINS IN THE CHICAGO AREA WATERWAY SYSTEM

JANUARY 2012 // GREAT LAKES COMMISSION
GREAT LAKES AND ST. LAWRENCE CITIES INITIATIVE

Great Lakes Commission
des Grands Lacs

Great Lakes and St. Lawrence Cities Initiative
Alliance des villes des Grands Lacs et du Saint-Laurent

From the Executive Committee

WE ARE PLEASED TO RECEIVE this report containing options for separating the Great Lakes and Mississippi River basins in the Chicago Area Waterway System, and look forward to reviewing it in detail. The report, led by the Great Lakes Commission and the Great Lakes and St. Lawrence Cities Initiative, is a critical step forward that lays a foundation for continued dialogue on how to safeguard the Great Lakes and Mississippi River watersheds from Asian carp and other aquatic invasive species. The report correctly concludes that any credible solution must also sustain the system's ability to support recreation, manage flooding, and transport people and goods.

The report reflects an emerging vision for Chicago's waterways, a future that includes cleaner water, less flooding and more efficient transportation. We believe this report, and the collaborative process through which it was developed, will help us achieve this goal while preventing the movement of Asian carp and other aquatic invasive species through Chicago-area waterways. Through our continued work together, we can advance a solution that benefits the Chicago region and the Great Lakes and Mississippi River basins as a whole.

This report and the full study can be found online at www.glc.org/caws.

Hon. Pat Quinn
Governor of Illinois

Hon. Rahm Emanuel
Mayor of Chicago

Hon. George Heartwell
Mayor of Grand Rapids

CHICAGO WATERWAY MAP

Restoring the Natural Divide

Separating the Great Lakes and Mississippi River Basins in the Chicago Area Waterway System

Silver carp, shown here, often feed in schools at the surface and can jump up to 10 feet out of the water when disturbed by boats.

Overview

THE GREAT LAKES COMMISSION AND THE Great Lakes and St. Lawrence Cities Initiative led a project to develop and evaluate alternatives for physically separating the Great Lakes and Mississippi River basins in the Chicago Area Waterway System to prevent the movement of Asian carp and other aquatic invasive species (AIS). This report summarizes the results of the project and shows that separation can be achieved while also maintaining or enhancing water quality, flood management, and transportation. The engineering and economic analyses suggest that separation is feasible and provide a solid foundation on which further dialogue to advance a long-term solution to the AIS threat can proceed. Separation is defined as stopping the flow of water by placing physical structures at key points in the waterway system.

The Chicago Area Waterway System

The Chicago Area Waterway System (or CAWS) includes an approximately 130-mile[1] array of natural and constructed rivers, canals, locks and other structures in Chicago and northwest Indiana. Constructed beginning in the 1890s, the waterway system diverted water from Lake Michigan and created a connection across the mid-continental divide to the Mississippi watershed. There are five connections between the CAWS and Lake Michigan, and the Chicago Sanitary and Ship Canal connects the system to the Illinois River and the Mississippi River watershed. The CAWS provides important benefits to the Chicago region, including conveying treated wastewater, supporting commercial shipping, managing flood water, and moving recreational boats and tour boats. However, the system faces significant challenges in these areas and has the potential to better serve residents, businesses and visitors.

Restoring the Natural Divide

Separation is needed to prevent the movement of Asian carp and other AIS between the Great Lakes and Mississippi River basins in the Chicago-area waterways. Asian carp, in particular, are an imminent threat; in 2010 a bighead carp was collected from Lake Calumet, just five miles from Lake Michigan.[2] Recent research confirms that they can survive and spread in the Great Lakes, and that the CAWS is the most likely point of entry.[3] Current control efforts for the carp are vital, including the electric barriers in the Chicago Sanitary and Ship Canal. However, these efforts are incomplete, costly to maintain, and vulnerable to failure. The electric barriers will not stop the spread of all AIS and may not stop small Asian carp.[4] Monitoring continues to find carp DNA between the barriers and Lake Michigan.[5]

In addition to Asian carp, separation will prevent future AIS from entering the Great Lakes or Mississippi River basins via the CAWS. The U.S. Army Corps of Engineers has identified 39 AIS with a high risk of passing into either the Great Lakes or Mississippi River.[6] More than 250 non-native species are already established in one or both of the basins, and invasive species cost the Great Lakes region alone an estimated $200 million annually.[7] For these reasons, separation appears to be the best long-term option to prevent Asian carp and other AIS from invading the Great Lakes or Mississippi River basins through Chicago-area waterways.

Economic Analysis

Like most major infrastructure projects, the costs of separation are substantial. However, they will be spread over nearly 50 years and will likely be shared among different groups within and beyond the Chicago area. At a regional level, the least expensive alternative would cost households in the Great Lakes region approximately $1 per month or just over $11 annually from 2012 through 2059. Adding households in the Mississippi River basin reduces the cost to just $4 a year during this timeframe. Given the widespread concern over the threat from Asian carp, and the benefits to the populations and economies of the two large watersheds, congressional funding support would be justified.

Separation could generate significant benefits for the Chicago region and the Great Lakes and Mississippi River basins as a whole, with the potential for between $1.4 billion to $9.5 billion in long-term savings from avoided AIS control costs and damages alone, as well as improved water quality, strengthened flood protection, and modernized shipping facilities. While the separation costs will be incurred over a limited timeframe, the benefits will be enjoyed indefinitely. Without separation, new AIS will likely pass through the CAWS, with the potential to cause significant economic and environmental damage. The documented costs from past AIS damages and controls—estimated at up to $500 million annually just for

zebra mussels—illustrate the future costs that separation will help avoid. **The project's technical report concludes that "stopping a single AIS from transferring between basins could avoid billions of dollars in economic loss."**

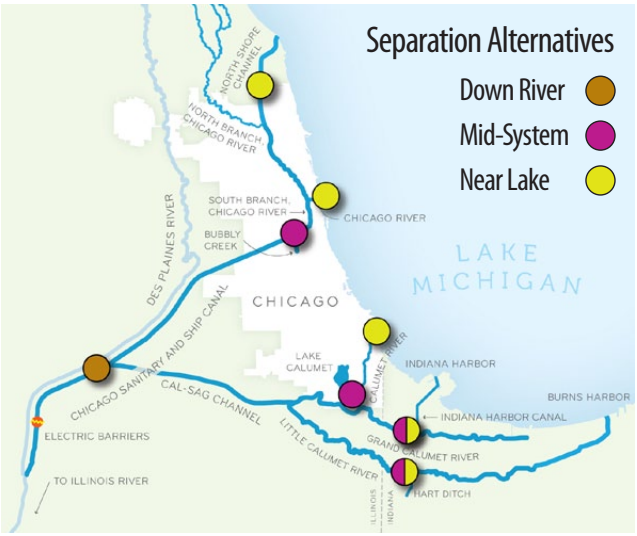
The Separation Alternatives

Three separation alternatives are identified that illustrate the advantages and disadvantages of placing barriers in different parts of the CAWS. The Down River, Mid-System, and Near Lake alternatives refer to the location of the barriers relative to Lake Michigan. Each alternative includes the location for barriers to divide the flow of water in the CAWS; improvements needed to maintain the system's benefits; the timing for implementation; and the costs. The report does not identify a preferred alternative. However, the Mid-System Alternative is the most viable. The costs (presented in 2010 dollars) reflect only the new investments that will be required beyond baseline expenditures already planned or underway, as well as the cost of the barriers themselves. It is noteworthy that the costs of just the barriers are a small proportion—approximately 3 percent—of the total investments needed for separation to succeed. Because of uncertainty about future regulatory standards, a range of costs are shown for the water quality investments required by separation. Finally, implementation depends on completion of Chicago's Tunnel and Reservoir Plan (TARP) for water quality improvement and flood management, scheduled for 2029.

Each of the separation alternatives stops the open flow of water between Lake Michigan and the Mississippi River watershed via the CAWS and maintains or enhances the system's benefits through investments in flood management, water quality and transportation.

Next Steps

The report shows that separation is feasible and can be accomplished in a way that maintains or enhances other vital uses of the Chicago waterway system. The report, and the collaborative process through which it was prepared, provides a strong foundation for developing and advancing a solution that benefits the Chicago region and the Great Lakes and Mississippi River basins as a whole.



Down River Alternative

This alternative includes a single barrier between the confluence of the Chicago Sanitary and Ship Canal and the Cal-Sag Channel and the Lockport Lock. This has the advantage of requiring only one barrier. However, it has significant impacts on water quality, transportation and flood management.

Separation barriers:		$109 million
Flood management:		$2.98 billion
Water quality:		$290 million to $5.85 billion
Transportation:		$560 million
Timeline:	Phase I:	One-way barrier with flood water bypass (lake to river) and all transportation improvements completed by 2022.
	Phase II:	Two-way barrier completed by 2029
Total Investment:		$3.94 - $9.5 billion

Mid-System Alternative

This alternative includes four barriers, one each on the South Branch of the Chicago River just upstream of Bubbly Creek, north of T.J. O'Brien Lock on the Calumet River, and on the Grand Calumet and Little Calumet rivers. This alternative poses the fewest challenges for stormwater management, flood management and transportation compared to the other two alternatives.

Separation barriers:		$140 million
Flood management:		$1.89 billion
Water quality:		$180 million to $1.2 billion
Transportation:		$1.04 billion
Timeline:	Phase I:	One-way barrier with flood water bypass (lake to river) and all transportation improvements completed by 2022.
	Phase II:	Two-way barrier completed by 2029
Total Investment:		$3.26 - $4.27 billion

Near Lake Alternative

This alternative requires five barriers, one each north of the North Side Wastewater Treatment Plant (WWTP) on the North Shore Channel, at the mouth of the Chicago River, at the mouth of the Calumet River, and on the Grand Calumet and Little Calumet rivers. It poses significant challenges for flood management and transportation.

Separation barriers:	$140 million
Flood management:	$3.82 billion
Water quality:	$120 million
Transportation:	$5.45 billion
Timeline:	Chicago River barriers completed by 2029 (with completion of TARP) Calumet River barriers completed by 2026 (with completion of new port facilities)
Total Investment:	$9.54 billion

The Chicago Area Waterway System and the Health of the Great Lakes

IN THE LATE 1800s CHICAGO CONFRONTED a public health crisis caused by untreated sewage in the Chicago River flowing to Lake Michigan, contaminating drinking water for a growing metropolis. Chicago residents were becoming sick and dying from typhoid and other diseases as a result. Something had to be done.

City leaders devised a bold solution to reverse the flow of the Chicago River and send the city's waste away from Lake Michigan. This required connecting the Chicago and Illinois rivers and sending the city's waste to the Mississippi River. This connection eventually became the Chicago Sanitary and Ship Canal, a 28-mile constructed waterway that links the south branch of the Chicago River with the Illinois River. When the canal opened in January 1900, water was diverted from Lake Michigan to dilute Chicago's waste and push it on to the Illinois River.

Over the following century what became known as the Chicago Area Waterway System (or CAWS) grew into a complex and heavily managed array of rivers, canals, locks and other structures. Eventually, the Cal-Sag Channel was created to connect the Calumet River with the Chicago Sanitary and Ship Canal, and the North Shore Channel was formed to connect the north branch of the Chicago River with Lake Michigan at Wilmette. Ultimately, Lake Michigan was opened to the CAWS at five points: the North Shore Channel at Wilmette, mouth of the Chicago River, Calumet River, Grand Calumet River at Indiana Harbor, and Little Calumet River at Burns Harbor.

The CAWS has become a vital part of the infrastructure for Chicago and northwest Indiana. In addition to managing wastewater, the system supports commercial shipping between Lake Michigan and the Mississippi River; conveys stormwater to control flooding; and accommodates the movement of thousands of recreational boats, tour boats and water taxis.

Bold actions in 1900 solved a critical challenge facing a growing city. A century later, however, the Great Lakes region is confronting a different challenge: how to halt the spread of aquatic invasive species—especially Asian carp—through the CAWS. This time, the ecological health and economic well-being of the Great Lakes are at stake.

Digging the canal in Palos Park, Ill., in 1914. Pictured is the construction of the Calumet feeder to the drainage canal.

Chicago Area Waterway System Bubbly Creek (right foreground), south branch of the Chicago River (right, toward downtown) and the Chicago Sanitary and Ship Canal (beginning at the bridge at center left). Metropolitan Water Reclamation District of Greater Chicago, ©MWRDGC2012-01.

Water flow in the Chicago area, circa 1900. Red arrows show the directional flow of water.

The Immediate Crisis: Asian Carp and Many More Aquatic Invasive Species

THE CAWS FORMS A CONTINUOUS hydrological connection that exposes the Mississippi River watershed – encompassing over 40 percent of the continental United States[8] – and the Great Lakes to each other, allowing fish and other aquatic life to pass freely between the two watersheds. The threat posed by this connection became apparent in the late 1990s as Asian carp approached the CAWS and the Great Lakes. This came after other aquatic invasive species (AIS) – such as zebra mussels and round gobies – had already passed through in the other direction, eventually spreading westward throughout the Mississippi River basin. Zebra mussels have infested water bodies in 28 states and have expanded as far west as Lake Mead.[9]

Asian carp threaten native fish populations because they grow rapidly, reproduce quickly, and consume vast quantities of phytoplankton and zooplankton, the foundation of the food chain in a healthy aquatic ecosystem. As a result, they out-compete native fish and disrupt the natural balance of the ecosystem. In addition, silver carp, one species of Asian carp, are easily startled by boat motors and leap out of the water, threatening recreational boaters and anglers. The federal government has recognized Asian carp as "the most acute [aquatic invasive species] threat facing the Great Lakes today."[10]

Asian carp were imported to help control algae in fish ponds in the southern United States. Flooding along the lower Mississippi River in the early 1990s allowed the carp to spread north. Within 10 years, they had spread nearly 1000 miles, moving into the Illinois and Ohio rivers.[11] In the mid 1990s, commercial catch of bighead carp in the Mississippi River grew by over 1000 percent; now commercial fishers in the Illinois River regularly catch up to 25,000 pounds of bighead and silver carp per day.[12] Scientists believe the leading edge of the Asian carp expansion in Illinois to be just 55 miles from Lake Michigan.[13]

Questions have been raised about whether Asian carp will survive and spread in the Great Lakes and whether they truly pose a significant threat to the region's ecological and environmental health. Several studies completed to date indicate that the environmental suitability of the Great Lakes for bighead carp and silver carp is very high;[14] some areas of the Great Lakes have sufficient food to support populations of these fish;[15] and at least 22 tributaries in the Great Lakes basin are potentially suitable for spawning by Asian carp.[16] In addition, a study focused on Lake Erie conducted by the U.S. Geological Survey found that the lake's largest tributaries – including the Maumee, Sandusky and Grand rivers – provide hospitable environments for Asian carp

What are Asian carp and why should we worry about them?

Asian carp is a generic term referring collectively to any of four species of carp native to Asia, including the bighead, silver, grass and black carp. Currently, bighead and silver carp are the most prevalent fish species in the Mississippi and Illinois rivers and are considered the most imminent threat to the Great Lakes.[17] They are voracious eaters, capable of eating up to 20 percent of their body weight each day and growing up to 110 pounds. They consume plankton—algae and other microscopic organisms—stripping the food web of key food for native fish. There are no fish in North America large enough to eat adult Asian carp, and they produce many offspring that grow quickly, rapidly becoming too large for native predators.

Silver carp.

A system of electric barriers, operated by the U.S. Army Corps of Engineers, in the Chicago Sanitary and Ship Canal is a key line of defense protecting the Great Lakes from Asian carp invading through the CAWS.

to reproduce and establish populations.[18] Taken collectively, this research demonstrates that the risk of Asian carp establishing populations in the Great Lakes basin is significant, potentially severe, and certainly very real.

Currently, a system of electric barriers in the Chicago Sanitary and Ship Canal (CSSC) is a key line of defense protecting the Great Lakes from Asian carp invading through the CAWS. The barriers use steel cables secured to the bottom of the canal to disperse a low-voltage electric field. The electric field is uncomfortable for fish and they do not swim across it. While they are an important part of a broader defensive strategy, the electric barriers will not stop many other species – especially viruses and plants – from passing through the CSSC, and their effectiveness in blocking small Asian carp has been questioned. In addition, a critical inherent deficiency is their inability to stop the downstream movement of live organisms, which, even if stunned by the electric current, can still pass through with the flow of water. The barriers also require ongoing maintenance and periodic shut downs, and cost $8 million annually to operate.[19]

The effectiveness of the electric barriers has been called into question by the detection of Asian carp DNA in the CAWS. Since federal agencies began using this new environmental DNA (or eDNA) monitoring technique in 2009, more than 90 positive samples of carp DNA have been detected between the electric barriers and Lake Michigan (that is, on the "wrong" side of the barriers).[20] A positive eDNA sample indicates the presence of Asian carp DNA and the possible presence of live fish. While the technique has limitations, it is an important "early warning" tool.

Electric barriers are a partial defense, but they do not provide a reliable, long-term solution that safeguards both the Great Lakes and Mississippi River watersheds from invasion by all potential AIS through the CAWS. The U.S. Army Corps of Engineers itself has acknowledged that "the electric barrier system is considered [an] experimental and temporary fix to this problem…"[21]

In response to growing indications in 2009 that Asian carp had bypassed the electric barriers, some Great Lakes leaders called for emergency measures to keep carp at bay, including the closure of navigation locks that connect the Chicago and Calumet rivers to Lake Michigan. Others disagreed, noting that lock closure would impact important benefits provided by the CAWS, such as commercial shipping and flood protection.

The dispute over closing Chicago-area navigation locks created divisions among the Great Lakes states and led to lawsuits in federal courts. This dispute threatens to undermine the region's unity and common purpose, which have been vital in advancing Great Lakes protection and restoration efforts over the past decade.

Rapid response activities, conducted by the Illinois Dept. of Natural Resources and other state and federal partners, included application of a chemical piscicide (rotenone) on sections of the CAWS in 2009 and 2010.

> In our view, the proper inference to draw from the evidence is that invasive carp are knocking on the door to the Great Lakes. We need not wait to see fish being pulled from the mouth of the Chicago River every day before concluding that the threat of a nuisance exists. It is enough that the threat is substantial and that it may be increasing with each day that passes. Unlike many nuisances that can be eliminated after they are discovered, this one in all likelihood cannot be. The fact that it would be impossible to un-ring the bell in this case is another reason to be more open to a conclusion that the threat is real.
>
> — U.S. COURT OF APPEALS FOR THE SEVENTH CIRCUIT, AUGUST 2011[22]

Restoring the Natural Divide to Protect the Great Lakes and Mississippi River

THE GREAT LAKES COMMISSION AND THE Great Lakes and St. Lawrence Cities Initiative formally endorsed separation of the Great Lakes and Mississippi River watersheds in the Chicago Area Waterway System as the best long-term solution to safeguard them from AIS, while recognizing the importance of accommodating the system's current uses.[23,24] Regional leaders recognize that current efforts to control Asian carp are critically important and must be sustained and strengthened wherever possible. However, they are also viewed as incomplete solutions to the long-term threat posed by AIS moving through the CAWS.

Preventing the introduction of invasive species is critical. Once established, they are usually impossible to eradicate and difficult and costly to manage or control. For example, more than $20 million is spent annually to control sea lamprey in the Great Lakes[25] (one of the few AIS that can be significantly controlled), and approximately $50 million is now being devoted each year on Asian carp control, management, research and prevention.[26] Without a long-term solution, the costs for Asian carp will continue indefinitely and the door will be left open for new invasive species.

It is important to recognize that separation is about much more than Asian carp and protecting the Great Lakes. While carp prompted the immediate crisis, they are only the latest AIS to threaten the Great Lakes. Over 180 non-native aquatic species are established in the Great Lakes[27] and 163 are established in the Mississippi River basin.[28] More non-native species are predicted to invade in decades to come. This could include not only species transported from foreign waters, but also non-native species already present in either the Great Lakes or Mississippi River watersheds that might pass through the CAWS and expand their range.

A report prepared by the U.S. Army Corps of Engineers as part of the Great Lakes and Mississippi River Interbasin Study (or GLMRIS) underscored this point. It identified 39 non-native invasive species with a high risk of passing through the CAWS, including 10 species poised to enter the Great Lakes and 29 ready to invade the Mississippi River basin. The report emphasized that these species are likely to have a moderate to severe impact on the basin being invaded.[29]

With the connection provided by the CAWS, the Great Lakes and Mississippi River watersheds will remain vulnerable indefinitely to the exchange of AIS and will face an ongoing battle, one species at a time. Control measures that work for one species may not stop other species, requiring constant investment in new technologies, monitoring and other efforts. Thus, re-establishing the natural divide between the Great Lakes and Mississippi River basins is a very effective and efficient long-term option for safeguarding the ecological and economic health of both water bodies.

In addition to the Great Lakes Commission and Great Lakes and St. Lawrence Cities Initiative, other organizations and jurisdictions calling for separation include the Great Lakes Fishery Commission,[30] American Fisheries Society,[31] Alliance for the Great Lakes,[32] Great Lakes United,[33] and the Healing our Waters-Great Lakes Coalition.[34] The 2005 Great Lakes Regional Collaboration restoration strategy called for a study of options for "permanent hydrological and/or biological separation of the Great Lakes and Mississippi River systems" and ranked the CAWS as the top priority for action in the region.[35] In September 2011,

Future AIS threatening the Great Lakes and Mississippi River basins

In addition to Asian carp, separating the Great Lakes and Mississippi River basins will stop the transfer of all future AIS via the CAWS and safeguard both water bodies. The U.S. Army Corps of Engineers has identified 39 AIS with a high risk of passing through the CAWS. These include invasive plants like water chestnut and the dense, mat-forming hydrilla; crustaceans like the spiny water flea and bloody red shrimp; molluscs such as New Zealand mud snail; and fish such as northern snakehead. The Corps predicts that these species are likely to have a moderate to severe impact on the water bodies being invaded.

Invasive species Clockwise from top: hydrilla, bloody red shrimp, northern snakehead.

A view of the Chicago River looking east showing Lake Shore Drive and the Chicago River Controlling Works.

Envisioning a Chicago Area Waterway System for the 21st Century

THE GREAT LAKES COMMISSION AND THE Great Lakes and St. Lawrence Cities Initiative seek to support a 21st Century vision for the Chicago Area Waterway System. This reflects and builds on the visions, plans and programs developed by many others in Chicago and northwest Indiana. Collectively, this emerging vision points to a future with cleaner water, less flooding and more efficient transportation. The project integrates these critical goals, with the added goal of preventing the movement of aquatic organisms through the CAWS.

For well over 100 years, the CAWS has been dedicated almost exclusively to barge traffic, stormwater and wastewater conveyance, tour boats in the downtown area, and some limited recreational boating. Now, more than a decade into the 21st Century, it is time to establish a new vision for the waterway. The nature of the water itself and the surrounding land, how it is used, and the relationship of the people to it are changing rapidly. There is an opportunity to redefine how the waterway shapes Chicago and the region now and into the future.

Chicago Mayor Rahm Emanuel has advanced this process by calling the Chicago River the next "recreational frontier" for the city.[36] For that to become a reality, dramatic improvements in water quality are necessary to meet the goals set in 1972 in the Clean Water Act. The commitment by the Metropolitan Water Reclamation District of Greater Chicago to disinfect its wastewater is a good beginning, but much more needs to be done to make the resource suitable for anglers, kayakers, canoeists, scullers, more tourists, and boaters going to and from Lake Michigan.

With more intense rainfall occurring more frequently, the capacity of the sewer system in the area is exceeded on a regular basis. The Tunnel and Reservoir Plan is helping significantly and will provide even more capacity in 2015 and upon its completion in 2029, but much of the area remains vulnerable to flooding. To deal with this, much work is needed to improve the sewer system, add green infrastructure and surface storage, and prevent stormwater from mixing with sewage. The future should be one where even in the most severe storm events, basements remain dry, streets stay open, and waterways are free of sewage.

Although transportation of goods and materials on Chicago-area waterways accounts for less than 3 percent of the total,[37] it is important and could be much more significant. Improvements in loading and unloading facilities, better multi-modal connections, and other strategies can lead to an integrated system that can take full advantage of the many environmental and energy advantages of waterborne transportation. This can help alleviate the significant problem of congestion on Chicago-area highways and railroads and take advantage of emerging opportunities to transport shipping containers on barges – an area that may grow significantly with expansion of the Panama Canal in 2015. The movement of shipping containers to and from the Great Lakes region, by all transportation modes, is projected to double by 2050.[38] However, Chicago-area ports do not currently have the facilities needed to serve this growing market. As with recreation on the Chicago River, Mayor Emanuel is moving to revitalize the Port of Chicago with a new vision and sorely-needed investments to attract new business.

There is an opportunity for a Chicago Area Waterway System for the 21st Century that is clean, does not flood, moves goods and people efficiently, and prevents the spread of aquatic plants and animals between the Great Lakes and Mississippi River basins.

Canoeists enjoy their paddle down the Chicago River.

the attorneys general of 17 states – from New York to Wyoming – called for aggressive action to "completely sever the ecological connection between the basins."[39]

The city of Chicago recognized the threat from invasive species and the need for separation when it hosted a 2003 meeting of experts who labeled invasive species "the greatest environmental threat to the national economy and to the ecology of the Great Lakes and Mississippi River regions." Among other actions, the experts recommended that "a project should be established that would result in the hydrologic separation of the Great Lakes and Mississippi River basins within 10 years."[40]

Separation: Moving from Concept to a Feasible Solution

WITH THIS CHALLENGE IN MIND, THE Great Lakes Commission and the Great Lakes and St. Lawrence Cities Initiative launched a project to develop alternatives for physical separation in the CAWS. The goal, in brief, is to illustrate how separation can be achieved while maintaining or enhancing other beneficial uses of the waterway system. Toward this end, the project developed three alternatives for physical separation that

1. Prevent the passage of Asian carp and other aquatic invasive species through the CAWS between the Mississippi River and the Great Lakes;
2. Improve water quality throughout the CAWS;
3. Improve the ability of the CAWS to protect against flooding; and
4. Improve the use of the waterways for commercial transportation and recreational boating.

A key premise of the project is that, to be successful, separation must support improvements to the CAWS while also preventing the movement of all AIS between the Great Lakes and Mississippi River basins. An additional project goal is to support and help accelerate the work being done by the U.S. Army Corps of Engineers in the GLMRIS.

The project was led by the Great Lakes Commission and the Great Lakes and St. Lawrence Cities Initiative, with guidance from an Executive Committee comprised of the governors of Illinois and Ohio and the mayors of Chicago, Ill., and Grand Rapids, Mich. A highly qualified consulting team with expertise in the various technical issues related to Chicago's waterway system conducted the technical aspects of the project. An Advisory Committee with stakeholders from Chicago, northwest Indiana, and other areas of the Great Lakes region provided input and ensured that all perspectives were represented and all significant issues were identified. While the committee's contributions were significant, the Great Lakes Commission and the Great Lakes and St. Lawrence Cities Initiative did not seek a formal consensus and the project findings do not necessarily reflect their views. Finally, independent peer reviews were conducted to assess the project methodology and advise the project team.

Initially, 20 potential barrier locations in the CAWS were identified and evaluated. These were narrowed down and, ultimately, three alternatives were chosen for detailed analysis. The three alternatives are the Down River Alternative, Mid-System Alternative, and Near Lake Alternative, with the names referring to their proximity to Lake Michigan. The alternatives include the following:

- The location for physical barriers to stop Asian carp and other AIS from passing through the CAWS
- The improvements needed to maintain or enhance water quality, flood management, and transportation in the CAWS after barriers are installed
- The timing for implementing separation, including a phased process that is coordinated with the completion of other improvements in the CAWS (particularly the Tunnel and Reservoir Plan (TARP))
- An economic analysis of the separation alternatives

What is GLMRIS?

GLMRIS is the Great Lakes and Mississippi River Interbasin Study, being conducted by the U.S. Army Corps of Engineers. It was authorized by Congress in 2007 and is currently scheduled for completion in 2015. The study is identifying potential aquatic pathways between the Great Lakes and Mississippi River watersheds; existing AIS with the potential to pass through the CAWS; and control measures, including separation, to prevent AIS transfer between the basins. When completed, the study will recommend an overall plan to prevent AIS transfer between the Mississippi River and Great Lakes systems. GLMRIS is generating a number of valuable interim reports, available online at http://glmris.anl.gov. This project is intended to inform and help advance GLMRIS.

Key Elements of the Separation Alternatives

THE FOLLOWING ILLUSTRATES KEY ELEMENTS of the Mid-System Separation Alternative that are needed to maintain or enhance water quality, flood protection and transportation in the CAWS while preventing AIS transfer between the Great Lakes and Mississippi River basins. The other two alternatives include similar elements.

Physical barriers could range from a sheet pile or impermeable land bridge without cargo or recreational boat transfer capability on the Little and Grand Calumet rivers, to a barrier with intermodal cargo transfer facilities and boat lifts on the Calumet River at Lake Calumet. The Chicago River barrier could include cargo and boat transfer equipment, depending on the need.

Interim one-way barrier to convey flood water on the Chicago River will prevent flooding until completion of the Tunnel and Reservoir Plan (TARP) in 2029, when it will be upgraded to block the flow of water in both directions. The one-way barrier will prevent AIS movement into Lake Michigan. Flows over the barrier from lake to river would occur infrequently to accommodate large storms.

Backflows to Lake Michigan from the CAWS will prevent flooding during large storms until TARP's completion. Locks and other control structures will remain closed except when backflows are needed to release flood water to Lake Michigan.

Wastewater treatment improvements at the North Side Wastewater Treatment Plant (WWTP) will ensure compliance with water quality standards and allow discharges to Lake Michigan.

Flow augmentation will prevent stagnant water on either side of the barriers. This could be provided by rerouting WWTP effluent or providing water from Lake Michigan to create flow.

Sewer separation within one mile on either side of the CAWS will separate sanitary and storm sewers to reduce peak discharges of flood water to the CAWS, preserving capacity of TARP for large storms.

Green infrastructure will be installed in the TARP service area when roads, sewers and water lines are reconstructed, and private developers will be required to capture more runoff. This will reduce flood water, preserving capacity in TARP for large storms and will improve water quality.

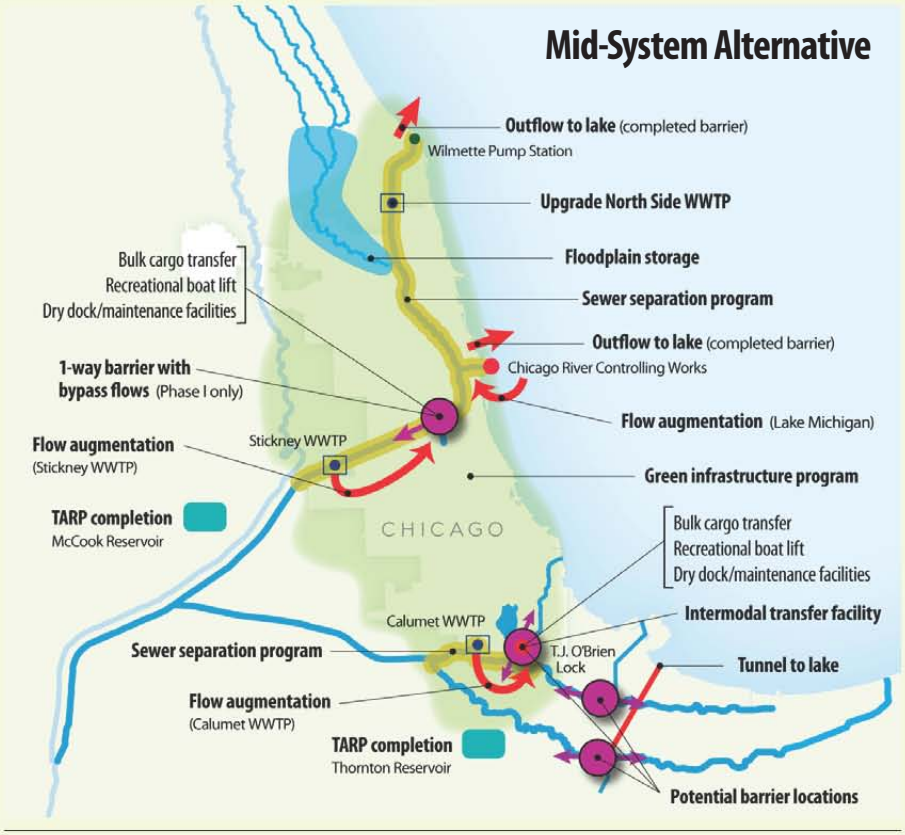
Floodplain storage on the North Branch of the Chicago River will reduce peak discharges of stormwater to the CAWS and conserve storage in the TARP system.

A flood conveyance tunnel will prevent flooding in the Calumet River system by conveying flood water from the U.S. Army Corps of Engineers Little Calumet River Flood Control Project to Lake Michigan.

TARP storage reservoirs will capture flood water and prevent flooding. The Thornton Reservoir, to be completed in 2015, will capture flood water when barriers are installed on the Calumet rivers in 2022. The McCook Reservoir, to be completed in 2029, will allow two-way operation of the Chicago River barrier. TARP is an investment that will help ensure separation is successful, but will occur regardless of the separation project.

Transportation improvements will be completed by 2022 when the barriers are installed and will include facilities to transfer cargo and recreational boats. Intermodal cargo transfer equipment will be provided at the barrier on the Calumet River to accommodate barges coming from the Cal-Sag Channel to the deep-draft areas north of the barrier.

Phased implementation will allow separation to be implemented as quickly as possible, with a one-way barrier in place on the Chicago River and complete barriers on the Calumet River system by 2022, and the two-way barrier implemented on the Chicago River by 2029 when the TARP system is completed.



The following are important factors to keep in mind when considering the alternatives:

The alternatives are intended to show varying impacts from different barrier locations: The alternatives were selected because they illustrate a range of impacts and opportunities that result from placing barriers at different locations in the CAWS. They are intended to clearly contrast each other and illuminate their respective benefits and disadvantages.

The maps show approximate barrier locations: The maps of the alternatives are not intended to show the precise location for each barrier, but the general vicinity where they would be located.

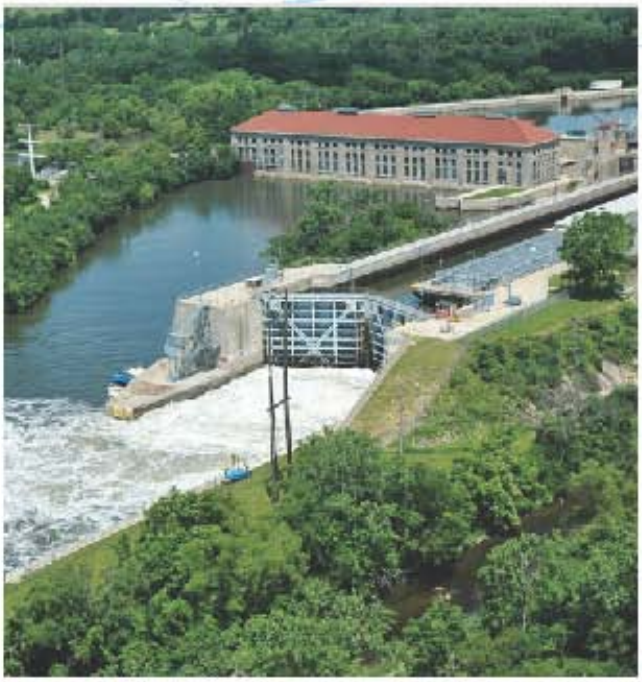
A preferred alternative is not identified: The project's purpose is to provide credible information and a sound analysis of separation alternatives to inform and advance the public dialogue. Using this information, decisionmakers will be equipped to begin considering a preferred alternative.

The alternatives are not assumed to be equally feasible: While the report does not identify a preferred alternative, they clearly differ in their advantages and disadvantages. The report shows, for example, that the Mid-System Alternative is far less expensive and has advantages over the other alternatives. The Great Lakes Commission and the Great Lakes and St. Lawrence Cities Initiative recognize this, but believe it is important to present three different alternatives in order to better inform the public dialogue.

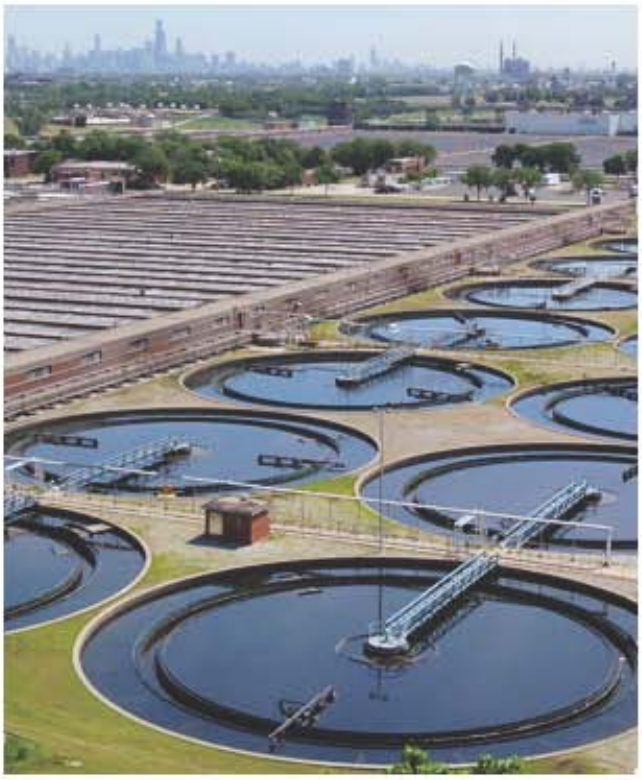
Wastewater treatment costs are uncertain: There is significant uncertainty about future requirements for treating wastewater. While future standards for Lake Michigan and the Mississippi River are likely to be more stringent, it is unclear how much and what type of wastewater treatment plant (WWTP) improvements will be required. Thus, a range of costs are provided for each alternative reflecting varying levels of investments in the three major WWTPs that discharge to the CAWS.

The alternatives will be implemented in phases: The report recommends that separation be implemented in phases to avoid new flooding. The phases are integrated with the TARP program, scheduled for completion in 2029, with significant new floodwater storage coming online in 2015. During phase I, one-way barriers will prevent the movement of water and aquatic organisms from the CAWS into Lake Michigan. Complete separation will be implemented in 2029 when TARP is completed and can manage large storm events and prevent flooding.

Constructing the barriers is a small portion of the overall costs of separation: The costs of the physical barriers are a small proportion of the total investments required for separation, representing at most 3 percent of the cost of each alternative.



Lockport Powerhouse and Lock. Metropolitan Water Reclamation District of Greater Chicago, ©MWRDGC2012-01.



MWRD Stickney water reclamation plant, located in Cicero, Illinois, looking northeast toward downtown Chicago. Metropolitan Water Reclamation District of Greater Chicago, ©MWRDGC2012-01.

Understanding the Chicago Area Waterway System

THE CAWS IS A COMPLEX AND HEAVILY managed array of rivers, canals, locks and other structures. To understand how to implement separation in this context, this report defines a set of "baseline conditions" that reflect how the CAWS currently functions, as well as upcoming infrastructure investments. While these investments will help ensure separation is successful, they are expected to occur regardless of separation. The description of baseline conditions also illustrates current problems and limitations in the waterways and the services they provide. These shortcomings further confirm the importance of defining separation alternatives that improve water quality, flood management and transportation.

Flood Management

Managing stormwater and preventing flooding in the Chicago area is limited by the capacity of sewer pipes, widespread impervious surfaces, flat terrain, and open waterway channels, as well as the interaction of the CAWS with water levels on Lake Michigan. Storms generating just 1.5 inches of precipitation over a two-hour period can exceed the system's capacity, leading to basement and overbank flooding as well as combined sewer overflows (CSOs), when untreated sewage and stormwater are discharged into the CAWS.[41] As a result, the separation alternatives will impact stormwater management operations in the CAWS, requiring modifications and improvements to prevent additional flooding.

Planned improvements in stormwater infrastructure include the Tunnel and Reservoir Plan (TARP), scheduled for completion in 2029 with significant new capacity coming on line in the intervening years. TARP includes improved stormwater and wastewater conveyance and expanded storage. A December 2011 proposed Consent Decree between the U.S. Environmental Protection Agency (U.S. EPA) and the Metropolitan Water Reclamation District of Greater Chicago (MWRD) also requires an expanded green infrastructure program. The separation alternatives are designed to fit in with these and other planned infrastructure improvements to enhance flood protection.

Water Quality

Water quality in the CAWS is degraded by wastewater effluent, stormwater runoff, CSOs, contaminated sediments, and the slow flow of water in the system. There are 263 combined sewer discharge points to the CAWS and less than an inch of rainfall produces CSOs. Between 2000 and 2010 there were 416 CSO events that released more than 8 billion gallons of untreated sewage to local waterways.[42]

Illinois has designated the CAWS as "impaired" because it does not meet certain water quality standards. Current standards for the system are for a riverine system like the Mississippi River, and are less stringent than Great Lakes water quality standards that apply to municipalities across the basin. As a result, separation alternatives that involve the redirection of water flows to Lake Michigan will be subject to more stringent standards and will require upgrades to wastewater treatment plants (WWTPs). However, standards for discharging to the Mississippi River will likely become more stringent over the project period. To deal with this uncertainty and show how different standards will impact separation costs, the alternatives reflect various regulatory requirements and associated costs.

In June 2011 MWRD announced that it will disinfect wastewater discharges from the North Side and Calumet WWTPs (a standard practice for all other major WWTPs in the Great Lakes) in response to de-

September 2008 flooding in communities along the Des Plaines River, southwest of Chicago. Metropolitan Water Reclamation District of Greater Chicago, ©MWRDGC2012-01.

mands by U.S. EPA and Illinois EPA.[43] In calling for this change, U.S. EPA noted that "during the past 25 years, the [CAWS] has been transformed into a valuable recreational asset that citizens increasingly use for boating, canoeing, kayaking, jet and water skiing, tubing and swimming. The State of Illinois is long overdue on updating its water quality standards to provide the Clean Water Act protections that must accompany this transformation."[44] These upgrades are incorporated into the baseline conditions.

Transportation

Northeast Illinois is the freight capital of North America. Railroads, interstates, airports, and waterways all converge in the greater Chicago area, making it a strategic location as a national freight hub. For example, more than 500 freight trains operate in the region every day.[45] The CAWS, however, is severely underutilized for transporting cargo, with only 3 percent of freight in northeast Illinois moved by water.[46] This reflects a continual decline over past decades even after accounting for the recent economic downturn. At the same time, congestion on Chicago-area highways and rail lines is a significant, long-term problem. Freight trains passing through the region typically are delayed by up to two days, and highway congestion is estimated to cost the region over $7 billion annually.[47]

The decline in waterborne commerce on the CAWS has been driven by a number of factors: less heavy industry in the Chicago area, more reliance on rail and truck transport, and lack of investment in waterborne infrastructure and intermodal material handling equipment. For example, port facilities in the CAWS currently lack the infrastructure to efficiently transfer shipping containers between barges, ships, trains and trucks. The former director of Chicago's Regional Transportation Authority has characterized the Port of Chicago as "inconsequential" in the context of Chicago's role as a transportation hub.[48]

The CAWS has potential to help relieve congestion, move freight, and contribute to the region's economy. Waterways provide the least costly and most environmentally friendly way of transporting cargo, particularly bulk cargo that is not time sensitive. For example, a single 15-barge tow is equivalent to two 100-car trains or 870 trucks.

In addition, the expansion of the Panama Canal in 2015 will present new opportunities for increased cargo traffic in the Mississippi River and Great Lakes-St. Lawrence Seaway systems, including the use of barges to transport containers offloaded from the larger vessels that will be passing through the canal. The expanded canal is expected to shift many ocean-going vessels from West Coast ports to those on the East Coast and Gulf of Mexico. In response, Gulf Coast ports are planning to significantly increase their container capacity over the coming decade.[49] Some of these can be transferred to barges and moved up the Mississippi and Illinois rivers and then through the CAWS to the Great Lakes. Overall, the total market for transporting shipping containers in the Great Lakes region, by all modes, is expected to double by 2050.[50] However, substantial investments in Chicago-area ports and harbors will be needed for the barge industry to take advantage of this opportunity.

Commercial barge traffic on the Chicago Sanitary and Ship Canal. Metropolitan Water Reclamation District of Greater Chicago, ©MWRDGC2012-01.

The CAWS is also heavily used for recreational boating, tour boats and water taxis. Between 2009 and 2010 the tour boat industry saw a 15 percent increase in passengers.[51] In 2010, more than 23,000 recreational boats passed through the Chicago Lock and more than 12,000 passed through the T.J. O'Brien Lock on the Calumet River.[52] The Chicago River is increasingly being used by canoeists and kayakers and the city is developing four new boathouses on the river to improve recreational opportunities. They will be located near expanded trails along the river that will provide river access for runners, bikers and walkers.

Baseline conditions for transportation include investments planned as part of the Chicago Region Environmental and Transportation Efficiency (CREATE) program, which aims to increase the efficiency of the region's rail infrastructure. Planned investments in new marinas by the Chicago Park District are also included and are expected to enhance recreational activity along the waterfront.

The baseline conditions in the CAWS illustrate two key points:

- The Chicago area faces significant challenges managing water
- The region's waterways are underutilized for recreation and commercial transportation and have the potential to provide significantly greater benefits to local residents

With this in mind, and by building on already-planned improvements and investments, the separation alternatives are designed to help solve Chicago's water-related problems and leverage local waterways as a positive amenity while preventing the interbasin transfer of aquatic organisms.

Overview of Separation Alternatives

THE FOLLOWING IS A SUMMARY OF THE separation alternatives, emphasizing the barrier locations; improvements for flood management, water quality and transportation; and the timeline for phased implementation. This reflects only the improvements and associated costs required to make separation successful; it does not include investments that are already planned or anticipated. A detailed evaluation of the alternatives is provided in the project's technical report. It is important to note that the costs of the physical barriers are a very small proportion of the overall costs of separation, accounting for no more than 3 percent of total costs.

Down River Alternative

The Down River Alternative includes a single barrier placed between the confluence of the Chicago Sanitary and Ship Canal and the Cal-Sag Channel and the Lockport Lock. This has the advantage of requiring only one barrier. However, of the three alternatives, this one poses the most significant challenges for water quality and transportation.

Separation Barriers ($109 million)
- Single barrier

Flood Protection ($2.98 billion)
- Green infrastructure in the TARP service area on public rights-of-way based on Chicago's current road, sewer and water construction program and increased stormwater retention for private developments
- Partial separation of sanitary and storm sewers within one mile on either side of portions of the CAWS
- Tunnels from the CSSC, Calumet River and the Little Calumet River to Lake Michigan to convey flood water with a pump station near the Chicago River Controlling Works
- Increased floodplain storage along the North Branch of the Chicago River

Water Quality ($290 million-$5.85 billion, depending on stringency of future standards)
- Upgrades to all three WWTPs in the CAWS to meet Lake Michigan water quality standards
- Flow augmentation to prevent stagnant water on both sides of the barrier

Transportation ($560 million)
- Intermodal transfer facilities for bulk and liquid cargo
- New road and rail connections
- Recreational boat lift and disinfection station
- Dry dock facilities

Timeline for Phased Implementation
- Timeline driven by completion of TARP
  - Phase I: One-way barrier with floodwater bypass (lake to river) and all transportation improvements completed by 2022
  - Phase II: Two-way barrier completed by 2029

Total cost for the Down River Alternative:
$3.94 billion - $9.5 billion, depending on wastewater treatment requirements.

The Down River Alternative would improve the region's resiliency to large floods and provide stormwater management capability equal to or better than existing capacity. Water quality in the CAWS would be improved in order to meet Lake Michigan standards, including the removal of nutrients such as phosphorous and nitrogen. Diversion of water from Lake Michigan to the Mississippi River basin would be significantly reduced. Transportation within the CAWS would be maintained with enhanced access to Lake Michigan since the Chicago and T.J. O'Brien locks would be maintained in an "open" state. The new cargo transfer facility at the barrier location would improve intermodal connections, facilitate container traffic, and help reduce congestion on local roads and rail lines.

Mid-System Alternative

The Mid-System Alternative requires four barriers located on the South Branch of the Chicago River just upstream of Bubbly Creek, north of T.J. O'Brien Lock on the Calumet River, and on the Grand Calumet and Little Calumet rivers. This alternative poses the fewest challenges for stormwater management, flood management, water quality and transportation when compared to the other two alternatives.

Separation Barriers ($144 million)

- Four barriers

Flood Protection ($1.89 billion)

- Green infrastructure in the TARP service area on public rights-of-way based on Chicago's current road, sewer and water construction program and increased stormwater retention for private developments
- Partial separation of sanitary and storm sewers within one mile on either side of the CAWS
- Tunnel from the Little Calumet River to Lake Michigan to convey flood water
- Increased floodplain storage along the North Branch of the Chicago River

Water Quality ($180 million-$1.2 billion, depending on stringency of future standards)

- Upgrades to only the North Side WWTP to meet Lake Michigan water quality standards
- Flow augmentation to prevent stagnant water on both sides of the barriers

Transportation ($1.04 billion)

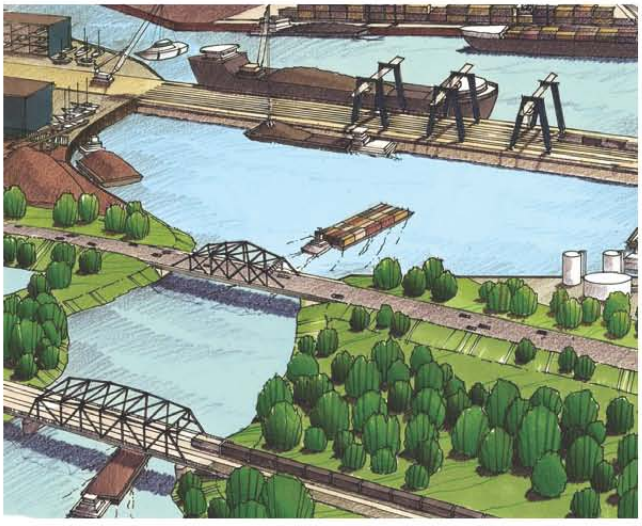
- Intermodal transfer facilities for bulk and liquid cargo at the barrier on the south branch of the Chicago River
- Expanded multimodal port infrastructure where the navigational channel on the Calumet River meets the barrier just north of the O'Brien lock to transfer freight, including containers, from barges and other modes of transport, including deep draft vessels coming from Lake Michigan
- Recreational boat lift and disinfection stations
- Dry dock facilities

Timeline for Phased Implementation

- Timeline for separation on the Chicago River system is driven by completion of TARP
  - Phase I: One-way barrier would block species transfer from river to lake, with floodwater bypass (lake to river) and all transportation improvements completed by 2022
  - Phase II: Two-way barrier completed by 2029
- Timeline for separation on the Calumet River system is driven by completion of new port and intermodal cargo transfer facilities: Two-way barriers completed by 2022 (only one phase)

Total cost for the Mid-System Alternative:
$3.26 billion - $4.27 billion depending on wastewater treatment requirements

The Mid-System Alternative would improve the region's resiliency to large floods and provide stormwater management capability equal to or better than existing capacity. Water quality in the CAWS would be improved and discharges from the North Side WWTP would meet Lake Michigan standards, including the removal of nutrients such as phosphorous. A portion of the water diverted from Lake Michigan would be returned. Recreational vessels and tour boats would have open access to Lake Michigan in downtown Chicago and from the North Shore Channel at Wilmette. Expanded port facilities on the Calumet River would improve intermodal connections, facilitate container traffic, and help reduce congestion on local roads and rail lines.



A conceptual rendering of the barrier and transportation improvements on the Calumet River near Lake Calumet.

Near Lake Alternative

The Near Lake Alternative requires five barriers located north of the North Side WWTP on the North Shore Channel, at the mouth of the Chicago River, at the mouth of the Calumet River, and on the Grand Calumet and Little Calumet rivers. This alternative poses significant challenges for flood management and transportation. The outlets to Lake Michigan would no longer be available, requiring construction of three tunnels to convey stormwater to prevent flooding. Freighters coming from Lake Michigan (known as "lakers") would no longer have access to ship terminals on the Calumet River and Lake Calumet, requiring construction of a new port on Lake Michigan.

Separation Barriers ($140 million)

- Five barriers

Flood Protection ($3.82 billion)

- Green infrastructure in the TARP service area on public rights-of-way based on Chicago's current road, sewer and water construction program and increased stormwater retention for private developments.
- Partial separation of sanitary and storm sewers within one mile on either side of the CAWS
- Tunnel from the Little Calumet River to Lake Michigan to convey flood water
- Tunnel from the Cal-Sag Channel/Calumet River to the Thornton Reservoir to convey flood water
- Tunnel from the North Branch of the Chicago River to the McCook Reservoir to convey flood water
- Additional capacity near the TARP reservoirs
- Increased floodplain storage along the North Branch of the Chicago River

Water Quality ($120 million)

- No WWTP upgrades are required
- Flow augmentation to prevent stagnant water on both sides of the barriers

Transportation ($5.45 billion)

- New port at the mouth of the Calumet River with 18 terminals to replace those on the river that would no longer be accessible by vessels coming from Lake Michigan
- Intermodal facilities to transfer cargo, including containers, from barges to lakers, rail and trucks
- Harbor, mooring, launching, dry dock, and disinfection facilities on Lake Michigan for recreational and commercial tour boats
- Recreational boat lift and disinfection stations

Timeline for Phased Implementation

- Timeline for separation on the Chicago River system is driven by completion of TARP and the flood control tunnel: Barriers completed by 2029 (one phase only)
- Timeline for separation on the Calumet River system is driven by completion of new port and intermodal cargo transfer facilities: Barriers completed by 2026 (one phase only)

Total cost for the Near Lake Alternative: $9.54 billion

The Near Lake Alternative would improve the region's resiliency to large floods and provide stormwater management capability equal to or better than existing capacity. Water quality in the CAWS would remain largely unchanged, except for benefits from already-planned improvements to WWTPs. There would be no more wastewater or CSO discharges to Lake Michigan except during large storm events. Barges, recreational vessels and tour boats would have unrestricted movement within the CAWS, but direct access to Lake Michigan would no longer be available. Deep-water vessels coming from Lake Michigan would no longer have access to port facilities on the Calumet River and in Lake Calumet. However, a modern, full-service port with consolidated terminals, intermodal facilities, and recreational boat facilities would be constructed at the mouth of the Calumet River. This could help reduce congestion on area roads and rail lines, increase container traffic in the region, and improve the intermodal efficiency of the freight system.

What is TARP and how does it affect separation?

TARP is the Chicago Tunnel and Reservoir Plan, a system adopted in 1972 to prevent water pollution and flooding in the CAWS and Lake Michigan. It includes 109 miles of tunnels and three large reservoirs that collect and store runoff and sewage from combined sewer overflows (CSOs) during large storms that exceed the capacity of treatment plants. When completed in 2029, the system will be able to capture and store nearly 20 billion gallons of CSOs and floodwater. Along with other measures, the separation alternatives will rely on the TARP system to prevent flooding and water pollution after barriers are installed. As a result, the schedule for implementing separation is largely dependent on completion of the TARP system.

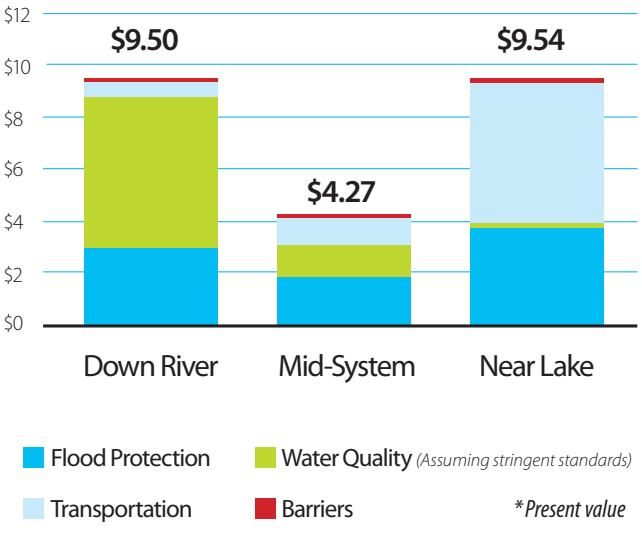
Economic Analysis

Managing the costs of separation

The estimated costs for implementing separation in the CAWS are substantial, ranging from a low of $3.26 billion for the Mid-System Alternative to a high of up to $9.54 billion for the Near Lake Alternative over approximately 50 years, including operation and maintenance. While these costs may appear daunting, they are consistent with the costs of other large-scale public infrastructure projects being implemented in the Great Lakes region and beyond:

- Chicago's Tunnel and Reservoir Plan (TARP): begun in 1972 and expected to cost $3.7 billion when completed in 2029[53]
- Illinois Tollway Capital Plan: projected to cost $12 billion over 15 years[54]
- Boston's Central Artery/Tunnel Project (the "Big Dig"): constructed over nearly a decade at a cost of approximately $15 billion[55]
- Chicago Area Waterway System: construction through 1928 cost approximately $11 billion in today's dollars[56]

Total Costs* ($ Billions)



The Chicago Lock.

Important considerations

Separation will generate important benefits: The separation costs include infrastructure investments that will provide cleaner water, increased flood protection and modernized shipping facilities, all of which will provide significant benefits to the Chicago region, in addition to preventing AIS movement through the CAWS.

Separation investments will be spread over many years: As presented, the separation alternatives would be implemented over nearly 20 years. Thus, the costs would be spread over a lengthy timeframe.

Investments could be shared by different groups within and beyond the Chicago area: Separation will involve a variety of activities that could be considered the responsibility of different sectors, such as utility customers in the Chicago region, waterway operators, local communities, land developers, and state and federal agencies. Thus, the costs likely will be shared among a range of entities, including those in the broader Great Lakes and Mississippi River regions benefitting from the improvements. This justifies a federal investment in implementing separation.

MWRD has a large customer base and relatively low sewer rates: MWRD serves more than 5 million people,[57] providing a large customer base to absorb the costs of upgrading WWTPs. Its rates are among the lowest in the country and are below the average sewer rates paid by residents in other areas of the Great Lakes.[58] For example, the average homeowner in the Chicago area pays about $222 annually for sewer services, while, on average, Ohio homeowners pay over $500.[59] Thus, paying for the water quality improvements required by separation will not put the Chicago area at a competitive disadvantage with other Great Lakes cities.

Recreation in Chicago, from top to bottom: Chicago River Day 2001, a water taxi on the Chicago River, and boating in Lake Michigan off the coast of Chicago.

A federal investment is justified: Great Lakes residents, both U.S. and Canadian – and the elected officials who represent them – are alarmed by the threat from Asian carp and are calling for an effective, long-term solution. In addition, states in the Mississippi River basin are concerned about receiving invasive species from the Great Lakes as well as polluted water from the CAWS. Congress and the public at large recognize the value of the Great Lakes and should support federal funding to help implement separation.

Public-private partnerships and other creative approaches can help finance separation: Some elements of separation – particularly improvements for transportation and commercial shipping – may be financed through public-private partnerships and other innovative financing options. Recent legislation in Illinois promotes such arrangements, authorizing public-private partnerships for the development, operation, and financing of transportation facilities.

Understanding the benefits of separation

Separation will generate significant benefits for the Chicago area and the Great Lakes and Mississippi River regions in general. While many of these benefits are difficult to quantify, they are important to consider. It is also noteworthy that the costs of separation will be incurred over a limited timeframe, while the benefits will be enjoyed indefinitely.

Preventing the transfer of aquatic invasive species

Separation will prevent the transfer of AIS through the CAWS. This is a significant benefit that will prevent future AIS-related damage to the economy and environment of the Great Lakes.

Knowing which AIS would enter the Great Lakes or Mississippi River basins without separation is difficult, but not impossible. As previously discussed, the U.S. Army Corps of Engineers identified 39 AIS with a high risk of passing through the CAWS that would have a moderate to severe impact on either the Great Lakes or Mississippi River basin.[60]

While new AIS could pass through the CAWS without separation, predicting the damage they will do and quantifying the costs incurred is extremely difficult. However, the Great Lakes region has a long history of battling invasive species and the documented costs incurred as a result of existing AIS can illustrate the future costs that could be avoided by implementing separation in the CAWS. Existing AIS costs include

- Sea lamprey control: $20 million annually[61]
- Invasive species introduced to the Great Lakes by ballast water: $150 million annually[62]
- Zebra mussel costs and damages: $300-$500 million annually[63]

These documented costs can be used to illustrate one dimension of the long-term benefits that would be generated if similar costs from future AIS are avoided by implementing separation.

- Avoiding $150 million in annual costs from AIS with similar impacts to those introduced to the Great Lakes by ballast water would generate approximately $400 million to $2.8 billion in long-term savings
- Avoiding $500 million in annual costs from a future AIS with impacts similar to zebra mussels would generate approximately $1.4 to $9.5 billion in long-term savings

As envisioned, separation will generate significant, long-term cost savings. For example, with the Great Lakes commercial and sport fishery generating $7 billion in economic activity annually,[64] the potential for avoiding economic damage from future AIS invasions is clearly evident. The project's technical report concludes that "stopping a single AIS from transferring between basins could avoid billions of dollars in economic loss."

Other benefits from separation

Other benefits from separation, some of which could not be quantified, include

- **Shipping containers on barges:** Over $400 million in economic benefits is estimated from expanded shipping of containers on barges in the CAWS.
- **Reducing flooding:** Local communities will benefit from reduced flooding of basements, streets and businesses as a result of infrastructure investments that will increase capacity in the CAWS to better handle large storm events.
- **Improving water quality:** Improved water quality in the CAWS will generate benefits for local residents. While these benefits are not quantified, studies by U.S. EPA have estimated the value of improvements generated by the Clean Water Act to be approximately $11 billion annually.[65]
- **Avoiding costs:** Avoiding the costs of operating and maintaining shipping locks on the CAWS and conducting AIS-related research and prevention are estimated at over $100 million.
- **Creating jobs:** Like any major infrastructure project, separation will create jobs and generate economic activity. It is estimated that separation will generate between 2,900 and 7,500 jobs annually over the approximately 50-year period evaluated in the report.

The cost of separation per household in the Great Lakes

Another approach to considering the costs and benefits of separation is to determine the cost per household in the Great Lakes and Mississippi River basins and consider if sufficient "willingness to pay" exists to support the effort.

Container ship, Panama Canal.

How Chicago could benefit from an expanded Panama Canal

With expansion of the Panama Canal in 2015, the Chicago region could attract new shipping business and become a primary hub for waterborne commerce. Anticipating a growth in container vessels passing through the Panama Canal, Gulf Coast ports are planning to significantly increase their container capacity over the coming decade.[66] Some of these containers can be transferred to barges and moved up the Mississippi and Illinois rivers and then through the CAWS into the Great Lakes. Containerized shipments make up the largest proportion of global trade, and the market for containerized traffic moving to and from the Great Lakes region, by all modes, is expected to double by 2050, growing to over 70 million containers annually.[67] Increased container-on-barge (COB) traffic could help reverse the decline in business for Chicago-area ports, relieve congestion on roads and rail lines, and link with ports on the Great Lakes and St. Lawrence Seaway. However, the CAWS currently lacks the infrastructure to efficiently serve the COB market. The improvements needed to take advantage of this economic opportunity are included in the separation alternatives.

This "willingness to pay" to prevent the movement of invasive species through the CAWS helps to put the required investments in perspective and provides an overall "reasonableness" test.

Households in the Great Lakes basin (in both the U.S. and Canada) would pay, on average, approximately $11 annually from 2012 through 2059 to implement the Mid-System Alternative. If the Mississippi River basin is included, households would pay approximately $4 annually through 2059. The annual costs through 2059 for the other two alternatives is approximately $24 for just Great Lakes households and $9 with the addition of Mississippi River households.

Next Steps

THIS REPORT SHOWS THAT SEPARATION is feasible and can be accomplished in a way that maintains or enhances other vital uses of the Chicago waterway system. It also illustrates how the management and use of the waterways is evolving and how upcoming investments can help facilitate separation and reduce its cost. Finally, the report proposes a holistic vision for the waterway system that integrates these investments with the steps needed to halt AIS transfer between the Great Lakes and Mississippi River basins.

There was never an intention to present a final plan for separation. More discussion is needed to identify the best location for barriers; integrate separation with Mayor Emanuel's new vision for the river as a "recreational frontier"; planned improvements related to water quality, flood management, and transportation; and incorporate the additional investments needed to achieve separation without compromising the system's benefits. However, this report is a critical step forward that provides a credible foundation for further dialogue on these and other issues.

Beyond the many technical issues, the report illustrates a fundamental challenge: separation will occur in the Chicago and northwest Indiana area and almost all of the expenditures will be made in that area. However, the most significant benefit – safeguarding the Great Lakes and Mississippi River from harmful invasive species – will accrue to the broader Great Lakes and Mississippi River basins. This "non-alignment" of expenditures and benefits suggests the need for continued dialogue and coordination to determine the most equitable sharing of costs. Ultimately, an effective, long-term solution will benefit both local residents and the region as a whole and the sharing of costs should reflect that.

Remaining United and Advancing a Long-Term Solution

THE GREAT LAKES COMMISSION AND THE Great Lakes and St. Lawrence Cities Initiative present this report to our members – the Great Lakes states, provinces and mayors – and the region's stakeholders and decision-makers. The report outlines solutions to the threat from Asian carp and other invasive species moving through Chicago-area waterways while also maintaining and enhancing the system's benefits. The report shows that separation is achievable from an engineering perspective. To move forward, political, jurisdictional and financial issues must be addressed and resolved.

Chicago skyline.

Over the past decade the Great Lakes region united to develop and implement a comprehensive strategy to restore this priceless natural resource through the Great Lakes Restoration Initiative. This unity and common purpose led to unprecedented investments, from all levels of government, to clean up the lakes and leverage them as a vital economic and environmental asset for our region and the nation as a whole. The region also adopted the Great Lakes-St. Lawrence River Basin Water Resources Compact and Agreement, an unprecedented and far-sighted plan for protecting Great Lakes water resources from diversions and over-consumption.

Asian carp have threatened this regional unity. This project, and the collaborative process through which it was conducted, is intended to lay the foundation for preserving regional unity while finding a solution to the serious and costly threat from AIS.

The Great Lakes Commission and the Great Lakes and St. Lawrence Cities Initiative look forward to collaborating with the many agencies and organizations responsible for Chicago's waterway system, together with other U.S. and Canadian partners, to advance a long-term solution that safeguards the Great Lakes and Mississippi River basins from aquatic invasive species while maintaining the important benefits the system provides to the residents of Chicago and northwest Indiana. Ultimately, any feasible solution must achieve both of these fundamental goals. Therefore, it is critical that the region remain united moving forward toward this end.

Summary of Findings for the Down River Alternative

	Flood Protection	Water Quality[b]	Transportation
Opportunities	■ Continual connection between the CAWS and Lake Michigan	■ Provides impetus for improving CAWS water quality	■ Maintains movements within the CAWS ■ Maintains laker access to CAWS terminals ■ No disruption to commercial tour boats, water taxis, and most recreational travel ■ Improved river-to-lake travel for commercial tour and recreational vessels
Challenges	■ Lose downstream conveyance outlet for flood water	■ More-stringent WWTP discharge standards ■ Flow stagnation along CSSC and Cal-Sag Channel ■ Reduction in flows downstream of barrier (water supply, habitat, and hydropower impacts) ■ Flood water (and potential pollutants) directed to Lake Michigan	■ Prevents movement of barges into and out of CSSC ■ Interrupts all traffic between the CAWS and the Illinois River
Improvements	■ Green infrastructure and sewer separations ■ Additional conveyance (lake outlets and tunnels) and storage (floodplain)	■ WWTP upgrades (North Side, Calumet, and Stickney)	■ Enhanced intermodal facilities and connections ■ New COB market potential
Investments	■ Emergency barrier bypass	■ Flow augmentation	■ Bulk and liquid cargo transfer ■ Recreational boat lift with disinfection ■ New dry dock
Timeline	Chicago and Calumet River System: ■ Overall timeline driven by TARP completion ■ Phase I – One-way barrier with bypass by 2022 ■ Phase II – Completed barrier by 2029		
Barrier Costs[a]	■ $109 million		
Investements by Area[a]	■ $2.98 billion	■ $0.29 – $5.85 billion	■ $0.56 billion
Total Investment[a,b]	■ $3.94 billion – $9.50 billion		

Summary of Findings for the Mid-System Alternative

	Flood Protection	Water Quality[b]	Transportation
Opportunities	■ Continual connection between the CAWS and Lake Michigan	■ Provides impetus for improving CAWS water quality	■ Minimal interruption to commercial tours and water taxis ■ Minimal interruption to recreational vessels using Chicago Lock ■ Maintains laker access to Lake Calumet and Calumet River terminals
Challenges	■ Lose downstream conveyance outlet for flood water at Bubbly Creek	■ More-stringent WWTP discharge standards ■ Flow stagnation near South Branch and Lake Calumet barriers ■ Flood water (and potential pollutants) directed to Lake Michigan	■ Prevents movement of barges and recreational vessels directly to Lake Michigan
Improvements	■ Green infrastructure and sewer separations ■ Additional conveyance (lake outlets) and storage (floodplain)	■ WWTP upgrades (North Side)	■ Enhanced intermodal facilities and connections ■ New COB market potential ■ Furthers community goals of open space and industrial revitalization
Investments	■ Emergency barrier bypass	■ Flow augmentation	■ Bulk and liquid cargo transfer ■ Recreational boat lift with disinfection ■ Dry dock facilities
Timeline	Chicago River System: ■ Overall timeline driven by TARP completion ■ Phase I – One-way barrier with bypass by 2022 ■ Phase II – Completed barrier by 2029	Calumet River System: ■ Overall timeline driven by port and intermodal facility construction ■ Phase I – Completed barrier by 2022 (only one phase)	
Barrier Costs[a]	■ $144 million		
Investements by Area[a]	■ $1.89 billion	■ $0.18 – $1.20 billion	■ $1.04 billion
Total Investment[a,b]	■ $3.26 billion – $4.27 billion		

Summary of Findings for the Near Lake Alternative

	Flood Protection	Water Quality	Transportation
Opportunities	■ Reduces backflows to Lake Michigan	■ CSOs and WWTP discharges remain riverside ■ Eliminates diversions from Lake Michigan	■ Maintains barge, commercial tour, water taxi, and recreational vessel movement within the CAWS
Challenges	■ Lose multiple conveyance outlets to Lake Michigan for flood water	■ Flow stagnation in NSC and Calumet River	■ Interrupts all barge and laker traffic to and from the lake ■ Interrupts all commercial tour and recreational vessels to and from the lake
Improvements	■ Green infrastructure and sewer separations ■ Additional conveyance (tunnels) and storage (floodplain and reservoir)	■ Not applicable	■ Modern, full-service port facility with consolidated terminals, intermodal facilities, and recreational vessel facilities ■ New COB market potential ■ Furthers community goals of open space and industrial revitalization
Investments	■ Emergency barrier bypass	■ Flow augmentation	■ Consolidated terminals ■ New container terminal ■ Recreational boat transfer with disinfection ■ Dry dock facilities
Timeline	Chicago River System: ■ Overall timeline driven by TARP completion and stormwater elements ■ Phase I – Completed barriers by 2029 (only one phase)	Calumet River System: ■ Overall timeline driven by port and intermodal facility construction ■ Phase I – Completed barrier by 2026 (only one phase)	
Barrier Costs[a]	■ $143 million		
Investements by Area[a]	■ $3.82 billion	■ $120 million	■ $5.45 billion
Total Investment[a,b]	■ $9.54 billion		

Notes:

a All costs represent median present values with a 3% discount rate.

b Based on the range of assumed WWTP upgrades that may be required, depending on future water quality standards for Lake Michigan and the Mississippi River.

List of Acronyms

AIS	aquatic invasive species
Cal-Sag Channel	Calumet-Saganashkee Channel
CAWS	Chicago Area Waterway System
CREATE	Chicago Region Environmental and Transportation Efficiency Program
CSO	combined sewer overflow
COB	container-on-barge
CSSC	Chicago Sanitary and Ship Canal
eDNA	environmental deoxyribonucleic acid
GLMRIS	Great Lakes and Mississippi River Interbasin Study
MWRD	Metropolitan Water Reclamation District of Greater Chicago
TARP	Tunnel and Reservoir Plan
USACE	United States Army Corps of Engineers
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WWTP	wastewater treatment plant

ENDNOTES

1 Dave Wethington, U.S. Army Corps of Engineers, personal communication, January 17, 2012.

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Acknowledgments

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We benefitted tremendously from the project Advisory Committee, whose members contributed important technical information and diverse perspectives that informed and strengthened our work. We did not seek their endorsement, however, and the findings in this report do not necessarily reflect their views. We also thank the members of the Resource Group, representing government agencies, who also contributed to the project.

We especially wish to recognize and thank our lead consultant, HDR, Inc., and their multidisciplinary team of experts, for their outstanding technical analysis and success in addressing a multitude of complex challenges in a limited timeframe. Environmental Consulting and Technology, Inc. administered the project's independent peer review and provided invaluable counsel, support and guidance throughout the process.

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Finally, we thank our boards of directors for their strong leadership and their willingness to take on this challenging project. We hope our work meets the expectations of everyone involved and helps advance a solution that safeguards the health of the Great Lakes while preserving and enhancing the benefits of the Chicago Area Waterway System.

Tim Eder
Executive Director
Great Lakes Commission

David Ullrich
Executive Director
Great Lakes and St. Lawrence Cities Initiative

Credits

Photographs: page 4: silver carp, ©Jason Lindsey, courtesy The Nature Conservancy. *Page 6:* Calumet feeder to Drainage Canal, ©The Field Museum, digital identifier CSB39428; Chicago Area Waterway System, Metropolitan Water Reclamation District of Greater Chicago, ©MWRDGC2012-01. *Page 7:* silver carp, ©Great Lakes Fishery Commission; electric barrier, ©U.S. Army Corps of Engineers Chicago District. *Page 8:* rapid response activities, both photos ©Asian Carp Regional Coordinating Committee. *Page 9:* hydrilla, ©U.S. Fish and Wildlife Service; bloody red shrimp, ©NOAA, Great Lakes Environmental Research Laboratory; northern snakehead, ©U.S. Geological Survey. *Page 10:* Chicago Lock and Dam, ©City of Chicago; canoeists, ©Friends of the Chicago River. *Pages 13-15, all photos:* Metropolitan Water Reclamation District of Greater Chicago, ©MWRDGC2012-01. *Page 17:* illustration, ©HDR, Inc. *Page 19:* Chicago Lock, ©U.S. Army Corps of Engineers Chicago District. *Page 20:* Chicago River day, ©Friends of the Chicago River; Chicago Water Taxi ©Erika Jensen, Great Lakes Commission; Lake Michigan boating ©Tom Gill, flickr/lapstrake. *Page 21:* Panama Canal, ©Roger Wollstadt, flickr/roger4336. *Page 22:* Chicago skyline, ©City of Chicago.

This report and the full study can be found online at www.glc.org/caws.

Advisory Committee

Alliance for the Great Lakes	*Joel Brammeier*
American Waterways Operators	*Lynn Muench*
Chemical Industry Council of Illinois	*Mark Biel*
Chicago Metropolitan Agency for Planning	*Timothy Loftus*
Chicago Yachting Association	*Commodore Richard Lauric*
Chicago's First Lady Cruises	*Holly Agra*
Council of Great Lakes Industries	*George Kuper*
Environmental Law and Policy Center	*Howard Learner*
Friends of the Chicago River	*Margaret Frisbie*
Great Lakes Panel on Aquatic Nuisance Species	*Phil Moy, Ph.D.*
Great Lakes Sport Fishing Council	*Dan Thomas*
Great Lakes United	*Jen Nalbone*
Healing Our Waters – Great Lakes Coalition	*Andy Buchsbaum*
Illinois Chamber of Commerce	*Gideon Blustein*
Illinois Farm Bureau	*Kevin Rund*
Illinois International Port District	*Anthony Ianello*
Illinois River Carriers Association	*John Kindra*
Lake Erie Charter Boat Association	*Rick Unger*
Metropolitan Mayors Caucus	*David Bennett*
Metropolitan Planning Council	*Josh Ellis*
Metropolitan Water Reclamation District of Greater Chicago	*David St. Pierre*
Michigan Chamber of Commerce	*Doug Roberts*
Mid-West Truckers Association	*Don Schaefer*
Natural Resources Defense Council	*Henry Henderson*
Northeast Ohio Mayors & City Managers Assoc.	*Mayor Debbie Sutherland*
Northwest Indiana Forum	*Kay Nelson*
Ontario Federation of Anglers and Hunters	*Terry Quinney, Ph.D.*
Prairie Rivers Network	*Glynnis Collins*
Sierra Club - Illinois Chapter	*Jack Darin*
Wendella Boats	*Michael Borgstrom*
West Michigan Strategic Alliance	*Greg Northrup*

The Great Lakes Commission, chaired by James Tierney, assistant commissioner for water resources at the New York State Department of Environmental Conservation, is an interstate compact agency established under state and U.S. federal law and dedicated to promoting a strong economy, healthy environment and high quality of life for the Great Lakes-St. Lawrence region and its residents. The Commission consists of governors' appointees, state legislators and agency officials from its eight member states. Associate membership for Ontario and Québec was established through the signing of a "Declaration of Partnership." The Commission maintains a formal Observer program involving U.S. and Canadian federal agencies, tribal authorities, binational agencies and other regional interests. The Commission offices are located in Ann Arbor, Michigan. Learn more at www.glc.org.

The Great Lakes and St. Lawrence Cities Initiative is a U.S. and Canadian coalition of over 80 cities representing more than 14 million people that works actively with federal, state, tribal, First Nation and provincial governments and other stakeholders to advance the restoration and protection of the Great Lakes and St. Lawrence River basin. For more information on the Cities Initiative, visit www.glslcities.org.

Great Lakes Commission
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ATTACHMENT 6

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
WATER QUALITY STANDARDS AND	)	
EFFLUENT LIMITATIONS FOR THE	)	R08-9
CHICAGO AREA WATERWAY SYSTEM	)	(Rulemaking-Water)
AND THE LOWER DES PLAINES RIVER:	)	
Adm. Code Parts 301, 302, 303 and 304	)	(Subdocket C)

ATTACHMENT 6 TO THE FINAL FIRST-NOTICE COMMENTS ON SUBDOCKET C

Proposed Use C and Affected Waters

STANDARD:
303.238 Chicago Area Waterway System Aquatic Life Use C Waters
Waters designated as Chicago Area Waterway System Aquatic Life Use C Waters are not capable of maintaining aquatic-life populations and have also been categorized as non-recreational. They have unique physical conditions, flow patterns, and operational controls designed to maintain navigational use, flood control, and drainage functions in deep-draft, steep-walled shipping channels. These waters are also used for controls, such as electric fish barriers and other methods, with respect to preventing invasive species from migrating from the Illinois River system towards Lake Michigan. These waters are also used to take up waters with high chloride levels as a result of de-icing actions. The following waters are designated as Chicago Area Waterway System Aquatic Life Use C waters and must meet the existing water quality standards of 35 Ill. Adm. Code 302, Subpart D:

a) The Chicago Sanitary and Ship Canal from its confluence with the Cal-Sag Channel to the Lockport Locks;

Or, as an alternative:

b) The Chicago Sanitary and Ship Canal from River Mile 295.5 to River Mile 297.2.

Other waters in the Chicago Area Waterway System may be added to the list of Use C waters through an Adjusted Standard proceeding which shows that the water meets the use criteria described above, except that said water need not also be a non-recreation water body.

EXPLANATION:

CAWS Aquatic Life Use C waters are utilized in maintaining controls to prevent invasive species, such as Asian carp species, from entering the Great Lakes. In addition, they are artificially constructed or channelized, straight, deep-draft, steep-walled shipping channels with little or no fixed aquatic or overhanging riparian vegetation or other refuge for aquatic life from shipping traffic and predation. They are generally 15 feet or more deep and square or rectangular in cross section. The channel walls are kept in place by sheet piling, concrete, timbers or various combinations of each. Use C waterways are subject to recurring, moderate to severe anthropogenic impacts such as the application of fish poison, the use of electric fish barriers, sediment scouring, wake disturbances of shoreline areas, and rapid changes in water levels and flow velocities; the impacts are attributable primarily to control of invasive species, navigational uses, de-icing and stormwater run-off, and flood control functions.

At the present time, the Lower CSSC meets the definitions for a Use C water. The Board recognizes that there may, in the future, be other water bodies for which information may be developed which shows that the water body meets the aquatic life criteria for a Use C water. Should those waters be identified, an Adjusted Standard may be submitted to add said bodies of water to the Use C category.

Adapted from testimony of Jim Huff, February 2, 2011, Illinois Pollution Control Board R08-09 (Subdocket C).

CERTIFICATE OF SERVICE

I, the undersigned, certify that on this 5th day of March, 2012, I have served electronically the attached Final Comments on Subdocket C and Notice of Filing upon the following person:

John Therriault, Clerk
Pollution Control Board
James R. Thompson Center
100 West Randolph Street - Suite 11-500
Chicago, IL 60601

and by U.S. Mail, first class postage prepaid, to the following persons:

Marie Tipsord, Hearing Officer
Illinois Pollution Control Board
James R. Thompson Center
100 W. Randolph St., Suite 11-500
Chicago, IL 60601

Deborah J. Williams, Assistant Counsel
Stefanie N. Diers, Assistant Counsel
Illinois Environmental Protection Agency
1021 N. Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

The participants listed on the attached
SERVICE LIST

Jeffrey C. Fort

SERVICE LIST

Frederick M. Feldman, Esq.
Louis Kollias
Margaret T. Conway
Ronald M. Hill
Metropolitan Water Reclamation District
100 East Erie Street
Chicago, IL 60611

Andrew Armstrong
Matthew J. Dunn-Chief
Susan Hedman
Office of the Attorney General
Environmental Bureau North
69 West Washington Street, Suite 1800
Chicago, IL 60602

Roy M. Harsch
Drinker Biddle & Reath
191 N. Wacker Drive, Suite 3700
Chicago, IL 60606-1698

Bernard Sawyer
Thomas Granto
Metropolitan Water Reclamation District
6001 W. Pershing Road
Cicero, IL 60650-4112

Claire Manning
Brown Hay & Stephens LLP
700 First Mercantile Bank Blvd.
205 S. Fifth St., P.O. Box 2459
Springfield, IL 62705-2459

Lisa Frede
Chemical Industry Council of Illinois
1400 E. Touhy Ave.
Suite 110
Des Plaines, IL 60018

Fredric Andes
Erika Powers
Barnes & Thornburg
1 N. Wacker Dr., Suite 4400
Chicago, IL 60606

Alec M. Davis
Katherine D. Hodge
Matthew C. Read
Monica T. Rios
N. LaDonna Driver
Hodge Dwyer & Driver
3150 Roland Avenue
P.O. Box 5776
Springfield, IL 62705-5776

James L. Daugherty-District Manager
Thorn Creek Basin Sanitary District
700 West End Avenue
Chicago Heights, IL 60411

Tracy Elzemeyer
American Water Company
727 Craig Road
St. Louis, MO 63141

Jessica Dexter
Environmental Law & Policy Center
35 E. Wacker Dr., Suite 1600
Chicago, IL 60601

Keith Harley
Elizabeth Schenkier
Chicago Legal Clinic, Inc.
211 West Wacker Drive, Suite 750
Chicago, IL 60606

Robert VanGyseghem
City of Geneva
1800 South St.
Geneva, IL 60134-2203

Frederick D. Keady, P.E.-President
Vermillion Coal Company
1979 Johns Drive
Glenview, IL 60025

Cindy Skrukrud
Jerry Paulsen
McHenry County Defenders
110 S. Johnson Street, Suite 106
Woodstock, IL 60098

W.C. Blanton
Husch Blackwell LLP
4801 Main St., Suite 1000
Kansas City, MO 64112

Dr. Thomas J. Murphy
2325 N. Clifton St.
Chicago, IL 60614

Cathy Hudzik
City of Chicago
Mayor's Office of Intergovernmental Affairs
121 N. LaSalle St., Room 406
Chicago, IL 60602

Stacy Meyers-Glen
Openlands
25 E. Washington, Suite 1650
Chicago, IL 60602

Beth Steinhorn
2021 Timberbrook
Springfield, IL 62702

Lyman Welch
Alliance for the Great Lakes
17 N. State Street, Suite 390
Chicago, IL 60602

James Huff-President
Huff & Huff, Inc.
915 Harger Road, Suite 330
Oak Brook, IL 60523

Mark Schultz
Navy Facilities and Engineering Command
201 Decatur Avenue Building 1A
Great Lakes, IL 60088-2801

Irwin Polls
Ecological Monitoring and Assessment
3206 Maple Leaf Drive
Glenview, IL 60025

James E. Eggen
City of Joliet,
Director of Public Works & Utilities
921 E. Washington St.
Joliet, IL 60431

Kay Anderson
American Bottoms RWTF
One American Bottoms Road
Sauget, IL 62201

Jack Darin
Sierra Club, Illinois Chapter
70 E. Lake St., Suite 1500
Chicago, IL 60601-7447

Bob Carter
Bloomington Normal Water Reclamation
P.O. Box 3307
Bloomington, IL 61711

Tom Muth
Fox Metro Water Reclamation District
682 State Route 31
Oswego, IL 60543

Susan Charles
Thomas W. Dimond
Ice Miller LLP
200 West Madison Street, Suite 3500
Chicago, IL 60606

Kenneth W. Liss
Andrews Environmental Engineering
3300 Ginger Creek Drive
Springfield, IL 62711

Albert Ettinger
Environmental Law & Policy Center
53 W. Jackson, Suite 1664
Chicago, IL 60604

Kristy A.N. Bulleit
Hunton & Williams LLC
1900 K Street, NW
Washington, DC 20006

Susan M. Franzetti
Nijman Franzetti LLP
10 South LaSalle St.
Suite 3600
Chicago, IL 60603

Vicky McKinley
Evanston Environment Board
223 Grey Avenue
Evanston, IL 60202

Olivia Dorothy
Office of Lt. Governor
Room 414 State House
Springfield, IL 62706

Ann Alexander, Senior Attorney
Natural Resources Defense Council
2 N. Riverside Plaza, Suite 2250
Chicago, IL 60606