BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

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

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 August 4, 2008, we filed electronically with the Office of the Clerk of the Illinois Pollution Control Board the attached Pre-Filed Testimony of James E. Huff, P.E. and accompanying Exhibits, a copy of which is served upon you.

CITGO PETROLEUM CORPORATION, and
PDV MIDWEST, LLC, Petitioners

By: ______________________
One of Its Attorneys

Jeffrey C. Fort
Ariel J. Tesher
Sonnenschein Nath & Rosenthal LLP
7800 Sears Tower
233 S. Wacker Drive
Chicago, IL 60606-6404

Katherine D. Hodge
Monica T. Rios
Hodge Dwyer Zeman
3150 Roland Avenue
P.O. Box 5776
Springfield, IL 62705-5776

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

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

PRE-FILED TESTIMONY OF JAMES E. HUFF, P.E.

My name is James E. Huff, and I am Vice President and part owner of Huff & Huff, Inc., an environmental consulting firm founded in 1979. I received a Bachelor of Science in Chemical Engineering in 1970 from Purdue University and was awarded a Masters of Science in Engineering from the Environmental Engineering Department at Purdue University in 1971. I am a registered Professional Engineer in Illinois.

My work experience includes two years with Mobil Joliet Refining Corporation as an Advanced Environmental Engineer during the construction and start-up of the Joliet Refinery. After leaving Mobil in the fall of 1973, I was employed for three years at IIT Research Institute in the Chemical Engineering Department, working on advanced wastewater treatment projects. I then spent four years with the Armak Company, now called Akzo Nobel Chemicals, where I was the Corporate Manager of Environmental Affairs responsible for regulatory compliance and engineering design of environmental systems at nine manufacturing facilities in the United States and Canada.

For the last 28 years at Huff & Huff, Inc., I have been involved in over 40 environmental impact studies associated with the impact of wastewater discharges on receiving streams throughout the United States. Many of these studies have involved stream surveys, including the Chicago Ship & Sanitary Canal for the MWRDGC, Citgo, and Corn Products. I was Project Manager on a year long Fox River Ammonia Study on behalf of most of the municipal dischargers on the Fox River below the Chain-of-Lakes. I am currently working on a study addressing low dissolved oxygen levels on the East Branch of the DuPage River and Salt Creek on behalf of the DuPage River/Salt Creek Work Group and am also currently supporting a work group studying water quality issues on Hickory Creek. A copy of my resume is included in Attachment 1.

I have been retained by Citgo Petroleum Corporation (Lemont Refinery) and Corn Products International, Inc. to review the Use designation proposed by the Illinois EPA (Agency) for the Chicago Sanitary & Ship Canal ("Ship Canal") and the technical justification provided by the Agency in support of its proposed Use designation. I have reviewed many of the reports submitted into the record, pre-filed testimony, and transcripts from the hearings. I have also evaluated the impact the proposed use designation will have on Citgo and Corn Products.

The collection of waterways currently under consideration represents a range of dissimilar waterways, from natural streams to manmade canals. To some extent, the Agency's proposed changes recognize these differences in those two different use categories, as Use A and Use B have been proposed. My review was focused on the appropriateness of Use B designation for the Ship Canal. Both Corn Products and Citgo operate facilities which discharge into the Ship Canal. At the point of their respective discharges, the Ship Canal can be described - as the Agency has stated - as an "effluent dominated" waterway. The uses of the Ship Canal are demonstrably different than the use of the other bodies of water in the CAWS and in this Use Attainability Analysis proceeding.

The Agency is proposing to group the Ship Canal as an Aquatic Life Use B Water that include the North Branch Chicago River, the Chicago River, South Branch Chicago River the Calumet River to Torrence Avenue, Lake Calumet Connecting Channel and the Lower Des Plaines River from the Ship Canal to the Brandon Road Lock and Dam. With the exception of the Lake Calumet Connecting Channel, all of the waterways in this group are natural waterways. A proper consideration of the uniqueness of the artificially created and physically constrained Ship Canal is lost by including it in this grouping. The Ship Canal is further sub-divided into Incidental Contact Recreation Waters (upstream of the Calumet-Sag Channel confluence) and Non-Recreational Waters down of the Calumet-Sag Channel confluence. 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, page 49).

For the reasons that I will now present to the Board, I submit that the Ship Canal is unique and is fundamentally different in many important characteristics that distinguishes it from the other "Use B" waters. I would recommend the Board not include the Ship Canal in "Use B," but recognize the Ship Canal as a separate Use and establish water quality standards that correspond to the unique conditions.

UNIQUENESS OF THE SANITARY & SHIP CANAL

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 (Page 17). The Pollution Control Board has consistently recognized the challenges, variability and uniqueness of the Chicago Area Waterway System and Lower Des Plaines River and many of the same challenges and limitations that the Board recognized in the early 1970s remain valid today.

The Ship Canal extends 31.1 miles upstream from its confluence with the Des Plaines River to the Damen Avenue Bridge in Chicago (CDM 2007). The Ship Canal is typically 200 to 300 ft. wide with depths ranging from 27 to 50 ft. (CDM, 2007). The construction of the Ship Canal includes vertical walls and steep embankments. The Ship Canal was completed in 1907 to divert pollutants away from Lake Michigan, the City of Chicago primary water supply. The Ship Canal was expanded in 1919 to its present form to increase navigation capabilities and provide additional waste dilution. There is no other water body in the Chicago Area Waterway System (CAWS) which has the unique physical features, commercial shipping, discharge loadings, and lack of appropriate habitat for aquatic life, as does the Ship Canal.

As part of the Use Attainability Analyses (UAA), CDM conducted recreation and navigation surveys for 28 days. No swimming, skiing, tubing, or wading was observed. A single *canoe, sculling or hand powered boat* was observed over the 28 days. From my own experience in conducting benthic surveys on the Ship Canal for both the Citgo Refinery as well as for the MWRDGC, the Ship Canal is not safe for canoes, sculling or other hand powered boating activities. When barges pass, the physical design of the canal functions as a dangerous wave machine that amplifies the wake and creates very large waves when the barge wakes bounce off the vertical walls. Where two waves cross, the amplitude doubles, and I have personally observed waves to get progressively larger reaching wave heights in excess of five feet before gradually subsiding. This is an obviously a dangerous and undesirable condition. The barge traffic itself also create safety hazards for smaller boaters that must avoid large and lengthy vessels that move rapidly while consuming much of the open water in the canal, leaving little room for small craft to maneuver. Any capsized boater would have a difficult time getting out of the water due to the steep banks (CDM, 2007, pg 3-3). The record already reflects the dangers of barge traffic further downstream (see exhibit 9). The nature of the Ship Canal makes it even more dangerous-perhaps a reason why only one small watercraft was observed during the study period cited above.

The electric barrier on the Ship Canal is another unique hazard to boaters. Anyone falling into the water in proximity to the barrier risks serious injury or death. The U.S. Army Corps of Engineer's Col. Jack Drolet noted, "The safest thing is to keep people out of the water entirely" (Attachment 2). The dangers associated with the use that this federal agency is trying to discourage has apparently not been reconciled with the Agency's proposal to upgrade the use designation of the Ship Canal.

The aquatic habitat of the 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. The identified causes of impairment were polychlorinated biphenyls (PCBs), irons, oil and grease, 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

In addition to the unique manmade structure, the Ship Canal is home to three coal fired power plants that provide low cost electricity to the City of Chicago, the remainder of the State of Illinois, and elsewhere through the electrical power gird. The Ship Canal is effluent dominated from the effluents from the MWRDGC facilities, including the Stickney plant, which is one of the largest treatment plants in the world. On an annual average, the municipal treatment plants contribute 70 percent of the total flow exiting the Ship Canal at Lockport. Important barge traffic also flows along this critical artery to a wide range of industry that is located along the Ship Canal and several of these industries also withdraw water from the Ship Canal and/or discharge back into the Ship Canal. The coal fired power plants introduce a thermal loading to the Ship Canal; however, other industries also discharge wastewater with a thermal component.

Another distinguishing factor on the Ship Canal is the electric barrier installed near the Lockport Lock to prevent the aquatic invasive species (including the bighead carp) from migrating into the Great Lakes as well as migrating to the Mississippi River. It is my understanding that two more electric barriers are planned, the second one is constructed, but safety issues from the electric current have delayed placing this second barrier on-line to date. The second electric barrier is critical for periods when the first barrier goes down for either scheduled or unscheduled maintenance. 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 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 will also prevent all other fish from migrating up or down the 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 certainly necessary in light of the greater goal of protecting the biological integrity of the Great Lakes and the Mississippi River Basin.

The above description of the Chicago Sanitary & Ship Canal is truly unique among the Chicago Waterways and Lower Des Plaines River as well as any other region in the country. The following list summarizes the uniqueness of the Chicago Sanitary & Ship Canal:

- The Ship Canal is vital to the economic well being of the region,
- The electric barrier is vital to protecting Lake Michigan and the Mississippi River from aquatic invasive species, which also results in no fish migration at Lockport.

- The three coal fired power plants[1] provide lower cost electricity during peak energy demand periods, which occur during prolonged hot periods during the summer season, for the Chicago, other Illinois communities, and beyond.
- The Ship Canal carries the treated wastewater effluents from most of Cook County and represents 70 percent of the Ship Canal flow at Lockport on an annual basis (Agency's Statement of Reasons, page 18). An estimated population equivalent of 9.5 million people has effluent discharged through the MWRDGC (Agency's Statement of Reasons, page 17).
- A significant pollutant load from combined sewer overflows enters the Ship Canal, and the reservoir portion of the TARP program will not be completed for at least an additional eight years. Stormwater runoff from this highly urbanized area also discharge to the Ship Canal.
- The shoreline of the Ship Canal houses many industries that rely upon the waterway for cooling water, effluent discharge, as well as for commerce.
- The Canal is manmade, and is unsafe for small boat traffic, from both wave generated turbulence from barges as well as from the electric barrier(s).
- There is a lack of suitable physical habitat to promote a more diversified aquatic community, as well as frequent disturbances caused by the barge traffic.
- Silty substrates (CDM, 2007, page 4-80)
- Poor substrate material (CDM, 2007, page 4-80)
- Little instream cover (CDM, 2007, page 4-80)
- Channelization (CDM, 2007, page 4-80)
- No sinuosity (CDM, 2007, page 4-80)
- There are no backwater areas or tributary mouths along the Ship Canal.
- Routine dredging is required to maintain channel depth.

---

[1] Fisk, Crawford, and Will County. Technically Fisk is on the South Branch of the Chicago River, just prior to the head waters of the Ship Canal, but the physical structure and other features are similar to the Ship Canal.

- The Ship Canal has minimal slope and low velocities, not optimal conditions for aquatic habitat, but optimal conditions for sediment depositions.
- The shoreline is predominantly commercially owned with limited access and no recreation potential (Agency's Statement of Reason, page 20). Downstream from the Calumet-Sag Channel to the confluence with the Des Plaines River, no public access points exist (Agency's Statement of Reason, page 33).

USE ATTAINABILITY GOALS

The approach taken towards the Use Attainability Goals rests on certain assumptions that do not apply to the Ship Canal. In the Executive Summary of the *Chicago Area Waterway System Use Attainability Analysis* (CDM, 2007), the goal for Limited Warm Water Aquatic Life stretches (including the Ship Canal) was:

> *Maintain water quality to meet general use criteria, where attainable, and allow for navigation and fish passage.*

The Executive Summary then states the following objective:

> *To ensure D.O. and temperature criteria are met, and if unattainable, identify a treatment alternative to increase D. O. levels and reduce temperature levels.*

This goal and objective seem to make two significant assumptions. First, that *fish passage* even occurs or second fish passage is even desirable. Congress, the U. S. Army Corps of Engineers, state and federal biologists have already determined that fish passage at Lockport is NOT desirable, in their attempt to keep aquatic invasive species, including the bighead carp out of the Great Lakes and the Mississippi River Basin. Fish passage therefore is limited to above Lockport and below Lockport, but not through the Lockport portion of the Ship Canal. While this is clearly not a natural situation, it is necessary to protect more valuable aquatic resources, which effectively precludes fish passage at Lockport. So we have state and federal biologists working to prevent fish passage while this UAA goal, as stated above is to "allow for fish passage."

Given the poor habitat of the Ship Canal, it is not clear where fish passage from Lake Michigan would be going, nor have I seen any data presented that such fish passage is occurring or would occur no matter what additional improvements in water quality are achieved. Lake Michigan fish do enter the locks at Lake Michigan from time-to-time, but there are no data to suggest they are taking up residency in the Ship Canal. One would assume that the natural avoidance mechanism of fish from Lake Michigan would discourage them from swimming into the Ship Canal, because of the poorer habitat and lower water quality than found in Lake Michigan. Habitat limitations suggest it improbable that any indigenous species to the Great Lakes would establish a viable population in the Ship Canal. Therefore, establishing more stringent water quality standards would provide little if any improvement in the overall biological assemblage than is currently present under existing conditions.

The poor physical habitat conditions within the Ship Canal also need to be considered when contemplating upgrading standards. The objective to increase D.O. and reduce temperature implies that improved fish quality will result if these changes are made. Similarly, imposing a chloride water quality standard of 500 mg/L when the Ship Canal clearly does not currently achieve this standard now implies that the aquatic community will improve if this standard is adopted and achieved. All of these regulatory changes have an economic cost and the benefits are merely assumed to occur. Given the poor habitat, any such improvement in aquatic life in the Ship Canal is questionable. Roy Smogor testified for the Agency that improvements in the Chicago Area Waterways can attain a "biological condition that is still somewhat imbalanced." (R08-09, transcript, March 10th, 2008 morning transcript, page 19). Whether this also applies to the Ship Canal was not addressed. The Ship Canal is also routinely subject to unavoidable moderate to severe sediment scouring associated with barge traffic. Scott Twait noted that the Agency was "not promoting recreational use, only protecting the existing use." (R08-09 March 10, 2008 afternoon transcript, page 13). In the case of the Ship Canal, the primary existing uses would be the commercial shipping, industrial use, and carrying the treated and untreated (CSOs) from the Chicago area away from Lake Michigan as listed in the preceding section. By lumping all of the Chicago Area Waterways together in these proceedings, the uniqueness of the Ship Canal is lost.

Chlorides in the Ship Canal exceed the proposed 500 mg/L routinely during snow melt conditions (Attachment 3), due to highway deicing. This is yet another "existing use" that is occurring – removal of precipitation which has become laden with sodium chloride due to safety measures relating to our winter season.

The economic impact of the proposed changes in thermal, chloride, and sulfate will be significant. Industrial dischargers will lose their mixing zones for these three pollutants during periods of water quality violations, which will necessitate in shutting down production during these periods. The long-term fate of the three coal-fired power plants is also of concern. Growth by wet industries along the Ship Canal will be precluded due to the inability to add any thermal load, chlorides, or sulfates.

The re-designation of the Ship Canal should also evaluate whether this is an issue which will have an economic effect on residents of the region in the form of more expensive electricity – and the inability to use power generation facilities at precisely the time that peak power production is needed most. Peak demand for electricity will occur when temperatures are highest. (Attachment 4). We recommend the Board consider these other uses of the Ship Canal.

MIXING ZONE IMPLICATIONS, CHLORIDES, AND SULFATES

Because of the uniqueness of the Ship Canal, a separate use category is appropriate. However, the Agency has proposed limits for three pollutants, which we have identified as not achieving the proposed Use B standards on the Ship Canal: thermal, chlorides, and sulfates.[2] Under 35 Ill Adm Code 302.105, mixing zones and Zones of Initial Dilution (ZIDs) are allowed, subject to certain restrictions. Section 302.105(b) (9) prohibits mixing zones for constituents where the water quality standard is already violated in the receiving stream. Assuming for the moment that this prohibition only applies during the period of time the receiving water body exceeds a water quality standard, then there will be times during each year when all dischargers adding any chlorides, sulfates, or thermal will have to meet the water quality standards at the end of pipe. The Agency noted in its Statement of Reasons (page 76) that it expects that there will be violations of the chloride standard during the winter months, yet offers no solution in its proposal

[2] Sulfates only when the chlorides are greater than 500 mg/L, no net increase in sulfates would be allowed.

and does not address at all the loss of mixing zones. It is likely that every discharger on the Ship Canal will be negatively impacted by this loss of mixing zone, with significant economic implications. If we can't support industrial dischargers to the Ship Canal, where in Illinois should industrial facilities locate?

Attachment 3 presents three years of chloride data from the Citgo Lemont Refinery's water intake [which is upstream of its discharge]. Chloride levels as high as 835 mg/L have been recorded in the Ship Canal. The chloride level in the Ship Canal remained above 500 mg/L from February 19, 2007 to at least to March 5, 2007, attributed to highway de-icing runoff. The intense population center (i.e. the City of Chicago and suburban Cook County which are upstream of the Lemont Refinery) on an effluent dominated stream make achieving a 500 mg/L chloride standard not practicable without changing de-icing practices. Moreover, while ignoring the current uses being made of the Ship Canal, the proposal penalizes the point source dischargers on the Ship Canal. During periods of elevate chlorides, no discharger can contribute any chlorides or sulfates under the proposed water quality regulations. The Board has already granted variances relating to Total Dissolved Solids to Citgo [and changed the water quality standard for TDS for the Exxon-Mobil Refinery] due to the snow-melt phenomena. Facilities that use once through cooling water would not be allowed to add chlorine to control microbial growth, nor can they add sulfite type compounds to consume any chlorine residual (de-chlorinate) in the discharge. On an effluent dominated stream, chlorinating the incoming water is important to prevent biological growth on the heat exchangers. To discontinue discharging would entail ceasing operations for most industries, which has its own economic ramifications. In addition, new dischargers to the Ship Canal would essentially be limited to operations that did not add any heat (no once through cooling), chlorinate, de-chlorinate, use de-icing salt in the winter, or any process that contributes chlorides or sulfates. MWRDGC would also not be allowed to discharge during periods its effluent exceeded 500 mg/L chlorides, which would occur when the Ship Canal is also over 500 mg/L.

There is no indication in the record I reviewed that the Agency has considered the loss of mixing zones that will occur on the Ship Canal if the Use B designation is adopted to this waterway. The unintended consequences of the Agency's proposed UAA rules for chlorides and sulfates could be addressed by development of Best Management Practices (BMP) for chlorides and sulfates in place of winter water quality standards for these parameters.

THERMAL

The proposed Use B contains some very significant changes to the thermal limits for all of these waterways. Because of the three coal-fired power plants and other industrial users that add heat to the Ship Canal, special consideration regarding thermal limits is appropriate. The thermal standards on the Chicago Sanitary & Ship Canal have been in effect for over 36 years, and specify the temperature shall not exceed 93 degrees F more than 5 percent of the time and shall not exceed 100 degrees F at any time (35 Ill Adm Code 302.408). Water quality standards are set to be protective of stream uses.

There are two basic methods of establishing thermal standards, either through laboratory testing, exposing fish to water of various temperatures or through the collection of field data. The advantage of field-based standards are that natural responses, such as acclimatization and avoidance, can be allowed to occur, while avoidance is not an option in laboratory tests and acclimatization is limited to the experimental design as to how fast the water is to be heated. Dr. Charles Coutant, the author of the Heat and Temperature chapter of the National Academy of Sciences/National Academy of Engineering report *Water Quality Crieria-1972* believes that field data are scientifically superior to extrapolations from laboratory-derived temperature requirements for evaluation fish community responses to temperature (Attachment 5).

The UAA process for thermal standards relied to a large extent on the data analysis of Chris Yoder, which was based on a literature search of laboratory temperature studies, which were then ranked by a proprietary computer model to come up with growth and survival criteria of chosen Representative Aquatic Species (RAS). Seasonal cycles were also developed to "protect essential functions such as growth, gametogenesis and spawning." (Pre-filed Testimony of Chris O. Yoder, in R08-09, pg 11.) Mr. Yoder concludes his pre-filed testimony noting that "occasional exceedences of well developed thermal criteria are inevitable and may not necessarily result in a biologically impaired use." (pg 12).

For the Secondary Contact waterways, eight fish species were utilized by Yoder to derive temperature limits, and these eight fish species were listed in Appendix Table 1G of the report *Temperature Criteria Options for the Lower Des Plaines River* (Yoder, C. and E. T. Rankin, Nov 2005). These eight species were as follows:

Gizzard Shad

Common Carp

Golden Shiner

Fathead Minnow

Bluntnose Minnow

Black Bullhead

Largemouth Bass

Green Sunfish

The bluntnose minnow was identified as the most thermally sensitive of the eight fish species, with an Upper incipient lethal temperature (UILT) of 32.4 degrees C (or 90.3 degrees F).

The Agency then used the Yoder Report to develop the proposed thermal limits. Scott Twait's pre-filed testimony indicates that the eight fish species used by Yoder are "representative of the species that would be found in water 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." (Page 11.) In essence, the thermal standards proposed appear to be based on what the Agency believes is necessary to protect these eight species, at least with respect to maximum (summer) temperature limits.

For the non-summer months, Mr. Twait notes, "Because the source water of the CAWS is composed of the MWRDGC wastewater treatment plant effluents, the temperatures of these waters can be expected to exceed other measures of background or ambient temperature at certain times of the year. Consequently, the Agency decided to use the effluent temperature from MWRDGC's North Side, Calumet and Stickney facilities as the background temperature instead of using temperatures at the Route 83 Chicago Sanitary & Ship Canal station during periods of the non-summer months when the effluent temperature was higher than the background temperature."…Had the Agency not made this alteration to the recommendations Chris Yoder's temperature report in developing water quality standards, the water quality standards for the three aquatic life use designations proposed for the CAWS and Lower Des Plaines river would have been lower than the MWRDGC effluents and would have required installation of cooling towers or other treatment technology to reduce the temperature of these effluents." (Pages 13 and 14). In essence, the Agency discounted Mr. Yoder's analysis, and set the non-summer temperatures so that the MWRDGC would not have to install cooling towers. Implicit in this decision was that the cost of such cooling towers could not be justified, which begs the question what about the other existing uses (industrial users) on the Ship Canal, including the three coal fired power plants? No attempt was made to look at the Ship Canal temperatures at the edge of the mixing zones from these industrial discharges.

The highest temperatures on the Ship Canal are likely downstream of the Crawford power plant, after the contributions from both Fisk and Crawford stations. The MWRDGC has monitored temperature at Cicero Avenue, approximately one mile downstream of the Crawford Station outfall. Comparing the proposed period average limits for Use B to the period average results at Cicero indicates extended periods when the Ship Canal at Cicero Avenue is above the Use B proposed limits. Temperatures above 90 degrees for a period average were recorded in 2002. Period maximum temperatures are also plotted in Attachment 6 for the Cicero Avenue data. Peak temperatures approaching 100 degrees F were recorded in 2001, and in all summers peak temperatures above the reported bluntnose minnow short-term survival temperature determined by Yoder, 90.3 degrees F, have been recorded.

The Ship Canal has important functions, including commercial shipping, industrial cooling, moving the treated effluent away from Lake Michigan, and flood control. If we are worried about "optimum" temperatures for fish on the Ship Canal, what about the "optimum" amount of barge traffic for fish (undoubtedly zero)? Removal of the treated effluents and CSO points would also move the Ship Canal toward more "optimal" conditions for fish. The economic burden of such ideas negates any serious consideration, yet the Agency's proposal summarily imposes significant impacts on the industrial users of the Ship Canal.

It is instructive to review the fish community that resides in the Ship Canal currently. All eight of the fish species listed above have been collected in the Lower Lockport Pool (the 34 miles of the Ship Canal) over the years. Midwest Generation's fish collection data from 1994 to 2006 is included in the Attachment 7. Interestingly, the thermally most sensitive of these species, the bluntnose minnow, is the second most abundant species caught in the Ship Canal. Over the years there appears to be a general increase in its population. Prior to 2000, the bluntnose minnow represented less than 6 percent of the total catch, while since 2001; it has represented over 13 percent of the catch. During this same period, the number of fish collected per gear effort and number of species collected have both also increased dramatically. There is no indication that the bluntnose minnow or any other of the species is being negatively affected by the current temperature regime in the Ship Canal.

The MWRDGC has also conducted fish collection studies on the Ship Canal. All eight of the above fish species are present, with the gizzard shad most years representing the highest percentage of fish collected. However, the bluntnose minnow since 1993 has also been very well represented, averaging 17.8 percent over the ten year period (CDM, 2007, page 4-78). Also of interest are the IBI scores for the Ship Canal, which CDM found, "fairly uniform throughout the CSSC." (CDM, 2007, page 4-77). If thermal is what is limiting the fish quality/population, then one should see a dramatic drop in fish diversity, IBI, and fish population at the downstream stations. At Cicero Avenue, immediately below two of the coal-fired power plants, the MWRDGC found the greatest fish diversity (19 species). (CDM, 2007, page 4-77). It should also be noted that IBI scores for the other CAWS waterways, which do not have the thermal discharges have similar IBI scores to the Ship Canal, another indication that temperature is not the cause of overall impairment on the Ship Canal.

Several fundamental questions arise out of a review of Yoder's thermal endpoint data versus the actual fish data collected within the Ship Canal.

- If the bluntnose minnow is as sensitive to temperature as the laboratory studies indicate, why do they represent a significant portion of the fish population?
- Based upon Mr. Yoder's computed Upper incipient lethal temperature (UILT) of 32.4 degrees C (or 90.3 degrees F), why haven't there been massive bluntnose minnow or any other fish species temperature related fish kills been observed on the Ship Canal?
- Why is the greatest fish diversity found at Cicero Avenue, immediately downstream of the Fisk and Crawford generating station outfalls?
- If all eight fish species already exist in the waterway and are not shown through field collection studies to be negatively impacted by the current temperature regime, then given the documented habitat limitations on the Ship Canal, what benefits will be derived from more restrictive temperature limitations on the Ship Canal?

The field collected data should speak for itself. Recall that Dr. Charles Coutant noted the preference of using field collected data over relying on laboratory-based studies. Mr. Yoder concluded his pre-filed testimony by noting that "occasional exceedences of well developed thermal criteria are inevitable and may not necessarily result in a biologically impaired use." (pg 12). This statement would appear to call into question both the derivation of the thermal limits as well as its application to a real world waterway.

CONCLUSION

In Adjusted Standard AS96-10, the Board's opinion noted that the Agency's opinion was that the costs of installing additional cooling "may not be economically reasonable when compared to the likelihood of no improvement in the aquatic community of the UIW."[3] (AS96-10, Opinion and Order at page 7). If there will be no improvement in the aquatic community, then it is not clear what benefits will occur from more restrictive thermal standards. The uniqueness of the Ship Canal, as outlined in my testimony is so apparent, that a separate use category is needed that

[3] UIW-Upper Illinois Waterway

recognizes the existing uses and limitations of the Canal, which factors in the actual fish data on the Ship Canal. Where there are going to be violations of the proposed Use B water quality standards will not be met, which is the case for thermal, chlorides and sulfates, the Board must consider whether any improvement in the biological community will result from the adoption of these more restrictive standards and what impact these proposed changes would have on the existing uses. Since the present and highly abundant blunt-nose minnow, the most sensitive of the RAS species, is already the second most collected fish species and that the physical habitat is poor and not likely to change, the fundamental basis behind changing these standards appears flawed. and ignores the impact on existing uses. Since this set of hearings is focused on the proposed uses of the CAWS, I will not go further into the appropriate water quality standards for the Ship Canal. But I would urge the Board to separate the use designation for the Chicago Sanitary and Ship Canal from the other "Use B" water bodies and examine the appropriate water quality standards based on the unique conditions of the Ship Canal.

Thank you, this concludes my pre-filed testimony.

ATTACHMENT 1

RESUME OF JAMES E. HUFF, P.E.

JAMES E. HUFF, P.E.
Vice President

Expertise: Wastewater Treatment Planning and Design
Stream Surveys/Antidegradation Analysis

Experience:

Since 1980, Mr. Huff has been vice president of Huff & Huff, Inc. responsible for projects pertaining to wastewater treatment, design and operation, water quality studies, hazardous waste management, groundwater and soil remediation, and compliance assessments.

Mr. Huff has directed 15 municipal wastewater treatment design projects. Examples of municipal design projects are listed below:

- Belt filter press system for aerobic digested sludge, with sludge mixer and control system.
- Sludge storage pad with enclosure
- Bar screen
- Grit, washer replacement
- Tertiary filter rehabilitation
- Secondary/Tertiary high flow bypass with chlorine contact tank and flow measurement and blending
- Anaerobic digester supernatant treatment for ammonia removal using SBRs (1999 ACEC-IL Engineering Excellence Merit Award project.)
- Conversion from chlorine to sodium hypochlorite disinfection
- Conversion of wet weather storage facilities to store-treat basins, with effluent disinfection
- In-stream high purity oxygen injection into effluent and receiving stream for increasing stream D.O
- 1 million gallon excess flow storage/treatment concrete tank for new CSO with disinfection

Mr. Huff is currently the Project Manager for preparation of a Facilities Plan for the Village of New Lenox and in 2007 completed for the Village of Barrington a Facilities Plan that evaluated the treatment options for future nutrient removal and the need to upgrade to Class A sludge. Mr. Huff has also conducted several CSO studies including Long-term Control Plans, Nine Minimum Controls, O&M Plans, and Water Quality Impact Studies. He is currently working on CMOM evaluations for three communities. Two novel in-stream aeration systems, using high-purity oxygen on a shallow Illinois stream, were designed by the firm, and have operated successfully for over twenty years. In stream aeration feasibility is currently being investigated on Salt Creek under a contract with the DuPage River/Salt Creek Work Group. Mr. Huff has also completed two value engineering projects, one on an expanded wastewater treatment plant and the other for an excess flow holding tank to offload the sewer system. The Galesburg Sanitary District pretreatment ordinance and revisions have been prepared under Mr. Huff's direction.

Mr. Huff has designed industrial wastewater treatment plants ranging in size from less than one thousand gallons per day to eight million gallons per day. He has assisted two petroleum refineries with biological nitrification issues and evaluated the impact an industrial user's sodium sulfate discharge would have on the POTW, including the anaerobic sludge process. Mr. Huff directed the treatablility studies for breakpoint chlorination for ammonia discharge in an inorganic wastewater stream from a petroleum refinery and assisted in the full-scale start up, and directed a treatablility study evaluating another industrial discharger's proposed sodium sulfate discharge will have on an Indiana POTW. Mr. Huff has worked in a variety of industries on wastewater projects, including: petroleum refineries, cosmetics, foundries, plating, printed circuit boards, inorganic and organic chemical plants, pharmaceutical manufacturers, and meat packing. Examples of industrial wastewater designs are listed below:

- Sequential batch reactors (SBRs) for BOD_5/COD reduction at pharmaceutical plant, pretreatment system subject to the Pharmaceutical Categorical Pretreatment Standards
- Replacement of a rotary drum pre-coat filter with a belt filter press for cosmetic wastewater stream, with polymer addition
- Side stream SBR for nitrification on meat packing three-stage lagoon
- Breakpoint chlorination for ammonia removal at chemical plant, petroleum refinery and also a meat packer
- Land application, with winter lagoon at chemical plant
- Copper removal from printed circuit board facility using sodium borohydride
- Integrated settling basin/ sludge drying beds at foundry
- Completed a preliminary engineering evaluation for a chemical plant for upgrading its overloaded wastewater land application system, which included conversion of the winter storage lagoon to an aerated lagoon with an anaerobic first stage lagoon

He has also designed cluster wastewater treatment systems with subsurface discharge for seven residential developers/country clubs, an outdoor event facility, and a temple. These systems are typically 10,000 to 20,000 gpd, utilizing two SBRs, computer controlled, followed by a large leach field. These unique systems are permitted under the IDPH under a unique experimental use permit provision.

On the Fox River, Mr. Huff was project manager for a group of municipal dischargers on a project to collect and analyze weekly water quality samples along the river, its tributaries, and outfalls at over 30 locations to establish a better database on un-ionized ammonia levels. Mr. Huff has directed fish, mussel, benthic, and water quality surveys for municipal, storm water, and industrial discharges located on the following waterways: Beaver Creek, Cedar Creek, Deep Run, Flint Creek, Mississippi River, Thorn Creek, North Kent Creek, Tyler Creek, Kiswaukee River, Chicago Sanitary & Ship Canal, and Casey Fork Creek, and has completed antidegradation studies as part of many of these studies. Thermal studies, mixing zone studies, and multi-part diffuser designs have been completed for a variety of clients. A thermal study on the Illinois River is on-going. Sediment sampling, Sediment Oxygen Demand, and habitat evaluations have been completed on Salt Creek and the DuPage Rivers.

From 2004 to 2007, Mr. Huff was the lead consultant for NIPC (now CMAP) to review FPA requests for consistency with the Commission's Water Quality Management Plan. Mr. Huff has completed over 150 FPA requests, including the Facilities Plan associated with these. Antidegradation and nutrients have been two major issues on many of these applications. Mr. Huff serves on the Illinois Nutrient Technical Advisory Committee, representing the American Council of Engineering Companies – Illinois (ACEC-IL). Mr. Huff has been involved in eleven site specific rule changes and adjusted standards in Illinois. These studies have included ammonia, D.O., BOD_5, TSS, TDS, and sulfates.

From 1987 through 1990, Mr. Huff was a part-time faculty member, teaching the senior level environmental courses in the Civil Engineering Department at IIT-West in Wheaton, Illinois.

From 1976 to 1980, Mr. Huff was Manager of Environmental Affairs for Akzo Nobel Chemicals, a diversified industrial chemical manufacturer. At Akzo, Mr. Huff was responsible for all environmental activities at eight plants located throughout the United States and Canada. Technical work included extensive biological and chemical treatability studies as well as designing new facilities, including two wastewater pretreatment facilities, a land application system, and an incinerator system.

Previously, Mr. Huff was an Associate Environmental Engineer in the Chemical Engineering Section at IIT Research Institute (IITRI). Much of this work involved advanced wastewater treatment development, including applying a combination of ozone/UV treatment of cyanide, PCB's, RDX, HMX, and TNT and the use of catalytic oxidation of cyanide using powdered activated (carbon impregnated with copper in refinery activated sludge units. At Mobil Oil's Joliet Refinery Mr. Huff was employed as an Advanced Environmental Engineer during the construction and start-up of the largest grassroots refinery ever constructed. Mr. Huff was responsible for wastewater training, permitting start-up, and technical support as well as for water supply, solid waste, and noise abatement issues at the refinery from 1971 to 1973.

Membership

Illinois Association of Wastewater Agencies
American Council of Engineering Companies - IL
Environmental Committee 1999 – 2005
Chairman-June 2000-2004
Board of Directors – 2005-2009
Vice President-2007-2009
Water Environment Federation Member
Illinois Water Environment Federation
National Water Well Association

Licenses: Registered Professional Engineer- Illinois
Class 2 Wastewater Operator-Illinois
Class K Industrial Wastewater Operator-Illinois

Education:

1966-1970 Purdue University, West Lafayette, Indiana
B.S. in Chemical Engineering

1970-1971 Purdue University, West Lafayette, Indiana
M.S.E. in Environmental Engineering

1974-1976 University of Chicago
Graduate School of Business. Part time

Honors: Omega Chi Epsilon (Chem. Engr. Honorary)
President's Academic Award
Graduated with Distinction
Fellowship from the Federal Water Quality Admin.

Thesis: "Destabilizing Soluble Oil Emulsions Using Polymers with Activated Carbon," Major Professor, Dr. James E. Etzel

Selected Papers:

"Ozone-U.V. Treatment of TNT Wastewater," E.G. Fochtman and J.E. Huff, International Ozone Institute Conference, Montreal, May 1975.

"Characterization of Sensory Properties: Qualitative, Threshold, and Supra-Threshold," J.E. Huff and A. Dravnieks, American Water Works Assoc. Seminar, Minneapolis, MN, June 1975.

"Control of Rendering Plant Odors by Wet Scrubbers: Results of Plant Tests," R.H. Snow, J.E. Huff, and W. Boehme, APCA Conference Boston, MA, June 1975.

"Alternative Cyanide Standards in Illinois, a Cost-Benefit Analysis," L.L. Huff and J.E. Huff, 31st Annual Purdue Industrial Waste Conference, Lafayette, IN, May 1976.

"Cyanide Removal from Refinery Wastewaters Using Powdered Activated Carbon," J.E. Huff, J.M. Bigger, and E.G. Fochtman, American Chemical Society Annual Conference, New Orleans, LA, March 1977. Published in

Carbon Adsorption Handbook, P.N. Cheremisinoff and F. Ellerbusch, Eds., Ann Arbor Science Publishers, Inc., 1978.

"Industrial Discharge and/or Pretreatment of Fats, Oils and Grease," J.E. Huff and E.F. Harp, Eighth Engineering Foundation Conference on Environmental Engineering, Pacific Grove, CA, February 1978.

"A Review of Cyanide of Refinery Wastewaters," R.G. Kunz, J.E. Huff, and J.P. Casey, Third Annual Conference of Treatment and Disposal of Industrial Wastewater and Residues, Houston, TX, April 1978. Published as: "Refinery Cyanides: A Regulatory Dilemma," Hydrocarbon Processing, pp 98-102, January 1978.

"Treatment of High Strength Fatty Amines Wastewater - A Case History," J.E. Huff and C.M. Muchmore, 52nd Conference - Water Pollution Control Federation, Houston, TX, October 1979. Published JWPCF, Vol. 54, No. 1, pp 94-102, January 1982.

"A Proposal to Repeal the Illinois Pollution Control Board's Construction Permit Water Regulations," J.H. Russell and J.E. Huff, Chicago Bar Record, Vol. 62, No. 3, pp 122-136, Nov.-Dec., 1980.

"Measurement of Water Pollution Benefits - Do We Have the Option?" L.L. Huff, J.E. Huff, and N.B. Herlevson, IL Water Pollution Control Assn 3rd Annual Conference, Naperville, IL, May 1983.

"Evaluation of Alternative Methods of Supplementing Oxygen in a Shallow Illinois Stream," J.E. Huff and J.P. Browning, IL Water Pollution Control Assn 6th Annual Meeting, Naperville, IL, May 7, 1985.

"Technical and Economic Feasibility of a Central Recovery Facility for Electroplating Wastes in Cook County, IL," J.E. Huff and L.L. Huff, 1986 Governor's Conference on Science and Technology in Illinois, Rosemont, IL, Sept. 3, 1986.

"Biomonitoring/Bioassay," J.E. Huff, Federation of Environmental Technologists Seminar, Harvey, IL, December 11, 1989.

"Storm Water Discharges," J.E. Huff, Federation of Environmental Technologists Environment '90 Seminar, Milwaukee, WI, March 7, 1990.

"Engineering Aspects of Individual Wastewater System Design," J.E. Huff, 22nd Annual Northern Illinois Onsite Wastewater Contractors Workshop, St. Charles, IL, February 27, 1995.

"Total Maximum Daily Loadings (TMDL) and Ammonia Conditions in the Fox River Waterway," J. E. Huff and S. D. LaDieu, Illinois Water '98 Conference, Urbana, IL, Nov. 16, 1998.

"The Illinois Ammonia Water Quality Standards: Effluent Implications & Strategies for Compliance," L.R. Cunningham & J. E. Huff, Illinois Water '98 Conference, Urbana, IL, Nov. 16, 1998.

"Impact of a High Sulfate and TDS Industrial Discharge on Municipal Wastewater Treatment," J.L. Daugherty, J.E. Huff, S.D. LaDieu, and D. March, WEFTEC 2000, Anaheim, CA, October 17, 2000.

"Phase II Storm Water Regulations – Compliance Strategies For The Gas Transmission/Distribution Industry," J.E. Huff, American Gas Association 2003 Operations Conference, Orlando, Florida, April 28, 2003.

"Endocrine Disruptors or Better Living Through Chemistry" Illinois Association of Wastewater Agencies Fall Meeting, Bloomington, IL, November 14, 2003.

"Permitting Wastewater Treatment Plant Expansions in Northeast Illinois in the 21st Century", J.E. Huff , 28th Annual Illinois Water Environment Association Conference, Bloomington, IL, March 6, 2007.

ATTACHMENT 2

FISH BARRIER HAZARDS

DANGER

U.S. ARMY CORPS OF ENGINEERS

ELECTRIC FISH BARRIER HAZARDOUS VOLTAGES PRESENT IN CANAL WATERWAY

BOATERS ARE ADVISED TO EXERCISE EXTREME CAUTION WHILE NAVIGATING THE CHICAGO SANITARY & SHIP CANAL BETWEEN THE POWER PLANT TO THE PIPELINE ARCH(MILE MARKER 296.1 to 296.7)

HIGH RISK OF SERIOUS INJURY OR DEATH

PRECAUTIONS

DO NOT - Enter the water or place hands or feet in the water in the restricted area for any reason.

PLEASE - Closely supervise children and pets or send them below deck while in the restricted area.

DO NOT - Linger or attempt to moor in the restricted area.

MAN OVERBOARD PROCEDURES

DO NOT - Enter the water to attempt a rescue.

USE - A non-metallic oar or similar item to pull the victim onto your boat as quickly as possible.

NOTIFY - Authorities by calling 9-1-1 or by broadcasting a distress call on VHF Channel 16.

For additional information, contact the U.S. Army Corps of Engineers at (312) 846-5330 or visit our safety website at www.lrc.usace.army.mil/safety.

NEWS RELEASE

U.S. Army
Corps of Engineers
Chicago District

Contact: Lynne Whelan
Telephone: (312) 846-5330
E-Mail: lynne.e.whelan@usace.army.mil

Lt. Corey Gardner-Meeks
(630) 986-2155
corey.a.gardner-meeks@uscg.mil

Army Corps and Coast Guard Kick Off Barrier Safety Campaign

March 27, 2008 – The U.S. Army Corps of Engineers and U.S. Coast Guard will begin a campaign April 1st to advise boaters how to safely transit over the electric fish barrier in the Chicago Sanitary and Ship Canal near Romeoville, IL. A portion of the canal near the barrier system has been a Regulated Navigation Area for passage of vessels since 2005.

The Corps of Engineers and Coast Guard have expanded their safety information campaign following the findings of a draft report that indicates the effect of the barrier's electric field on a person immersed in the electrified water could result in serious injury or death. The Corps commissioned the report to determine the potential effects of the barrier's electric field should a person fall into the water.

"Public safety is our highest priority. Although the draft report indicates a wide array of possible impacts, it does show that serious injury or death is possible in worst case scenarios. Therefore, we feel that it is critically important to make sure that people know how to pass through the area safely. The safest thing is to keep people out of the water entirely," said Col. Jack Drolet, commander of the U.S. Army Corps of Engineers, Chicago District, the office responsible for building and operating the electric barrier system.

The final report will not be available until later this Spring, but the Corps of Engineers and Coast Guard have decided to begin an expanded education and information campaign now in order to reach people before the start of the Chicago area boating season.

"Reaching out to commercial and recreational users we initiated a workgroup to address the hazard of a person falling in the water within the fish barrier," said CDR Paul Mehler III, Commanding Officer of the U.S. Coast Guard, Marine Safety Unit Chicago. This partnership has resulted in a campaign involving distributing informational flyers at area locks, boat launches, bait shops, and fuel docks, and working with local and national boating groups to pass the information to as many boaters as possible. The key message is to inform boaters to use extreme caution while traveling in the Sanitary and Ship Canal between River Miles 296.1 to 296.7. This area is bounded approximately by the power plant near the Romeo Road bridge and an aerial pipeline arch. While traveling through the area, boaters are advised to take the following precautions:

- Do not enter the water or place hands or feet in the water for any reason.
- Be sure to closely supervise children and pets or send them below deck if possible.
- Do not linger or attempt to moor in the area.

. The Corps of Engineers and Coast Guard are working with representatives from commercial navigation and recreational boating groups and others to find ways to enhance safety features in the barrier area.

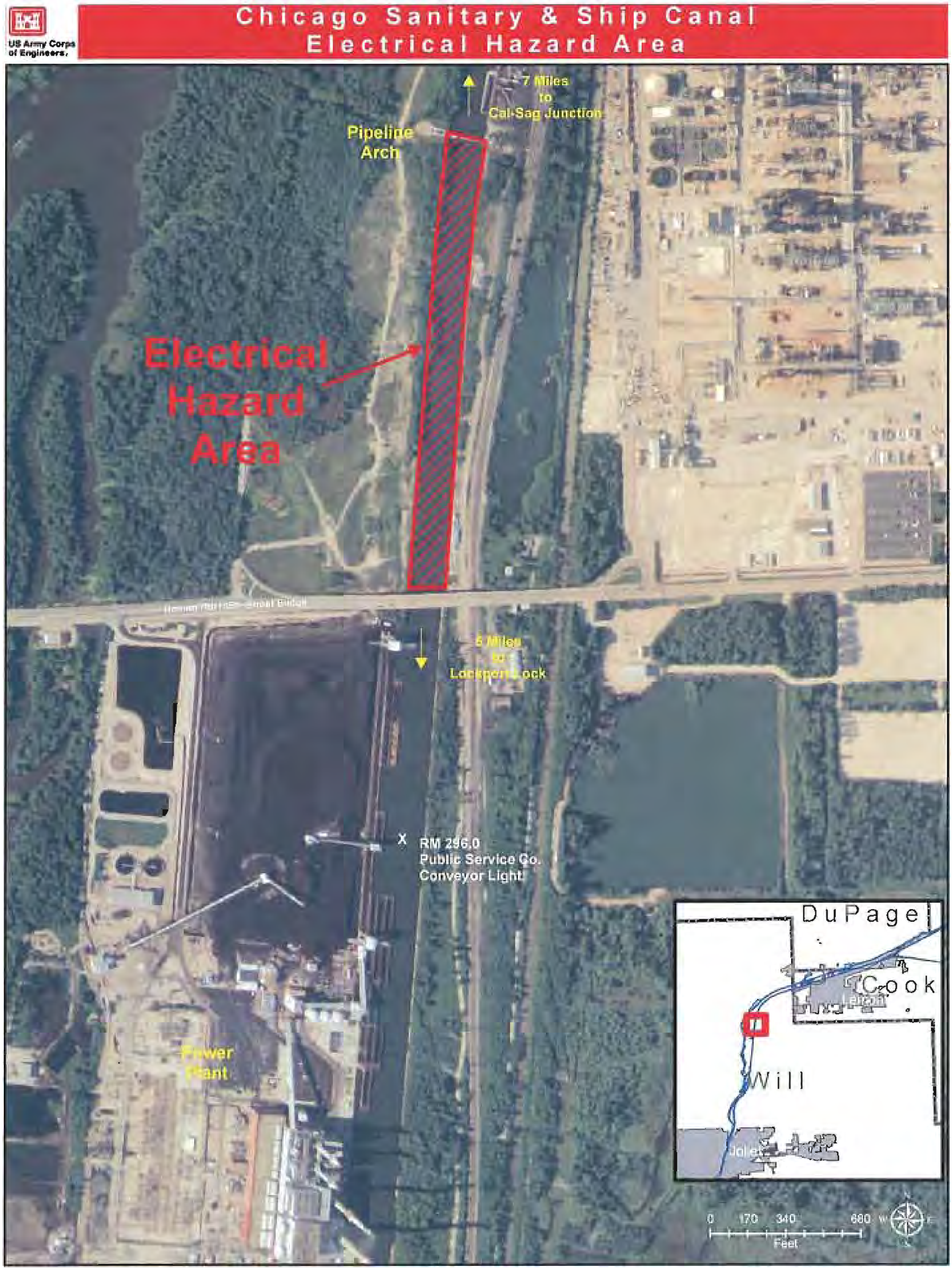
An electric barrier has been operating in the Sanitary and Ship Canal since 2002. The purpose of the barrier system is to stop the movement of invasive species of fish, such as the Asian carp, between the Great Lakes and Mississippi River basins.

For additional information pertaining to the fish barrier please visit www.lrc.usace.army.mil/safety.

-30-

For additional information pertaining to the fish barrier operation, please contact Lynne Whelan with the U.S. Army Corps of Engineers, Chicago District. For information regarding vessel safety, please contact Lt. Corey Gardner-Meeks with the U.S. Coast Guard Marine Safety Unit Chicago. Point of contact information is provided on the first page of this press release.

Electronic Filing - Received, Clerk's Office, August 4, 2008



ATTACHMENT 3

CHLORIDE DATA IN
CHICAGO SANITARY & SHIP CANAL
AT CITGO'S WATER INTAKE

SANITARY & SHIP CANAL
CITGO INTAKE CHLORIDE DATA

Date	Chloride, mg/L	Date	Chloride, mg/L	Date	Chloride, mg/L	Date	Chloride, mg/L
3/13/2004	248	**1/10/2005**	**835**	1/2/2006	330	1/1/2007	174
3/20/2004	195	1/12/2005	492	1/6/2006	320	1/5/2007	156
3/27/2004	231	**1/13/2005**	**580**	1/9/2006	314	1/8/2007	113
4/3/2004	187	1/14/2005	274	1/13/2006	276	1/12/2007	133
4/17/2004	180	1/17/2005	242	1/16/2006	226	1/19/2007	239
4/24/2004	129	1/19/2005	250	1/20/2006	215	1/22/2007	203
5/8/2004	178	1/21/2005	235	1/23/2006	220	1/26/2007	384
5/15/2004	102	1/24/2005	430	1/27/2006	413	1/29/2007	286
5/22/2004	150	**1/31/2005**	**634**	1/30/2006	308	2/2/2007	225
6/12/2004	96	2/4/2005	413	2/3/2006	298	2/5/2007	227
6/19/2004	114	2/11/2005	416	2/6/2006	252	2/9/2007	181
6/26/2004	117	2/14/2005	364	2/10/2006	243	2/12/2007	224
7/10/2004	92	2/25/2005	307	2/13/2006	238	2/16/2007	181
7/24/2004	65	3/7/2005	283	2/17/2006	251	**2/19/2007**	**695**
7/31/2004	78	3/11/2005	286	2/20/2006	276	**2/23/2007**	**549**
8/14/2004	72	3/14/2005	277	2/24/2006	249	**2/26/2007**	**600**
9/4/2004	103	3/21/2005	300	2/27/2006	484	**3/2/2007**	**734**
9/18/2004	99	3/25/2005	272	3/3/2006	200	**3/5/2007**	**616**
9/25/2004	102	3/28/2005	270	3/17/2006	209	3/9/2007	395
10/2/2004	108	4/4/2005	240	3/20/2006	201	3/16/2007	350
10/23/2004	115	4/8/2005	232	3/31/2006	189	3/19/2007	340
		4/11/2005	221	4/3/2006	208	3/23/2007	281
		4/15/2005	200	4/7/2006	189	3/23/2007	281
		4/18/2005	199	4/10/2006	183	3/26/2007	415
		4/22/2005	197	4/14/2006	188		
		4/25/2005	196	4/17/2006	190		
		4/29/2005	184	4/21/2006	128		
		5/2/2005	190	4/24/2006	154		
		5/6/2005	195	4/28/2006	162		
		5/13/2005	164	5/1/2006	175		
		5/16/2005	151	5/5/2006	152		
		5/20/2005	167	5/12/2006	166		
		5/23/2005	147	5/15/2006	145		
		5/27/2005	151	5/19/2006	145		
		5/30/2005	163	5/19/2006	145		
		6/1/2005	160	5/22/2006	147		
		6/3/2005	156	5/26/2006	167		
		6/10/2005	121	5/29/2006	145		
		6/13/2005	124	6/2/2006	134		
		6/17/2005	128	6/5/2006	122		
		6/20/2005	127	6/9/2006	132		
		6/24/2005	122	6/12/2006	108		
		6/27/2005	118	6/16/2006	109		
		7/1/2005	119	6/19/2006	129		
		7/4/2005	103	6/23/2006	123		
		7/8/2005	103	6/26/2006	119		
		7/11/2005	103	6/30/2006	294		
		7/15/2005	100	6/30/2006	294		
		7/18/2005	100	7/3/2006	110		
		7/22/2005	92	7/7/2006	12		
		7/25/2005	99	7/10/2006	85		
		7/29/2005	99	7/14/2006	103		
		8/1/2005	92	7/17/2006	414		
		8/5/2005	102	7/21/2006	92		
		8/8/2005	88	7/24/2006	227		
		8/12/2005	93	7/28/2006	104		
		8/15/2005	88	7/31/2006	96		
		8/19/2005	98	8/4/2006	74		

SANITARY & SHIP CANAL
CITGO INTAKE CHLORIDE DATA

Date	Chloride, mg/L	Date	Chloride, mg/L	Date	Chloride, mg/L	Date	Chloride, mg/L
		10/7/2005	81	9/25/2006	95		
		10/10/2005	96	9/29/2006	107		
		10/14/2005	88	10/2/2006	95		
		10/17/2005	100	10/6/2006	83		
		10/21/2005	87	10/9/2006	113		
		10/24/2005	92	10/13/2006	119		
		10/28/2005	85	10/16/2006	209		
		10/31/2005	106	10/20/2006	146		
		11/4/2005	146	10/23/2006	109		
		11/7/2005	126	10/27/2006	126		
		11/11/2005	105	10/30/2006	120		
		11/14/2005	132	11/3/2006	134		
		11/18/2005	110	11/6/2006	149		
		11/21/2005	116	11/13/2006	118		
		11/25/2005	128	11/17/2006	108		
		11/28/2005	128	11/20/2006	128		
		12/2/2005	146	11/24/2006	140		
		12/5/2005	130	11/27/2006	143		
		12/9/2005	183	12/1/2006	105		
		12/12/2005	192	12/4/2006	14		
		12/16/2005	406	12/8/2006	195		
		12/19/2005	264	12/11/2006	236		
		12/23/2005	295	12/15/2006	249		
		12/26/2005	253	12/18/2006	200		
		12/30/2005	357	12/22/2006	198		
				12/25/2006	129		
				12/29/2006	139		
Average	**131**		**183**		**168**		**333**
Maximum	**248**		**835**		**484**		**734**

R:\Citgo\Des Plaines River Sampling 2006\[Citgo Chloride Data from Ship Canal.xls]Influent Cl

ATTACHMENT 4

HEAT RELATED HAZARDS FROM BROWNOUTS

Power failure puts ComEd on hot seat - Toll hits 69 - heat subsides

Chicago Sun-Times - August 2, 1999

Author: *MARK SKERTIC AND ROBERT C. HERGUTH*

Falling temperatures weren't enough to cool off thousands of city and suburban Commonwealth Edison customers who remained without power Sunday after a heat wave that has claimed at least 69 lives.

ComEd hoped to have all power restored by this morning, but the beleaguered utility's troubles are far from over. For the first time, ComEd must pay customers for spoiled food and other expenses they rang up because their electricity failed.

"We all are angry that outages happened in the first place," Mayor Daley said.

Ald. Helen Shiller (46th), whose ward includes some of the more than 20 buildings along North Lake Shore Drive that had no power or water Sunday, didn't try to hide her anger with ComEd.

"The deal is ComEd blew it by saying everything is fine," she said. "They should have been telling people the truth. I've told that to every person I've talked to from ComEd."

ComEd spokesman Steve Solomon said, "We're not pleased. They're not pleased. We both have the same concern_getting the customers' power turned back on."

In the weeks ahead, ComEd will be sorting through claims for reimbursement, which are available at www.ucm.com or by calling (800) EDISON-1.

The company also will be trying to determine why cables and other equipment gave out, keeping the power off in about 10,500 homes in the utility's service area late Sunday.

More than 9,600 of them were in the city, while about 850 power failures were scattered in the suburbs, mostly in the south suburbs.

At the peak of the power failures, more than 92,000 of ComEd's nearly 3.5 million customers were without electricity Friday.

After a week of temperatures hovering around 100, suburbs and city neighborhoods were filled Sunday with people out enjoying a day when the temperature was in the lower 80s. But public officials were left dealing with the grim aftermath of the deadly heat wave.

The Cook County medical examiner's office added 30 names to the list of heat victims, bringing the total to 73 for the summer.

Sixty-nine deaths, including six from the suburbs, have been blamed on the current heat spell. More autopsies scheduled for Sunday night and today are expected to increase that number, a spokesman said.

The 1995 heat wave contributed to more than 700 Chicago area deaths.

Dropping temperatures, brought on by a shift in the jet stream, has pushed cooler air over Chicago and much of the Midwest, bringing relief to much of the nation. The heat wave was blamed for at least 185 deaths nationally, 80 of them in Illinois. Missouri was next with 44.

In Chicago, officials said they were generally pleased with the city's response. "Overall, our emergency plan has worked very well," Daley said. "Without the plan, and thousands of Chicagoans who checked on neighbors, it could have been worse."

Over three days the city received 50,000 calls to the non-emergency 311 number. Forty percent were about power failures.

The most widespread failures were in Chicago's Lake View neighborhood, where underground electrical cables failed starting about 5:20 p.m. Saturday. More than 20 mid-rises and high-rises_roughly between Irving Park Road, Belmont, the lakefront and Halsted_remained without power Sunday, officials said.

Police and fire officials estimated those buildings are home to 5,500 people, many of whom are elderly.

A 1997 state law requires ComEd to compensate customers for the costs incurred during a power failure that lasts at least four hours and affects 30,000 or more customers.

The law requires "that someone take responsibility," said David Farrell, a spokesman for the Illinois Commerce Commission. "This will be the first check of that."

At some buildings without power, ComEd gave away meals, flashlights, drinking water and ice.

ComEd spent $120 million earlier this year on system upgrades to avoid the kind of problems seen over several days, Solomon said.

"Unfortunately, the combination of weather and usage will take its toll on the equipment."

Contributing: Jim Ritter, Abdon M. Pallasch

Caption: Lake View residents sit outside their building Sunday while waiting for the power to come back on. More than 20 high-rise and mid-rise buildings along North Lake Shore Drive had no power or water Sunday. See related stories page 2. ROBERT A. DAVIS

Edition: *LATE SPORTS FINAL*
Section: *NEWS*
Page: *1*
Index Terms: *hot ; heat wave ; deaths ; Commonwealth Edison ; electricity ; outage ; power failure ; WEATHER ; ENERGY*
Record Number: *CST08020025*

COMED HOPES TO DELIVER SOME CHECKS BY NEXT WEEK - COMPANY EXPECTS TO PAY OUT MILLIONS

Chicago Tribune - August 5, 1999

Author: *Gary Washburn, Tribune Staff Writer.*

Commonwealth Edison Co. customers who suffered losses after last weekend's power outages may begin receiving reimbursement checks as early as next week, ComEd Chairman John Rowe said Wednesday.

Rowe reported that the company probably will hire an outside firm to expedite the handling of claims.

"I would like to see some people start getting (checks) as early as next week," Rose said. "I don't know if I can deliver on that, but we'll try."

An estimated 90,000 Chicagoans suffered power interruptions of four hours or more as smothering heat knocked equipment off line, causing losses that ComEd officials believe will be in the millions of dollars. Electricity was restored to all customers by Monday.

No claims have been filed so far, but ComEd has fielded more than 12,000 calls regarding claim forms, a company spokeswoman said Wednesday.

Most of the losses are believed to be related to spoilage of food and medicines requiring refrigeration.

ComEd will not require receipts for items in the "normal array of what people keep in their refrigerators," Rowe said. "My wife doesn't keep her grocery receipts, and I don't expect other people to either."

Rowe said he expects submission of some phony claims, and "if we feel people are ripping (us) off, then we will get tough." But, he added, "the key is we will pay all the reasonable ones as fast as we can."

Rowe has contended that ComEd was not required by law to reimburse customers for losses in the outages because the problems were caused by the extremely hot temperatures.

But he decided that reimbursement was the proper way to treat customers.

Meanwhile, the city was tallying the cost of expenditures for its outage-related emergency response, including the evacuation of residents from high-rise buildings that went dark.

Mayor Richard Daley, who praised ComEd last week for the way it was dealing with the heat, was upset with the subsequent outages.

But by Wednesday, the mayor had cooled off. He commended Rowe for his decision to pay claims, hailing what he said was a new frankness by the company.

Rowe also said the company will expedite improvements at two substations where failures led to outages.

Claim forms are available by calling ComEd at 800-EDISON-1 and can be downloaded from the company's Internet site at www.ucm.com. The claims, however, cannot be filed electronically. Claim forms also can be obtained through Chicago public library branches, aldermanic offices or by calling 311, the city's non-emergency information number.

In a related development, Gov. George Ryan said low-income households with children, the elderly or people with health problems will be the prime targets for the $15.9 million in federal utility bill subsidies announced Tuesday by President Clinton.

"We want to make sure that low-income families who suffered through last month's heat wave don't have to suffer again when their electric bills come," Ryan said.

The help is available through local agencies. Applications for assistance under the program will be accepted through Aug. 31, the governor's office said.

For information on program eligibility and where to apply, Illinois residents can call 800-252-8643. Chicago residents also can call 312-456-4100.

The death toll in Cook County from the heat since July 29 was raised to 81 Wednesday when the Cook County medical examiner's office reported that heat played a role in the death Tuesday of Margaret Cornils, 77, of Evanston.

Edition: *CHICAGO SPORTS FINAL*
Section: *METRO CHICAGO*
Page: *1*
Index Terms: *ENERGY ; UTILITY ; DEFECT ; CONSUMER ; WEATHER ; FOOD ; DEATH ; COST*
Record Number: *CTR9908050161*

HEAT STALKS CITY ELDERLY - DEATHS CLIMB; OFFICIALS WARN RISK NOT OVER - RESIDENTS STEAM AS OUTAGES LINGER

Chicago Tribune - August 1, 1999

Author: *Jeremy Manier and John Chase, Tribune Staff Writers.*

In a frightening echo of 1995's heat disaster, the hottest days in the Chicago area in four years claimed as many as 57 lives Friday and early Saturday, amid power outages that at times left up to 100,000 households virtually defenseless against searing temperatures.

The Cook County medical examiner's office said Saturday that 25 deaths had been linked to temperatures that topped 100 degrees and heat indexes that hovered near 120 on Thursday and Friday. Investigators also were looking at 30 additional deaths in Cook County that they believed likely were heat related.

In addition, Lake County on Saturday reported two heat-related deaths.

Even with the new victims, the toll trails that of 1995, when 85 heat-related deaths occurred the first day after the hottest temperatures, on the way to a total of more than 700 dead.

The danger is not past, Chicago officials said at a news conference.

"Just because it will be cooler today doesn't mean everyone will be able to get through," said Mayor Richard Daley, who called on residents to help city workers look after the elderly and other groups at risk from the heat.

"You have to check on them, because you could save their life," Daley said.

Hope for relief came from forecasts that temperatures would drop further after a slight improvement Saturday, with highs projected in the low 80s for Sunday and merciful lows in the mid-60s. The cooler temperatures prompted the National Weather Service to cancel its heat advisory Saturday.

Residents and city officials on Saturday continued venting frustration with Commonwealth Edison over outages that left 26,000 homes without power for more than 24 hours. As of 8 p.m., ComEd officials said, 11,500 homes citywide remained without power.

The North Side outage was caused by a transformer failure in a substation at Addison Street and California Avenue. During the 1995 heat wave, the same substation suffered a fire that deprived 41,000 North Side residents of power for more than a day.

Jacquelyn Heard, Daley's press secretary, said the mayor had not known the same substation was responsible for both failures. But she expanded on Daley's comments at the earlier press conference, when he said he was "upset" about the outage.

"I think people who lost power deserve some answers," Heard said. "The mayor was very clear he would hold ComEd responsible. We're going to see to it that they follow through with the work, and this is not just empty promises."

Martin Cohen, executive director of the Citizens Utility Board, a watchdog group, was more direct in his criticism.

"It's apparent the system on the North Side is not engineered properly," Cohen said. "That should have been apparent four years ago. There aren't any excuses for not providing power when people most need it."

ComEd spokesman Steve Solomon said the eight transformers that failed at the station had been inspected weekly. Some had been installed as far back as the early 1980s, he said, noting that such electrical equipment can have a lifespan of 40 to 50 years under normal conditions.

But the demand late last week was anything but normal.

"This isn't a situation of maintenance or upgrades not being done at that station," Solomon said. "This is a situation of peak demand records being beaten five times in two weeks.

"Frankly, the system as a whole has held up extremely well."

Local power performance has been trouble-free compared to other cities this summer, Solomon said. In early July, record temperatures topping 100 degrees caused blackouts affecting 200,000 residences in New York, prompting Mayor Rudolph Giuliani to charge that the power utility was woefully unprepared.

After the lessons of 1995, no officials in Chicago could claim ignorance of the mayhem that heat can unleash. The deaths and power crisis come despite a citywide emergency plan implemented after 1995 and forecasts that accurately predicted high temperatures Thursday and Friday.

Power crews from as far away as Rockford and Maywood worked non-stop, beginning at 11 p.m. Friday night, when a portable transformer was hauled to the Addison substation, ComEd officials said.

The mechanical problems with the transformers differ from those suffered at the substation in 1995, according to ComEd. In 1995, transformers overloaded, but this year the transformers weren't considered stressed.

Crews worked all Saturday to bring the transformers online, but early estimates that the task would be completed by mid-afternoon proved overly optimistic.

Steve Wickman, a ComEd supervisor and substation engineer who is part of the team trying to bring the plant back to power, said the temporary transformers carry about half the power of one of the failed transformers.

The two working transformers at the substation were hosed down by Chicago firefighters for most of the day to keep them cool.

Although there was no way of knowing Saturday whether the North Side outage contributed to the death toll, four victims at the medical examiner's office had addresses within the outage area or on its borders.

Cook County Medical Examiner Edmund Donoghue said he doubts the deaths were linked to power outages. Heat-related deaths most often are the result of extended exposure to broiling conditions over a period of a day or more, Donoghue said, so an outage late Friday might not have had much impact.

"People who had air conditioning would be cooled off already." Donoghue said. "A short power outage wouldn't cause too many problems."

But he said the lack of air conditioning might be an issue if power outages continued for more than 24 hours. That danger was a possibility late Saturday because of the thousands of residences still without power.

Donoghue also praised the city's emergency response plan for trying to find people suffering from the heat.

"I think the city has done everything they can," Donoghue said. "Older people are difficult to reach. When you look into this, I think you'll find (the victims) were people who were living alone."

Many heat deaths reported Saturday fit Donoghue's profile. Evelyn Doss, 86, had resisted getting air conditioning for her home on the South Side, partly because it caused her arthritis to flare up, said Florida Ware, a relative who lived nearby.residents. Such visits turned up four heat deaths Saturday, according to CHA Director Phil Jackson.

The Chicago Police Department, the Department of Human Services and Department on Aging check on senior citizens in nursing homes and others who ask at least once a day, according to officials.

If no one answers the phone or the person sounds weak, a squad car is sent to the home, and officers knock on the door, question neighbors and try to contact relatives, police spokesman Pat Camden said. They also are authorized to knock down a door.

Camden said Saturday that the Police Department had made 3,020 such checks since Thursday morning.

The definition of what exactly constitutes a heat-related death was questioned after the 1995 disaster. Some local health officials balked at Donoghue's reports that hundreds of people had died from the heat, theorizing that the heat was just the last stress for people who were close to death.

Donoghue and other medical examiners have since led attempts to create uniform guidelines. Victims typically have body temperatures in excess of 105 degrees before they die, though experts say other factors can justify classifying a death as heat-related.

The broader criteria include people with heart conditions who make an attempt to cool off before dying. Elevated levels of certain liver and muscle enzymes or signs of mental disorientation can also lead to a verdict that heat played a role.

Most victims are not near death when heat strikes, according to Donoghue. Otherwise, they already would be in hospitals or nursing homes with air conditioning. The heat claims people who are frail but independent enough to live on their own, who might have lived additional years if not for the heat.

The disproportionate toll in Cook County arises in part from the fact that Chicago's vast expanses of concrete and asphalt tend to trap heat, yielding temperatures 3 to 4 degrees above those in the suburbs, experts say. The city also is home to more poor residents who cannot afford air conditioning.

Before late Friday, the heat wave had claimed 13 lives in Cook County and one in Kane County in the past 10 days.

The weekend's only heat-related deaths outside Cook were the two in Lake County.

A 91-year-old Highland Park man died Saturday morning at Highland Park Hospital after suffering heat stroke at home Friday night, said Jim Wipper, deputy coroner.

A Maryland woman in town to see her brother graduate from Great Lakes Naval Training Center died Thursday, although Wipper said the heat was only a complicating factor to heart and respiratory problems.

Aside from the local crisis, nearly 100 heat-related deaths outside the Chicago area have been reported since mid-July.

In more than a dozen states, people were found dead in homes and apartments without air conditioning or fans.

In Missouri, 39 deaths were blamed on the heat.

The lack of electricity for air conditioning drove multitudes into the streets or the lake, seeking relief. Chicago Park District spokeswoman Angelynne Amores said an estimated 450,000 people stormed the lakefront Friday.

Adam Knoll, 69, spent the night sleeping on a pier near his home on Virginia Street along the north branch of the Chicago River.

"The river was nice and cool," Knoll said.

Weighing stifling heat versus his safety on the street, Knoll said he chose the lesser of two evils.

"I didn't feel safe in the house where it was boiling," he said.

Tribune staff writers Anthony Colarossi, Bechetta Jackson, James Janega and Anthony Burke Boylan contributed to this report.

Caption: PHOTOS 2 GRAPHIC
PHOTO: Firefighters from Engine Company 106 pour water onto a working ComEd transformer Saturday at California Avenue and Addison Street. Tribune photo by Todd Panagopoulos. PHOTO (color): A body is placed in a refrigerated truck outside the Cook County medical examiner's office after heat deaths overloaded the facility. Tribune photo by Phil Greer. GRAPHIC: Blackouts hit the city At its worst, between 4 p.m. and 11 p.m. Friday night, the outage affected 100,000 households in the Chicago area, including 62,000 on the North and

ATTACHMENT 5

LETTER FROM CHARLES C. COUTANT
TO
JULIA WOZNIAK, AUGUST 9, 2007

Charles C. Coutant, Ph. D.
Aquatic Ecologist

120 Miramar Circle
Oak Ridge, TN 37830
865-483-5976
e-mail: ccoutant3@comcast.net

August 9, 2007

Julia Wozniak
Senior Biologist, Environmental Services
Midwest Generation EME, LLC
One Financial Place
440 South LaSalle Street
Suite 3500
Chicago, IL 60605

Dear Julia:

At your request, I have reviewed the August 2007 report, entitled "Development of Biologically Based Thermal Limits for the Lower Des Plaines River," prepared for Midwest Generation by EA Engineering, Science and Technology, Inc. (the "EA Report"). This letter provides my views and opinions concerning the methodology, findings and recommendations contained in the EA report.

I understand I was asked to review the EA report as an independent expert who was not involved with its preparation (other than providing editorial comments for clarity of earlier drafts). My expertise in the subject includes a long career that emphasized thermal effects on fish and other aquatic life. I retired in 2005 from the Oak Ridge National Laboratory. I was principal author of the Heat and Temperature chapter of the National Academy of Sciences/National Academy of Engineering report Water Quality Criteria-1972, and a co-author of the US EPA's 1977 interagency guidance for implementing Section 316(a) of the Clean Water Act. I am familiar with the Lower Des Plaines River from my work as co-chair of the Upper Illinois Waterway Ecological Study Task Force in the early 1990s, which involved stakeholder groups including US EPA, IEPA, IDNR, MWRDGC, USFWS, Sierra Club and Commonwealth Edison.

The EA report is, in my opinion, technically sound and directed appropriately at the issue of setting biologically based water temperature standards in the Lower Des Plaines River. I base this opinion on the following points:

• I agree that carefully developed and thoughtfully analyzed field data are scientifically superior to extrapolations from laboratory-derived temperature requirements for evaluating fish community responses to temperature. Having been involved with both the laboratory-based Academy report and the heavily field oriented 316(a) guidance, I can objectively view the relative merits of laboratory and field data for developing thermal criteria and standards. The report provides both scientific and administrative justification for emphasizing the field approach in this situation.

• The technical analyses are appropriate and well done. Species richness and the IWBmod are two widely accepted indices of fish community health. It is reasonable to compare each index with temperatures at time of fish collections. The author uses two analytical methods for these indices, pair-wise ANOVA and Loess regression, to provide useful weight of evidence, rather than relying on one technique alone. The Loess regression is a particularly innovative way to obtain an second, independent evaluation. The results are shown in tables and in well-prepared figures.

• The analysis of winter thermal limits is consistent with EPA guidance, my own development of cold kill guidance for power plants (reference below), and the wintertime conditions of the Lower Des Plaines River.

• I agree with the EA report's discussion of the need for verification of data (for validity and suitability) used for establishing water quality criteria and standards. The examples provided from the Midwest Biodiversity Institute (MBI) report are clearly unacceptable scientifically. To the degree that data evaluation and verification have not been done for the database used by MBI for their recommendations to US EPA Region V and Illinois EPA, I would put more credence on the field data and analyses given in the EA report.

• The EA report is consistent with my reading of US EPA's overall guidance for water quality criteria, whereby full protection of all species (including the most sensitive) is not required and field studies are preferred (US EPA 1985, cited in the EA report).

• The EA report's numerical conclusions are supported by the technical analyses.

In summary, I found the EA report to be sound, consistent with recognized scientific literature and administrative guidance, and with appropriate discussion justifying the approach. It is a valuable contribution toward development of rational thermal standards for the Lower Des Plaines River.

Sincerely,

Charles C. Coutant, Ph.D.

Coutant, C. C. 1977. Cold shock to aquatic organisms: guidance for power-plant siting, design, and operation. Nucleaar Safety 18(3):329-342.

Publication: HERALD-NEWS
Publication date: 08/19/2002
By:

Fishermen died by drowning

CHANNAHON -- Will County Coroner Patrick O'Neil's office ruled the deaths of three fishermen whose bodies were found Saturday afternoon in the Des Plaines River as drownings after autopsies were performed Sunday. Rescue workers pulled the bodies of William Weavers and Otis Brown, both 59 and from Chicago, and John M. Gaters, 58, of Dolton from the river a half-mile upstream from Interstate 55 shortly before 5:30 p.m.

The fishermen launched a small, silver boat from the marina at 6 a.m., according to eyewitness Melvin Minor of Joliet.

An hour later a barge tender saw the boat riding low in the water, and then at 11 a.m. he spotted the capsized vessel drifting in the water.

Emergency personnel from Channahon, Minooka, Braidwood, Coal City, Troy and Wilmington fire departments, as well as Illinois Department of Natural Resource's Conservation Police and Will County sheriff's police joined in the search for the missing men.

Weavers, Brown and Gaters were not wearing life vests at the time, and authorities do not think they had any in the boat.

Windy weather, choppy water and an overloaded boat probably caused the accident, said Sgt. Mark Simon, of the Illinois Department of Natural Resource's Conservation Police.

Gaters' son-in-law said the men were all experienced fishermen.

The coroner's office will conduct an inquest at a later date once police reports are completed.

Exhibit 9
R08-9
1/28/09
mt

Center for Applied Bioassessment & Biocriteria
P.O. Box 21541
Columbus, OH 43221-0541

Temperature Criteria Options for the Lower Des Plaines River

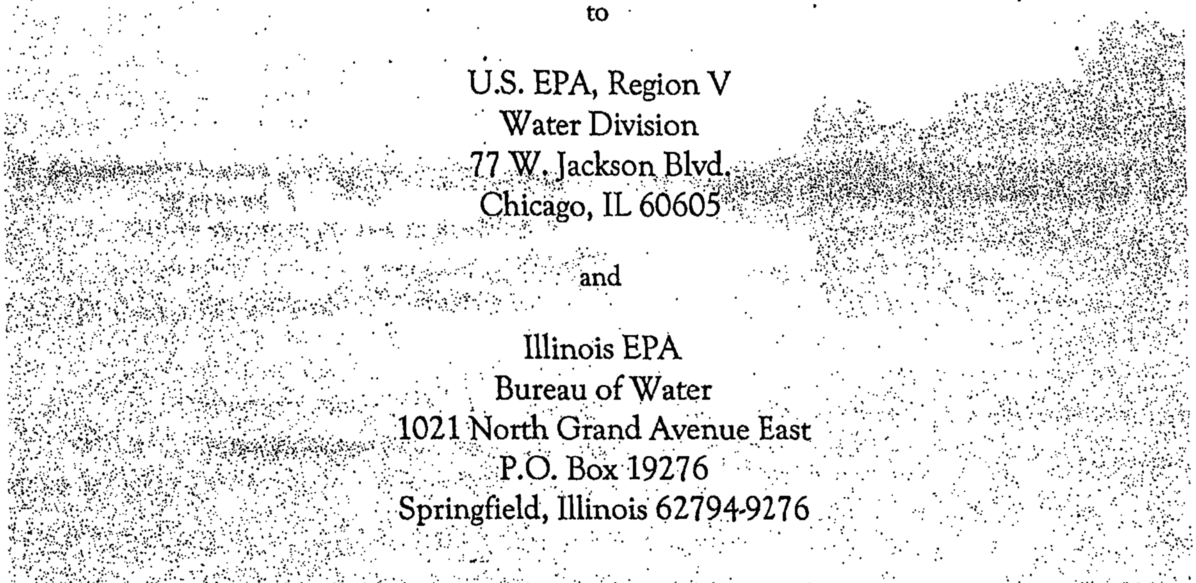
Final Report

to

U.S. EPA, Region V
Water Division
77 W. Jackson Blvd.
Chicago, IL 60605

and

Illinois EPA
Bureau of Water
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276



Des Plaines R. below Dresden Dam (Hey & Assoc. 2003)

November 23, 2005

Chris O. Yoder, Research Director
Midwest Biodiversity Institute
P.O. Box 215641
Columbus, OH 43221-0561

and

Edward T. Rankin, Senior Research Associate
Center for Applied Bioassessment and Biocriteria
P.O. Box 21541
Columbus, OH 43221-0541

Appendix Table 1G. Thermal thresholds for secondary contact use RAS list.

Fish Temperature Model -- Selected Species Report

Family Code	Species Code	Common Name	Optimum °C	MWAT Growth °C	Upper Avoidance °C	UILT °C	Latin Name
20	003	Gizzard Shad	30.0	31.9	34.0	35.8	Dorosoma cepedianum
43	001	Common Carp	31.5	33.4	34.9	37.3	Cyprinus carpio
43	003	Golden Shiner	27.8	29.9	30.7	34.0	Notemigonus crysoleucas
43	042	Fathead Minnow	27.7	30.0	31.5	34.5	Pimephales promelas
43	043	Bluntnose Minnow	27.5	29.1	31.4	32.4	Pimephales notatus
47	006	Black Bullhead	27.6	30.2	32.1	35.4	Ameiurus melas
77	006	Largemouth Bass	29.1	30.9	31.6	34.5	Micropterus salmoides
77	008	Green Sunfish	27.8	30.3	30.9	35.3	Lepomis cyanellus

Table 3. Fish temperature model outputs (°F[°C]) for fish species representative of a modified use (two versions) and the Secondary Contact/Indigenous Aquatic Life use for the Lower Des Plaines River. The long-term and short-term survival temperatures represent summer season (June 16 – September 15) average and maxima.

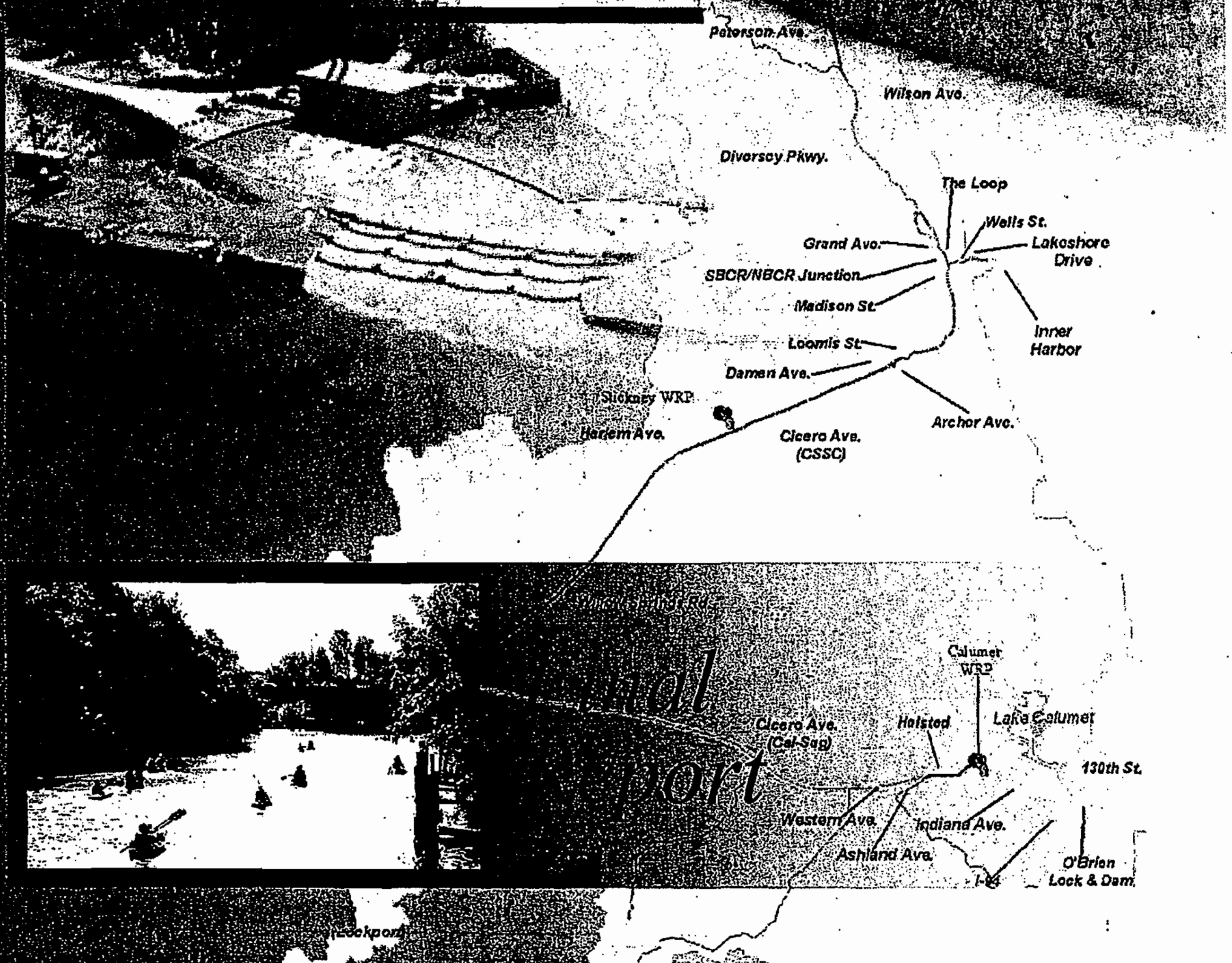
Thermal Category	**Proportion of Representative Fish Species**			
	100%	**90%**	**75%**	**50%**
Modified Use RAS 1 *(includes golden redhorse)*				
Optimum	71.2 (21.8)	75.4 (24.1)	81.3 (27.4)	82.6 (28.1)
Growth (MWAT)	77.5 (25.3)	81.0 (27.2)	85.8 (29.9)	86.7 (30.4)
Avoidance (UAT)	83.7 (28.7)	84.9 (29.4)	87.1 (30.6)	88.9 (31.6)
Survival (Long-term)	85.1 (29.5)	86.5 (30.3)	89.1 (31.7)	91.4 (33.0)
Survival (Short-term)	88.7 (31.5)	90.1 (32.3)	92.7 (33.7)	95.0 (35.0)
Modified Use RAS 2 *(excludes golden redhorse)*				
Optimum	71.2 (21.8)	75.0 (23.9)	81.5 (27.5)	82.8 (28.2)
Growth (MWAT)	77.5 (25.3)	80.6 (27.0)	85.8 (29.9)	86.9 (30.5)
Avoidance (UAT)	83.7 (28.7)	85.6 (29.8)	87.4 (30.8)	89.1 (31.7)
Survival (Long-term)	85.1 (29.5)	86.5 (30.3)	89.8 (32.1)	91.4 (33.0)
Survival (Short-term)	88.7 (31.5)	90.1 (32.3)	93.4 (34.1)	95.0 (35.0)
Secondary Contact/Indigenous Aquatic Life				
Optimum	81.5 (27.5)	81.7 (27.6)	81.9 (27.7)	82.1 (27.8)
Growth (MWAT)	84.5 (29.1)	85.3 (29.7)	86.0 (30.0)	86.5 (30.3)
Avoidance (UAT)	87.3 (30.7)	87.5(30.8)	88.3 (31.3)	88.9 (31.6)
Survival (Long-term)	86.7 (30.4)	88.7 (31.5)	90.3 (32.4)	91.2 (32.9)
Survival (Short-term)	90.3 (32.4)	92.2 (33.5)	93.9 (34.4)	94.8 (34.9)

TABLE 14. SPECIES COMPOSITION, NUMBER, AND RELATIVE ABUNDANCE OF FISH COLLECTED WITHIN FOUR SEGMENTS OF THE UPPER ILLINOIS WATERWAY, 1994, 1995, 2000-2002, AND 2005-2006.

	LOWER LOCKPORT POOL													
	1994		1995		2000		2001		2002		2005		2006	
SPECIES	#	%	#	%	#	%	#	%	#	%	#	%	#	%
SKIPJACK HERRING	--	--	--	--	--	--	2	0.1	--	--	--	--	1	0.1
GIZZARD SHAD	1	1.7	33	20.6	404	64.0	1615	66.8	2500	75.8	1245	71.2	629	61.5
THREADFIN SHAD	--	--	--	--	4	0.6	--	--	--	--	--	--	--	--
RAINBOW TROUT	--	--	--	--	1	0.2	--	--	--	--	--	--	--	--
GRASS PICKEREL	--	--	--	--	5	0.8	1	0.0	--	--	--	--	--	--
NORTHERN PIKE	--	--	--	--	--	--	--	--	--	--	--	--	1	0.1
GOLDFISH	8	13.8	2	1.3	--	--	--	--	2	0.1	--	--	--	--
COMMON CARP	29	50.0	18	11.3	53	8.4	70	2.9	140	4.2	80	4.6	38	3.7
CARP X GOLDFISH HYBRID	3	5.2	8	5.0	1	0.2	1	0.0	2	0.1	--	--	1	0.1
GOLDEN SHINER	1	1.7	--	--	--	--	--	--	15	0.5	--	--	--	--
EMERALD SHINER	3	5.2	21	13.1	50	7.9	178	7.4	178	5.4	24	1.4	59	5.8
SPOTTAIL SHINER	--	--	--	--	--	--	3	0.1	1	0.0	--	--	2	0.2
SPOTFIN SHINER	1	1.7	--	--	16	2.5	6	0.2	20	0.6	2	0.1	--	--
SAND SHINER	--	--	--	--	--	--	--	--	1	0.0	--	--	--	--
BLUNTNOSE MINNOW	2	3.4	2	1.3	37	5.9	383	15.8	188	5.7	314	18.0	140	13.7
FATHEAD MINNOW	1	1.7	1	0.6	--	--	1	0.0	8	0.2	1	0.1	1	0.1
BULLHEAD MINNOW	--	--	--	--	--	--	1	0.0	--	--	--	--	--	--
WHITE SUCKER	--	--	--	--	--	--	--	--	1	0.0	--	--	--	--
ORIENTAL WEATHERFISH	--	--	--	--	1	0.2	--	--	--	--	1	0.1	3	0.3
BLACK BULLHEAD	--	--	--	--	--	--	--	--	3	0.1	--	--	--	--
YELLOW BULLHEAD	--	--	--	--	--	--	--	--	4	0.1	3	0.2	1	0.1
CHANNEL CATFISH	--	--	1	0.6	5	0.8	20	0.8	22	0.7	10	0.6	13	1.3
TADPOLE MADTOM	--	--	--	--	--	--	1	0.0	1	0.0	--	--	--	--
BLACKSTRIPE TOPMINNOW	--	--	--	--	1	0.2	--	--	3	0.1	1	0.1	--	--
WESTERN MOSQUITOFISH	4	6.9	--	--	2	0.3	--	--	27	0.8	1	0.1	1	0.1
BROOK SILVERSIDE	--	--	--	--	--	--	1	0.0	--	--	--	--	--	--
THREESPINE STICKLEBACK	1	1.7	--	--	--	--	--	--	--	--	--	--	--	--
WHITE PERCH	--	--	--	--	--	--	10	0.4	--	--	--	--	--	--
WHITE BASS	--	--	--	--	--	--	1	0.0	--	--	--	--	--	--
YELLOW BASS	--	--	1	0.6	--	--	--	--	--	--	--	--	--	--
GREEN SUNFISH	1	1.7	6	3.8	16	2.5	75	3.1	110	3.3	14	0.8	31	3.0
PUMPKINSEED	--	--	--	--	3	0.5	3	0.1	10	0.3	--	--	55	5.4
WARMOUTH	--	--	--	--	--	--	--	--	1	0.0	--	--	--	--
ORANGESPOTTED SUNFISH	--	--	--	--	--	--	--	--	3	0.1	--	--	1	0.1
BLUEGILL	2	3.4	--	--	4	0.6	19	0.8	27	0.8	10	0.6	7	0.7
LONGEAR SUNFISH	--	--	1	0.6	--	--	1	0.0	--	--	--	--	--	--
REDEAR SUNFISH	--	--	--	--	--	--	--	--	--	--	1	0.1	--	--
HYBRID SUNFISH	1	1.7	--	--	--	--	1	0.0	2	0.1	10	0.6	3	0.3
UNID LEPOMIS	--	--	--	--	--	--	--	--	--	--	2	0.1	--	--
SMALLMOUTH BASS	--	--	1	0.6	--	--	1	0.0	1	0.0	--	--	1	0.1
LARGEMOUTH BASS	--	--	64	40.0	28	4.4	22	0.9	17	0.5	23	1.3	27	2.6
WHITE CRAPPIE	--	--	--	--	--	--	--	--	2	0.1	--	--	--	--
BLACK CRAPPIE	--	--	1	0.6	--	--	--	--	1	0.0	--	--	--	--
FRESHWATER DRUM	--	--	--	--	--	--	1	0.0	3	0.1	5	0.3	6	0.6
ROUND GOBY	--	--	--	--	--	--	--	--	4	0.1	1	0.1	1	0.1
TOTAL FISH	58	100.0	160	100.0	631	100.0	2417	100.0	3297	100.0	1748	100.0	1022	100.0
CATCH PER GEAR EFFORT	4		11		16		60		82		44		26	
TOTAL SPECIES	12		13		16		22		28		17		20	

CDM

Chicago Area Waterway System Use Attainability Analysis



Prepared for the

Illinois Environmental Protection Agency

August 2007

SOD data was available for one study conducted by MWRDGC in the fall and winter of 2001 that included three locations along the CSSC. Measurements performed on sediments at Cicero, I-55, and Lockport were 1.71, 3.64, and 2.71 $g/m^2/day$ respectively.

4.4.4 Biological Assessment

4.4.4.1 Fish

Chicago Sanitary Ship Canal

Fish sampling in the CSSC was conducted at five MWRDGC locations:

- Damen Avenue
- Cicero Avenue
- Harlem Avenue
- Willow Springs
- LP&L (16th Street)

Twenty-seven species of fish (excluding hybrids) were captured in the CSSC from 1993 to 2002, with the dominant fish species being common carp, gizzard shad, goldfish, and bluntnose minnow (**Table 4-47**). Dominant game fish species included largemouth bass, pumpkinseed and bluegill.

The greatest species diversity (19 species) was observed at Cicero Avenue, with lowest diversity being at Damen Avenue. Species diversity showed a general decline in the 1990s, and began to rebound in 2001 (**Figure 4-32**). IBI scores ranged from 12 to 24 and were fairly uniform throughout the CSSC (**Figure 4-33**). The median IBI score for the CSS fish sampling sites was 18. These IBI scores are reflective of poor to very poor water quality conditions in the CSSC.

4.4.4.2 Macroinvertebrates

MWRDGC sampled macroinvertebrates at six locations in the CSSC during 2001 and 2002.

- Damen Avenue
- Cicero Avenue
- Harlem Avenue
- Route 83
- Stephen Street
- LP&L (16th Street)

Table 4-47 Species Richnes and Relative Abundance of Fish Species in the CSSC 1993 - 2002, All Sampling Locations

	Percent Abundance (%)									
Fish Species	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Clupeidae: Herrings, Shads, Sardines, and allies										
Alosa pseudoharengus - alewife		0.18								
Dorosoma cepedianum - gizzard shad	34.46	3.70	12.02	30.58	14.21	14.17	43.52	43.78	44.48	31.60
Cyprinidae: Minnows and Carps										
Carassius auratus - goldfish	8.85	10.04	12.31	4.69	0.55	1.35			0.57	0.84
Cyprinella spiloptera - spotfin shiner							0.15		0.28	1.01
Cyprinus carpio - common carp	14.33	23.50	49.26	49.03	68.31	16.69	20.12	46.59	38.24	32.10
Notemigonus crysoleucas - golden shiner	1.25	0.53	0.74		0.55	1.18				3.70
Notropis atherinoides - emerald shiner	0.08	0.09	0.15		0.55		0.30		0.85	2.52
Notropis hudsonius - spottail shiner	0.23	0.09								
Notropis volucellus - mimic shiner						0.17				
Pimephales notatus - bluntnose minnow	34.93	31.69	8.01	0.49	2.19	60.88	29.51		3.97	6.72
Pimephales promelas - fathead minnow	3.13	25.70	1.63			0.67	0.30			
Carp x goldfish	0.78	0.88	1.48	1.29	0.55			0.40	0.85	0.17
Catostomidae: Suckers										
Catostomus commersoni - white sucker							0.45			
Erimyzon oblongus - creek chubsucker	0.08									
Ictaluridae: Catfishes										
Ameiurus melas - black bullhead	0.16	0.18	0.15			0.17		0.80		
Ameiurus natalis - yellow bullhead			0.30	0.16			0.15	0.80	0.28	1.01
Ictalurus punctatus - channel catfish									0.28	0.67
Umbridae: Mudminnows										
Umbra limi - central mudminnow		0.09								
Poeciliidae: Live-bearers										
Gambusia affinis - mosquitofish		0.09				0.17			0.57	8.74
Gasterosteidae: Sticklebacks and Tubesnouts										
Gasterosteus aculeatus - threespine stickleback				1.13						
Moronidae: Temperate Basses										
Morone chrysops - white bass							0.15			
Morone mississippiensis - yellow bass	0.47									
Centrarchidae: Sunfishes and Freshwater Basses										
Lepomis cyanellus - green sunfish	0.16	0.35	1.48	0.32	1.09	0.34	0.15		1.42	0.84
Lepomis gibbosus - pumpkinseed		0.18	0.30	0.65		0.34	2.53	4.42	6.52	7.73
Lepomis macrochirus - bluegill	0.23	0.09	0.45	1.78		2.02	0.30		1.13	1.18
Micropterus salmoides - largemouth bass	0.86	2.55	11.72	9.55	12.02	1.69	2.38	3.21	0.57	1.01
Pomoxis nigromaculatus - black crappie		0.09		0.32						
Pumpkinseed x Bluegill hybrid						0.17				
Sciaenidae: Coakers and Drums										
Aplodinotus grunniens - freshwater drum										0.17
Total Number of Species	15	18	14	12	9	14	13	7	14	16

Figure 4-32. Temporal Trend in Fish Species Diversity in the CSSC 1993 - 2002

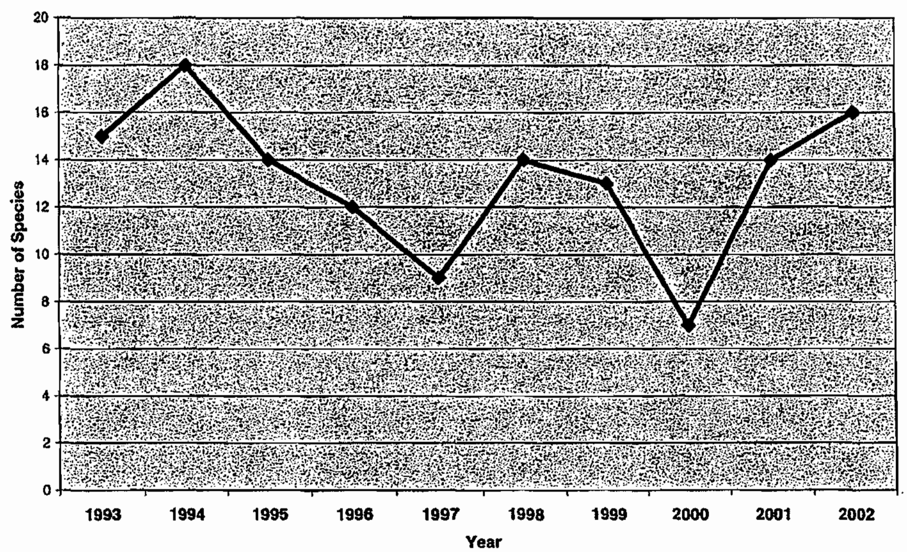
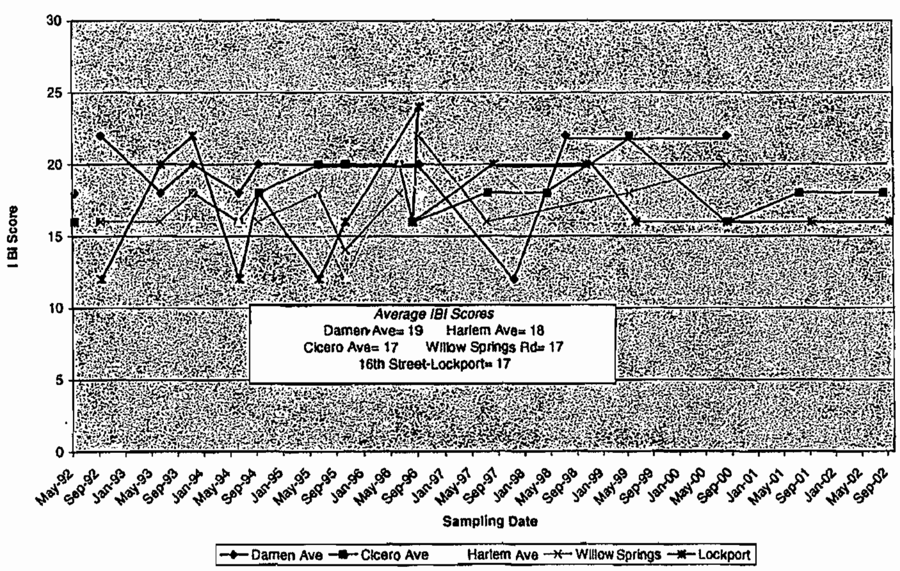


Figure 4-33. IBI Scores for Fish Sampling Locations on the CSSC 1992 - 2002



Tables 4-48 shows the relative abundance, species richness and associated MBI score for both MWRDGC HD and PP dredge sample collection methods. Thirty-one species of macroinvertebrates were collected in the CSSC. Species richness for the MWRDGC HD data set was highest at the Lockport sampling location (14 species).

Dominant taxa in the CSSC was Oligochaeta (82%), followed by Turbellaria and *Dicrotendipes simpsoni*. MBI scores for HD sampling data ranged from 6.4 at Damen Avenue to 9.6 at Cicero Avenue, and the PP dredge MBI scores ranged from 7.0 at Damen Avenue to 10.0 at Lockport. Additional data collected in 2001 by MWRDGC at Lockport, showed three caddisfly taxa present. The high MBI scores are reflective of a poor to very poor water quality conditions in the CSSC.

4.4.4.3 Habitat

Rankin's (2004) habitat evaluation showed that the CSSC instream habitat ranged from poor to very poor. The habitat at L, Romeoville and Willow Springs Road was canal-like with steep sides and little functional cover for fish (**Table 4-49**). Limiting factors for the CSSC include:

- Silty substrates
- Poor substrate material
- Little instream cover
- Channelization
- No sinuosity

The stretch of waterway between Harlem and Cicero avenues had some shoreline shallows that provided suitable habitat to support a slightly better community than found in the remainder of the CSSC channel (Rankin 2004). Rankin categorized the Harlem to Cicero street section as MWH-C, while the other portions of the CSSC were considered a LRW according to Ohio EPA's classification system.

4.4.5 IEPA Letter Response Request

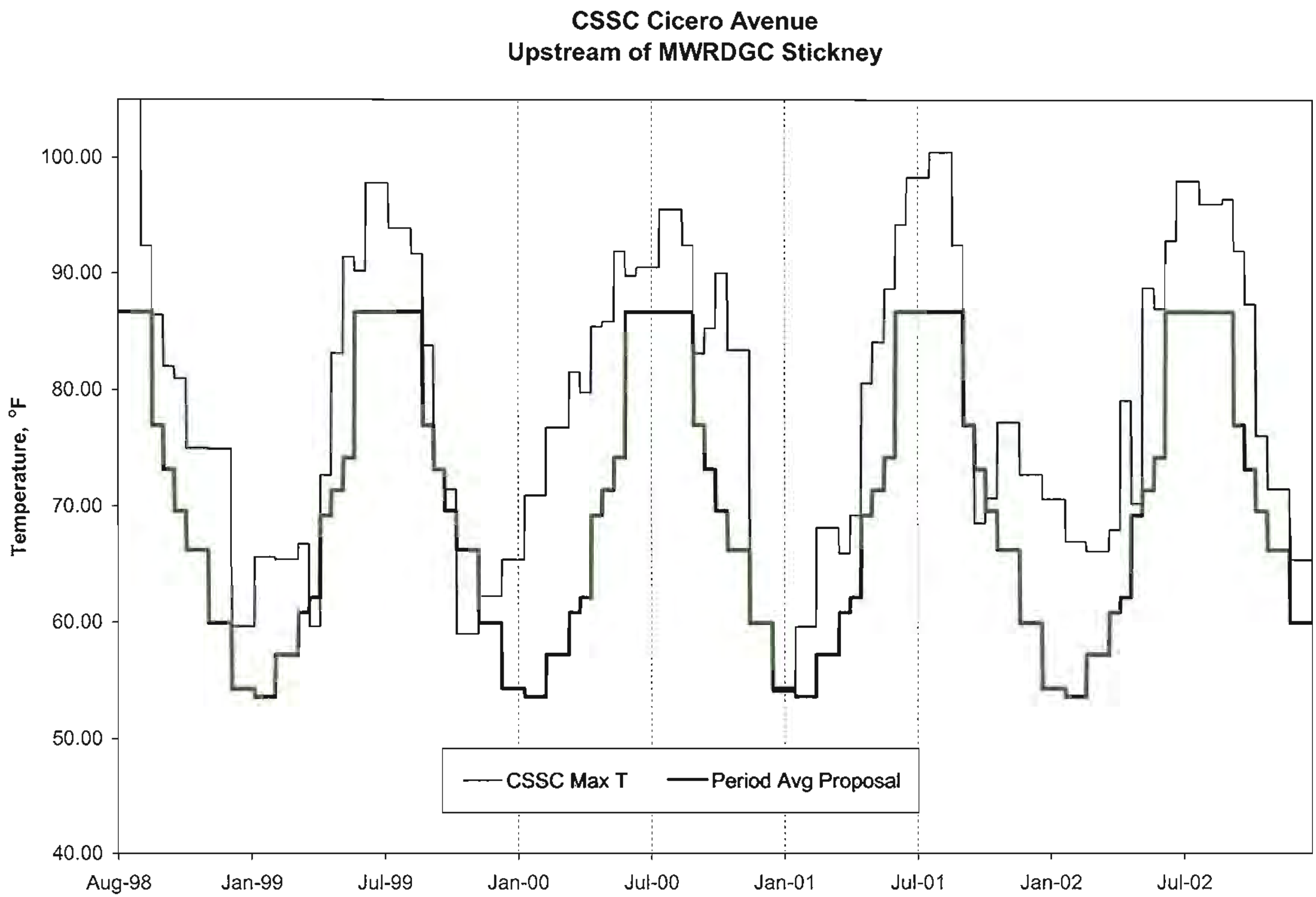
As part of this UAA study, IEPA requested from communities along the CSSC if they had plans for instream habitat improvements or the development of swimming areas. There were no responses back to IEPA from the municipalities contacted.

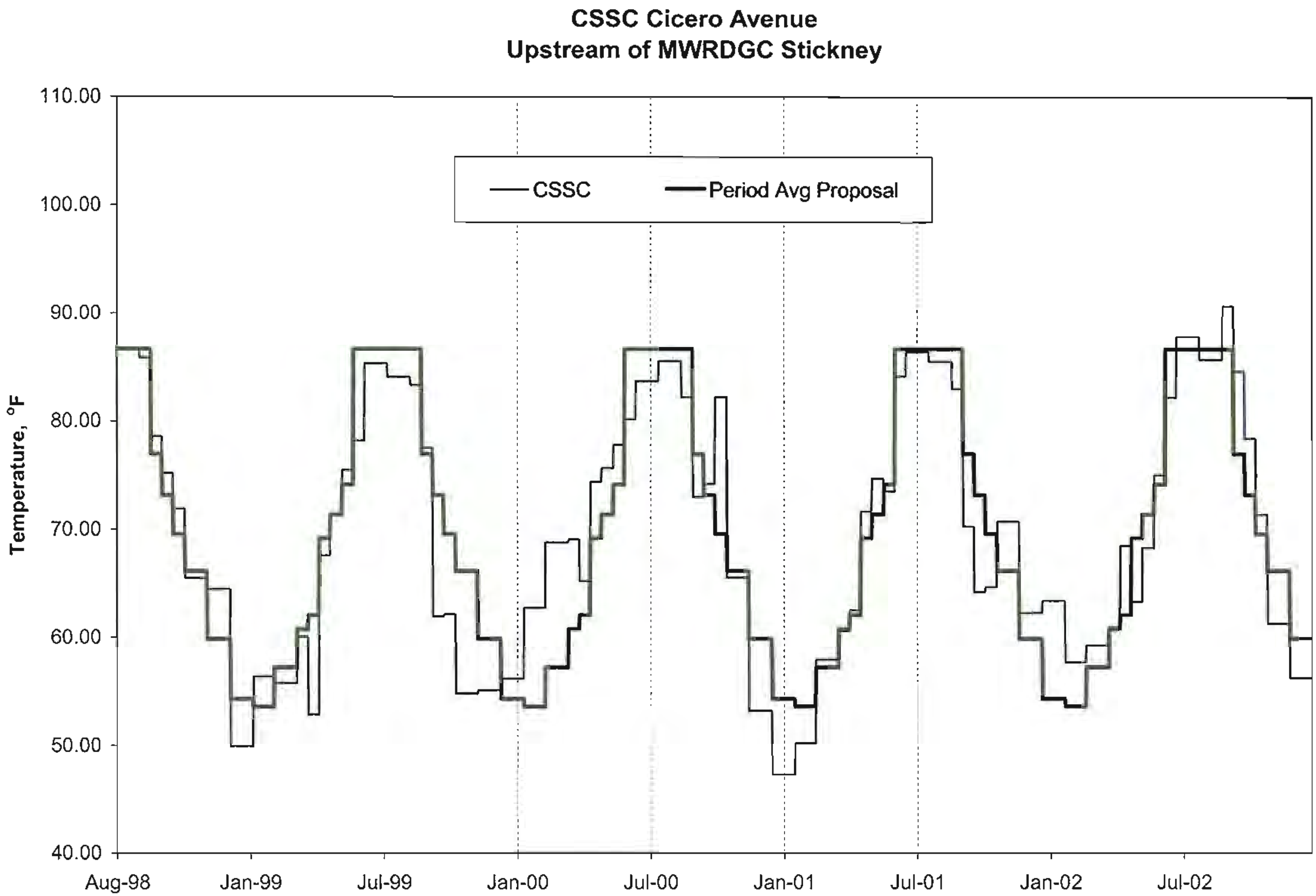
4.5 Calumet System

The Calumet System consists of the Calumet-Sag Channel, the east and west segments of the Little Calumet River, North Leg, the GCR, the Calumet River and Lake Calumet. The total segment length is 26.2 miles.

ATTACHMENT 6

MAXIMUM AND PERIOD AVERAGE TEMPERATURES
AT CICERO AVENUE ON SHIP CANAL


CSSC Cicero Avenue
Upstream of MWRDGC Stickney
Temperature, °F
100.00
90.00
80.00
70.00
60.00
50.00
40.00
Aug-98
Jan-99
Jul-99
Jan-00
Jul-00
Jan-01
Jul-01
Jan-02
Jul-02
CSSC Max T
Period Avg Proposal


CSSC Cicero Avenue
Upstream of MWRDGC Stickney
CSSC
Period Avg Proposal
Temperature, °F
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
Aug-98
Jan-99
Jul-99
Jan-00
Jul-00
Jan-01
Jul-01
Jan-02
Jul-02

ATTACHMENT 7

FISH DATA ON THE UPPER ILLINOIS WATERWAY

2006 UPPER ILLINOIS WATERWAY FISHERIES INVESTIGATION RM 274.4-296.0

Prepared for:

Midwest Generation EME, LLC
One Financial Place
440 S. LaSalle Street, Suite 3500
Chicago, IL 60605

Prepared by:

EA Engineering, Science, and Technology
444 Lake Cook Road, Suite 18
Deerfield, IL 60015

March 2008

TABLE 5. SUMMARY OF THE NUMBER OF FISH COLLECTED WITHIN EACH SEGMENT OF THE UPPER ILLINOIS WATERWAY, 2006.

SPECIES	LOWER LOCKPORT POOL		BRANDON POOL		UPSTREAM I-55		DOWNSTREAM I-55		SEGMENTS COMBINED	
	#	%	#	%	#	%	#	%	#	%
LONGNOSE GAR	--	--	--	--	17	0.19	1	0.01	18	0.08
SKIPJACK HERRING	1	0.10	--	--	--	--	--	--	1	0.00
GIZZARD SHAD	629	61.55	514	14.32	780	8.59	1,560	15.97	3,483	14.85
THREADFIN SHAD	--	--	6	0.17	46	0.51	60	0.61	112	0.48
GRASS PICKEREL	--	--	1	0.03	--	--	--	--	1	0.00
NORTHERN PIKE	1	0.10	--	--	--	--	--	--	1	0.00
CENTRAL STONEROLLER	--	--	1	0.03	2	0.02	--	--	3	0.01
GOLDFISH	--	--	1	0.03	7	0.08	1	0.01	9	0.04
COMMON CARP	38	3.72	87	2.42	124	1.37	30	0.31	279	1.19
CARP X GOLDFISH HYBRID	1	0.10	5	0.14	1	0.01	1	0.01	8	0.03
HORNYHEAD CHUB	--	--	--	--	15	0.17	--	--	15	0.06
GOLDEN SHINER	--	--	3	0.08	6	0.07	11	0.11	20	0.09
PALLID SHINER	--	--	--	--	--	--	3	0.03	3	0.01
EMERALD SHINER	59	5.77	922	25.68	798	8.79	451	4.62	2,230	9.51
GHOST SHINER	--	--	--	--	5	0.06	22	0.23	27	0.12
STRIPED SHINER	--	--	--	--	153	1.69	33	0.34	186	0.79
SPOTTAIL SHINER	2	0.20	--	--	131	1.44	127	1.30	260	1.11
SPOTFIN SHINER	--	--	62	1.73	211	2.32	222	2.27	495	2.11
SAND SHINER	--	--	1	0.03	23	0.25	1	0.01	25	0.11
REDFIN SHINER	--	--	--	--	2	0.02	--	--	2	0.01
UNID NOTROPIS	--	--	--	--	--	--	1	0.01	1	0.00
BLUNTNOSE MINNOW	140	13.70	1,172	32.65	4,198	46.23	2,874	29.42	8,384	35.74
FATHEAD MINNOW	1	0.10	9	0.25	4	0.04	1	0.01	15	0.06
BULLHEAD MINNOW	--	--	3	0.08	7	0.08	218	2.23	228	0.97
RIVER CARPSUCKER	--	--	--	--	2	0.02	7	0.07	9	0.04
QUILLBACK	--	--	--	--	7	0.08	5	0.05	12	0.05
WHITE SUCKER	--	--	5	0.14	--	--	--	--	5	0.02
SMALLMOUTH BUFFALO	--	--	3	0.08	61	0.67	25	0.26	89	0.38
BIGMOUTH BUFFALO	--	--	--	--	2	0.02	--	--	2	0.01
SILVER REDHORSE	--	--	--	--	10	0.11	2	0.02	12	0.05
BLACK REDHORSE	--	--	--	--	--	--	1	0.01	1	0.00
GOLDEN REDHORSE	--	--	--	--	6	0.07	46	0.47	52	0.22
SHORTHEAD REDHORSE	--	--	--	--	2	0.02	5	0.05	7	0.03
UNID ICTIOBINAE	--	--	--	--	--	--	1	0.01	1	0.00
ORIENTAL WEATHERFISH	3	0.29	1	0.03	1	0.01	--	--	5	0.02
YELLOW BULLHEAD	1	0.10	21	0.58	9	0.10	3	0.03	34	0.14
CHANNEL CATFISH	13	1.27	60	1.67	158	1.74	35	0.36	266	1.13
TADPOLE MADTOM	--	--	6	0.17	8	0.09	5	0.05	19	0.08
FLATHEAD CATFISH	--	--	--	--	2	0.02	--	--	2	0.01
BLACKSTRIPE TOPMINNOW	--	--	62	1.73	127	1.40	70	0.72	259	1.10
WESTERN MOSQUITOFISH	1	0.10	225	6.27	71	0.78	7	0.07	304	1.30
BROOK SILVERSIDE	--	--	--	--	6	0.07	105	1.07	111	0.47
WHITE PERCH	--	--	1	0.03	--	--	--	--	1	0.00
WHITE BASS	--	--	--	--	5	0.06	--	--	5	0.02
YELLOW BASS/WHITE PERCH	--	--	--	--	1	0.01	--	--	1	0.00
ROCK BASS	--	--	1	0.03	5	0.06	10	0.10	16	0.07
GREEN SUNFISH	31	3.03	117	3.26	420	4.63	335	3.43	903	3.85
PUMPKINSEED	55	5.38	44	1.23	18	0.20	1	0.01	118	0.50
ORANGESPOTTED SUNFISH	1	0.10	7	0.19	25	0.28	390	3.99	423	1.80
BLUEGILL	7	0.68	87	2.42	964	10.62	2,571	26.32	3,629	15.47
LONGEAR SUNFISH	--	--	--	--	13	0.14	14	0.14	27	0.12
REDEAR SUNFISH	--	--	--	--	3	0.03	1	0.01	4	0.02
HYBRID SUNFISH	3	0.29	19	0.53	241	2.65	44	0.45	307	1.31
UNID LEPOMIS	--	--	1	0.03	--	--	21	0.21	22	0.09
SMALLMOUTH BASS	1	0.10	1	0.03	31	0.34	18	0.18	51	0.22
LARGEMOUTH BASS	27	2.64	54	1.50	281	3.09	384	3.93	746	3.18
WHITE CRAPPIE	--	--	--	--	1	0.01	1	0.01	2	0.01
BLACK CRAPPIE	--	--	--	--	2	0.02	2	0.02	4	0.02
JOHNNY DARTER	--	--	7	0.19	7	0.08	--	--	14	0.06
LOGPERCH	--	--	--	--	--	--	17	0.17	17	0.07
BLACKSIDE DARTER	--	--	1	0.03	--	--	--	--	1	0.00
SLENDERHEAD DARTER	--	--	--	--	--	--	1	0.01	1	0.00
FRESHWATER DRUM	6	0.59	33	0.92	50	0.55	22	0.23	111	0.47
ROUND GOBY	1	0.10	47	1.31	11	0.12	3	0.03	62	0.26
TOTAL FISH	1,022	100.00	3,590	100.00	9,080	100.00	9,769	100.00	23,461	100.00
GEAR EFFORTS	40		80		96		64		280	
CATCH PER GEAR EFFORT	26		45		95		153		84	
TOTAL SPECIES	20		33		49		44		58	

NOTE: 0.00 DENOTES VALUES LESS THAN 0.005.

TABLE 13. SPECIES COMPOSITION, NUMBER, AND RELATIVE ABUNDANCE OF FISH COLLECTED FROM THE UPPER ILLINOIS WATERWAY, 1994, 1995, 2000-2002, AND 2005-2006.

SPECIES	1994		1995		2000		2001		2002		2005		2006	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
LONGNOSE GAR	--	--	7	0.10	11	0.09	15	0.10	15	0.07	11	0.04	18	0.08
UNID GAR	1	0.02	--	--	3	0.03	--	--	1	0.00	--	--	--	--
BOWFIN	--	--	--	--	--	--	1	0.01	--	--	--	--	--	--
SKIPJACK HERRING	4	0.10	1	0.01	3	0.03	27	0.17	16	0.08	5	0.02	1	0.00
GIZZARD SHAD	850	20.83	508	7.52	2,457	21.07	5,459	34.64	7,841	37.12	9,101	29.79	3,441	15.51
THREADFIN SHAD	--	--	--	--	167	1.43	124	0.79	84	0.40	2	0.01	112	0.50
RAINBOW TROUT	--	--	--	--	1	0.01	--	--	--	--	--	--	--	--
CENTRAL MUDMINNOW	--	--	2	0.03	--	--	--	--	--	--	--	--	--	--
GRASS PICKEREL	--	--	--	--	34	0.29	8	0.05	2	0.01	5	0.02	1	0.00
NORTHERN PIKE	--	--	2	0.03	--	--	1	0.01	--	--	--	--	1	0.00
CENTRAL STONEROLLER	2	0.05	--	--	--	--	18	0.11	--	--	6	0.02	3	0.01
GOLDFISH	29	0.71	26	0.38	7	0.06	6	0.04	9	0.04	17	0.06	9	0.04
GRASS CARP	--	--	--	--	--	--	3	0.02	2	0.01	4	0.01	--	--
COMMON CARP	471	11.54	338	5.00	633	5.43	719	4.56	568	2.69	483	1.58	268	1.21
CARP X GOLDFISH HYBRID	64	1.57	69	1.02	48	0.41	33	0.21	21	0.10	1	0.00	8	0.04
BIGHEAD CARP	--	--	--	--	--	--	--	--	2	0.01	--	--	--	--
HORNYHEAD CHUB	--	--	--	--	--	--	2	0.01	1	0.00	3	0.01	15	0.07
GOLDEN SHINER	16	0.39	5	0.07	52	0.45	13	0.08	32	0.15	70	0.23	20	0.09
PALLID SHINER	--	--	--	--	2	0.02	--	--	2	0.01	2	0.01	3	0.01
EMERALD SHINER	340	8.33	105	1.55	507	4.35	1,276	8.10	2,426	11.49	1,217	3.98	2,038	9.19
GHOST SHINER	5	0.12	2	0.03	--	--	3	0.02	4	0.02	8	0.03	27	0.12
STRIPED SHINER	23	0.56	2	0.03	--	--	21	0.13	40	0.19	141	0.46	185	0.83
BIGMOUTH SHINER	--	--	--	--	--	--	--	--	2	0.01	--	--	--	--
SPOTTAIL SHINER	208	5.10	174	2.57	281	2.41	513	3.26	164	0.78	168	0.55	241	1.09
RED SHINER	--	--	--	--	1	0.01	1	0.01	1	0.00	--	--	--	--
SPOTFIN SHINER	15	0.37	21	0.31	143	1.23	158	1.00	207	0.98	485	1.59	460	2.07
SAND SHINER	16	0.39	10	0.15	12	0.10	31	0.20	48	0.23	88	0.29	24	0.11
REDFIN SHINER	--	--	1	0.01	--	--	2	0.01	1	0.00	2	0.01	2	0.01
MIMIC SHINER	9	0.22	5	0.07	--	--	--	--	--	--	5	0.02	--	--
UNID NOTROPIS	2	0.05	1	0.01	--	--	--	--	--	--	1	0.00	1	0.00
SUCKERMOUTH MINNOW	--	--	--	--	--	--	--	--	1	0.00	1	0.00	--	--
BLUNTNOSE MINNOW	1,057	25.91	3,609	53.40	1,441	12.36	2,849	18.08	2,334	11.05	8,106	26.54	7,661	34.54
FATHEAD MINNOW	1	0.02	12	0.18	--	--	2	0.01	18	0.09	24	0.08	14	0.06
BULLHEAD MINNOW	59	1.45	199	2.94	247	2.12	367	2.33	106	0.50	716	2.34	228	1.03
CREEK CHUB	--	--	1	0.01	--	--	3	0.02	--	--	--	--	--	--
RIVER CARPSUCKER	12	0.29	17	0.25	22	0.19	20	0.13	19	0.09	19	0.06	9	0.04
QUILLBACK	10	0.25	17	0.25	15	0.13	17	0.11	9	0.04	19	0.06	10	0.05
UNID CARPIODES	--	--	--	--	--	--	--	--	--	--	1	0.00	--	--
WHITE SUCKER	67	1.64	30	0.44	5	0.04	39	0.25	20	0.09	36	0.12	5	0.02
SMALLMOUTH BUFFALO	25	0.61	43	0.64	86	0.74	116	0.74	121	0.57	103	0.34	86	0.39
BIGMOUTH BUFFALO	--	--	2	0.03	5	0.04	3	0.02	7	0.03	2	0.01	2	0.01
BLACK BUFFALO	4	0.10	2	0.03	5	0.04	3	0.02	1	0.00	2	0.01	--	--
SPOTTED SUCKER	--	--	--	--	--	--	2	0.01	2	0.01	--	--	--	--
SILVER REDHORSE	3	0.07	3	0.04	1	0.01	2	0.01	3	0.01	5	0.02	8	0.04
RIVER REDHORSE	1	0.02	--	--	--	--	--	--	--	--	--	--	--	--
BLACK REDHORSE	--	--	--	--	--	--	--	--	1	0.00	--	--	1	0.00
GOLDEN REDHORSE	6	0.15	20	0.30	2	0.02	4	0.03	23	0.11	3	0.01	49	0.22
SHORTHEAD REDHORSE	28	0.69	25	0.37	23	0.20	16	0.10	8	0.04	3	0.01	6	0.03
UNID MOXOSTOMA	1	0.02	--	--	1	0.01	--	--	--	--	--	--	--	--
UNID CATOSTOMINAE	--	--	--	--	--	--	--	--	--	--	2	0.01	--	--
UNID ICTIOBINAE	--	--	--	--	--	--	--	--	1	0.00	--	--	1	0.00
ORIENTAL WEATHERFISH	--	--	--	--	1	0.01	3	0.02	--	--	1	0.00	5	0.02
BLACK BULLHEAD	5	0.12	1	0.01	1	0.01	--	--	4	0.02	--	--	--	--
YELLOW BULLHEAD	12	0.29	11	0.16	48	0.41	26	0.16	69	0.33	33	0.11	34	0.15
CHANNEL CATFISH	36	0.88	37	0.55	159	1.36	196	1.24	262	1.24	212	0.69	259	1.17
UNID AMEIURUS	--	--	--	--	1	0.01	1	0.01	--	--	--	--	--	--
TADPOLE MADTOM	--	--	1	0.01	9	0.08	7	0.04	5	0.02	10	0.03	19	0.09
FLATHEAD CATFISH	--	--	--	--	2	0.02	2	0.01	3	0.01	5	0.02	2	0.01
BLACKSTRIPE TOPMINNOW	10	0.25	7	0.10	74	0.63	20	0.13	34	0.16	118	0.39	259	1.17
WESTERN MOSQUITOFISH	5	0.12	--	--	57	0.49	23	0.15	132	0.62	196	0.64	277	1.25
BROOK SILVERSIDE	14	0.34	23	0.34	4	0.03	10	0.06	17	0.08	168	0.55	111	0.50
THREESPINE STICKLEBACK	1	0.02	--	--	--	--	--	--	--	--	--	--	--	--
WHITE PERCH	--	--	2	0.03	19	0.16	32	0.20	7	0.03	--	--	1	0.00
WHITE BASS	1	0.02	--	--	9	0.08	10	0.06	14	0.07	4	0.01	3	0.01
YELLOW BASS	--	--	14	0.21	7	0.06	10	0.06	3	0.01	3	0.01	--	--
YELLOW BASS/WHITE PERCH	--	--	--	--	--	--	--	--	--	--	--	--	1	0.00
HYBRID MORONE	1	0.02	--	--	--	--	2	0.01	--	--	--	--	--	--
UNID MORONE	2	0.05	--	--	--	--	--	--	--	--	--	--	--	--
ROCK BASS	--	--	--	--	7	0.06	7	0.04	6	0.03	9	0.03	16	0.07
GREEN SUNFISH	227	5.56	133	1.97	1,731	14.84	792	5.03	1,852	8.77	895	2.93	869	3.92
PUMPKINSEED	3	0.07	1	0.01	4	0.03	3	0.02	18	0.09	10	0.03	117	0.53
WARMOUTH	--	--	--	--	1	0.01	1	0.01	2	0.01	1	0.00	--	--
ORANGESPOTTED SUNFISH	97	2.38	163	2.41	291	2.50	138	0.88	747	3.54	328	1.07	423	1.91
BLUEGILL	45	1.10	181	2.68	2,175	18.65	1,993	12.65	2,849	13.49	6,224	20.38	3,541	15.96
LONGEAR SUNFISH	7	0.17	2	0.03	29	0.25	37	0.23	29	0.14	26	0.09	27	0.12
REDEAR SUNFISH	--	--	--	--	--	--	--	--	3	0.01	1	0.00	3	0.01
HYBRID SUNFISH	5	0.12	3	0.04	133	1.14	64	0.41	134	0.63	227	0.74	296	1.33
UNID LEPOMIS	89	2.18	111	1.64	3	0.03	30	0.19	8	0.04	564	1.85	22	0.10

TABLE 13 (cont.)

SPECIES	1994		1995		2000		2001		2002		2005		2006	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
SMALLMOUTH BASS	25	0.61	33	0.49	27	0.23	46	0.29	99	0.47	35	0.11	38	0.17
LARGEMOUTH BASS	77	1.89	658	9.74	492	4.22	274	1.74	446	2.11	354	1.16	693	3.12
UNID MICROPTERUS	--	--	8	0.12	--	--	--	--	--	--	1	0.00	--	--
WHITE CRAPPIE	6	0.15	--	--	7	0.06	--	--	7	0.03	--	--	2	0.01
BLACK CRAPPIE	1	0.02	3	0.04	13	0.11	3	0.02	20	0.09	4	0.01	4	0.02
JOHNNY DARTER	2	0.05	43	0.64	1	0.01	7	0.04	2	0.01	3	0.01	14	0.06
LOGPERCH	1	0.02	4	0.06	9	0.08	11	0.07	15	0.07	33	0.11	17	0.08
BLACKSIDE DARTER	--	--	--	--	1	0.01	1	0.01	1	0.00	5	0.02	1	0.00
SLENDERHEAD DARTER	--	--	--	--	2	0.02	--	--	2	0.01	1	0.00	1	0.00
SAUGER	--	--	--	--	--	--	--	--	1	0.00	--	--	--	--
WALLEYE	--	--	--	--	--	--	--	--	--	--	1	0.00	--	--
FRESHWATER DRUM	79	1.94	61	0.90	127	1.09	129	0.82	151	0.71	103	0.34	108	0.49
ROUND GOBY	--	--	--	--	2	0.02	5	0.03	18	0.09	105	0.34	62	0.28
TOTAL FISH	4,080	100.00	6,759	100.00	11,661	100.00	15,760	100.00	21,123	100.00	30,547	100.00	22,183	100.00
TOTAL SPECIES	46		48		55		61		66		61		58	

NOTE: DATA COMPARED ARE FROM ELECTROFISHING AND SEINING DURING THE PERIOD OF MAY-SEPTEMBER AT THE SAME LOCATIONS, EXCEPT THAT LOCATION 302B WAS SUBSTITUTED FOR LOCATION 302C IN LOWER LOCKPORT POOL BEGINNING IN 2001 AND LOCATION 405 IN THE UPSTREAM I-55 SEGMENT WAS NOT SAMPLED IN 2000. DATA FROM THE FOLLOWING LOCATIONS (AND YEARS) ARE EXCLUDED: LOCATION 308 (1994, 1995, AND 2000), LOCATION 404A (2001, 2002, 2005, AND 2006), AND LOCATION 409 (1994 AND 1995). 0.00 DENOTES VALUES LESS THAN 0.005.

TABLE 14. SPECIES COMPOSITION, NUMBER, AND RELATIVE ABUNDANCE OF FISH COLLECTED WITHIN FOUR SEGMENTS OF THE UPPER ILLINOIS WATERWAY, 1994, 1995, 2000-2002, AND 2005-2006.

	LOWER LOCKPORT POOL													
	1994		1995		2000		2001		2002		2005		2006	
SPECIES	#	%	#	%	#	%	#	%	#	%	#	%	#	%
SKIPJACK HERRING	--	--	--	--	--	--	2	0.1	--	--	--	--	1	0.1
GIZZARD SHAD	1	1.7	33	20.6	404	64.0	1615	66.8	2500	75.8	1245	71.2	629	61.5
THREADFIN SHAD	--	--	--	--	4	0.6	--	--	--	--	--	--	--	--
RAINBOW TROUT	--	--	--	--	1	0.2	--	--	--	--	--	--	--	--
GRASS PICKEREL	--	--	--	--	5	0.8	1	0.0	--	--	--	--	--	--
NORTHERN PIKE	--	--	--	--	--	--	--	--	--	--	--	--	1	0.1
GOLDFISH	8	13.8	2	1.3	--	--	--	--	2	0.1	--	--	--	--
COMMON CARP	29	50.0	18	11.3	53	8.4	70	2.9	140	4.2	80	4.6	38	3.7
CARP X GOLDFISH HYBRID	3	5.2	8	5.0	1	0.2	1	0.0	2	0.1	--	--	1	0.1
GOLDEN SHINER	1	1.7	--	--	--	--	--	--	15	0.5	--	--	--	--
EMERALD SHINER	3	5.2	21	13.1	50	7.9	178	7.4	178	5.4	24	1.4	59	5.8
SPOTTAIL SHINER	--	--	--	--	--	--	3	0.1	1	0.0	--	--	2	0.2
SPOTFIN SHINER	1	1.7	--	--	16	2.5	6	0.2	20	0.6	2	0.1	--	--
SAND SHINER	--	--	--	--	--	--	--	--	1	0.0	--	--	--	--
BLUNTNOSE MINNOW	2	3.4	2	1.3	37	5.9	383	15.8	188	5.7	314	18.0	140	13.7
FATHEAD MINNOW	1	1.7	1	0.6	--	--	1	0.0	8	0.2	1	0.1	1	0.1
BULLHEAD MINNOW	--	--	--	--	--	--	1	0.0	--	--	--	--	--	--
WHITE SUCKER	--	--	--	--	--	--	--	--	1	0.0	--	--	--	--
ORIENTAL WEATHERFISH	--	--	--	--	1	0.2	--	--	--	--	1	0.1	3	0.3
BLACK BULLHEAD	--	--	--	--	--	--	--	--	3	0.1	--	--	--	--
YELLOW BULLHEAD	--	--	--	--	--	--	--	--	4	0.1	3	0.2	1	0.1
CHANNEL CATFISH	--	--	1	0.6	5	0.8	20	0.8	22	0.7	10	0.6	13	1.3
TADPOLE MADTOM	--	--	--	--	--	--	1	0.0	1	0.0	--	--	--	--
BLACKSTRIPE TOPMINNOW	--	--	--	--	1	0.2	--	--	3	0.1	1	0.1	--	--
WESTERN MOSQUITOFISH	4	6.9	--	--	2	0.3	--	--	27	0.8	1	0.1	1	0.1
BROOK SILVERSIDE	--	--	--	--	--	--	1	0.0	--	--	--	--	--	--
THREESPINE STICKLEBACK	1	1.7	--	--	--	--	--	--	--	--	--	--	--	--
WHITE PERCH	--	--	--	--	--	--	10	0.4	--	--	--	--	--	--
WHITE BASS	--	--	--	--	--	--	1	0.0	--	--	--	--	--	--
YELLOW BASS	--	--	1	0.6	--	--	--	--	--	--	--	--	--	--
GREEN SUNFISH	1	1.7	6	3.8	16	2.5	75	3.1	110	3.3	14	0.8	31	3.0
PUMPKINSEED	--	--	--	--	3	0.5	3	0.1	10	0.3	--	--	55	5.4
WARMOUTH	--	--	--	--	--	--	--	--	1	0.0	--	--	--	--
ORANGESPOTTED SUNFISH	--	--	--	--	--	--	--	--	3	0.1	--	--	1	0.1
BLUEGILL	2	3.4	--	--	4	0.6	19	0.8	27	0.8	10	0.6	7	0.7
LONGEAR SUNFISH	--	--	1	0.6	--	--	1	0.0	--	--	--	--	--	--
REDEAR SUNFISH	--	--	--	--	--	--	--	--	--	--	1	0.1	--	--
HYBRID SUNFISH	1	1.7	--	--	--	--	1	0.0	2	0.1	10	0.6	3	0.3
UNID LEPOMIS	--	--	--	--	--	--	--	--	--	--	2	0.1	--	--
SMALLMOUTH BASS	--	--	1	0.6	--	--	1	0.0	1	0.0	--	--	1	0.1
LARGEMOUTH BASS	--	--	64	40.0	28	4.4	22	0.9	17	0.5	23	1.3	27	2.6
WHITE CRAPPIE	--	--	--	--	--	--	--	--	2	0.1	--	--	--	--
BLACK CRAPPIE	--	--	1	0.6	--	--	--	--	1	0.0	--	--	--	--
FRESHWATER DRUM	--	--	--	--	--	--	1	0.0	3	0.1	5	0.3	6	0.6
ROUND GOBY	--	--	--	--	--	--	--	--	4	0.1	1	0.1	1	0.1
TOTAL FISH	58	100.0	160	100.0	631	100.0	2417	100.0	3297	100.0	1748	100.0	1022	100.0
CATCH PER GEAR EFFORT	4		11		16		60		82		44		26	
TOTAL SPECIES	12		13		16		22		28		17		20	

TABLE 14 (cont.)

SPECIES	BRANDON POOL													
	1994		1995		2000		2001		2002		2005		2006	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
SKIPJACK HERRING	1	0.1	1	0.0	1	0.0	10	0.4	6	0.1	2	0.1	--	--
GIZZARD SHAD	37	5.1	82	3.5	510	17.6	862	33.5	2076	42.8	1348	39.9	514	14.3
THREADFIN SHAD	--	--	--	--	31	1.1	52	2.0	22	0.5	--	--	6	0.2
CENTRAL MUDMINNOW	--	--	2	0.1	--	--	--	--	--	--	--	--	--	--
GRASS PICKEREL	--	--	--	--	27	0.9	3	0.1	1	0.0	--	--	1	0.0
CENTRAL STONEROLLER	--	--	--	--	--	--	--	--	--	--	--	--	1	0.0
GOLDFISH	16	2.2	19	0.8	3	0.1	1	0.0	3	0.1	2	0.1	1	0.0
GRASS CARP	--	--	--	--	--	--	--	--	1	0.0	1	0.0	--	--
COMMON CARP	199	27.6	98	4.2	281	9.7	202	7.8	132	2.7	84	2.5	87	2.4
CARP X GOLDFISH HYBRID	17	2.4	9	0.4	15	0.5	10	0.4	1	0.0	1	0.0	5	0.1
GOLDEN SHINER	--	--	3	0.1	44	1.5	2	0.1	3	0.1	5	0.1	3	0.1
EMERALD SHINER	49	6.8	25	1.1	243	8.4	487	18.9	744	15.3	189	5.6	922	25.7
STRIPED SHINER	1	0.1	--	--	--	--	--	--	--	--	--	--	--	--
BIGMOUTH SHINER	--	--	--	--	--	--	--	--	1	0.0	--	--	--	--
SPOTTAIL SHINER	3	0.4	--	--	--	--	3	0.1	4	0.1	9	0.3	--	--
SPOTFIN SHINER	--	--	--	--	54	1.9	22	0.9	16	0.3	70	2.1	62	1.7
SAND SHINER	--	--	2	0.1	2	0.1	3	0.1	5	0.1	1	0.0	1	0.0
UNID NOTROPIS	2	0.3	--	--	--	--	--	--	--	--	--	--	--	--
BLUNTNOSE MINNOW	253	35.1	1970	85.1	563	19.4	463	18.0	843	17.4	1136	33.6	1172	32.6
FATHEAD MINNOW	--	--	8	0.3	--	--	--	--	10	0.2	2	0.1	9	0.3
BULLHEAD MINNOW	--	--	--	--	--	--	--	--	2	0.0	1	0.0	3	0.1
CREEK CHUB	--	--	--	--	--	--	3	0.1	--	--	--	--	--	--
WHITE SUCKER	58	8.1	10	0.4	3	0.1	35	1.4	17	0.4	36	1.1	5	0.1
SMALLMOUTH BUFFALO	--	--	--	--	--	--	--	--	1	0.0	4	0.1	3	0.1
SPOTTED SUCKER	--	--	--	--	--	--	--	--	1	0.0	--	--	--	--
SILVER REDHORSE	1	0.1	--	--	--	--	--	--	--	--	2	0.1	--	--
SHORTHEAD REDHORSE	--	--	--	--	--	--	3	0.1	--	--	--	--	--	--
ORIENTAL WEATHERFISH	--	--	--	--	--	--	3	0.1	--	--	--	--	1	0.0
BLACK BULLHEAD	1	0.1	--	--	--	--	--	--	1	0.0	--	--	--	--
YELLOW BULLHEAD	9	1.3	9	0.4	22	0.8	20	0.8	37	0.8	21	0.6	21	0.6
CHANNEL CATFISH	9	1.3	2	0.1	49	1.7	57	2.2	90	1.9	58	1.7	60	1.7
UNID AMEIURUS	--	--	--	--	1	0.0	--	--	--	--	--	--	--	--
TADPOLE MADTOM	--	--	--	--	6	0.2	4	0.2	2	0.0	1	0.0	6	0.2
FLATHEAD CATFISH	--	--	--	--	--	--	1	0.0	1	0.0	--	--	--	--
BLACKSTRIPE TOPMINNOW	--	--	3	0.1	47	1.6	8	0.3	13	0.3	21	0.6	62	1.7
WESTERN MOSQUITOFISH	1	0.1	--	--	47	1.6	19	0.7	101	2.1	123	3.6	225	6.3
WHITE PERCH	--	--	1	0.0	13	0.4	17	0.7	2	0.0	--	--	1	0.0
WHITE BASS	--	--	--	--	4	0.1	3	0.1	--	--	1	0.0	--	--
YELLOW BASS	--	--	10	0.4	4	0.1	8	0.3	2	0.0	1	0.0	--	--
ROCK BASS	--	--	--	--	--	--	--	--	--	--	2	0.1	1	0.0
GREEN SUNFISH	57	7.9	29	1.3	758	26.1	204	7.9	575	11.9	103	3.1	117	3.3
PUMPKINSEED	--	--	--	--	--	--	--	--	2	0.0	4	0.1	44	1.2
WARMOUTH	--	--	--	--	--	--	1	0.0	--	--	--	--	--	--
ORANGESPOTTED SUNFISH	--	--	--	--	14	0.5	1	0.0	10	0.2	8	0.2	7	0.2
BLUEGILL	--	--	5	0.2	83	2.9	30	1.2	43	0.9	32	0.9	87	2.4
LONGEAR SUNFISH	--	--	--	--	1	0.0	--	--	--	--	--	--	--	--
HYBRID SUNFISH	--	--	--	--	4	0.1	--	--	7	0.1	7	0.2	19	0.5
UNID LEPOMIS	1	0.1	--	--	--	--	--	--	--	--	4	0.1	1	0.0
SMALLMOUTH BASS	--	--	--	--	1	0.0	--	--	4	0.1	2	0.1	1	0.0
LARGEMOUTH BASS	--	--	22	1.0	54	1.9	7	0.3	23	0.5	12	0.4	54	1.5
WHITE CRAPPIE	--	--	--	--	--	--	--	--	2	0.0	--	--	--	--
BLACK CRAPPIE	1	0.1	--	--	--	--	--	--	1	0.0	1	0.0	--	--
JOHNNY DARTER	--	--	--	--	--	--	7	0.3	2	0.0	--	--	7	0.2
BLACKSIDE DARTER	--	--	--	--	1	0.0	--	--	1	0.0	--	--	1	0.0
WALLEYE	--	--	--	--	--	--	--	--	--	--	1	0.0	--	--
FRESHWATER DRUM	4	0.6	4	0.2	11	0.4	19	0.7	30	0.6	25	0.7	33	0.9
ROUND GOBY	--	--	--	--	2	0.1	4	0.2	13	0.3	56	1.7	47	1.3
TOTAL FISH	720	100.0	2314	100.0	2899	100.0	2574	100.0	4851	100.0	3376	100.0	3590	100.0
CATCH PER GEAR EFFORT	24		77		36		32		61		42		45	
TOTAL SPECIES	17		20		29		33		40		34		33	

TABLE 14 (cont.)

SPECIES	UPSTREAM I-55													
	1994		1995		2000		2001		2002		2005		2006	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
LONGNOSE GAR	--	--	1	0.1	9	0.3	12	0.2	8	0.1	5	0.0	17	0.2
UNID GAR	1	0.1	--	--	1	0.0	--	--	1	0.0	--	--	--	--
BOWFIN	--	--	--	--	--	--	1	0.0	--	--	--	--	--	--
SKIPJACK HERRING	1	0.1	--	--	1	0.0	7	0.1	6	0.1	1	0.0	--	--
GIZZARD SHAD	87	6.3	191	14.4	542	19.1	1571	27.0	1754	27.7	4116	39.6	738	9.5
THREADFIN SHAD	--	--	--	--	25	0.9	6	0.1	9	0.1	--	--	46	0.6
GRASS PICKEREL	--	--	--	--	2	0.1	1	0.0	1	0.0	--	--	--	--
NORTHERN PIKE	--	--	2	0.2	--	--	1	0.0	--	--	--	--	--	--
CENTRAL STONEROLLER	2	0.1	--	--	--	--	18	0.3	--	--	6	0.1	2	0.0
GOLDFISH	4	0.3	4	0.3	4	0.1	5	0.1	4	0.1	14	0.1	7	0.1
GRASS CARP	--	--	--	--	--	--	2	0.0	1	0.0	2	0.0	--	--
COMMON CARP	156	11.3	180	13.5	188	6.6	299	5.1	239	3.8	218	2.1	113	1.4
CARP X GOLDFISH HYBRID	26	1.9	28	2.1	26	0.9	21	0.4	18	0.3	--	--	1	0.0
HORNYHEAD CHUB	--	--	--	--	--	--	2	0.0	1	0.0	3	0.0	15	0.2
GOLDEN SHINER	2	0.1	--	--	1	0.0	2	0.0	6	0.1	4	0.0	6	0.1
EMERALD SHINER	109	7.9	35	2.6	173	6.1	392	6.7	977	15.4	314	3.0	606	7.8
GHOST SHINER	3	0.2	--	--	--	--	2	0.0	3	0.0	1	0.0	5	0.1
STRIPED SHINER	19	1.4	1	0.1	--	--	21	0.4	37	0.6	90	0.9	152	1.9
BIGMOUTH SHINER	--	--	--	--	--	--	--	--	1	0.0	--	--	--	--
SPOTTAIL SHINER	113	8.2	93	7.0	14	0.5	435	7.5	84	1.3	47	0.5	112	1.4
RED SHINER	--	--	--	--	--	--	1	0.0	1	0.0	--	--	--	--
SPOTFIN SHINER	2	0.1	8	0.6	28	1.0	80	1.4	90	1.4	210	2.0	176	2.3
SAND SHINER	16	1.2	8	0.6	10	0.4	26	0.4	41	0.6	21	0.2	22	0.3
REDFIN SHINER	--	--	--	--	--	--	2	0.0	1	0.0	1	0.0	2	0.0
MIMIC SHINER	9	0.7	4	0.3	--	--	--	--	--	--	2	0.0	--	--
UNID NOTROPIS	--	--	1	0.1	--	--	--	--	--	--	1	0.0	--	--
SUCKERMOUTH MINNOW	--	--	--	--	--	--	--	--	1	0.0	1	0.0	--	--
BLUNTNOSE MINNOW	552	40.0	408	30.7	262	9.3	1290	22.2	747	11.8	2654	25.5	3475	44.5
FATHEAD MINNOW	--	--	3	0.2	--	--	1	0.0	--	--	17	0.2	3	0.0
BULLHEAD MINNOW	2	0.1	6	0.5	12	0.4	126	2.2	7	0.1	292	2.8	7	0.1
CREEK CHUB	--	--	1	0.1	--	--	--	--	--	--	--	--	--	--
RIVER CARPSUCKER	8	0.6	7	0.5	11	0.4	7	0.1	12	0.2	3	0.0	2	0.0
QUILLBACK	4	0.3	7	0.5	11	0.4	5	0.1	5	0.1	--	--	5	0.1
WHITE SUCKER	8	0.6	12	0.9	1	0.0	4	0.1	2	0.0	--	--	--	--
SMALLMOUTH BUFFALO	19	1.4	29	2.2	48	1.7	58	1.0	71	1.1	73	0.7	58	0.7
BIGMOUTH BUFFALO	--	--	2	0.2	3	0.1	2	0.0	3	0.0	--	--	2	0.0
BLACK BUFFALO	4	0.3	--	--	2	0.1	2	0.0	1	0.0	--	--	--	--
SPOTTED SUCKER	--	--	--	--	--	--	1	0.0	--	--	--	--	--	--
SILVER REDHORSE	--	--	--	--	1	0.0	1	0.0	3	0.0	--	--	6	0.1
RIVER REDHORSE	1	0.1	--	--	--	--	--	--	--	--	--	--	--	--
GOLDEN REDHORSE	2	0.1	2	0.2	1	0.0	--	--	6	0.1	1	0.0	3	0.0
SHORTHEAD REDHORSE	3	0.2	7	0.5	12	0.4	8	0.1	4	0.1	1	0.0	1	0.0
UNID MOXOSTOMA	1	0.1	--	--	1	0.0	--	--	--	--	--	--	--	--
UNID ICTIOBINAE	--	--	--	--	--	--	--	--	1	0.0	--	--	--	--
ORIENTAL WEATHERFISH	--	--	--	--	--	--	--	--	--	--	--	--	1	0.0
BLACK BULLHEAD	1	0.1	1	0.1	1	0.0	--	--	--	--	--	--	--	--
YELLOW BULLHEAD	1	0.1	2	0.2	11	0.4	1	0.0	19	0.3	9	0.1	9	0.1
CHANNEL CATFISH	24	1.7	27	2.0	73	2.6	86	1.5	98	1.5	107	1.0	151	1.9
UNID AMEIURUS	--	--	--	--	--	--	1	0.0	--	--	--	--	--	--
TADPOLE MADTOM	--	--	--	--	--	--	1	0.0	2	0.0	8	0.1	8	0.1
FLATHEAD CATFISH	--	--	--	--	2	0.1	1	0.0	2	0.0	5	0.0	2	0.0
BLACKSTRIPE TOPMINNOW	9	0.7	1	0.1	11	0.4	9	0.2	11	0.2	49	0.5	127	1.6
WESTERN MOSQUITOFISH	--	--	--	--	6	0.2	3	0.1	4	0.1	18	0.2	44	0.6
BROOK SILVERSIDE	--	--	--	--	1	0.0	1	0.0	2	0.0	44	0.4	6	0.1
WHITE PERCH	--	--	--	--	5	0.2	3	0.1	5	0.1	--	--	--	--
WHITE BASS	1	0.1	--	--	4	0.1	6	0.1	12	0.2	3	0.0	3	0.0
YELLOW BASS	--	--	1	0.1	2	0.1	2	0.0	--	--	1	0.0	--	--
YELLOW BASS/WHITE PERCH	--	--	--	--	--	--	--	--	--	--	--	--	1	0.0
HYBRID MORONE	--	--	--	--	--	--	1	0.0	--	--	--	--	--	--
ROCK BASS	--	--	--	--	3	0.1	5	0.1	5	0.1	3	0.0	5	0.1
GREEN SUNFISH	103	7.5	82	6.2	492	17.4	398	6.8	761	12.0	373	3.6	386	4.9
PUMPKINSEED	--	--	--	--	--	--	--	--	--	--	3	0.0	17	0.2
ORANGESPOTTED SUNFISH	3	0.2	7	0.5	29	1.0	2	0.0	14	0.2	15	0.1	25	0.3
BLUEGILL	11	0.8	36	2.7	404	14.3	572	9.8	733	11.6	1137	10.9	876	11.2
LONGEAR SUNFISH	5	0.4	1	0.1	25	0.9	24	0.4	26	0.4	13	0.1	13	0.2
REDEAR SUNFISH	--	--	--	--	--	--	--	--	2	0.0	--	--	2	0.0
HYBRID SUNFISH	2	0.1	3	0.2	98	3.5	51	0.9	101	1.6	156	1.5	230	2.9
UNID LEPOMIS	--	--	--	--	--	--	2	0.0	--	--	109	1.0	--	--
SMALLMOUTH BASS	10	0.7	10	0.8	7	0.2	26	0.4	63	1.0	21	0.2	18	0.2
LARGEMOUTH BASS	28	2.0	43	3.2	169	6.0	132	2.3	219	3.5	127	1.2	228	2.9
UNID MICROPTERUS	--	--	8	0.6	--	--	--	--	--	--	--	--	--	--
WHITE CRAPPIE	--	--	--	--	2	0.1	--	--	1	0.0	--	--	1	0.0
BLACK CRAPPIE	--	--	1	0.1	4	0.1	2	0.0	9	0.1	--	--	2	0.0
JOHNNY DARTER	--	--	41	3.1	1	0.0	--	--	--	--	3	0.0	7	0.1
LOGPERCH	--	--	--	--	2	0.1	1	0.0	3	0.0	7	0.1	--	--
BLACKSIDE DARTER	--	--	--	--	--	--	1	0.0	--	--	2	0.0	--	--
SLENDERHEAD DARTER	--	--	--	--	--	--	--	--	1	0.0	--	--	--	--
SAUGER	--	--	--	--	--	--	--	--	1	0.0	--	--	--	--
FRESHWATER DRUM	27	2.0	25	1.9	91	3.2	71	1.2	87	1.4	50	0.5	47	0.6
ROUND GOBY	--	--	--	--	--	--	1	0.0	1	0.0	35	0.3	11	0.1
TOTAL FISH	1379	100.0	1329	100.0	2832	100.0	5815	100.0	6328	100.0	10396	100.0	7802	100.0
CATCH PER GEAR EFFORT	46		42		44		75		79		130		98	
TOTAL SPECIES	36		36		45		55		55		47		49	

TABLE 14 (cont.)

SPECIES	DOWNSTREAM I-55													
	1994		1995		2000		2001		2002		2005		2006	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
LONGNOSE GAR	--	--	6	0.2	2	0.0	3	0.1	7	0.1	6	0.0	1	0.0
UNID GAR	--	--	--	--	2	0.0	--	--	--	--	--	--	--	--
SKIPJACK HERRING	2	0.1	--	--	1	0.0	8	0.2	4	0.1	2	0.0	--	--
GIZZARD SHAD	725	37.7	202	6.8	1001	18.9	1411	28.5	1511	22.7	2392	15.9	1560	16.0
THREADFIN SHAD	--	--	--	--	107	2.0	66	1.3	53	0.8	2	0.0	60	0.6
GRASS PICKEREL	--	--	--	--	--	--	3	0.1	--	--	5	0.0	--	--
GOLDFISH	1	0.1	1	0.0	--	--	--	--	--	--	1	0.0	1	0.0
GRASS CARP	--	--	--	--	--	--	1	0.0	--	--	1	0.0	--	--
COMMON CARP	87	4.5	42	1.4	111	2.1	148	3.0	57	0.9	101	0.7	30	0.3
CARP X GOLDFISH HYBRID	18	0.9	24	0.8	6	0.1	1	0.0	--	--	--	--	1	0.0
BIGHEAD CARP	--	--	--	--	--	--	--	--	2	0.0	--	--	--	--
GOLDEN SHINER	13	0.7	2	0.1	7	0.1	9	0.2	8	0.1	61	0.4	11	0.1
PALLID SHINER	--	--	--	--	2	0.0	--	--	2	0.0	2	0.0	3	0.0
EMERALD SHINER	179	9.3	24	0.8	41	0.8	219	4.4	527	7.9	690	4.6	451	4.6
GHOST SHINER	2	0.1	2	0.1	--	--	1	0.0	1	0.0	7	0.0	22	0.2
STRIPED SHINER	3	0.2	1	0.0	--	--	--	--	3	0.0	51	0.3	33	0.3
SPOTTAIL SHINER	92	4.8	81	2.7	267	5.0	72	1.5	75	1.1	112	0.7	127	1.3
RED SHINER	--	--	--	--	1	0.0	--	--	--	--	--	--	--	--
SPOTFIN SHINER	12	0.6	13	0.4	45	0.8	50	1.0	81	1.2	203	1.4	222	2.3
SAND SHINER	--	--	--	--	--	--	2	0.0	1	0.0	66	0.4	1	0.0
REDFIN SHINER	--	--	1	0.0	--	--	--	--	--	--	1	0.0	--	--
MIMIC SHINER	--	--	1	0.0	--	--	--	--	--	--	3	0.0	--	--
UNID NOTROPIS	--	--	--	--	--	--	--	--	--	--	--	--	1	0.0
BLUNTNOSE MINNOW	250	13.0	1229	41.6	579	10.9	713	14.4	556	8.4	4002	26.6	2874	29.4
FATHEAD MINNOW	--	--	--	--	--	--	--	--	--	--	4	0.0	1	0.0
BULLHEAD MINNOW	57	3.0	193	6.5	235	4.4	240	4.8	97	1.5	423	2.8	218	2.2
RIVER CARPSUCKER	4	0.2	10	0.3	11	0.2	13	0.3	7	0.1	16	0.1	7	0.1
QUILLBACK	6	0.3	10	0.3	4	0.1	12	0.2	4	0.1	19	0.1	5	0.1
UNID CARPIODES	--	--	--	--	--	--	--	--	--	--	1	0.0	--	--
WHITE SUCKER	1	0.1	8	0.3	1	0.0	--	--	--	--	--	--	--	--
SMALLMOUTH BUFFALO	6	0.3	14	0.5	38	0.7	58	1.2	49	0.7	26	0.2	25	0.3
BIGMOUTH BUFFALO	--	--	--	--	2	0.0	1	0.0	4	0.1	2	0.0	--	--
BLACK BUFFALO	--	--	2	0.1	3	0.1	1	0.0	--	--	2	0.0	--	--
SPOTTED SUCKER	--	--	--	--	--	--	1	0.0	1	0.0	--	--	--	--
SILVER REDHORSE	2	0.1	3	0.1	--	--	1	0.0	--	--	3	0.0	2	0.0
BLACK REDHORSE	--	--	--	--	--	--	--	--	1	0.0	--	--	1	0.0
GOLDEN REDHORSE	4	0.2	18	0.6	1	0.0	4	0.1	17	0.3	2	0.0	46	0.5
SHORTHEAD REDHORSE	25	1.3	18	0.6	11	0.2	5	0.1	4	0.1	2	0.0	5	0.1
UNID CATOSTOMINAE	--	--	--	--	--	--	--	--	--	--	2	0.0	--	--
UNID ICTIOBINAE	--	--	--	--	--	--	--	--	--	--	--	--	1	0.0
BLACK BULLHEAD	3	0.2	--	--	--	--	--	--	--	--	--	--	--	--
YELLOW BULLHEAD	2	0.1	--	--	15	0.3	5	0.1	9	0.1	--	--	3	0.0
CHANNEL CATFISH	3	0.2	7	0.2	32	0.6	33	0.7	52	0.8	37	0.2	35	0.4
TADPOLE MADTOM	--	--	1	0.0	3	0.1	1	0.0	--	--	1	0.0	5	0.1
BLACKSTRIPE TOPMINNOW	1	0.1	3	0.1	15	0.3	3	0.1	7	0.1	47	0.3	70	0.7
WESTERN MOSQUITOFISH	--	--	--	--	2	0.0	1	0.0	--	--	54	0.4	7	0.1
BROOK SILVERSIDE	14	0.7	23	0.8	3	0.1	8	0.2	15	0.2	124	0.8	105	1.1
WHITE PERCH	--	--	1	0.0	1	0.0	2	0.0	--	--	--	--	--	--
WHITE BASS	--	--	--	--	1	0.0	--	--	2	0.0	--	--	--	--
YELLOW BASS	--	--	2	0.1	1	0.0	--	--	1	0.0	1	0.0	--	--
HYBRID MORONE	1	0.1	--	--	--	--	1	0.0	--	--	--	--	--	--
UNID MORONE	2	0.1	--	--	--	--	--	--	--	--	--	--	--	--
ROCK BASS	--	--	--	--	4	0.1	2	0.0	1	0.0	4	0.0	10	0.1
GREEN SUNFISH	66	3.4	16	0.5	465	8.8	115	2.3	406	6.1	405	2.7	335	3.4
PUMPKINSEED	3	0.2	1	0.0	1	0.0	--	--	6	0.1	3	0.0	1	0.0
WARMOUTH	--	--	--	--	1	0.0	--	--	1	0.0	1	0.0	--	--
ORANGESPOTTED SUNFISH	94	4.9	156	5.3	248	4.7	135	2.7	720	10.8	305	2.0	390	4.0
BLUEGILL	32	1.7	140	4.7	1684	31.8	1372	27.7	2046	30.8	5045	33.6	2571	26.3
LONGEAR SUNFISH	2	0.1	--	--	3	0.1	12	0.2	3	0.0	13	0.1	14	0.1
REDEAR SUNFISH	--	--	--	--	--	--	--	--	1	0.0	--	--	1	0.0
HYBRID SUNFISH	2	0.1	--	--	31	0.6	12	0.2	24	0.4	54	0.4	44	0.5
UNID LEPOMIS	88	4.6	111	3.8	3	0.1	28	0.6	8	0.1	449	3.0	21	0.2
SMALLMOUTH BASS	15	0.8	22	0.7	19	0.4	19	0.4	31	0.5	12	0.1	18	0.2
LARGEMOUTH BASS	49	2.5	529	17.9	241	4.5	113	2.3	187	2.8	192	1.3	384	3.9
UNID MICROPTERUS	--	--	--	--	--	--	--	--	--	--	1	0.0	--	--
WHITE CRAPPIE	6	0.3	--	--	5	0.1	--	--	2	0.0	--	--	1	0.0
BLACK CRAPPIE	--	--	1	0.0	9	0.2	1	0.0	9	0.1	3	0.0	2	0.0
JOHNNY DARTER	2	0.1	2	0.1	--	--	--	--	--	--	--	--	--	--
LOGPERCH	1	0.1	4	0.1	7	0.1	10	0.2	12	0.2	26	0.2	17	0.2
BLACKSIDE DARTER	--	--	--	--	--	--	--	--	--	--	3	0.0	--	--
SLENDERHEAD DARTER	--	--	--	--	2	0.0	--	--	1	0.0	1	0.0	1	0.0
FRESHWATER DRUM	48	2.5	32	1.1	25	0.5	38	0.8	31	0.5	23	0.2	22	0.2
ROUND GOBY	--	--	--	--	--	--	--	--	--	--	13	0.1	3	0.0
TOTAL FISH	1923	100.0	2956	100.0	5299	100.0	4954	100.0	6647	100.0	15027	100.0	9769	100.0
CATCH PER GEAR EFFORT	80		114		83		77		104		235		153	
TOTAL SPECIES	36		38		44		41		45		50		44	

NOTE: DATA COMPARED ARE FROM ELECTROFISHING AND SEINING DURING THE PERIOD OF MAY-SEPTEMBER AT THE SAME LOCATIONS, EXCEPT THAT LOCATION 302B WAS SUBSTITUTED FOR LOCATION 302C IN LOWER LOCKPORT POOL BEGINNING IN 2001 AND LOCATION 405 IN THE UPSTREAM I-55 SEGMENT WAS NOT SAMPLED IN 2000. DATA FROM THE FOLLOWING LOCATIONS (AND YEARS) ARE EXCLUDED: LOCATION 308 IN BRANDON POOL (1994, 1995, AND 2000), LOCATION 404A IN THE UPSTREAM I-55 SEGMENT (2001, 2002, 2005, AND 2006), AND LOCATION 409 IN THE DOWNSTREAM I-55 SEGMENT (1994 AND 1995). 0.0 DENOTES VALUES LESS THAN 0.05.

Collective Abundance (%) of Emerald shiner, Gizzard shad, & Highly Tolerants

Year	Lower Lockport Pool	Brandon Pool	Upstream I-55	Downstream I-55
2006	88	80	68	54
2005	96	87	74	51
2002	95	92	72	46
2001	96	89	69	53
2000	89	84	60	42
1995	57	98	71	52
1994	84	97	76	70

These data also suggest that the fish communities within each of the four segments have improved somewhat compared to 1994 and 1995 based on: 1) catch per gear effort values since 2000 are generally higher than in 1994 or 1995; 2) species richness values in each segment during the past five study years were consistently higher than in 1994 and 1995; and 3) the collective abundances of emerald shiner, gizzard shad, and highly tolerant taxa within the three downstream segments were lower during at least three of the past five study years compared to 1994 and 1995.

4.3 LONGITUDINAL COMPARISONS OF COMMUNITY LEVEL PARAMETERS

4.3.1 Electrofishing

Electrofishing catch rates (CPE) of native species, IWBmod scores, and native species richness values were compared among the four segments to determine whether the longitudinal patterns of these parameters in 2006 were different than those observed during 1994 (EA 1995), 1995 (EA 1996b), 2000 (EA 2001), 2001 (EA 2002), 2002 (EA 2003), or 2005 (EA 2007). As discussed in Section 4.2, data compared are from similar locations and the same seasons.

The following relationships of CPEs among segments were consistent for each of the seven years compared: 1) CPEs were significantly lower ($P<0.05$) upstream of Brandon Road Lock and Dam when compared to the Downstream I-55 segment; and 2) CPEs from lower Lockport Pool were significantly lower when compared to the Upstream I-55 segment (Tables 15 and 16). However, the relationships between the Brandon Pool and Upstream I-55 segments, as well as between the Upstream and Downstream I-55 segments, were inconsistent among these seven years. For example, CPEs from the Upstream I-55 segment were significantly lower than the Downstream I-55 segment in 1994, 2000, 2005, and 2006, but CPEs were statistically similar between these two segments in 1995, 2001, and 2002. CPEs from Brandon Pool were significantly lower than the Upstream I-55 segment in 1994, 2001, 2002, 2005, and 2006, but were statistically similar in 1995 and 2000. The inconsistent relationships between these two pairs of segments were primarily due to the differences in the catch rates of highly tolerant native species and gizzard shad. For example, when CPEs are recalculated excluding highly tolerant species and gizzard shad, the resulting longitudinal pattern becomes the same each year; significantly lower within the two segments upstream of the Brandon Road Lock and Dam than within the two segments downstream of it (Table 16). The catch rates of non-tolerant native fish (less gizzard shad) have been higher within the General Use water downstream of I-55 than within the Secondary Contact water of the Upstream I-55 segment in all study years except 2001 (Table 16).

TABLE 15. CPE AND RELATIVE ABUNDANCE OF NATIVE FISH COLLECTED ELECTROFISHING WITHIN FOUR SEGMENTS OF THE UPPER ILLINOIS WATERWAY, MAY-SEPTEMBER 1994, 1995, 2000-2002, AND 2005-2006.

	1994								1995							
	LOWER LOCKPORT POOL		BRANDON POOL		UPSTREAM I-55		DOWNSTREAM I-55		LOWER LOCKPORT POOL		BRANDON POOL		UPSTREAM I-55		DOWNSTREAM I-55	
SPECIES	CPE	%	CPE	%	CPE	%	CPE	%	CPE	%	CPE	%	CPE	%	CPE	%
LONGNOSE GAR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.3	0.3
UNID GAR	--	--	--	--	0.1	0.2	--	--	--	--	--	--	--	--	--	--
BOWFIN	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SKIPJACK HERRING	--	--	0.1	0.5	0.1	0.2	0.3	0.2	--	--	0.1	0.1	--	--	--	--
GIZZARD SHAD	0.2	9.1	0.9	4.3	6.6	13.8	102.5	60.7	5.5	25.0	7.7	8.7	17.0	30.8	28.6	25.7
CENTRAL MUDMINNOW	--	--	--	--	--	--	--	--	--	--	0.1	0.1	--	--	--	--
GRASS PICKEREL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NORTHERN PIKE	--	--	--	--	--	--	--	--	--	--	--	--	0.2	0.3	--	--
CENTRAL STONEROLLER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HORNYHEAD CHUB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GOLDEN SHINER	0.2	9.1	--	--	--	--	--	--	--	--	--	--	--	--	0.1	0.1
PALLID SHINER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EMERALD SHINER	0.5	27.3	0.2	1.1	3.2	6.8	7.2	4.2	3.5	15.9	2.8	3.1	2.2	4.0	0.9	0.8
GHOST SHINER	--	--	--	--	--	--	0.2	0.1	--	--	--	--	--	--	0.1	0.1
STRIPED SHINER	--	--	0.1	0.5	0.3	0.7	0.2	0.1	--	--	--	--	--	--	0.1	0.1
BIGMOUTH SHINER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SPOTTAIL SHINER	--	--	0.3	1.6	1.0	2.1	0.7	0.4	--	--	--	--	1.6	3.0	2.3	2.1
RED SHINER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SPOTFIN SHINER	--	--	--	--	0.2	0.5	0.2	0.1	--	--	--	--	0.5	0.8	0.6	0.5
SAND SHINER	--	--	--	--	--	--	--	--	--	--	0.2	0.3	0.1	0.2	--	--
REDFIN SHINER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MIMIC SHINER	--	--	--	--	--	--	--	--	--	--	--	--	0.4	0.7	0.1	0.1
UNID NOTROPIS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SUCKERMOUTH MINNOW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BLUNTNOSE MINNOW	0.3	18.2	3.9	18.9	8.8	18.4	4.0	2.4	0.3	1.5	67.6	76.3	7.0	12.7	12.3	11.1
FATHEAD MINNOW	0.2	9.1	--	--	--	--	--	--	0.2	0.8	--	--	--	--	--	--
BULLHEAD MINNOW	--	--	--	--	--	--	2.2	1.3	--	--	--	--	0.3	0.5	1.0	0.9
CREEK CHUB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RIVER CARPSUCKER	--	--	--	--	0.9	1.9	0.7	0.4	--	--	--	--	0.6	1.2	1.4	1.3
QUILLBACK	--	--	--	--	0.4	0.9	1.0	0.6	--	--	--	--	0.6	1.2	1.4	1.3
WHITE SUCKER	--	--	5.9	28.6	0.2	0.5	0.2	0.1	--	--	1.1	1.3	1.1	2.0	1.1	1.0
SMALLMOUTH BUFFALO	--	--	--	--	2.1	4.4	1.0	0.6	--	--	--	--	2.6	4.8	2.0	1.8
BIGMOUTH BUFFALO	--	--	--	--	--	--	--	--	--	--	--	--	0.2	0.3	--	--
BLACK BUFFALO	--	--	--	--	0.4	0.9	--	--	--	--	--	--	--	--	0.3	0.3
SPOTTED SUCKER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SILVER REDHORSE	--	--	0.1	0.5	--	--	0.3	0.2	--	--	--	--	--	--	0.4	0.4
RIVER REDHORSE	--	--	--	--	0.1	0.2	--	--	--	--	--	--	--	--	--	--
BLACK REDHORSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GOLDEN REDHORSE	--	--	--	--	0.2	0.5	0.7	0.4	--	--	--	--	0.2	0.3	2.6	2.3
SHORTHEAD REDHORSE	--	--	--	--	0.3	0.7	4.2	2.5	--	--	--	--	0.6	1.2	2.6	2.3
UNID MOXOSTOMA	--	--	--	--	0.1	0.2	--	--	--	--	--	--	--	--	--	--
BLACK BULLHEAD	--	--	0.1	0.5	0.1	0.2	0.5	0.3	--	--	--	--	0.1	0.2	--	--
YELLOW BULLHEAD	--	--	1.0	4.9	0.1	0.2	0.3	0.2	--	--	1.0	1.1	0.1	0.2	--	--
CHANNEL CATFISH	--	--	1.0	4.9	2.7	5.6	0.5	0.3	0.2	0.8	0.2	0.3	2.5	4.4	1.0	0.9
UNID AMEIURUS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TADPOLE MADTOM	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FLATHEAD CATFISH	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BLACKSTRIPE TOPMINNOW	--	--	--	--	0.1	0.2	--	--	--	--	0.1	0.1	--	--	--	--
BROOK SILVERSIDE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WHITE BASS	--	--	--	--	0.1	0.2	--	--	--	--	--	--	--	--	--	--
YELLOW BASS	--	--	--	--	--	--	--	--	0.2	0.8	1.1	1.3	0.1	0.2	0.3	0.3
UNID MORONE	--	--	--	--	--	--	0.3	0.2	--	--	--	--	--	--	--	--
ROCK BASS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GREEN SUNFISH	0.2	9.1	6.3	30.8	11.3	23.8	11.0	6.5	1.0	4.5	3.2	3.6	7.5	13.5	2.3	2.1
PUMPKINSEED	--	--	--	--	--	--	0.5	0.3	--	--	--	--	--	--	0.1	0.1
WARMOUTH	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ORANGESPOTTED SUNFISH	--	--	--	--	0.3	0.7	13.2	7.8	--	--	--	--	0.5	1.0	16.3	14.7
BLUEGILL	0.2	9.1	--	--	1.0	2.1	5.0	3.0	--	--	0.4	0.5	2.7	4.9	6.7	6.0
LONGEAR SUNFISH	--	--	--	--	0.4	0.9	0.3	0.2	0.2	0.8	--	--	--	--	--	--
HYBRID SUNFISH	0.2	9.1	--	--	0.2	0.5	0.3	0.2	--	--	--	--	0.3	0.5	--	--
UNID LEPOMIS	--	--	--	--	--	--	0.5	0.3	--	--	--	--	--	--	14.3	12.9
SMALLMOUTH BASS	--	--	--	--	0.8	1.6	1.8	1.1	0.2	0.8	--	--	0.6	1.2	2.6	2.3
LARGEMOUTH BASS	--	--	--	--	2.2	4.7	1.2	0.7	10.7	48.5	2.4	2.8	3.4	6.1	4.0	3.6
WHITE CRAPPIE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BLACK CRAPPIE	--	--	0.1	0.5	--	--	--	--	0.2	0.8	--	--	--	--	0.1	0.1
JOHNNY DARTER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LOGPERCH	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.6	0.5
BLACKSIDE DARTER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SLENDERHEAD DARTER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SAUGER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WALLEYE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FRESHWATER DRUM	--	--	0.4	2.2	3.0	6.3	8.0	4.7	--	--	0.4	0.5	2.3	4.1	4.6	4.1
TOTAL FISH	1.8	100.0	20.6	100.0	47.7	100.0	168.8	100.0	22.0	100.0	88.6	100.0	55.2	100.0	111.1	100.0
TOTAL SPECIES	7		14		28		28		11		15		26		30	

TABLE 15 (cont.)

SPECIES	2000								2001							
	LOWER LOCKPORT POOL		BRANDON POOL		UPSTREAM I-55		DOWNSTREAM I-55		LOWER LOCKPORT POOL		BRANDON POOL		UPSTREAM I-55		DOWNSTREAM I-55	
	CPE	%	CPE	%	CPE	%	CPE	%	CPE	%	CPE	%	CPE	%	CPE	%
LONGNOSE GAR	--	--	--	--	0.4	0.3	--	--	--	--	--	--	0.5	0.3	0.1	0.1
UNID GAR	--	--	--	--	0.1	0.0	0.1	0.0	--	--	--	--	--	--	--	--
BOWFIN	--	--	--	--	--	--	--	--	--	--	--	--	0.0	0.0	--	--
SKIPJACK HERRING	--	--	0.0	0.0	0.1	0.0	--	--	0.1	0.1	0.4	0.5	0.3	0.2	0.4	0.2
GIZZARD SHAD	24.9	75.7	20.0	22.1	27.0	23.0	62.3	23.3	100.6	74.1	28.0	35.3	65.1	39.7	84.9	42.7
CENTRAL MUDMINNOW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GRASS PICKEREL	0.3	0.9	0.8	0.8	0.1	0.0	--	--	0.1	0.0	0.1	0.1	--	--	--	--
NORTHERN PIKE	--	--	--	--	--	--	--	--	--	--	--	--	0.0	0.0	--	--
CENTRAL STONEROLLER	--	--	--	--	--	--	--	--	--	--	--	--	0.1	0.1	--	--
HORNYHEAD CHUB	--	--	--	--	--	--	--	--	--	--	--	--	0.0	0.0	--	--
GOLDEN SHINER	--	--	0.7	0.7	--	--	0.3	0.1	--	--	0.0	0.1	0.0	0.0	0.2	0.1
PALLID SHINER	--	--	--	--	--	--	0.1	0.0	--	--	--	--	--	--	--	--
EMERALD SHINER	3.1	9.4	7.3	8.1	7.7	6.5	1.8	0.7	10.2	7.5	17.6	22.2	11.4	6.9	9.2	4.6
GHOST SHINER	--	--	--	--	--	--	--	--	--	--	--	--	0.0	0.0	0.1	0.0
STRIPED SHINER	--	--	--	--	--	--	--	--	--	--	--	--	0.0	0.0	--	--
BIGMOUTH SHINER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SPOTTAIL SHINER	--	--	--	--	0.4	0.3	5.8	2.2	0.2	0.1	0.1	0.2	4.5	2.7	2.4	1.2
RED SHINER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SPOTFIN SHINER	1.0	3.0	0.5	0.6	1.3	1.1	1.5	0.6	0.4	0.3	0.5	0.7	1.4	0.9	2.1	1.1
SAND SHINER	--	--	0.1	0.1	0.4	0.3	--	--	--	--	0.0	0.1	0.2	0.1	--	--
REDFIN SHINER	--	--	--	--	--	--	--	--	--	--	--	--	0.0	0.0	--	--
MIMIC SHINER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UNID NOTROPIS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SUCKERMOUTH MINNOW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BLUNTNOSE MINNOW	0.4	1.3	20.1	22.2	6.2	5.3	26.7	10.0	15.1	11.1	16.4	20.7	20.9	12.7	19.1	9.6
FATHEAD MINNOW	--	--	--	--	--	--	--	--	0.1	0.0	--	--	--	--	--	--
BULLHEAD MINNOW	--	--	--	--	0.6	0.5	11.2	4.2	0.1	0.0	--	--	3.8	2.3	12.9	6.5
CREEK CHUB	--	--	--	--	--	--	--	--	--	--	0.0	0.1	--	--	--	--
RIVER CARPSUCKER	--	--	--	--	0.6	0.5	0.7	0.3	--	--	--	--	0.3	0.2	0.8	0.4
QUILLBACK	--	--	--	--	0.6	0.5	0.3	0.1	--	--	--	--	0.2	0.1	0.8	0.4
WHITE SUCKER	--	--	0.1	0.1	0.1	0.0	0.1	0.0	--	--	1.4	1.7	0.1	0.1	--	--
SMALLMOUTH BUFFALO	--	--	--	--	2.4	2.1	2.4	0.9	--	--	--	--	2.5	1.5	3.2	1.6
BIGMOUTH BUFFALO	--	--	--	--	0.2	0.1	0.1	0.0	--	--	--	--	0.1	0.1	0.1	0.0
BLACK BUFFALO	--	--	--	--	0.1	0.1	0.2	0.1	--	--	--	--	0.1	0.1	0.1	0.0
SPOTTED SUCKER	--	--	--	--	--	--	--	--	--	--	--	--	0.0	0.0	0.1	0.0
SILVER REDHORSE	--	--	--	--	0.1	0.0	--	--	--	--	--	--	0.0	0.0	0.1	0.0
RIVER REDHORSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BLACK REDHORSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GOLDEN REDHORSE	--	--	--	--	0.1	0.0	0.1	0.0	--	--	--	--	--	--	0.3	0.1
SHORTHEAD REDHORSE	--	--	--	--	0.6	0.5	0.7	0.3	--	--	0.1	0.2	0.2	0.1	0.3	0.1
UNID MOXOSTOMA	--	--	--	--	0.1	0.0	--	--	--	--	--	--	--	--	--	--
BLACK BULLHEAD	--	--	--	--	0.1	0.0	--	--	--	--	--	--	--	--	--	--
YELLOW BULLHEAD	--	--	0.8	0.9	0.5	0.4	0.9	0.3	--	--	0.7	0.8	0.0	0.0	0.3	0.2
CHANNEL CATFISH	0.3	0.9	2.0	2.2	3.6	3.1	2.0	0.7	1.3	0.9	2.4	3.0	3.5	2.1	1.9	1.0
UNID AMEIURUS	--	--	0.0	0.0	--	--	--	--	--	--	--	--	0.0	0.0	--	--
TADPOLE MADTOM	--	--	0.0	0.0	--	--	0.2	0.1	--	--	0.1	0.2	--	--	--	--
FLATHEAD CATFISH	--	--	--	--	0.1	0.1	--	--	--	--	0.0	0.1	0.0	0.0	--	--
BLACKSTRIPE TOPMINNOW	0.1	0.2	0.8	0.9	0.3	0.2	0.2	0.1	--	--	--	--	0.1	0.1	0.1	0.0
BROOK SILVERSIDE	--	--	--	--	--	--	0.1	0.0	0.1	0.0	--	--	--	--	0.4	0.2
WHITE BASS	--	--	0.2	0.2	0.2	0.2	0.1	0.0	0.1	0.0	0.1	0.2	0.2	0.1	--	--
YELLOW BASS	--	--	0.2	0.2	0.1	0.1	0.1	0.0	--	--	0.3	0.4	0.1	0.1	--	--
UNID MORONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ROCK BASS	--	--	--	--	0.2	0.1	--	--	--	--	--	--	0.1	0.1	0.1	0.0
GREEN SUNFISH	0.9	2.8	31.5	34.9	24.5	20.9	28.9	10.8	4.7	3.4	8.3	10.5	16.9	10.3	7.0	3.5
PUMPKINSEED	0.1	0.4	--	--	--	--	0.1	0.0	0.2	0.1	--	--	--	--	--	--
WARMOUTH	--	--	--	--	--	--	0.1	0.0	--	--	0.0	0.1	--	--	--	--
ORANGESPOTTED SUNFISH	--	--	0.5	0.6	1.5	1.2	14.5	5.4	--	--	0.0	0.1	0.1	0.1	6.9	3.5
BLUEGILL	0.2	0.8	2.0	2.3	19.0	16.2	86.4	32.4	1.2	0.9	1.1	1.4	18.2	11.1	33.9	17.0
LONGEAR SUNFISH	--	--	0.0	0.0	1.3	1.1	0.2	0.1	0.1	0.0	--	--	0.8	0.5	0.6	0.3
HYBRID SUNFISH	--	--	0.2	0.2	4.9	4.2	1.9	0.7	0.1	0.0	--	--	2.1	1.3	0.7	0.3
UNID LEPOMIS	--	--	--	--	--	--	0.1	0.0	--	--	--	--	0.1	0.1	--	--
SMALLMOUTH BASS	--	--	0.0	0.0	0.4	0.3	1.1	0.4	0.1	0.0	--	--	1.0	0.6	0.9	0.5
LARGEMOUTH BASS	1.5	4.5	1.8	2.0	7.2	6.2	13.7	5.1	1.4	1.0	0.3	0.4	5.4	3.3	6.4	3.2
WHITE CRAPPIE	--	--	--	--	0.1	0.1	0.3	0.1	--	--	--	--	--	--	--	--
BLACK CRAPPIE	--	--	--	--	0.2	0.2	0.5	0.2	--	--	--	--	0.1	0.1	0.1	0.0
JOHNNY DARTER	--	--	--	--	0.1	0.0	--	--	--	--	0.3	0.3	--	--	--	--
LOGPERCH	--	--	--	--	0.1	0.1	0.1	0.0	--	--	--	--	0.0	0.0	0.3	0.2
BLACKSIDE DARTER	--	--	0.0	0.0	--	--	--	--	--	--	--	--	0.0	0.0	--	--
SLENDERHEAD DARTER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SAUGER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WALLEYE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FRESHWATER DRUM	--	--	0.5	0.5	4.6	3.9	1.6	0.6	0.1	0.0	0.8	1.0	3.0	1.8	2.4	1.2
TOTAL FISH	32.9	100.0	90.3	100.0	117.0	100.0	267.0	100.0	135.9	100.0	79.2	100.0	164.0	100.0	199.0	100.0
TOTAL SPECIES	11		23		38		36		19		25		43		33	

TABLE 15 (cont.)

SPECIES	2002 LOWER LOCKPORT POOL CPE	%	2002 BRANDON POOL CPE	%	2002 UPSTREAM I-55 CPE	%	2002 DOWNSTREAM I-55 CPE	%	2005 LOWER LOCKPORT POOL CPE	%	2005 BRANDON POOL CPE	%	2005 UPSTREAM I-55 CPE	%	2005 DOWNSTREAM I-55 CPE	%
LONGNOSE GAR	--	--	--	--	0.3	0.2	0.4	0.1	--	--	--	--	0.2	0.1	0.3	0.1
UNID GAR	--	--	--	--	0.0	0.0	--	--	--	--	--	--	--	--	--	--
BOWFIN	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SKIPJACK HERRING	--	--	0.2	0.1	0.3	0.1	0.2	0.1	--	--	0.1	0.1	0.0	0.0	0.1	0.0
GIZZARD SHAD	153.0	80.5	75.9	46.2	71.8	33.0	89.8	26.6	71.2	88.5	42.2	60.2	92.5	51.0	144.5	35.8
CENTRAL MUDMINNOW	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GRASS PICKEREL	--	--	0.0	0.0	0.0	0.0	--	--	--	--	--	--	--	--	0.3	0.1
NORTHERN PIKE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CENTRAL STONEROLLER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HORNYHEAD CHUB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GOLDEN SHINER	0.9	0.5	0.0	0.0	0.2	0.1	0.4	0.1	--	--	0.0	0.1	0.1	0.0	0.8	0.2
PALLID SHINER	--	--	--	--	--	--	0.1	0.0	--	--	--	--	--	--	0.1	0.0
EMERALD SHINER	10.8	5.7	24.7	15.0	34.5	15.9	31.9	9.4	1.2	1.5	6.0	8.6	4.8	2.6	19.1	4.7
GHOST SHINER	--	--	--	--	0.1	0.1	0.1	0.0	--	--	--	--	--	--	0.1	0.0
STRIPED SHINER	--	--	--	--	--	--	--	--	--	--	--	--	0.1	0.0	0.4	0.1
BIGMOUTH SHINER	--	--	--	--	0.0	0.0	--	--	--	--	--	--	--	--	--	--
SPOTTAIL SHINER	0.1	0.0	0.2	0.1	2.4	1.1	2.4	0.7	--	--	0.2	0.3	0.7	0.4	2.3	0.6
RED SHINER	--	--	--	--	0.0	0.0	--	--	--	--	--	--	--	--	--	--
SPOTFIN SHINER	1.2	0.6	0.4	0.3	2.5	1.2	1.5	0.4	0.1	0.2	0.4	0.6	2.8	1.5	2.8	0.7
SAND SHINER	0.1	0.0	--	--	0.5	0.2	0.1	0.0	--	--	--	--	0.0	0.0	--	--
REDFIN SHINER	--	--	--	--	0.0	0.0	--	--	--	--	--	--	--	--	--	--
MIMIC SHINER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UNID NOTROPIS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SUCKERMOUTH MINNOW	--	--	--	--	0.0	0.0	--	--	--	--	--	--	--	--	--	--
BLUNTNOSE MINNOW	10.3	5.4	29.0	17.7	15.0	6.9	18.1	5.4	4.0	5.0	10.0	14.3	18.4	10.1	42.0	10.4
FATHEAD MINNOW	0.4	0.2	0.2	0.1	--	--	--	--	--	--	--	--	0.0	0.0	0.1	0.0
BULLHEAD MINNOW	--	--	0.0	0.0	0.0	0.0	5.4	1.6	--	--	--	--	0.3	0.2	7.9	1.9
CREEK CHUB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RIVER CARPSUCKER	--	--	--	--	0.5	0.2	0.4	0.1	--	--	--	--	0.1	0.1	1.0	0.2
QUILLBACK	--	--	--	--	0.2	0.1	0.3	0.1	--	--	--	--	--	--	0.8	0.2
WHITE SUCKER	0.1	0.0	0.6	0.4	0.1	0.0	--	--	--	--	0.5	0.7	--	--	--	--
SMALLMOUTH BUFFALO	--	--	0.0	0.0	2.9	1.3	3.1	0.9	--	--	0.2	0.2	3.0	1.7	1.6	0.4
BIGMOUTH BUFFALO	--	--	--	--	0.1	0.1	0.3	0.1	--	--	--	--	--	--	0.1	0.0
BLACK BUFFALO	--	--	--	--	0.0	0.0	--	--	--	--	--	--	--	--	0.1	0.0
SPOTTED SUCKER	--	--	0.0	0.0	--	--	0.1	0.0	--	--	--	--	--	--	--	--
SILVER REDHORSE	--	--	--	--	0.1	0.1	--	--	--	--	0.1	0.1	--	--	0.2	0.0
RIVER REDHORSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BLACK REDHORSE	--	--	--	--	--	--	0.1	0.0	--	--	--	--	--	--	--	--
GOLDEN REDHORSE	--	--	--	--	0.3	0.1	0.9	0.3	--	--	--	--	0.0	0.0	0.1	0.0
SHORTHEAD REDHORSE	--	--	--	--	0.2	0.1	0.3	0.1	--	--	--	--	0.0	0.0	0.1	0.0
UNID MOXOSTOMA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BLACK BULLHEAD	0.2	0.1	0.0	0.0	--	--	--	--	--	--	--	--	--	--	--	--
YELLOW BULLHEAD	0.3	0.1	1.0	0.6	0.8	0.4	0.6	0.2	0.2	0.2	0.8	1.1	0.3	0.2	--	--
CHANNEL CATFISH	1.4	0.7	3.7	2.2	3.9	1.8	3.2	0.9	0.6	0.8	2.4	3.4	4.2	2.3	1.9	0.5
UNID AMEIURUS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TADPOLE MADTOM	0.1	0.0	0.1	0.1	--	--	--	--	--	--	--	--	0.0	0.0	0.1	0.0
FLATHEAD CATFISH	--	--	0.0	0.0	0.1	0.0	--	--	--	--	--	--	0.2	0.1	--	--
BLACKSTRIPE TOPMINNOW	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.0	0.1	0.0
BROOK SILVERSIDE	--	--	--	--	0.1	0.0	0.9	0.3	--	--	--	--	0.0	0.0	2.1	0.5
WHITE BASS	--	--	--	--	0.5	0.2	0.1	0.0	--	--	0.0	0.1	0.1	0.1	--	--
YELLOW BASS	--	--	0.1	0.1	--	--	0.1	0.0	--	--	0.0	0.1	0.0	0.0	0.1	0.0
UNID MORONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ROCK BASS	--	--	--	--	0.1	0.0	--	--	--	--	0.0	0.1	0.1	0.1	0.3	0.1
GREEN SUNFISH	7.0	3.7	23.6	14.4	31.4	14.5	25.0	7.4	0.8	1.0	4.0	5.8	15.3	8.4	25.4	6.3
PUMPKINSEED	0.6	0.3	0.1	0.1	--	--	0.3	0.1	--	--	--	--	0.1	0.1	0.1	0.0
WARMOUTH	0.1	0.0	--	--	--	--	0.1	0.0	--	--	--	--	--	--	0.1	0.0
ORANGESPOTTED SUNFISH	0.2	0.1	0.3	0.2	0.5	0.2	36.6	10.8	--	--	0.2	0.3	0.2	0.1	14.6	3.6
BLUEGILL	1.6	0.9	1.4	0.9	26.9	12.4	98.5	29.2	0.4	0.5	0.7	1.0	23.5	13.0	116.9	28.9
LONGEAR SUNFISH	--	--	--	--	1.0	0.5	0.1	0.0	--	--	--	--	0.2	0.1	0.5	0.1
HYBRID SUNFISH	0.1	0.1	0.3	0.2	4.1	1.9	1.2	0.4	0.1	0.1	0.3	0.4	5.8	3.2	2.6	0.7
UNID LEPOMIS	--	--	--	--	--	--	--	--	--	--	--	--	0.1	0.0	0.1	0.0
SMALLMOUTH BASS	0.1	0.0	0.2	0.1	2.4	1.1	1.5	0.4	--	--	0.1	0.1	0.7	0.4	0.4	0.1
LARGEMOUTH BASS	1.1	0.6	0.5	0.3	8.8	4.0	10.6	3.1	1.4	1.8	0.5	0.7	5.1	2.8	11.9	2.9
WHITE CRAPPIE	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	--	--	--	--	--	--	--	--
BLACK CRAPPIE	0.1	0.0	0.0	0.0	0.3	0.1	0.3	0.1	--	--	0.0	0.1	--	--	0.2	0.0
JOHNNY DARTER	--	--	0.1	0.1	--	--	--	--	--	--	--	--	--	--	--	--
LOGPERCH	--	--	--	--	0.1	0.0	0.6	0.2	--	--	--	--	0.1	0.0	0.7	0.2
BLACKSIDE DARTER	--	--	0.0	0.0	--	--	--	--	--	--	--	--	--	--	--	--
SLENDERHEAD DARTER	--	--	--	--	0.0	0.0	0.1	0.0	--	--	--	--	--	--	0.1	0.0
SAUGER	--	--	--	--	0.0	0.0	--	--	--	--	--	--	--	--	--	--
WALLEYE	--	--	--	--	--	--	--	--	--	--	0.0	0.1	--	--	--	--
FRESHWATER DRUM	0.2	0.1	1.3	0.8	3.6	1.7	1.9	0.6	0.3	0.4	1.0	1.5	2.1	1.1	1.4	0.4
TOTAL FISH	189.9	100.0	164.2	100.0	217.3	100.0	337.4	100.0	80.4	100.0	70.0	100.0	181.5	100.0	404.2	100.0
TOTAL SPECIES	24		34		44		39		11		24		34		40	

TABLE 15 (cont.)

SPECIES	2006							
	LOWER LOCKPORT POOL		BRANDON POOL		UPSTREAM I-55		DOWNSTREAM I-55	
	CPE	%	CPE	%	CPE	%	CPE	%
LONGNOSE GAR	--	--	--	--	0.7	0.5	0.1	0.0
UNID GAR	--	--	--	--	--	--	--	--
BOWFIN	--	--	--	--	--	--	--	--
SKIPJACK HERRING	0.1	0.1	--	--	--	--	--	--
GIZZARD SHAD	39.2	68.5	21.3	25.4	28.8	19.8	95.4	26.6
CENTRAL MUDMINNOW	--	--	--	--	--	--	--	--
GRASS PICKEREL	--	--	--	--	--	--	--	--
NORTHERN PIKE	0.1	0.1	--	--	--	--	--	--
CENTRAL STONEROLLER	--	--	--	--	--	--	--	--
HORNYHEAD CHUB	--	--	--	--	--	--	--	--
GOLDEN SHINER	--	--	0.1	0.1	0.3	0.2	0.1	0.0
PALLID SHINER	--	--	--	--	--	--	0.1	0.0
EMERALD SHINER	3.6	6.2	27.0	32.4	10.8	7.4	22.2	6.2
GHOST SHINER	--	--	--	--	0.2	0.1	1.4	0.4
STRIPED SHINER	--	--	--	--	0.6	0.4	0.4	0.1
BIGMOUTH SHINER	--	--	--	--	--	--	--	--
SPOTTAIL SHINER	0.1	0.1	--	--	0.3	0.2	1.8	0.5
RED SHINER	--	--	--	--	--	--	--	--
SPOTFIN SHINER	--	--	0.9	1.1	2.8	1.9	2.9	0.8
SAND SHINER	--	--	--	--	--	--	--	--
REDFIN SHINER	--	--	--	--	--	--	--	--
MIMIC SHINER	--	--	--	--	--	--	--	--
UNID NOTROPIS	--	--	--	--	--	--	0.1	0.0
SUCKERMOUTH MINNOW	--	--	--	--	--	--	--	--
BLUNTNOSE MINNOW	5.2	9.1	18.2	21.8	25.4	17.5	35.9	10.0
FATHEAD MINNOW	0.1	0.1	0.0	0.0	0.1	0.1	--	--
BULLHEAD MINNOW	--	--	0.1	0.1	0.0	0.0	8.9	2.5
CREEK CHUB	--	--	--	--	--	--	--	--
RIVER CARPSUCKER	--	--	--	--	0.1	0.1	0.4	0.1
QUILLBACK	--	--	--	--	0.2	0.1	0.3	0.1
WHITE SUCKER	--	--	0.2	0.2	--	--	--	--
SMALLMOUTH BUFFALO	--	--	0.1	0.1	2.4	1.7	1.5	0.4
BIGMOUTH BUFFALO	--	--	--	--	0.1	0.1	--	--
BLACK BUFFALO	--	--	--	--	--	--	--	--
SPOTTED SUCKER	--	--	--	--	--	--	--	--
SILVER REDHORSE	--	--	--	--	0.3	0.2	0.1	0.0
RIVER REDHORSE	--	--	--	--	--	--	--	--
BLACK REDHORSE	--	--	--	--	--	--	0.1	0.0
GOLDEN REDHORSE	--	--	--	--	0.1	0.1	2.9	0.8
SHORTHEAD REDHORSE	--	--	--	--	0.0	0.0	0.3	0.1
UNID MOXOSTOMA	--	--	--	--	--	--	--	--
BLACK BULLHEAD	--	--	--	--	--	--	--	--
YELLOW BULLHEAD	0.1	0.1	0.8	0.9	0.3	0.2	0.2	0.1
CHANNEL CATFISH	0.8	1.4	2.5	3.0	6.2	4.3	2.2	0.6
UNID AMEIURUS	--	--	--	--	--	--	--	--
TADPOLE MADTOM	--	--	--	--	0.0	0.0	0.3	0.1
FLATHEAD CATFISH	--	--	--	--	0.1	0.1	--	--
BLACKSTRIPE TOPMINNOW	--	--	0.1	0.1	0.6	0.4	0.2	0.1
BROOK SILVERSIDE	--	--	--	--	0.2	0.1	2.3	0.6
WHITE BASS	--	--	--	--	0.1	0.1	--	--
YELLOW BASS	--	--	--	--	--	--	--	--
UNID MORONE	--	--	--	--	--	--	--	--
ROCK BASS	--	--	0.0	0.0	0.0	0.0	0.4	0.1
GREEN SUNFISH	1.9	3.4	4.6	5.5	16.0	11.0	20.3	5.6
PUMPKINSEED	3.4	6.0	1.8	2.1	0.7	0.5	0.1	0.0
WARMOUTH	--	--	--	--	--	--	--	--
ORANGESPOTTED SUNFISH	0.1	0.1	0.3	0.3	0.9	0.6	20.3	5.6
BLUEGILL	0.4	0.7	1.8	2.2	26.7	18.4	108.9	30.4
LONGEAR SUNFISH	--	--	--	--	0.5	0.3	0.6	0.2
HYBRID SUNFISH	0.2	0.3	0.7	0.8	9.3	6.4	2.3	0.7
UNID LEPOMIS	--	--	--	--	--	--	0.9	0.2
SMALLMOUTH BASS	0.1	0.1	0.0	0.0	0.5	0.3	1.1	0.3
LARGEMOUTH BASS	1.7	3.0	1.5	1.7	8.1	5.6	21.5	6.0
WHITE CRAPPIE	--	--	--	--	0.0	0.0	0.1	0.0
BLACK CRAPPIE	--	--	--	--	0.1	0.1	0.1	0.0
JOHNNY DARTER	--	--	0.1	0.1	--	--	--	--
LOGPERCH	--	--	--	--	--	--	0.9	0.2
BLACKSIDE DARTER	--	--	0.0	0.0	--	--	--	--
SLENDERHEAD DARTER	--	--	--	--	--	--	--	--
SAUGER	--	--	--	--	--	--	--	--
WALLEYE	--	--	--	--	--	--	--	--
FRESHWATER DRUM	0.4	0.7	1.4	1.6	2.0	1.3	1.4	0.4
TOTAL FISH	57.2	100.0	83.5	100.0	145.3	100.0	358.6	100.0
TOTAL SPECIES	16		22		36		35	

NOTE: 0.0 DENOTES VALUES LESS THAN 0.05.

CERTIFICATE OF SERVICE

I, the undersigned, certify that on this 4th day of August, 2008, I have served electronically the attached Pre-Filed Testimony of James E. Huff, P.E., accompanying Exhibits, 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

Ariel J. Tesher

SERVICE LIST

Frederick M. Feldman
Ronald M. Hill
Margaret T. Conway
Metropolitan Water Reclamation District of Greater Chicago
111 E. Erie St.
Chicago, IL 60611

Matthew Dunn, Chief
Environmental Bureau
Office of the Attorney General
100 W. Randolph St., 12th Floor
Chicago, IL 60601

Bill Richardson, Chief Legal Counsel
Illinois Department of Natural Resources
One Natural Resources Way
Springfield, IL 62702-1271

Ann Alexander
Natural Resources Defense Counsel
101 N. Wacker Dr., Suite 609
Chicago, IL 60606

Keith Harley
Elizabeth Schenkier
Chicago Legal Clinic, Inc.
205 W. Monroe St., 4th Floor
Chicago, IL 60606

Thomas V. Skinner
Thomas W. Dimond
Kevin Desharnais
Jennifer A. Simon
Mayer Brown LLP
71 S. Wacker Drive
Chicago, IL 60606-4637

Katherine D. Hodge
Monica T. Rios
Hodge Dwyer Zeman
3150 Roland Avenue
P.O. Box 5776
Springfield, IL 62705-5776

Albert Ettinger
Jessica Dexter
Environmental Law & Policy Center
35 E. Wacker Dr.
Suite 1300
Chicago, IL 60601

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

Richard Kissel
Roy Harsch
DrinkerBiddle
191 N. Wacker Dr., Suite 3700
Chicago, IL 60606-1698

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

Charles Wesselhoft
James Harrington
Ross & Hardies
150 N. Michigan Ave.
Chicago, IL 60601-7567

Frederick Keady
Vermillion Coal Company
1979 Jolms Drive
Glenview, IL 60025

Georgia Vlahos
Naval Training Center
2601A Paul Jones St.
Great Lakes, IL 60088-2845

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

Jerry Paulsen
Cindy Skukrud
McHenry County Defenders
132 Cass Street
Woodstock, IL 60098

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

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

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

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

Fred L. Hubbard
P.O. Box 12
16 West Madison
Danville, IL 61834

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

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

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

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

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

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

Marc Miller
Jamie S. Caston
Office of Lt. Governor Pat Quinn
Room 414 State House
Springfield, IL 62706

James L. Daugherty
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

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

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

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

Traci Barkley
Prairie Rivers Networks
1902 Fox Drive, Suite 6
Champaign, IL 61920

Susan Hedman
Andrew Armstrong
Environmental Counsel
Environmental Bureau
69 W. Washington St., Suite 1800
Chicago, IL 60602

Sharon Neal
Commonwealth Edison
125 S. Clark St.
Chicago, IL 60603

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

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

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

Beth Steinhorn
2021 Timberbrook
Springfield, IL 62702

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