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

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SERVICE LIST

Please take notice that on March 25, 2009, we filed electronically with the Office of the Clerk of the Illinois Pollution Control Board the attached Updated 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

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

Introduction

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 29 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 Sanitary & Ship Canal ("Ship Canal") for the Metropolitan Water Reclamation District of Greater Chicago ("MWRDGC"), CITGO Petroleum corporation and PDV Midwest, LLC (the "Lemont Refinery"), and Corn Products International, Inc. ("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 the Lemont Refinery to review the Use designation proposed by the Illinois EPA (the "Agency") for the 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 that the proposed use designation will have on the Lemont Refinery. With the passage of time for the hearings in this matter, I have concluded that my Pre-filed Testimony in this matter needed to be updated. Since then, additional information has become available in the form of recent water quality data on the Ship Canal as collected at the Lemont Refinery intake, as well as a more thorough review of the available information relating to temperature conditions and fishery quality.

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 two different use categories, as Use A and Use B. My review was focused on the appropriateness of Use B designation for the Ship Canal. The Lemont Refinery discharges into the Ship Canal. At the point of its discharge, 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 Chicago Area Water System ("CAWS") and in this Use Attainability Analysis proceeding.

The Agency is proposing to group the Ship Canal as an Aquatic Life Use B Water, a group that also includes the North Branch Chicago River, the Chicago River, South Branch Chicago River, the Calumet River to Torrence Avenue, the Lake Calumet Connecting Channel, and the Lower Des Plaines River from the Ship Canal to the Brandon Road Lock and Dam. With the exception of the Lake Calumet Connecting Channel and the Ship Canal, 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 (downstream 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, p 49).

For the reasons that I will now present to the Illinois Pollution Control Board ("Board"), I submit that the Ship Canal is unique and is fundamentally different in many important characteristics that distinguish 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" (Agency's Statement of Reasons, p 17). The Board has consistently recognized the challenges, variability, and uniqueness of the CAWS and Lower Des Plaines River and many of the same challenges and limitations that the Board recognized in the early 1970s remain valid today.

The Ship Canal extends 31.1 miles upstream from its confluence with the Des Plaines River to the Damen Avenue Bridge in Chicago (*Chicago Area Waterway System Use Attainability Analysis* ("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's primary water supply. The Ship Canal was expanded in 1919 to its present form to increase navigation capabilities and provide additional waste dilution. With the potential exception of the Calumet-Sag Channel, as described later in my testimony, there is

no other water body in the CAWS which has the unique physical features, commercial shipping, discharge loadings, and lack of appropriate habitat for aquatic life, as the Ship Canal.

As part of the Use Attainability Analyses (UAA), CDM conducted recreation and navigation surveys for 28 days on the Ship Canal (CDM, 2007, page 4-69). 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 Lemont 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 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 obvious dangerous and undesirable condition. The barge traffic itself creates safety hazards for smaller boaters because they 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), iron, oil and grease, dissolved

oxygen ("D.O."), total nitrogen, and total phosphorus. Identified sources of the impairment include combined sewer overflows, urban runoff/storm sewers, and impacts from hydrostructure flow regulation/ modification, municipal point source discharges, and other unknown sources.

In addition to its 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 of the Ship Canal is the electric barrier installed near the Lockport Lock to prevent aquatic invasive species (including the Asian carp) from migrating into the Great Lakes as well as migrating to the Mississippi River. Based on the effectiveness of the first barrier, a second, more permanent barrier is being installed 800 to 1,500 feet downstream of the first barrier. The first half of the second barrier has been completed, and is expected to be activated in April of 2009, after a series of safety tests. To address some of the safety concerns, the Coast Guard enacted a *Regulated Navigation Area* in the vicinity of the barriers, which includes safety requirements for the vessels. The second half of the second barrier is awaiting funding authorization. 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 it is 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 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 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 Chicago, other Illinois communities, and beyond.
- The Ship Canal carries the treated wastewater effluents from most of Cook County which represent 70 percent of the Ship Canal flow at Lockport on an annual basis (Agency's Statement of Reasons, p 18). Effluent equal to an estimated population equivalent of 9.5 million people is discharged through the MWRDGC (Agency's Statement of Reasons, p 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. It is unsafe for small boat traffic, from both wave generated turbulence from barges as well as from the electric barrier(s).

[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.

- There are limited shallow areas along the shoreline (Pre-filed testimony of S.D. Mackey, pg 10).
- 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.
- The Ship Canal has minimal slope and low velocities. These are not optimal conditions for aquatic habitat, but they are 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 regarding 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, they assume that *fish passage* even occurs; second, they assume that 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, as they attempt to keep aquatic invasive species, including the Asian 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 is 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, 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 commercial shipping, industrial use, and the carrying of wastewater treatment plant effluent and combined sewer overflows (CSOs) from the Chicago area away from Lake Michigan. 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 limit routinely during snow melt conditions due to highway deicing (Attachment 3). This is yet another "existing use" that is occurring – removal of snow melt 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, sulfate, and mercury will be significant. Industrial dischargers will lose their mixing zones for these three pollutants during periods of water quality violations, which will necessitate 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, chloride, or sulfate loadings.

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 Ship Canal temperatures are highest. (Attachment 4).

Mixing Zone Implications, Chlorides, Sulfates, and Mercury

Because of the uniqueness of the Ship Canal, a separate use category is appropriate. However, the Agency has proposed limits for four pollutants which we have identified as not achieving the proposed Use B standards on the Ship Canal: thermal, chlorides, sulfates,[2] and mercury. 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, mercury, or thermal will have to meet the water quality standards at the end of pipe. The Agency noted in its Statement of Reasons (p 76) that it expects that there will be violations of the chloride standard during the winter months, yet it offers no solution in its proposal and it 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.

Attachment 3 presents four years of chloride data from the Lemont Refinery's water intake (which is upstream of its discharge). Chloride levels as high as 998 mg/L have been recorded in the Ship Canal. The chloride level in the Ship Canal has remained above 500 mg/L for over three weeks at a time, such as from January 28, 2008 to sometime between February 16 and 18, 2008, 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 elevated 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 the Lemont Refinery (and changed the water quality standard for TDS for the Exxon-

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

Mobil Refinery) due to the snow-melt phenomenon. Facilities that use once through cooling water would not be allowed to add chlorine (increase in chlorides) 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.

The Agency has proposed that the Human Health Standard (HHS) for mercury be applied consistent with the General Use Water Quality Standards. The HHS for mercury is 12 nanograms per liter, which is to be achieved based on an annual average and whenever the flow in the waterway exceeds the harmonic mean flow. Proposed Section 302.407(d) specifies that the HHS is to be achieved after mixing as allowed in Section 302.102, consistent with the General Use regulation. The Agency, in a recent NPDES permit, determined that the HHS for mercury must be met in the effluent and that no mixing zone is allowed, despite regulations that appear contrary to this position. The Agency needs to explain its proposal regarding the mercury HHS standard with respect to allowable mixing zones.

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.

Mercury Levels In The Ship Canal

The Lemont Refinery withdraws water used for processing from the Ship Canal at river mile 7.0. The Refinery has monitored this intake for many years for a variety of parameters. In the summer of 2008, Huff and Huff was asked to conduct metals sampling at the intake, including mercury sampling using U.S. EPA's Ultra Clean Sampling Protocol Method 1669.

Attachment 3 includes the metal results from the Ship Canal, again, collected upstream of the Lemont Refinery discharge. While the dissolved mercury levels were low, the total mercury averaged 9.09 nanograms per liter. On August 6, 2008, the total mercury was 15.5 nanograms per liter, and the flow in the Ship Canal was above its harmonic mean. If the stream already exceeds the proposed water quality standard, then there would be no mixing zone and the 12 nanograms per liter limit would be applied as an effluent limit to all dischargers. In addition, mercury would be listed as a cause of water quality impairment on this waterway, necessitating a TMDL study and subsequent load reductions from existing sources of mercury. This will have implications on all discharges on the Ship Canal, including the MWRDGC.

As this portion of the hearings is focusing on the uses of the receiving streams, we put forward only the data on the conditions in the receiving stream and have not developed information on the technical feasibility or economic reasonableness to meet the proposed mercury standard.

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 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." (p 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^{o}C (or 90.3 ^{o}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." (p 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." (p 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 questions what about the other existing uses (including industrial users) on the Ship Canal. 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 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. Attachment 6 includes a Report prepared by Nick Owens and myself from Huff & Huff, Inc. on behalf of the Lemont Refinery and Corn Products International comparing the thermal regime and fishery quality of the Ship Canal to the Calumet-Sag Channel. Nick Owens' CV is included in Attachment 8. Figure 3-8 in this report compares the daily maximum and highest period average temperature to the proposed Use B temperature limits. Temperatures up to 100^{o}F occur during the summer months. In addition, the proposed Use B period average temperatures are exceeded throughout the year, not just during the summer months. The reported bluntnose minnow short-term survival temperature determined by Yoder, 90.3 ^{o}F, is routinely exceeded on the Ship Canal.

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 Attachment 7. Interestingly, the most thermally 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. The emerald shiner, another thermally sensitive fish, according to Yoder, is also present in the Ship Canal. Its presence also seems to be increasing. In 1994, only 3 emerald shiner fish were collected. Since 2000, the number collected has ranged from 24 to 178. There is no indication that the bluntnose minnow,

emerald shiner, 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 utilized by Yoder in deriving in deriving temperature limits are present, with the gizzard shad representing the highest percentage of fish collected. The bluntnose minnow since 1993 has also been very well represented, averaging 17.8 percent over the ten year period (CDM, 2007, p 4-78). Also of interest are the IBI scores for the Ship Canal, which CDM found, "fairly uniform throughout the CSSC." (CDM, 2007, p 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.

In an effort to evaluate the appropriateness of the Yoder approach, a comparison of the fishery quality on the Ship Canal and the Calumet-Sag Channel was made. There are differences in historical temperatures between these two deep-draft waterways, which both have limited shallow area along the banks and a high volume of commercial traffic waterways. Therefore, a comparison of the fisheries quality between the Ship Canal and the Calumet-Sag Channel would be expected to identify limitations caused by thermal stress. Attachment 6 includes a copy of this comparison. Likewise, within the Ship Canal, comparing fish data from sampling points with different thermal characteristics would also be expected to identify limitations caused by thermal stress.

In that regard, July/August temperatures at Cicero Avenue on the Ship Canal between 1998 and 2006 averaged 85.9°F, compared to between 75.2 and 76.8^{o}F along the entire Calumet-Sag Channel between 1998 to 2008, or approximately 10°F warmer on average. Downstream along the Ship Canal, July/August temperatures are not as warm as at Cicero; however, the temperatures are still 3 to 6 °F warmer in the Calumet-Sag Channel.

Moreover, historical fish records have revealed that 79 fish species have been collected on the Ship Canal, versus 36 species on the CSC. More current fish collection data collected by the MWRDGC, after completion on the Sidestream Elevated Pool Aeration (SEPA) systems on the Calumet-Sag channel has yielded on average 8.5 species per site per sampling event on the Ship Canal versus 11.2 species on the Calumet-Sag channel. Overall, recent collections by the MWRDGC have found a total of 22 fish species on the Ship Canal and 29 species on the Calumet-Sag Channel. The five most common fish encountered on each waterway is as follows:

Ship Canal	Calumet-Sag Channel
Gizzard Shad	**Gizzard Shad**
Common Carp	**Emerald Shiner**
Bluntnose Minnow	**Common Carp**
Pumpkinseed	**Bluntnose Minnow**
Emerald Shiner	Largemouth Bass

Four out of five most common fish are identical in these two waterways. In deriving temperature limits, Yoder selected eight Representative Aquatic Species (RAS). The bluntnose minnow was identified by Yoder as the most thermally sensitive species, with a UILT of 90.3°F. The bluntnose minnow is among the most common fish collected on the Ship Canal, despite summer temperatures that consistently exceed 90.3°F.

Although not utilized by Yoder in deriving temperature limits, the Emerald Shiner is also reported to be thermally sensitive with an UILT of 89.8°F. This was the fifth most common species on the Ship Canal. In 2005 the Calumet-Sag Channel experienced a two order of magnitude increases in the Emerald Shiners collected. Otherwise, its population has historically been similar to that on the Ship Canal.

The Ship Canal and Calumet-Sag Channel have similar fisheries quality. Additionally, when comparing fishery qualities within the Ship Canal, a higher than average species diversity was observed at the warmest sampling point. Existing thermal inputs into the Ship Canal do not appear to be a controlling or limiting factor in the fisheries quality. In other words, if the thermal

loading on the Ship Canal were to be lowered to the proposed Use B thermal limits, there is no biological evidence indicating that an increase in fishery quality would be expected.

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 and emerald shiner are both 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 UILT of 32.4^{o}C (or 90.3^{o}F), why haven't there been massive bluntnose minnow, emerald shiner, or any other fish species temperature related fish kills been observed on the Ship Canal?

- Why is there greater fish diversity found at Cicero Avenue, immediately downstream of the Fisk and Crawford generating station outfalls than the overall average diversity on the Ship Canal?

- 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, what benefits will be derived from more restrictive temperature limitations on the Ship Canal given the documented habitat limitations on the Ship Canal?

- If the fisheries quality on the Calumet-Sag Channel and the Ship Canal are similar, yet have significantly different thermal regimes, doesn't this suggest that habitat is controlling the fisheries quality?

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 (Attachment 5). 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." (p 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 waterways. Therefore this comparison between the Ship Canal and the Calumet-Sag Channel demonstrates that no improvement in fishery quality would likely occur from the proposed more restrictive temperature limits for the Ship Canal.

Conclusion

In 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, p 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. Such a use category should recognize the existing uses and limitations of the Canal, which factors in the actual fish data on the Ship Canal. Where the proposed Use B water quality standards will not be met, which is the case for thermal, mercury, 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. The present and abundant blunt-nose minnow, the most sensitive of the RAS species, and the thermally-sensitive emerald shiner are already in the top five most common species collected and the physical habitat is poor and not likely to change. Therefore, the fundamental basis behind changing these standards appears flawed, and it 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.

[3] UIW-Upper Illinois Waterway

CERTIFICATE OF SERVICE

I, the undersigned, certify that on this 25th day of March 2009, 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
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and by U.S. Mail, first class postage prepaid, to the following persons:

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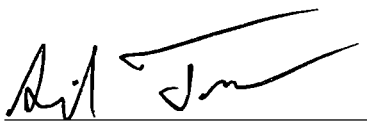

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Chicago, IL 60602

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

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

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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.

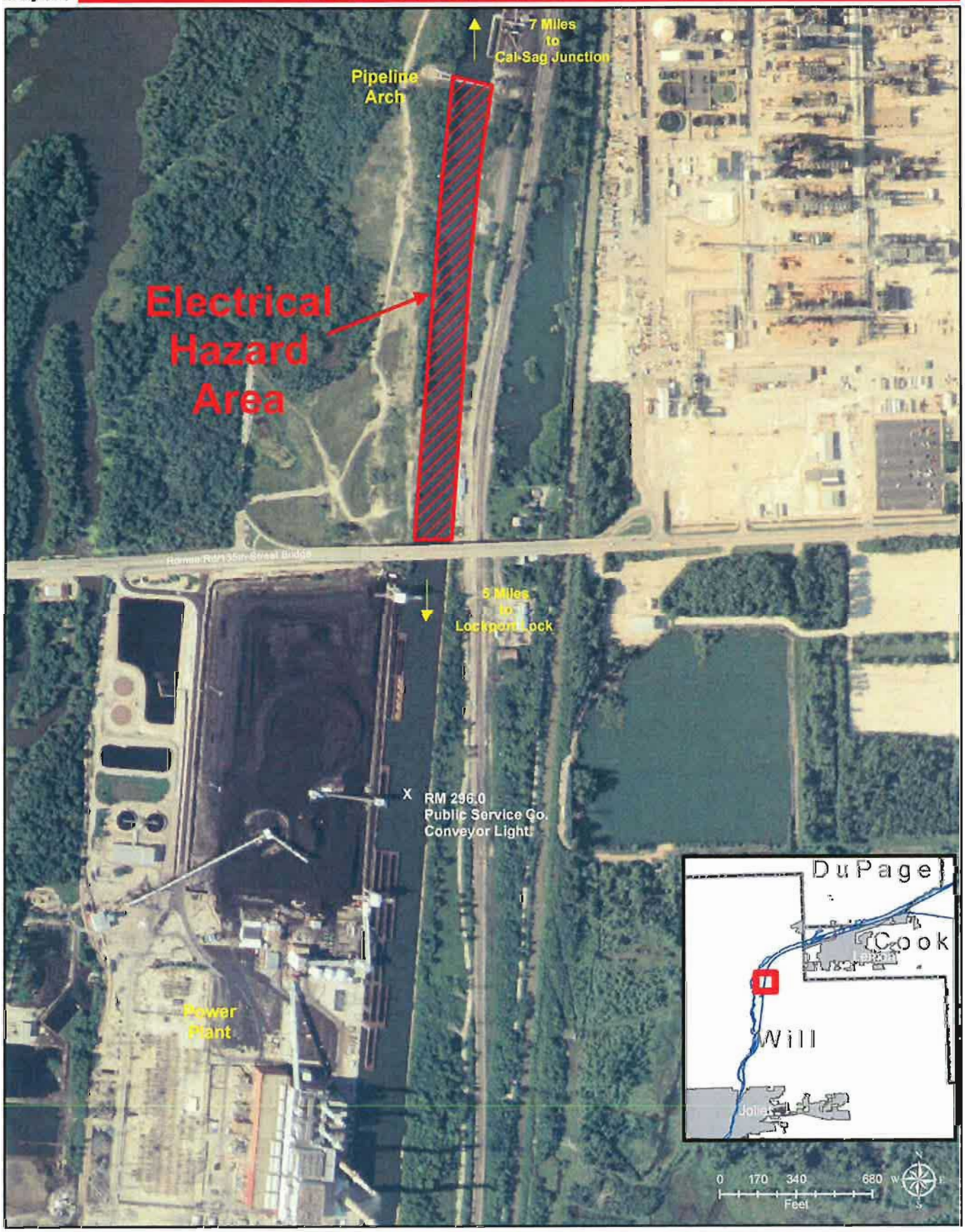
For additional information pertaining to the fish barrier please visit www.lrc.usace.army.mil/safety.

-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.

US Army Corps of Engineers

Chicago Sanitary & Ship Canal
Electrical Hazard Area



ATTACHMENT 3

METALS AND CHLORIDE DATA FROM THE CHICAGO SANITARY & SHIP CANAL AT THE LEMONT REFINERY WATER INTAKE

MERCURY LEVELS
CHICAGO SANITARY & SHIP CANAL

	Dissolved Hg, ng/L	Dissolved Hg, 4-day Running average, ng/L	Total Hg, ng/L	Stream Flow, cfs
	Acute	Chronic	Human Health Std	
General Use WQ Stds	2200.00	1100.00	12.00	
07/24/08	<0.50		11.10	
07/31/08	<0.50		9.66	
08/06/08	0.64		**15.50**	**3434**
08/11/08	<1.01	0.41	4.73	2655
08/13/08	<0.50	0.41	13.00	2255
08/18/08	0.50	0.47	9.48	
08/20/08	1.69	0.74	5.82	
08/25/08	<0.50	0.67	4.91	
08/27/08	<0.50	0.67	7.50	
09/03/08	<0.50	0.61	9.16	
Average			**9.09**	

Acute and Chronic based upon Critical hardness of 205 mg/L.
Chronic applies to four-day running average

Human Health Std based on annual average, total mercury, and shall also not be exceeded when the flow is above the harmonic mean.

The Harmonic mean flow for the Ship Canal is 2,900 cfs

IRON LEVELS
CHICAGO SANITARY & SHIP CANAL

	Dissolved Iron, µg/L
General Use WQ Stds	1,000.0
07/24/08	26.7
07/31/08	12.9
08/06/08	11.4
08/11/08	<20.0
08/13/08	<20.0
08/18/08	<20.0
08/20/08	<20.0
08/25/08	15.1
08/27/08	20.6
09/03/08	211.0

NICKEL LEVELS
CHICAGO SANITARY & SHIP CANAL

	Dissolved Nickel, µg/L	Dissolved Nickel, 4-day Running average, µg/L
	Acute	Chronic
General Use WQ Stds	151.20	9.20
07/24/08	3.64	
07/31/08	2.26	
08/06/08	1.91	
08/11/08	5.05	3.22
08/13/08	4.93	3.54
08/18/08	5.07	4.24
08/20/08	4.11	4.79
08/25/08	4.06	4.54
08/27/08	4.56	4.45
09/03/08	3.74	4.12

Acute and Chronic based upon Critical hardness of 205 mg/L.
Chronic applies to four-day running average

COPPER LEVELS
CHICAGO SANITARY & SHIP CANAL

	Dissolved Copper, µg/L	Dissolved Copper, 4-day Running average, µg/L
	Acute	Chronic
General Use WQ Stds	33.50	21.00
07/24/08	1.84	
07/31/08	1.89	
08/06/08	1.82	
08/11/08	1.85	1.85
08/13/08	1.66	1.81
08/18/08	1.72	1.76
08/20/08	1.84	1.77
08/25/08	1.63	1.71
08/27/08	1.69	1.72
09/03/08	2.03	1.80

Acute and Chronic based upon Critical hardness of 205 mg/L.
Chronic applies to four-day running average

ZINC LEVELS
CHICAGO SANITARY & SHIP CANAL

	Dissolved Zinc, µg/L	Dissolved Zinc, 4-day Running average, µg/L
	Acute	Chronic
General Use WQ Stds	219.50	39.60
07/24/08	8.26	
07/31/08	8.38	
08/06/08	8.77	
08/11/08	8.58	8.50
08/13/08	7.01	8.19
08/18/08	8.24	8.15
08/20/08	9.26	8.27
08/25/08	11.00	8.88
08/27/08	10.00	9.63
09/03/08	9.79	10.01

Acute and Chronic based upon Critical hardness of 205 mg/L.
Chronic applies to four-day running average

ARSENIC LEVELS
SANITARY & SHIP CANAL

	Dissolved Arsenic, µg/L	Dissolved Arsenic, 4-day Running average, µg/L
General Use WQ Stds	360.00 Acute	190.00 Chronic
07/24/08	2.06	
07/31/08	2.06	
08/06/08	1.77	
08/11/08	1.73	1.91
08/13/08	2.15	1.93
08/18/08	1.94	1.90
08/20/08	1.99	1.95
08/25/08	2.22	2.08
08/27/08	1.86	2.00
09/03/08	1.86	1.98

Acute and Chronic based upon Critical hardness of 205 mg/L.
Chronic applies to four-day running average

SELENIUM LEVELS
CHICAGO SANITARY & SHIP CANAL

	Total Selenium, µg/L
General Use WQ Stds	1,000.00
07/24/08	1.47
07/31/08	1.22
08/06/08	1.29
08/11/08	1.31
08/13/08	<1.20
08/18/08	1.33
08/20/08	<1.20
08/25/08	2.34
08/27/08	1.18
09/03/08	1.04

SILVER LEVELS
CHICAGO SANITARY & SHIP CANAL

	Total Silver, µg/L
General Use WQ Stds	5.000
07/24/08	0.080
07/31/08	0.068
08/06/08	0.099
08/11/08	0.049
08/13/08	0.064
08/18/08	0.060
08/20/08	<0.040
08/25/08	<0.020
08/27/08	0.049
09/03/08	0.063

CADMIUM LEVELS
CHICAGO SANITARY & SHIP CANAL

	Dissolved Cadmium, µg/L	Dissolved Cadmium, 4-day Running average, µg/L
	Acute	Chronic
General Use WQ Stds	20.100	1.800
07/24/08	0.045	
07/31/08	0.038	
08/06/08	0.034	
08/11/08	0.055	0.043
08/13/08	0.044	0.043
08/18/08	0.051	0.046
08/20/08	0.058	0.052
08/25/08	0.031	0.046
08/27/08	0.028	0.042
09/03/08	0.032	0.037

Acute and Chronic based upon Critical hardness of 205 mg/L.
Chronic applies to four-day running average

LEAD LEVELS
CHICAGO SANITARY & SHIP CANAL

	Dissolved Lead, µg/L	Dissolved Lead, 4-day Running average, µg/L
	Acute	Chronic
General Use WQ Stds	163.800	34.400
07/24/08	0.433	
07/31/08	0.438	
08/06/08	0.441	
08/11/08	0.420	0.433
08/13/08	0.366	0.416
08/18/08	0.424	0.413
08/20/08	0.460	0.418
08/25/08	0.533	0.446
08/27/08	0.551	0.492
09/03/08	0.509	0.513

Acute and Chronic based upon Critical hardness of 205 mg/L.
Chronic applies to four-day running average

CHICAGO SANITARY & SHIP CANAL CHLORIDE LEVELS AT LEMONT (CITGO's WATER INTAKE)

2008		2007		2006		2005	
Date	Chloride, mg/L	Date	Chloride, mg/L	Date	Chloride, mg/L	Date	Chloride, mg/L
1/7/08	**562**	1/1/07	174	1/2/06	330	1/10/05	**835**
1/11/08	272	1/5/07	156	1/6/06	320	1/12/05	492
1/18/08	270	1/8/07	113	1/9/06	314	1/13/05	580
1/21/08	256	1/12/07	133	1/13/06	276	1/14/05	274
1/25/08	252	1/19/07	239	1/16/06	226	1/17/05	242
1/28/08	**514**	1/22/07	203	1/20/06	215	1/19/05	250
2/1/08	**556**	1/26/07	384	1/23/06	220	1/21/05	235
2/4/08	**625**	1/29/07	286	1/27/06	413	1/24/05	430
2/8/08	**896**	2/2/07	225	1/30/06	308	1/31/05	**634**
2/11/08	**848**	2/5/07	227	2/3/06	298	2/4/05	413
2/15/08	**666**	2/9/07	181	2/6/06	252	2/11/05	416
2/18/08	489	2/12/07	224	2/10/06	243	2/14/05	364
2/22/08	351	2/16/07	181	2/13/06	238	2/25/05	307
2/25/08	376	2/19/07	**695**	2/17/06	251	3/7/05	283
2/29/08	299	2/23/07	**549**	2/20/06	276	3/11/05	286
3/3/08	460	2/26/07	**600**	2/24/06	249	3/14/05	277
3/7/08	398	3/2/07	**734**	2/27/06	484	3/21/05	300
3/10/08	364	3/5/07	**616**	3/3/06	200	3/25/05	272
3/14/08	333	3/9/07	395	3/17/06	209	3/28/05	270
3/17/08	316	3/16/07	350	3/20/06	201	4/4/05	240
3/21/08	301	3/19/07	340	3/31/06	189	4/8/05	232
3/24/08	294	3/23/07	281	4/3/06	208	4/11/05	221
3/28/08	388	3/23/07	281	4/7/06	189	4/15/05	200
3/31/08	413	3/26/07	415	4/10/06	183	4/18/05	199
4/4/08	333	3/30/07	258	4/14/06	188	4/22/05	197
4/7/08	328	4/2/07	252	4/17/06	190	4/25/05	196
4/11/08	275	4/6/07	236	4/21/06	128	4/29/05	184
4/14/08	247	4/9/07	232	4/24/06	154	5/2/05	190
4/18/08	158	4/13/07	214	4/28/06	162	5/6/05	195
4/21/08	266	4/16/07	242	5/1/06	175	5/13/05	164
4/25/08	251	4/20/07	259	5/5/06	152	5/16/05	151
4/28/08	242	4/23/07	241	5/12/06	166	5/20/05	167
5/2/08	224	4/27/07	136	5/15/06	145	5/23/05	147
5/5/08	90	4/27/07	136	5/19/06	145	5/27/05	151
5/9/08	220	4/30/07	169	5/19/06	145	5/30/05	163
5/12/08	172	5/4/07	176	5/22/06	147	6/1/05	160
5/16/08	172	5/7/07	215	5/26/06	167	6/3/05	156
5/19/08	174	5/11/07	202	5/29/06	145	6/10/05	121
5/23/08	213	5/14/07	200	6/2/06	134	6/13/05	124
5/26/08	204	5/18/07	191	6/5/06	122	6/17/05	128

CHICAGO SANITARY & SHIP CANAL CHLORIDE LEVELS AT LEMONT (CITGO's WATER INTAKE)

2008		2007		2006		2005	
Date	Chloride, mg/L	Date	Chloride, mg/L	Date	Chloride, mg/L	Date	Chloride, mg/L
5/30/08	170	5/21/07	180	6/9/06	132	6/20/05	127
6/2/08	183	5/23/07	188	6/12/06	108	6/24/05	122
6/6/08	163	5/25/07	170	6/16/06	109	6/27/05	118
6/9/08	133	5/28/07	187	6/19/06	129	7/1/05	119
6/13/08	130	6/1/07	150	6/23/06	123	7/4/05	103
6/16/08	157	6/4/07	138	6/26/06	119	7/8/05	103
6/20/08	165	6/8/07	145	6/30/06	294	7/11/05	103
6/23/08	175	6/11/07	148	6/30/06	294	7/15/05	100
6/27/08	171	6/15/07	144	7/3/06	110	7/18/05	100
6/30/08	110	6/18/07	141	7/7/06	12	7/22/05	92
7/4/08	144	6/22/07	110	7/10/06	85	7/25/05	99
7/7/08	154	6/25/07	119	7/14/06	103	7/29/05	99
7/11/08	156	6/29/07	108	7/17/06	414	8/1/05	92
7/14/08	124	7/2/07	108	7/21/06	92	8/5/05	102
7/18/08	135	7/6/07	115	7/24/06	227	8/8/05	88
7/21/08	105	7/9/07	100	7/28/06	104	8/12/05	93
7/25/08	110	7/13/07	104	7/31/06	96	8/15/05	88
7/28/08	111	7/16/07	103	8/4/06	74	8/19/05	98
8/1/08	111	7/20/07	108	8/7/06	91	8/22/05	76
8/4/08	99	7/23/07	114	8/11/06	93	8/26/05	80
8/8/08	109	7/27/07	99	8/14/06	92	8/29/05	88
8/11/08	101	7/30/07	105	8/18/06	85	9/2/05	87
8/15/08	100	8/3/07	102	8/21/06	96	9/5/05	68
8/18/08	99	8/6/07	102	8/25/06	81	9/9/05	67
8/22/08	90	8/10/07	90	8/28/06	90	9/12/05	73
8/25/08	140	8/13/07	101	9/1/06	71	9/16/05	70
8/29/08	126	8/17/07	99	9/4/06	87	9/19/05	86
9/1/08	90	8/20/07	111	9/8/06	82	9/23/05	63
9/5/08	77	8/24/07	92	9/11/06	100	9/26/05	73
9/8/08	88	8/27/07	88	9/15/06	245	9/30/05	60
9/12/08	112	8/31/07	115	9/18/06	200	10/3/05	68
9/15/08	140	9/3/07	105	9/25/06	95	10/7/05	81
9/19/08	110	9/7/07	101	9/29/06	107	10/10/05	96
9/22/08	138	9/10/07	91	10/2/06	95	10/14/05	88
9/26/08	116	9/14/07	89	10/6/06	83	10/17/05	100
9/29/08	89	9/17/07	94	10/9/06	113	10/21/05	87
10/3/08	96	9/21/07	87	10/13/06	119	10/24/05	92
10/6/08	106	9/24/07	100	10/16/06	209	10/28/05	85
10/10/08	86	9/28/07	105	10/20/06	146	10/31/05	106
10/20/08	115	10/1/07	101	10/23/06	109	11/4/05	146

CHICAGO SANITARY & SHIP CANAL CHLORIDE LEVELS AT LEMONT (CITGO's WATER INTAKE)

2008		2007		2006		2005	
Date	Chloride, mg/L	Date	Chloride, mg/L	Date	Chloride, mg/L	Date	Chloride, mg/L
10/24/08	124	10/5/07	99	10/27/06	126	11/7/05	126
10/27/08	119	10/8/07	110	10/30/06	120	11/11/05	105
10/31/08	127	10/12/07	107	11/3/06	134	11/14/05	132
11/3/08	145	10/15/07	107	11/6/06	149	11/18/05	110
11/7/08	146	10/19/07	104	11/13/06	118	11/21/05	116
11/10/08	152	10/22/07	91	11/17/06	108	11/25/05	128
11/14/08	115	10/26/07	103	11/20/06	128	11/28/05	128
11/17/08	147	10/29/07	114	11/24/06	140	12/2/05	146
11/21/08	149	11/2/07	111	11/27/06	143	12/5/05	130
11/24/08	154	11/5/07	122	12/1/06	105	12/9/05	183
11/28/08	149	11/9/07	120	12/4/06	14	12/12/05	192
		11/12/07	127	12/8/06	195	12/16/05	406
		11/16/07	130	12/11/06	236	12/19/05	264
		11/19/07	128	12/15/06	249	12/23/05	295
		11/23/07	122	12/18/06	200	12/26/05	253
		11/26/07	100	12/22/06	198	12/30/05	357
		11/30/07	103	12/25/06	129		
		12/7/07	261	12/29/06	139		
		12/10/07	717				
		12/14/07	**654**				
		12/17/07	404				
		12/21/07	**998**				
		12/24/07	**614**				
		12/28/07	488				
		12/31/07	412				
Average	**226**		**214**		**168**		**183**
Maximum	**896**		**998**		**484**		**835**

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

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Section: *NEWS*
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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.

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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.

ATTACHMENT 6

THERMAL EVALUATION OF THE CHICAGO SANITARY AND SHIP CANAL AND THE CALUMET-SAG CHANNEL AS IT PERTAINS TO FISHERIES QUALITY

THERMAL EVALUATION OF THE CHICAGO SANITARY AND SHIP CANAL AND THE CALUMET-SAG CHANNEL AS IT PERTAINS TO FISHERIES QUALITY

PREPARED FOR
CITGO PETROLEUM CORPORATION
AND
CORN PRODUCTS, INTERNATIONAL, INC.

PREPARED BY
HUFF & HUFF, INC.

MARCH 2009

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LIST OF ACRONYMS

CAWS	Chicago Area Waterway System
CSC	Calumet-Sag Channel
CWA	Clean Water Act
DC	Direct Current
D.O.	Dissolved Oxygen
IBI	Index of Biotic Integrity
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
INHS	Illinois Natural History Survey
IPCB	Illinois Pollution Control Board
MWRDGC	Metropolitan Water Reclamation District of Greater Chicago
QHEI	Qualitative Habitat Evaluation Index
RAS	Representative Aquatic Species
RM	River Mile
SEPA	Sidestream Elevated Pool Aeration
Ship Canal	Chicago Sanitary & Ship Canal
UILT	Upper Incipient Lethal Temperature

EXECUTIVE SUMMARY

The Illinois EPA has proposed new, more restrictive thermal water quality standards for the Chicago Sanitary and Ship Canal (Ship Canal). These proposed thermal limits were derived based upon laboratory fish studies using Representative Aquatic Species (RAS) and a model developed by Yoder. The proposed thermal limits are significantly more restrictive than the current standards, and also significantly more restrictive than the current thermal regime that exists on the Ship Canal.

The Chicago Area Waterways provide a unique opportunity to compare the fish quality on two man-made waterways, with and without the thermal stress. Specifically, both the Ship Canal and the Calumet-Sag Channel (CSC) are man-made waterways, with differing thermal characteristics. Therefore a comparison of the fisheries quality between these two water bodies would be expected to identify fishery limitations caused by thermal stress. Likewise, within the Ship Canal, comparing fish data from sampling points with different thermal characteristics would also be expected to identify limitations caused by thermal stress.

In that regard, July/August temperatures at Cicero Avenue on the Ship Canal average 85.9°F, compared to between 75.2 to 76.8°F along the entire CSC, or approximately 10°F warmer on average. Downstream along the Ship Canal, July/August temperatures are not as warm as at Cicero Avenue; however, the temperatures are still 3 to 6°F warmer than in the CSC. Temperatures at Cicero Avenue on the Ship Canal exceed the proposed temperature limits throughout the year.

Moreover, historical fish records have revealed that 79 fish species have been collected on the Ship Canal, versus 36 species on the CSC. More current fish collection data, after completion of the Sidestream Elevated Pool Aeration (SEPA) stations on the CSC, has yielded on average 8.5 species per site per sampling event on the Ship Canal versus 11.2 species on the CSC. Overall, recent collections by the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) have found a total of 22 fish species on the Ship Canal and 29 species on the CSC. The five most common fish encountered on each waterway is as follows:

Ship Canal	CSC
Gizzard Shad	**Gizzard Shad**
Common Carp	**Emerald Shiner**
Bluntnose Minnow	**Common Carp**
Pumpkinseed	**Bluntnose Minnow**
Emerald Shiner	Largemouth Bass

Four out of the five most common fish are identical in these two waterways.

In deriving temperature limits, Yoder selected eight Representative Aquatic Species (RAS). The bluntnose minnow was identified by Yoder as the most thermally sensitive of the eight RAS, with an upper incipient lethal temperature (UILT) of 90.3°F for this species. The bluntnose minnow is among the most common fish collected on the Ship Canal, despite summer temperatures that consistently exceed 90.3°F.

Although not utilized by Yoder in deriving temperature limits, the emerald shiner is also reported to be thermally sensitive with an UILT of 89.8°F. This is the fifth most common species collected on the Ship Canal. In 2005 the CSC experienced a two order of magnitude increase in the emerald shiners collected, otherwise, its population has historically been similar to that on the Ship Canal.

The resulting comparison in fisheries quality between the two waterways reveals they are similar. Additionally, when comparing fishery qualities within the Ship Canal, a higher than average species diversity was observed at the warmest sampling point. Existing thermal inputs into the Ship Canal do not appear to be a controlling or limiting factor in the fisheries quality that is present. In other words, if the thermal loading on the Ship Canal were to be lowered to the proposed thermal limits, there is no reason to expect any change in the fisheries quality present on the Ship Canal, based upon comparison of the fish and thermal regime on the CSC.

.

1. INTRODUCTION

There are significant difficulties in developing thermal limits based on laboratory tests. Results from such tests may not reflect actual impacts in receiving streams, where both acclimatization and avoidance mechanisms are at play. The Ship Canal and the Calumet-Sag Channel (CSC) are both man-made waterways that share many similar physical characteristics. However, the Ship Canal has a considerably warmer thermal regime, while the CSC does not. Therefore a comparison of fish community assemblages between these two waterways, as well as between various stations on the Ship Canal affords an opportunity to predict whether more stringent thermal water quality standards will result in improved fish quality and diversity on the Ship Canal. This report documents differences in thermal regimes and on fish communities within the Ship Canal and the CSC, which serves as a baseline for comparison. River mileages presented in this report are derived from the U.S Geological Survey Water-Resources Report: *River mileages and drainage areas for Illinois streams-Volume 2,* Illinois River Basin (Healy 1979). Pertinent pages from this publication are included in Appendix A.

2. EVALUATION OF STUDY AREA

2.1 Chicago Sanitary & Ship Canal

The Ship Canal flows south and west approximately 31.6 miles from the South Branch of the Chicago River and the South Fork of the South Branch of the Chicago River at Ashland Avenue in Chicago. The mouth of the Ship Canal is located at the Des Plaines River (at River Mile 16.9 on the Des Plaines River) in Will County, Illinois below the Lockport Lock and Dam.

Historical fisheries data are extensive for this man-made canal system, and include fisheries data from eight locations (River Mile (RM) 1.0, 10.5, 13.6, 14.1, 17.8, 24.0, 27.3, and 31.1) collected between 1985 and 2006 by the MWRDGC (MWRDGC 1998, 2008a, 2008b). Temperature data available for the Ship Canal come from six locations (RM 1.0, 6.0, 6.2, 14.1, 22.3, and 27.3), collected between 1998 and 2006 (FOIA response dated January 12, 2009 from the Metropolitan Water Reclamation District of Greater Chicago).

2.2 Calumet-Sag Channel

The CSC begins east of Interstate 57 where the Calumet River and the Little Calumet River converge. The CSC then flows south and west approximately 16.9 miles into the Ship Canal at River Mile 13.4 on the Ship Canal. Historical fisheries data are moderately extensive on the CSC, a man-made canal system, and include fisheries data from six locations (RM 0.3, 0.9, 11.7, 14.6, 15.7, and 16.9) collected between 1985 and 2005 by MWRDGC (MWRDGC 1998, 2008a, 2008b). The CSC has a unique feature in that between the years of 1992 to 1994 three SEPA stations were built at RM 0.3, 8.3, and 14.8 on the CSC. (Two additional SEPA stations are located on the Calumet River.) Given this supplemental oxygen supply, fisheries quality would be expected to improve after 1994 on the CSC, and also greater than on the Ship Canal, which does not have supplemental oxygen, except the improved dissolved oxygen (D.O.) from the final SEPA station 0.3 miles above the Ship Canal. Temperature data from the CSC include seven locations (RM 0.9, 4.3, 7.4, 8.3, 11.7, 13.7, and 16.7) collected between 1998 and 2008 (FOIA response dated January 12, 2009 from the Metropolitan Water Reclamation District of Greater Chicago).

3. EVALUATION OF AVAILABLE DATA

The MWRDGC began sampling for the Ambient Water Quality Monitoring (AWQM) Program at 59 stations on 21 waterways in 2001. Data from the MWRDGC study provides the basis from which to compare thermal effects on biological communities on the Ship Canal and CSC due to consistency in collection methods and sampling design.

3.1 Temperature

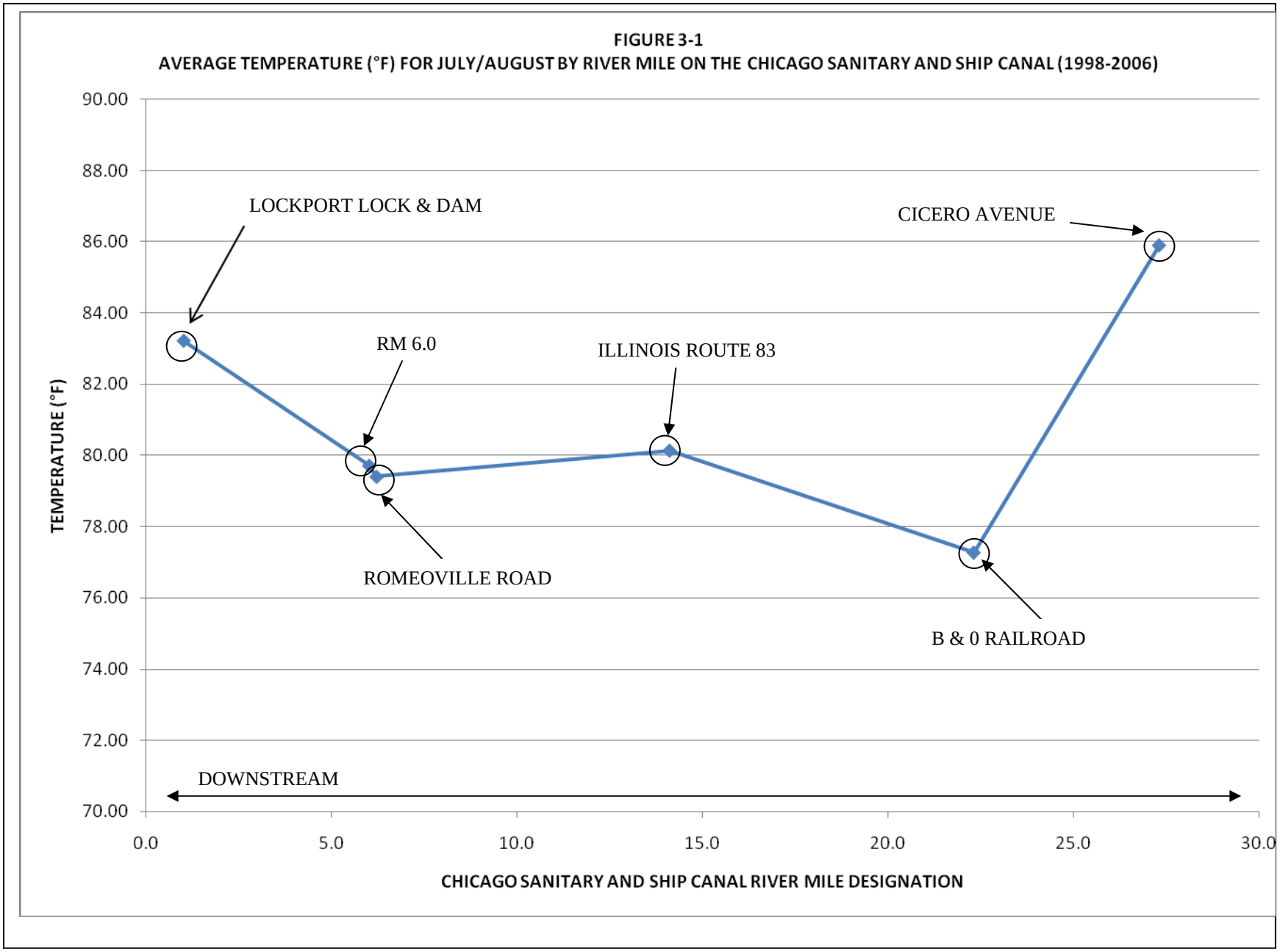
Temperature data collected by MWRDGC are available for both the Ship Canal and the CSC for the period 1998 through 2006 and 1998 through 2008, respectively (FOIA response dated January 12, 2009 from the MWRDGC). Period averages for Ship Canal stations are based on hourly temperature data and CSC period averages are based on continuous temperature data. Figure 3-1 presents the average July/August temperature on the Ship Canal from 1998 to 2006, while Figure 3-2 presents the average July/August temperature on the CSC from 1998 to 2008. The highest mean July/August temperature on the Ship Canal occurs at Cicero Avenue (RM 27.3), which averaged 85.9°F over these two months. The temperature then declines downstream of the West-Southwest Water Reclamation Plant at RM 22.3 to an average 77.3°F. The temperature then increases to an average 83.2°F at the furthest downstream location (RM 1.0). In general, the temperature on the CSC does not vary throughout the entire stream, with temperatures averaging between 75.2 and 76.8°F for the July/August period. Temperature data used in this report are included in Appendix B.

A detailed evaluation of yearly temperatures is presented in Figures 3-3 through 3-7 for those locations on the Ship Canal and CSC for which a comprehensive data set for all parameters of interest is available. These locations serve as the basis of comparison between the Ship Canal and CSC respectively. Figures 3-3, 3-4, and 3-5 depict temperature profiles for the Ship Canal at the Lockport Lock and Dam (RM 1.0), Illinois Route 83 (RM 14.1), and Cicero Avenue (RM 27.3). Figures 3-6 and 3-7 depict temperature profiles for the CSC at Illinois Route 83 (RM 0.9) and Cicero Avenue (RM 11.7).

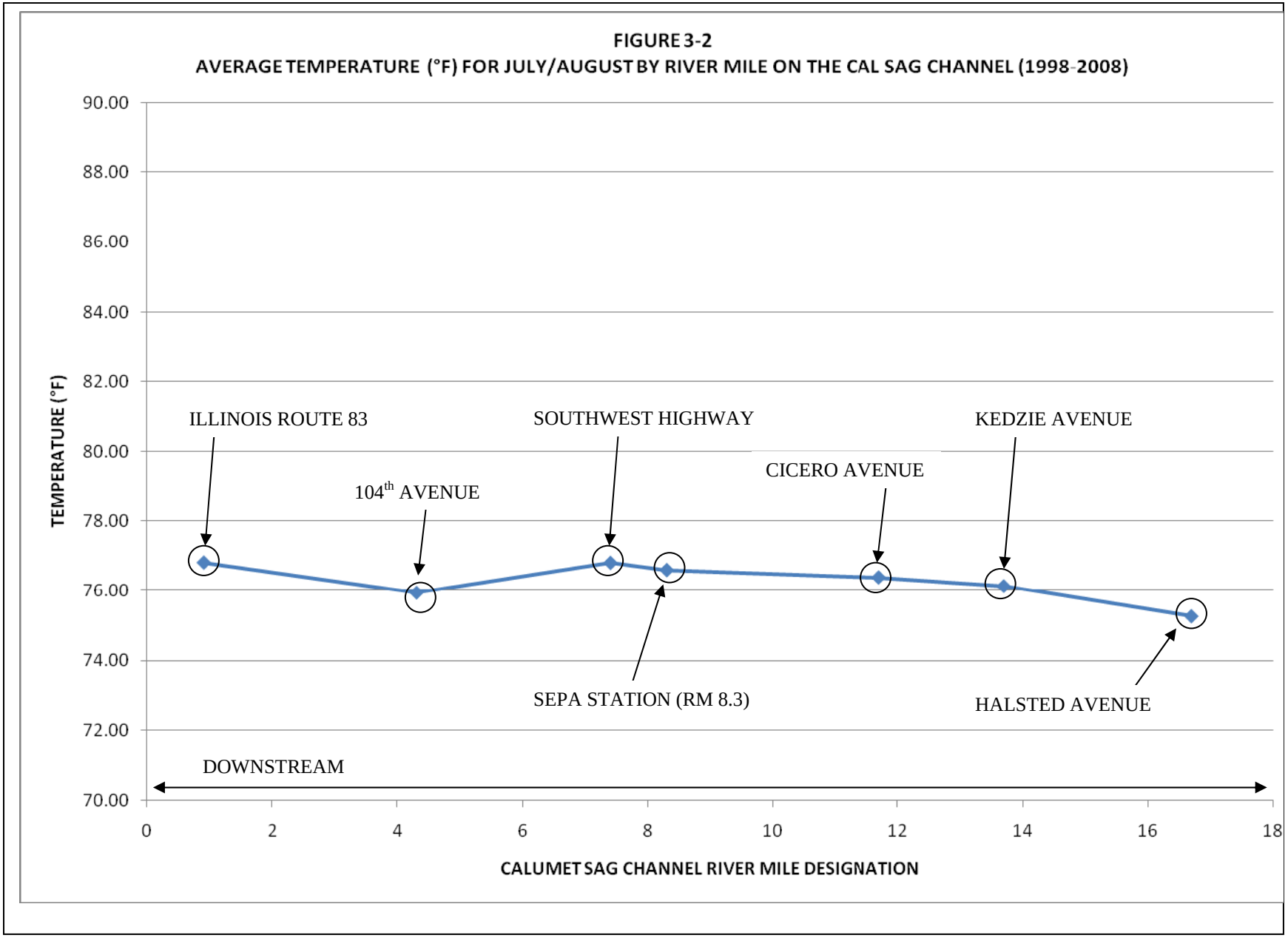
Figure 3-8 depicts the period average temperature pattern on the Ship Canal at Cicero Avenue, along with the Agency-proposed temperature period average limits and the current thermal limits. (IPCB, 2008). Both the highest period average for the six years of data, as well as the peak daily temperature in each period (24-hour average), is plotted on Figure 3-8. For the majority of the year, there is as much as a 20°F difference between the existing temperatures in the Ship Canal and what has been proposed by IEPA. It is also clear that the IEPA-proposed thermal limits would have an impact on far more than just the existing summer thermal regime.

Finally, Figure 3-9 contrasts the temperatures in the CSC (at Route 83) to the Ship Canal at Cicero. Most of the time, there is over a 10°F difference in temperatures, with the CSC being consistently colder. This temperature difference holds true for much of each year, with smaller differences during the spring and fall of the year. This figure provides a graphical representation of the difference in temperature regime between these two waterways over the course of several years.

From the thermal comparisons of the CSC and Ship Canal made above, if the proposed water quality thermal standards for the Ship Canal are truly necessary to protect the current and expected aquatic community in this waterway, one would expect significantly greater fish diversity on the CSC and a decreased abundance of more thermally sensitive fish on the Ship Canal. Information on historical fish data for these two waterways is presented in the next section.



"Data derived from FOIA response dated January 12, 2009 from MWRDGC for the years 1998-2006



"Data derived from FOIA response dated January 12, 2009 from MWRDGC for the years 1998 to 2008

FIGURE 3-3
CHICAGO SANITARY AND SHIP CANAL TEMPERATURE PROFILE AT LOCKPORT LOCK AND DAM (RM 1.0)

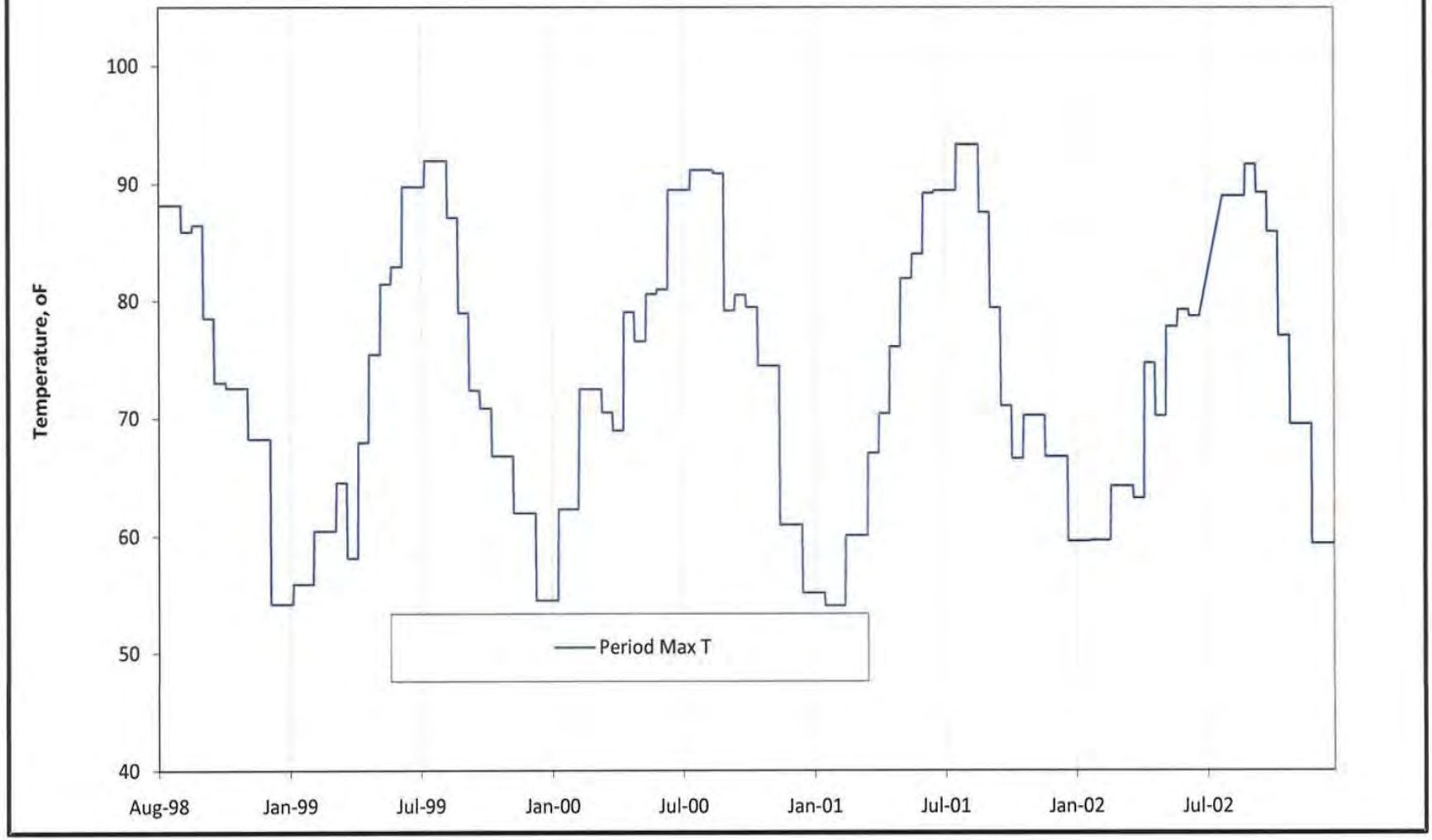


FIGURE 3-4
CHICAGO SANITARY AND SHIP CANAL TEMPERATURE PROFILE AT ILLINOIS ROUTE 83 (RM 14.1)

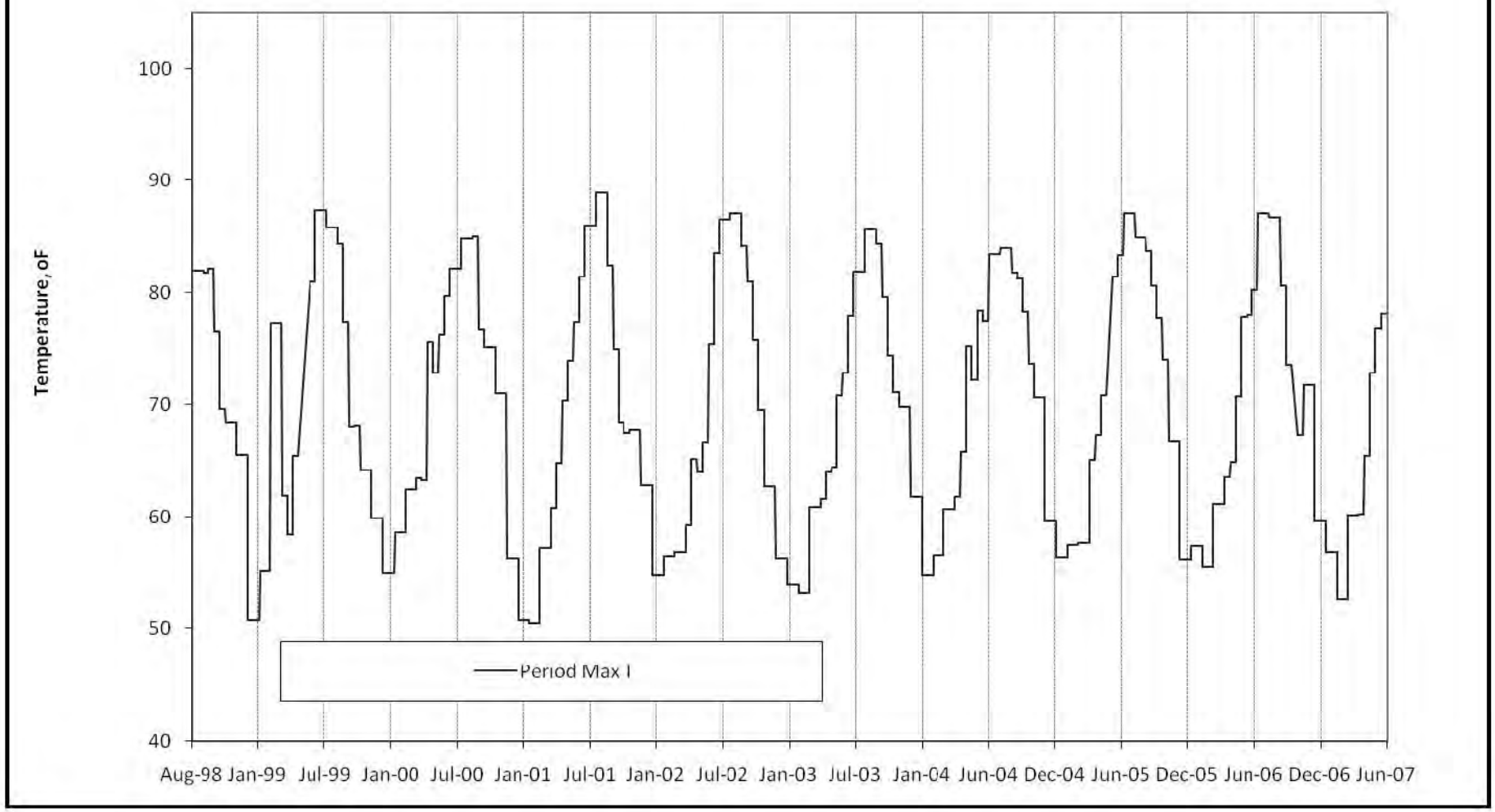


FIGURE 3-5
CHICAGO SANITARY AND SHIP CANAL TEMPERATURE PROFILE AT CICERO AVENUE (RM 27.3)

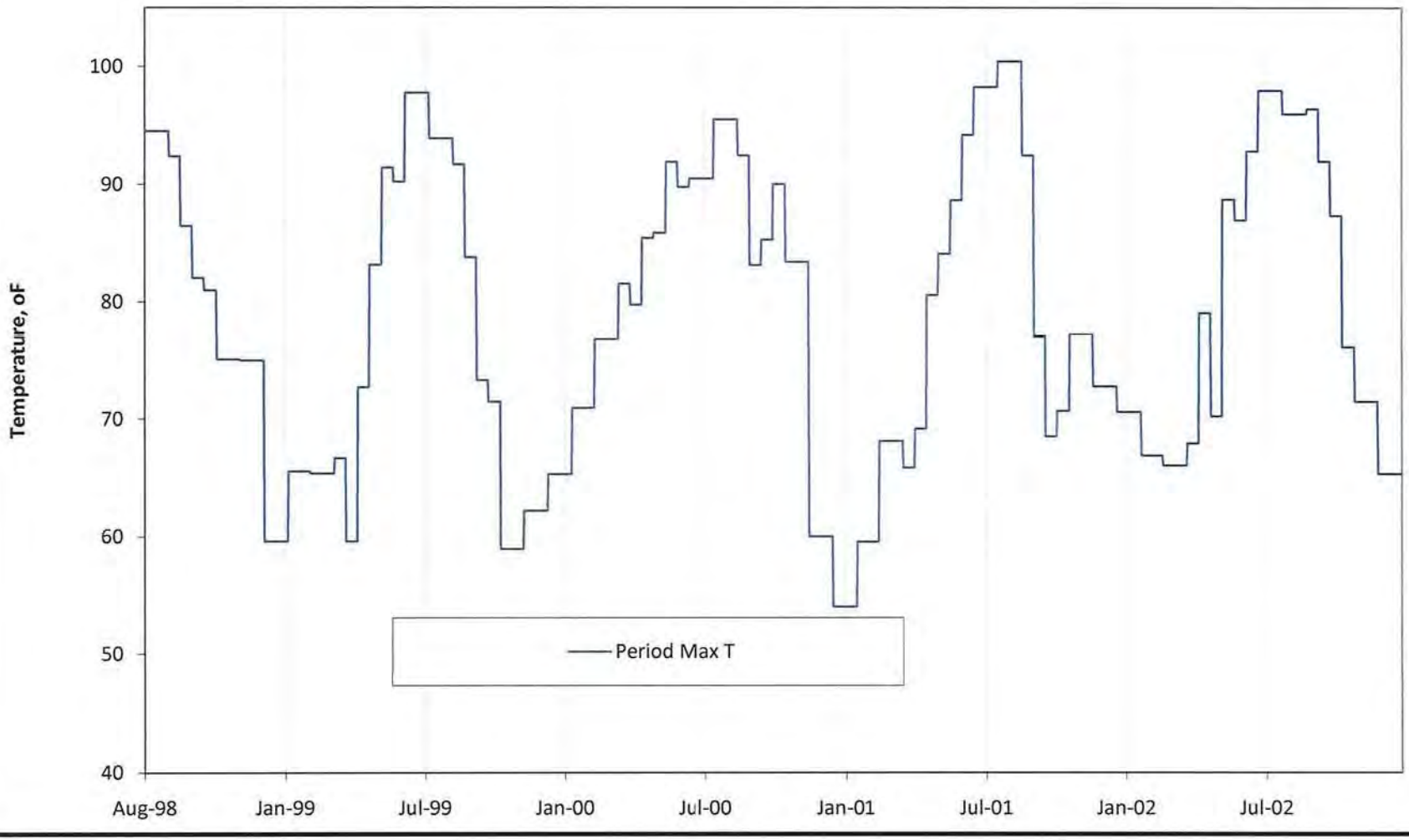


FIGURE 3-6
CALUMET SAG CHANNEL TEMPERATURE PROFILE AT ILLINOIS ROUTE 83 (RM 0.9)

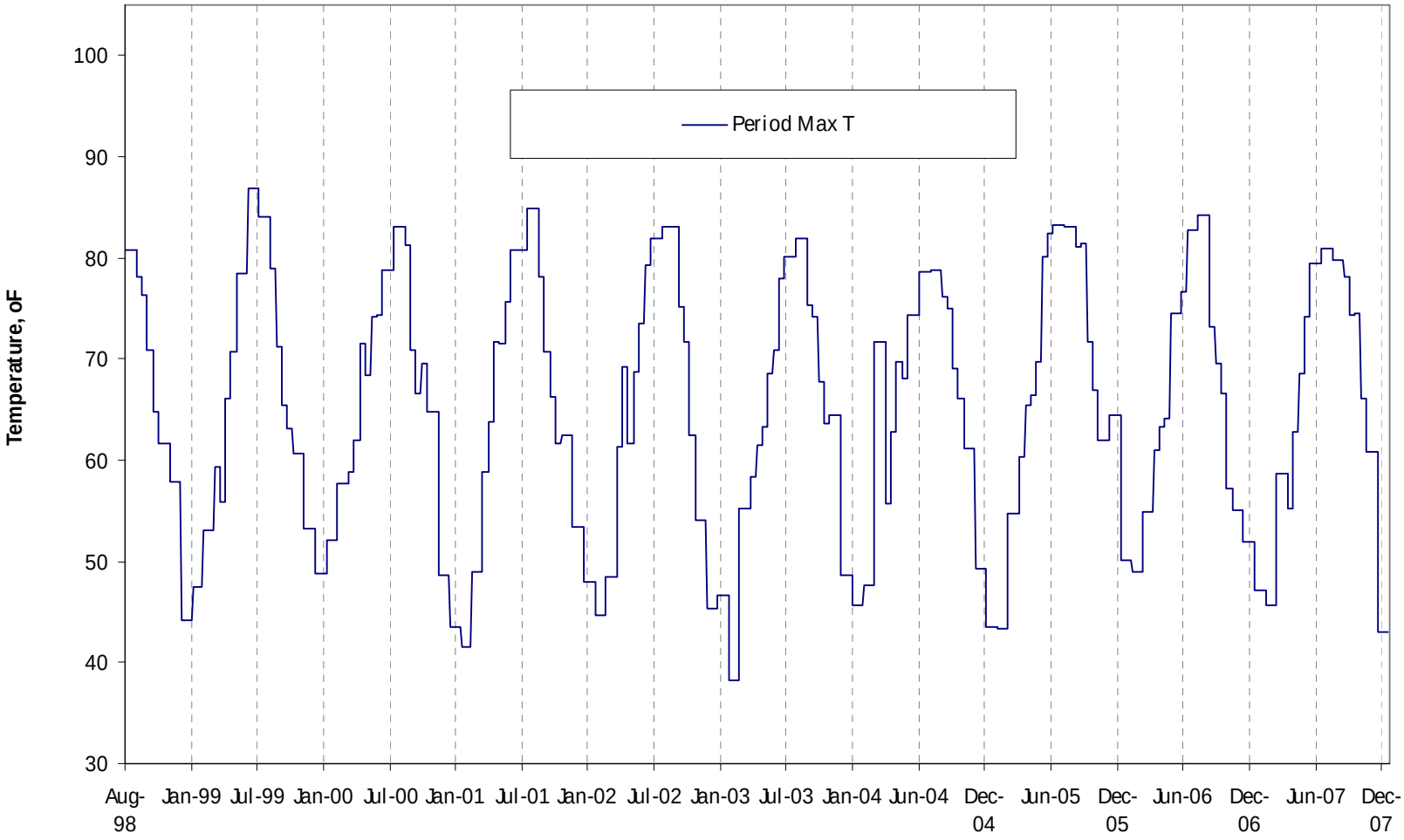


FIGURE 3-7
CALUMET SAG CHANNEL TEMPERATURE PROFILE AT CICERO AVENUE (RM 11.7)

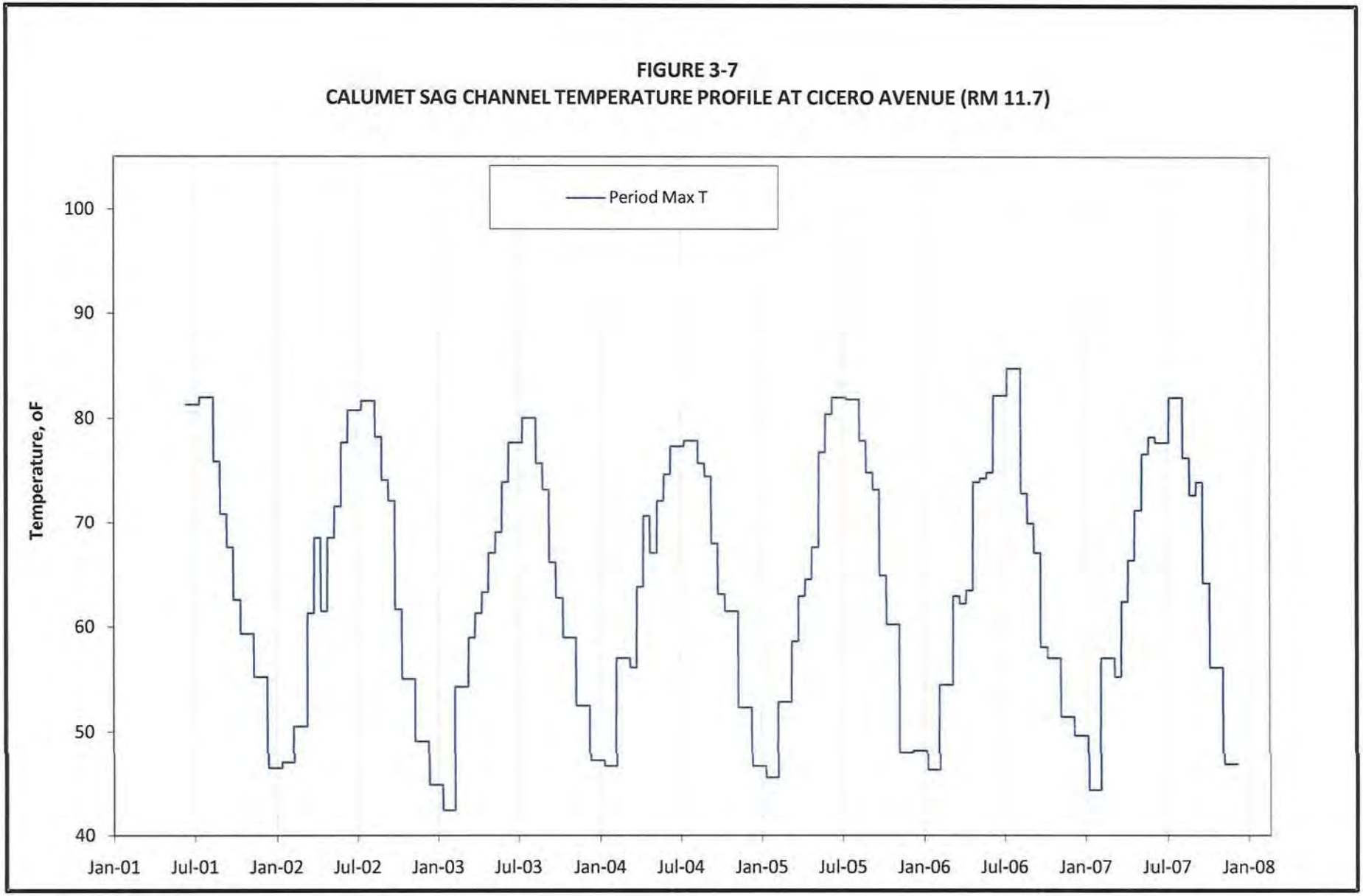


Figure 3-8
Cicero Avenue
Ship Canal at Cicero Period Average Temperatures and Limits

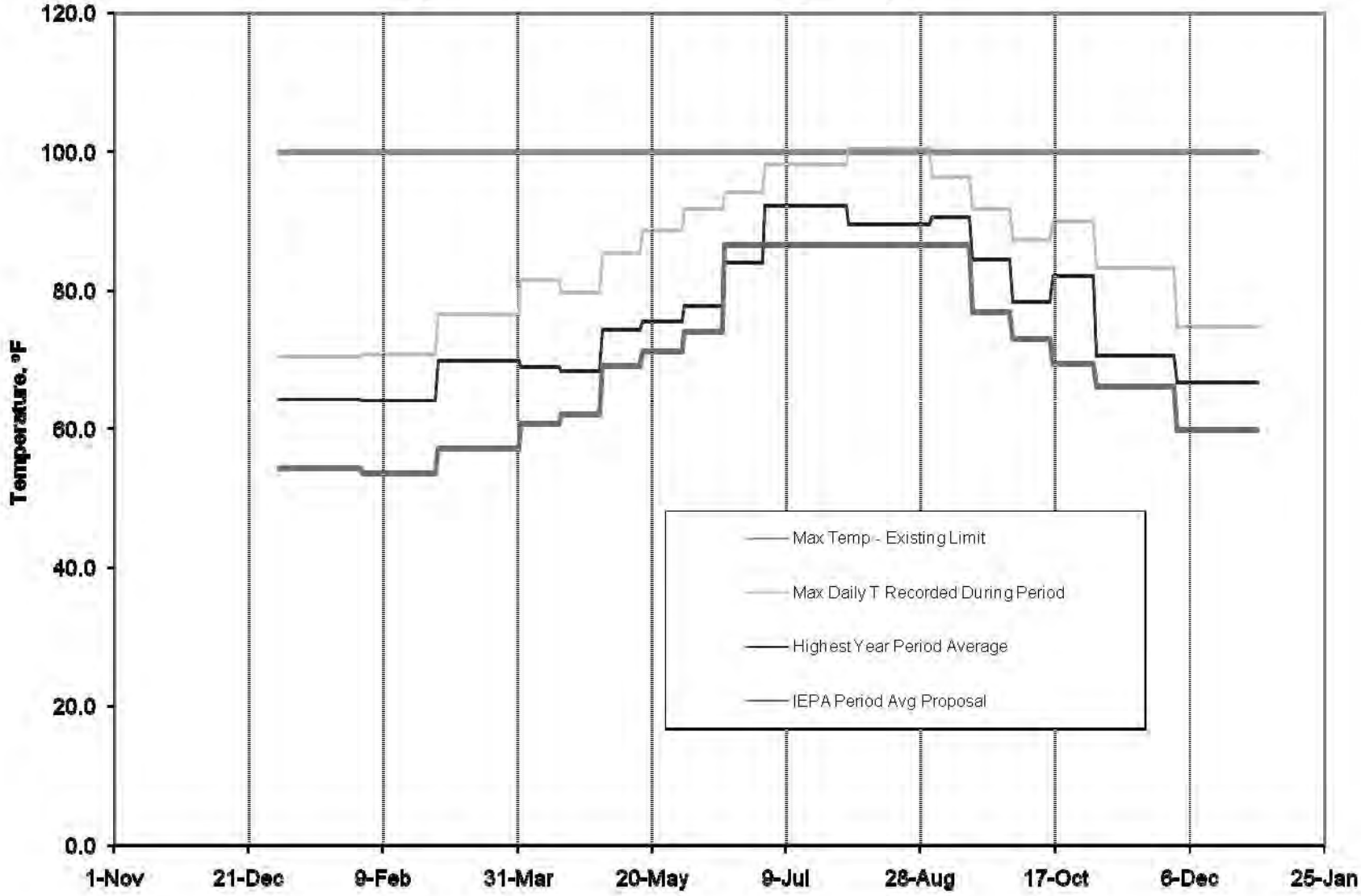
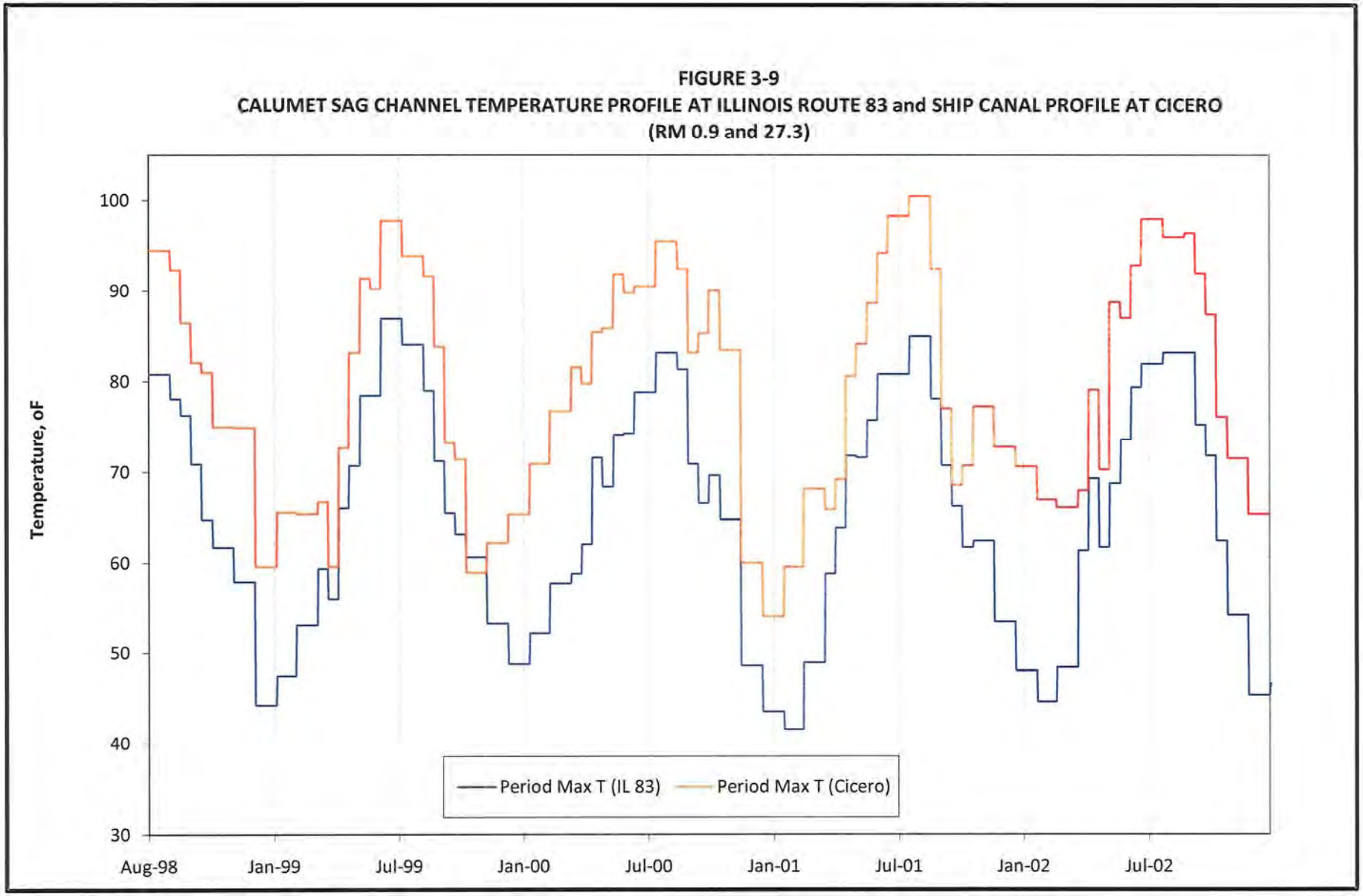


FIGURE 3-9
CALUMET SAG CHANNEL TEMPERATURE PROFILE AT ILLINOIS ROUTE 83 and SHIP CANAL PROFILE AT CICERO
(RM 0.9 and 27.3)



R:\Corn Products\CSSC Data\Cicero Avenue(CSSC).xls/Chart Annual

3.2 Fish Data

Historical fisheries data are extensive for the Ship Canal, and include data from eight locations (RM 1.0, 10.5, 13.6, 14.1, 17.8, 24.0, 27.3, and 31.1) collected between 1985 to 2005 by MWRDGC. Fisheries data for the CSC are available from six locations (RM 0.3, 0.9, 11.7, 14.6, 15.7, and 16.9) collected between 1985 and 2005 by MWRDGC. Historical fisheries collections from the Illinois Natural History Survey (INHS) and Illinois Department of Natural Resources (IDNR) were also searched in order to provide a historical baseline of species present in both the Ship Canal and CSC. A composite species list for these two streams based on the above data and collections housed at the INHS is presented in Table 3-1. Data used in this analysis is included in Appendix A.

Fish were sampled on the Ship Canal and CSC during the period between 2001 and 2005 by MWRDGC in association with their AWQM Program. Tables 3-2 and 3-3 present fisheries collection data from the MWRDGC AWQM Program on the Ship Canal and CSC, respectively. The level of effort expended for sampling was the same at each location with fish collected using a boat mounted electrofisher powered by a direct current (DC) generator with a sample length of 400 meters, with both sides of the canal segment being sampled (MWRDGC 2008a, 2008b).

Tables 3-4 and 3-5 summarize the fish collection data from Tables 3-2 and 3-3, respectively. Gizzard Shad is the dominant species on both waterways with a relative abundance of 53.7% on the Ship Canal and 39.8% on the CSC for the 2001 to 2005 sample period. Bluntnose minnow, which Yoder considered to be the most thermally sensitive of the eight RAS for the Ship Canal, had a relative abundance of 7.9% on the Ship Canal, compared to 5.5% on the CSC. From Table 3-3, the emerald shiner in 2005 increased two orders of magnitude from the previous years along the CSC. A similar trend was noted on the Ship Canal in 2005 at RM 13.6 and to a lesser degree at RM 24.0. These are the two stations closest to the CSC. Sampling in 2005 also collected more fish species at most stations on both waterways than in the previous years under the AWQM programs. On both the CSC and the Ship Canal, no darter or red horse species were collected during the five years of sampling conducted by MWRDGC as part of the AWQM Program. Most darter and red horse species are thermally sensitive, and their absence from the cooler CSC waters is an indication that poor habitat is keeping these two groups from inhabiting these waterways.

TABLE 3-1
HISTORICAL FISH SPECIES COMPARISON BETWEEN THE CHICAGO SANITARY & SHIP CANAL (CSSC) AND THE CALUMET SAG CHANNEL (CSC)

		CSSC	CSC			CSSC	CSC
Skipjack Herring	*Alosa chrysochloris*	×		Redfin Shiner	*Lythrurus umbratilis*	×	
Alewife	*Alosa pseudoharengus*	×	×	Smallmouth Bass	*Micropterus dolomieu*	×	×
Rock Bass	*Ambloplites rupestris*	×		Largemouth Bass	*Micropterus salmoides*	×	×
Black Bullhead	*Ameiurus melas*	×	×	Spotted Sucker	*Minytrema melanops*	×	
Yellow Bullhead	*Ameiurus natalis*	×	×	Oriental Weatherfish	*Misgurnus anguillicaudatus*	×	
Bowfin	*Amia calva*	×		White Perch	*Morone americana*	×	×
Freshwater Drum	*Aplodinotus grunniens*	×	×	White Bass	*Morone chrysops*	×	
Central Stoneroller	*Campostoma anomalum*	×		Yellow Bass	*Morone mississippiensis*	×	×
Goldfish	*Carassius auratus*	×	×	Striped Bass	*Morone saxatilis*		×
River Carpsucker	*Carpiodes carpio*	×		Silver Redhorse	*Moxostoma anisurum*	×	
Quillback	*Carpiodes cyprinus*	×		Black Redhorse	*Moxostoma duquesnei*	×	
White Sucker	*Catostomus commersoni*	×	×	Golden Redhorse	*Moxostoma erythrurum*	×	
Grass Carp	*Ctenopharyngodon idella*	×		Shorthead Redhorse	*Moxostoma macrolepidotum*	×	
Brook Stickleback	*Culaea inconstans*	×		Round Goby	*Neogobius melanostomus*	×	×
Red Shiner	*Cyprinella lutrensis*	×		Hornyhead Chub	*Nocomis biguttatus*	×	
Spotfin Shiner	*Cyprinella spiloptera*	×		Golden Shiner	*Notemigonus crysoleucas*	×	×
Common Carp	*Cyprinus carpio*	×	×	Emerald Shiner	*Notropis atherinoides*	×	×
Gizzard Shad	*Dorosoma cepedianum*	×	×	Ghost Shiner	*Notropis buchanani*	×	×
Threadfin Shad	*Dorosoma petenense*	×		Spottail Shiner	*Notropis hudsonius*	×	×
Grass Pickerel	*Esox americanus*	×		Sand Shiner	*Notropis ludibundus*	×	×
Northern Pike	*Esox lucius*	×		Mimic Shiner	*Notropis volucellus*	×	
Johnny Darter	*Etheostoma nigrum*	×		Tadpole Madtom	*Noturus gyrinus*	×	×
Blackstripe Topminnow	*Fundulus notatus*	×		Rainbow Trout	*Oncorhynchus mykiss*	×	×
Mosquitofish	*Gambusia affinis*	×		Chinook Salmon	*Oncorhynchus tshawytscha*	×	×
Threespine Stickleback	*Gasterosteus aculeatus*	×		Nile Tilapia	*Oreochromis niloticus*	×	
Pallid Shiner	*Hybopsis amnis*	×		Rainbow Smelt	*Osmerus mordax*	×	×
Bighead Carp	*Hypophthalmichthys nobilis*	×		Yellow Perch	*Perca flavescens*	×	×
Channel Catfish	*Ictalurus punctatus*	×	×	Logperch	*Percina caprodes*	×	
Smallmouth Buffalo	*Ictiobus bubalus*	×		Blackside Darter	*Percina maculata*	×	
Bigmouth Buffalo	*Ictiobus cyprinellus*	×		Slenderhead Darter	*Percina phoxocephala*	×	
Black Buffalo	*Ictiobus niger*	×		Bluntnose Minnow	*Pimephales notatus*	×	×
Brook Silverside	*Labidesthes sicculus*	×		Fathead Minnow	*Pimephales promelas*	×	×
Longnose Gar	*Lepisosteus osseus*	×		Bullhead Minnow	*Pimephales vigilax*	×	
Green Sunfish	*Lepomis cyanellus*	×	×	Flathead Catfish	*Pylodictis olivaris*	×	
Pumpkinseed	*Lepomis gibbosus*	×	×	White Crappie	*Pomoxis annularis*		×
Warmouth	*Lepomis gulosus*	×	×	Black Crappie	*Pomoxis nigromaculatus*	×	×
Orangespotted Sunfish	*Lepomis humilis*	×	×	Brown Trout	*Salmo trutta*	×	
Bluegill	*Lepomis macrochirus*	×	×	Creek Chub	*Semotilus atromaculatus*	×	×
Longear Sunfish	*Lepomis megalotis*	×		Sauger	*Stizostedion canadense*	×	
Striped Shiner	*Luxilus chrysocephalus*	×		Walleye	*Stizostedion vitreum*	×	
				Central Mudminnow	*Umbra limi*	×	×
				Total Species		79	36

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TABLE 3-2
MWRDGC AMBIENT WATER QUALITY MONITORING PROGRAM FISH COLLECTIONS
CHICAGO SANITARY AND SHIP CANAL (2001-2005)

RIVER MILE	1.0 2001	1.0 2002	1.0 2003	1.0 2004	1.0 2005	10.5 2002	13.6 2003	13.6 2004	13.6 2005	14.1 2002	24.0 2001	24.0 2002	24.0 2003	24.0 2004	24.0 2005	27.3 2001	27.3 2002	27.3 2003	27.3 2004	27.3 2005	31.1 2002	NUMBER COLLECTED	RELATIVE ABUNDANCE	RANK
Skipjack Herring					3																	3	0.1%	
Gizzard shad	51	50	19	3	159	7	91	27	180	1	59	83	54	102	603	47	37	88	48	106	10	1825	53.7%	1
Chinook Salmon									1													1	0.0%	
Goldfish											1	3		1	6	1	1	4	1		1	19	0.6%	
Carp	26	11	43	12	3	2	2	7	4	3	16	35	15	29	36	93	82	15	53	46	58	591	17.4%	2
Golden Shiner					1							4	2	1	14				12		18	52	1.5%	7
Emerald Shiner		2	1		8	3	4	6	120		2	4		1	33	1	1		1		5	192	5.6%	5
Spotfin Shiner							1	2	1		1	4	2	4	2		2	2	1	2		24	0.7%	
Bluntnose Minnow						12		6	3		4	12	112	29	14	10	3	2	33	16	13	269	7.9%	3
Fathead Minnow														1	1							2	0.1%	
Yellow Bullhead					1		2	1		1	1	3	4	2	4		2	4	2	4		31	0.9%	
Channel Catfish		2	1	2	2		2		3							1			2		2	17	0.5%	
Mosquitofish										25		27	1	1	2	2			1			59	1.7%	6
White Bass								1														1	0.0%	
White Perch									2													2	0.1%	
Yellow Bass									3						1							4	0.1%	
Green sunfish		1	1					1	1	2		1	3			5	1	6	7	2		31	0.9%	
Pumpkinseed			1		1				2		2	12	31	20	40	21	6	16	28	8	28	216	6.4%	4
Bluegill			1					5							1	4					7	18	0.5%	
Largemouth bass				5			4	8	13		2			1							6	39	1.1%	8
Freshwater drum		1			1																	2	0.1%	
Round Goby							1		1					1								3	0.1%	
Total Species	2	6	7	4	9	4	8	10	13	5	9	11	9	13	13	10	9	8	12	7	10	3401	100.00%	

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TABLE 3-3
MWRDGC AMBIENT WATER QUALITY MONITORING PROGRAM FISH COLLECTIONS
CALUMET SAG CHANNEL (2001-2005)

RIVER MILE	0.3 2003	0.3 2004	0.3 2005	0.9 2003	8.3 2003	8.3 2004	8.3 2005	11.7 2001	11.7 2002	11.7 2003	11.7 2004	11.7 2005	14.6 2003	14.6 2005	15.7 2003	NUMBER COLLECTED	RELATIVE ABUNDANCE	RANK
Gizzard shad	107	19	167	11	49	27	251	61	33	3	102	145	88	70	30	1163	39.8%	1
Rainbow Trout													1			1	0.0%	
Chinook Salmon														1		1	0.0%	
Goldfish				1			9	1	2					4	1	18	0.6%	
Carp	1	2	3	12	13	35	5	23	15	11	25	21	20	16	26	228	7.8%	3
Golden Shiner	1		7				1					7		2		18	0.6%	
Emerald Shiner	4		200		11	1	345	6	29			234	3	102		935	32.0%	2
Spotfin Shiner	1															1	0.0%	
Spottail Shiner					1	1	1									3	0.1%	
Sand Shiner							1									1	0.0%	
Bluntnose Minnow	3		5	11	4	7	29	7	41	12	1	27	1	9	5	162	5.5%	4
Fathead Minnow							2		5	2						9	0.3%	
Creek Chub								1		1				1		3	0.1%	
White Sucker					1								3	1		5	0.2%	
Black Bullhead										1		1				2	0.1%	
Yellow Bullhead			2	2				1	1	1	1				2	10	0.3%	
Channel Catfish	9		6											4		19	0.7%	
Tadpole Madtom			1													1	0.0%	
White Perch			1		6	1	6		2	2		6	3	11	3	41	1.4%	7
Yellow Bass			3			1	4				2	4	1	9	2	26	0.9%	8
Striped Bass													1			1	0.0%	
Green sunfish	1	8	4	3	1	1	1	5	9	12	3				9	57	2.0%	6
Pumpkinseed	1		6						2			1	2		1	13	0.4%	
Bluegill	4		1		1	2		1	1	1			6		5	22	0.8%	
Smallmouth Bass					2	2								2		6	0.2%	
Largemouth bass	11	1	8	3	4	4	5	21	31	9	9	7	18	13	8	152	5.2%	5
Black Crappie											1					1	0.0%	
Freshwater drum							3		3	1	1			3	2	13	0.4%	
Round Goby			1								2		1	5		9	0.3%	
Total Species	11	4	15	7	11	11	14	10	13	12	10	10	13	15	12	2921	100.0%	

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TABLE 3-4
SUMMARY OF FISH COLLECTED BY STATION
CHICAGO SANITARY AND SHIP CANAL

	RELATIVE ABUNDANCE (2001-2005) MWRDGC AWQM PROGRAM SAMPLING[1]						
River Mile	1.0	10.5	13.6	14.1	24.0	27.3	31.1
Skipjack Herring	0.7						
Gizzard shad	68.4	29.2	59.0	3.1	62.1	39.3	6.8
Chinook Salmon			0.2				
Goldfish					0.8	0.8	0.7
Carp	23.1	8.3	2.6	9.4	9.0	34.8	39.2
Golden Shiner	0.2				1.4	1.4	12.2
Emerald Shiner	2.7	12.5	25.7		2.8	0.4	3.4
Spotfin Shiner			0.8		0.9	0.8	
Bluntnose Minnow		50.0	1.8		11.8	7.7	8.8
Fathead Minnow					0.1		
Yellow Bullhead	0.2		0.6	3.1	1.0	1.4	
Channel Catfish	1.7		1.0			0.4	1.4
Mosquitofish				78.1	2.1	0.4	
White Bass			0.2				
White Perch			0.4				
Yellow Bass			0.6		0.1		
Green sunfish			0.4	6.3	0.3	2.5	
Pumpkinseed	0.5		0.4		7.2	9.5	18.9
Bluegill	0.5		1.0		0.1	0.5	4.7
Largemouth bass	0.2		5.0		0.2		4.1
Freshwater drum	1.2						
Round Goby	0.5		0.4		0.1		

[1] Sources: MWRDGC 2008a, 2008b.

TABLE 3-5
SUMMARY OF FISH COLLECTED BY STATION
CALUMET SAG CHANNEL

	RELATIVE ABUNDANCE (2001-2005) MWRDGC AWQM PROGRAM SAMPLING[1]					
River Mile	0.3	0.9	8.3	11.7	14.6	15.7
Gizzard shad	49.8	25.6	39.0	35.9	39.4	31.9
Rainbow Trout					0.2	
Chinook Salmon					0.2	
Goldfish		2.3	1.1	0.3	1.0	1.1
Carp	1.0	27.9	6.3	9.9	9.0	27.7
Golden Shiner	1.4		0.1	0.7	0.5	
Emerald Shiner	34.7		42.6	28.1	26.2	
Spotfin Shiner	0.2					
Spottail Shiner			0.4			
Sand Shiner			0.1			
Bluntnose Minnow	1.4	25.6	4.8	9.2	2.5	5.3
Fathead Minnow			0.2	0.7		
Creek Chub				0.2	0.2	
White Sucker			0.1		1.0	
Black Bullhead				0.2		
Yellow Bullhead	0.3	4.7		0.4		2.1
Channel Catfish	2.6				1.0	
Tadpole Madtom	0.2					
White Perch	0.2		1.6	1.0	3.5	3.2
Yellow Bass	0.5		0.6	0.6	2.5	2.1
Striped Bass					0.2	
Green sunfish	2.2	7.0	0.4	3.0		9.6
Pumpkinseed	1.2			0.3	0.5	1.1
Bluegill	0.9		0.4	0.3	1.5	5.3
Smallmouth Bass			0.5		0.5	
Largemouth bass	3.4	7.0	1.6	8.0	7.7	8.5
Black Crappie				0.1		
Freshwater drum			0.4	0.5	0.7	2.1
Round Goby	0.2			0.2	1.5	

[1] Sources: MWRDGC 2008a, 2008b.

3.3 Habitat Quality

Habitat along the Ship Canal and CSC was evaluated by the MWRDGC between 2002 and 2005 as part of its AWQM Program. Sites were analyzed using the Qualitative Habitat Evaluation Index (QHEI). Six locations along the Ship Canal (RM 1.0, 10.5, 14.1, 24.0, 27.3, and 31.1) and three locations along the CSC (RM 0.9, 11.7, and 15.7) were evaluated for habitat quality using the QHEI. Sites along both the Ship Canal and CSC had similar scores ranging from 32 to 40 on the Ship Canal and from 37 to 41 on the CSC (Table 3-6). Values ranging from 30 to 45 are considered to be of "poor quality" and are consistent with the habitat quality one would expect from these channelized, man-made canal systems. Table 3-6 presents these data.

The CSC and the Ship Canal share similar physical characteristics. For example, both are entirely man-made, both are deep-draft, each has limited shallow area along its banks, and both have a high volume of commercial navigation (Dennison, 2008). Additionally, both the Ship Canal and the CSC are dominated by soft homogenous sediments that are not conducive to a balanced benthic invertebrate community, being dominated by pollution tolerant invertebrates (MWRDGC 2008a, 2008b). Overall, both the CSC and Ship Canal exhibit similar habitat limitations, with the Ship Canal being of marginally poorer quality.

TABLE 3-6
QUALITATIVE HABITAT EVALUATION INDEX (QHEI) VALUES FOR THE CHICAGO SANITARY AND SHIP CANAL AND THE CALUMET SAG CHANNEL (2002-2005)[1]

RIVER MILE	WATERWAY	LOCATION	QHEI SCORE	QHEI RATING
1.0	SHIP CANAL (2005)	LOCKPORT LOCK AND DAM	40	POOR
10.5	SHIP CANAL (2002)	STEPHEN STREET	37	POOR
14.1	SHIP CANAL (2002)	ILLINOIS ROUTE 83	38	POOR
24.0	SHIP CANAL (2005)	HARLEM AVENUE	35	POOR
27.3	SHIP CANAL (2005)	CICERO AVENUE	32	POOR
31.1	SHIP CANAL (2002)	DAMEN AVENUE	34	POOR
0.9	CALUMET-SAG CHANNEL (2003)	ILLINOIS ROUTE 83	41	POOR
11.7	CALUMET-SAG CHANNEL (2004)	CICERO AVENUE	37	POOR
11.7	CALUMET-SAG CHANNEL (2005)	CICERO AVENUE	37	POOR
15.7	CALUMET-SAG CHANNEL (2003)	ASHLAND AVENUE	39	POOR

[1]Sources: Metropolitan Water Reclamation District of Greater Chicago. January 2008. Report No. 08-2.
Metropolitan Water Reclamation District of Greater Chicago. June 2008. Report No. 08-33.

4. DISCUSSION

When comparing the CSC to the Ship Canal some differences are readily apparent. Mean temperature during July and August on the CSC for the period 1998 through 2008 was relatively constant between RM 0.9 to RM 16.7 with a combined mean of 76.3°F. Temperatures by stations ranging between (75.2 and 76.8°F). Mean temperatures over the same period on the Ship Canal were more variable and ranged from (77.3 to 85.9°F) with an overall mean of 80.9°F between RM 1.0 and 27.3. Overall, mean temperatures on the Ship Canal for the July/August period 1998 through 2006, averaged two to three degrees higher than those recorded on the CSC, and at the warmest stations, up to a 9°F difference has been noted.

Fish data collected between 2001 and 2005 from the MWRDGC AWQM Program indicate the five most commonly-encountered species in the Ship Canal were gizzard shad, common carp, bluntnose minnow, pumpkinseed, and emerald shiner. The five most commonly encountered species on the CSC were gizzard shad, emerald shiner, common carp, bluntnose minnow, and largemouth bass. For those stations in the MWRDGC study, the average number of species caught on the Ship Canal was 8.5 per sampling event, while the average number of species caught on the CSC was 11.2 per sampling event. The MWRDGC surveys yielded 22 species of fish from the Ship Canal while 29 species were collected on the CSC. At the warmest location on the Ship Canal, Cicero Avenue (RM 27.3), 13 species were collected between 2001 and 2005 with gizzard shad, common carp, pumpkinseed, bluntnose minnow, and green sunfish encountered with the greatest frequency and were the most abundant species. The second warmest sampling station is located at RM 1.0. gizzard shad, common carp, emerald shiner, and channel catfish were the most abundant species at this location. Emerald shiner was the second most common species on the CSC, attributed to the two orders of magnitude increases in 2005. This species is common throughout the State of Illinois in large rivers (Smith, 1979), but it was not utilized by Yoder in deriving temperature limits for the Chicago area waterway system (CAWS) (Yoder et al. 2005).

Eight species of fish were selected as Representative Aquatic Species (RAS) by Yoder to derive temperature limits, for secondary contact waterways. These eight species, were gizzard shad, common carp, golden shiner, fathead minnow, bluntnose minnow, black bullhead, largemouth

bass, and green sunfish (Yoder et al. 2005). The bluntnose minnow was identified by Yoder as the most thermally sensitive of the eight species. Yoder suggested a UILT of 90.3°F for this species. The bluntnose minnow and three of the eight species utilized by Yoder were among the most populous species collected during the 2001 to 2005 MWRDGC AWQM Program collections at Cicero Avenue (RM 27.3) on the Ship Canal. As depicted in Figure 3-5, these fish experience a thermal regime significantly higher than the levels cited by Yoder as being necessary for the protection of the species.

Thermal parameters compiled by Midwest Biodiversity Institute (2005) were used as the primary database for deriving the Lower Des Plaines River temperature criteria options. From this model used to derive temperature criteria options proposed by the Illinois EPA, the UILT for the emerald shiner was 89.8°F, while the UILT for the bluntnose minnow was 90.3°F. The emerald shiner was well represented in collections on both streams, being the second most populous species collected on the CSC, and the fifth most populous species collected on the Ship Canal during the MWRDGC AWQM Program studies. Although the emerald shiner was found in higher numbers on the CSC, it represented a significant portion of the fish community within both streams. The higher numbers on the CSC are attributed to the two orders of magnitude increase observed in 2005.

The bluntnose minnow and the emerald shiner are both Cyprinids which can occupy similar niches in the stream environment and exhibit almost identical UILT's. Due to this similarity, one can postulate that temperature regimes that support the presence of the bluntnose minnow would additionally support the presence of the emerald shiner. Additionally, because these species can occupy similar niches in the environment, and have overlapping dietary preferences with both species taking small aquatic invertebrates as a portion of their diet (Smith 1979) it is likely that the poor habitat quality of the CSC and Ship Canal increase competition for resources between these two species. Community assembly rules explain the species composition of local communities given the composition of the regional species pool and the environment in which the species live (Roughgarden 1989; Wiens 1989; Fox and Brown 1993). Winston (1995) found that interspecific competition explained a significantly low degree of co-occurrence between morphologically similar species of stream fishes. This low degree of co-occurrence is noticeable in the MWRDGC AWQM data presented in Tables 3-2 and 3-3 where for those sites reporting

significant numbers of emerald shiners relatively few bluntnose minnows were collected on the CSC, and for those sites reporting significant numbers of bluntnose minnows very few emerald shiners were collected on the Ship Canal.

Historical fisheries records show that the fisheries diversity in the Ship Canal is nearly double that of the CSC (79 species versus 36 species, respectively). Recent surveys conducted by MWRDGC suggest the species richness on the CSC is now greater (29 versus 22 species), possibly as the result of the contribution of the SEPA status. However, at Cicero Avenue on the warmest stretch of the Ship Canal, the average species diversity (9.2) exceeds the average overall diversity by station for the Ship Canal (8.5). Temperature data available for the CSC and Ship Canal indicate that temperature regimes in the Ship Canal differ substantially from the CSC, with much warmer recorded temperatures occurring throughout the Ship Canal drainage than found in the CSC. From comparisons of the existing fish and temperature data for these two waterways, it can be concluded that the current temperature patterns existing in the Ship Canal have not impacted fisheries quality when referencing the CSC as a baseline comparison. Additionally, one would expect to see improved fisheries quality in the CSC since the installation of SEPA stations, which provide for increased D.O. for fisheries resources in these man-made canals.

A summary of available data providing a baseline of comparison between the Ship Canal and the CSC is presented in Table 4-1. Two stations located at Illinois Route 83 (RM 0.9) and Cicero Avenue (RM 11.7) on the CSC and three stations located at Lockport Lock and Dam (RM 1.0), Illinois Route 83 (RM 14.1), and Cicero Avenue (RM 27.3) for the Ship Canal provide a baseline for comparison between the two canal systems. Index of Biotic Integrity (IBI) scores fall within the “Poor” Category for all sites, and QHEI values rate all sites as being of “poor” habitat quality. Temperature varies dramatically between the CSC and Ship Canal; however, at Cicero Avenue (RM 27.3) on the Ship Canal, the warmest location on the waterway, nearly 8 percent of the catch was comprised of the *thermally sensitive* bluntnose minnow, one of the 8 RAS used by Yoder (2005) to derive temperature limits for the currently designated Secondary Contact waterways. When comparing data between the CSC and Ship Canal, habitat quality and fisheries quality remain similar, while the thermal regimes are considerably different. From the data summarized in Table 4-1, existing thermal inputs into the Ship Canal do not appear to be a controlling or limiting factor in the fisheries quality that is present. In other words, if the thermal

loading on the Ship Canal were to be lowered to the proposed thermal limits, there is no reason to expect any change in the fish quality present on the Ship Canal based upon the data and comparison with the CSC presented herein.

TABLE 4-1
Summary of Available Data for Specific Sample Locations on the Calumet Sag Channel and the Chicago Sanitary and Ship Canal (2001-2005) from the MWRDGC Ambient Water Quality Monitoring Program (Temperature Data Summarized from 2001-2005)[1]

METRIC	CSC		Ship Canal		
Common Location Name	IL 83	Cicero	Lockport	IL 83	Cicero
River Mile Designation	0.9	11.7	1.0	14.1	27.3
Average Temperature (July/August) (°F)	76.8	76.4	83.2	80.1	85.9
QHEI Score	41.0	37.0	40.0	38.0	32.0
Average IBI Value	22.0	27.0	22.5	26.0	21.5
Average Number of Species Collected	7.0	11.0	5.6	5.0	9.2

Percent of catch comprised of "Selected RAS Species[a/]"

SPECIES	CSC[b/]		Ship Canal[b/]		
Bluntnose Minnow	**25.58**	**9.20**	**----**	**----**	**7.71**
Gizzard Shad	25.58	35.95	68.45	3.13	39.28
Common Carp	27.91	9.93	23.06	9.38	34.82
Golden Shiner	----	0.73	0.24	----	1.45
Fathead Minnow	----	0.73	----	----	----
Black Bullhead	----	0.21	----	----	----
Largemouth Bass	6.98	8.05	1.21	----	----
Green Sunfish	6.98	3.03	0.49	6.25	2.53
TOTAL	93.03	67.83	93.45	18.76	85.79

[/a] Representative Aquatic Species (RAS) utilized by Yoder to derive Secondary Contact Waterway thermal limits. Bluntnose Minnow was considered the most thermally sensitive of the 8 RAS.
[/b] Data presented are a weighted average of all available data for a given station collected by MWRDGC as part of the AWQM Program.
/[1]Sources: Metropolitan Water Reclamation District of Greater Chicago. January 2008. Report No. 08-2.

Metropolitan Water Reclamation District of Greater Chicago. June 2008. Report No. 08-33.

FOIA response dated January 12, 2009 from the Metropolitan Water Reclamation District of Greater Chicago

QHEI CATEGORIES	
≥75	Excellent
60-74	Good
46-59	Fair
30-45	Poor
<30	Very Poor

IBI CATEGORIES	
60-51	Excellent
50-41	Good
40-31	Fair
30-21	Poor
≤ 20	Very Poor

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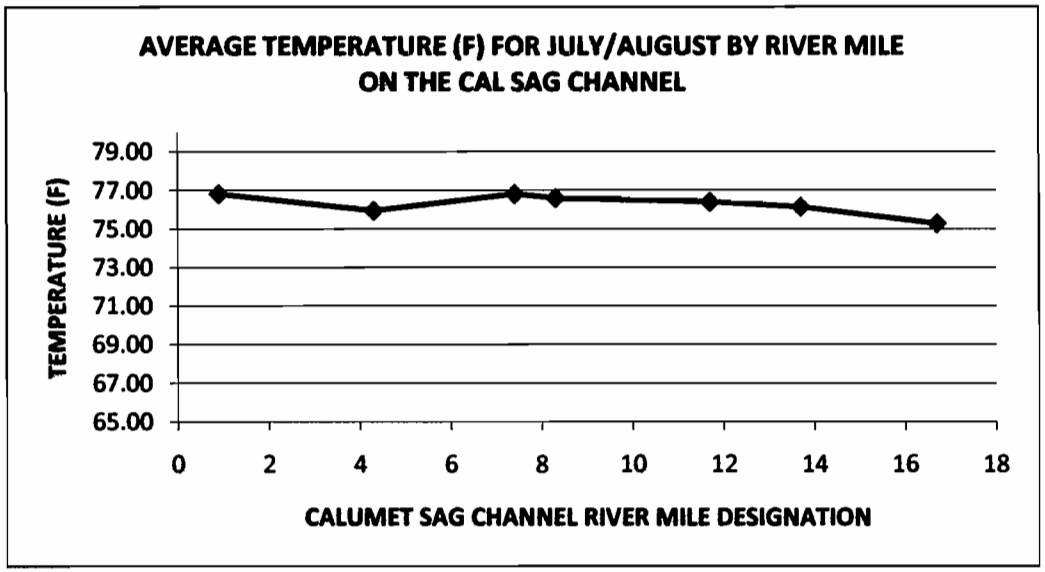
APPENDIX A

AVG. TEMP BY RIVER MILE (JULY/AUGUST) ON THE CAL SAG CHANNEL

	DOWNSTREAM ←						→ UPSTREAM
	0.9	4.3	7.4	8.3	11.7	13.7	16.7
1998	78.13				78.98		
1999	78.30				78.98		
2000	76.33				75.11		
2001	77.32		77.27	76.98	77.32	76.96	76.62
2002	78.42	76.30	77.95	77.83	77.40	77.09	76.69
2003	75.51	76.57	75.18	74.98	74.41	74.35	73.40
2004	74.01	74.97			73.36		73.04
2005	79.16	73.74			77.72		76.46
2006	76.55	78.42			75.74		75.65
2007	74.57	75.69			75.74		75.06
2008	76.60				75.52		
	76.81	75.95	76.80	76.60	76.39	76.14	75.27

0.9	ILLINOIS ROUTE 83
4.3	104TH AVENUE
7.4	SW HIGHWAY
8.3	RM 8.3 (SEPA)
11.7	CICERO
13.7	KEDZIE
16.7	HALSTED (Little Cal)



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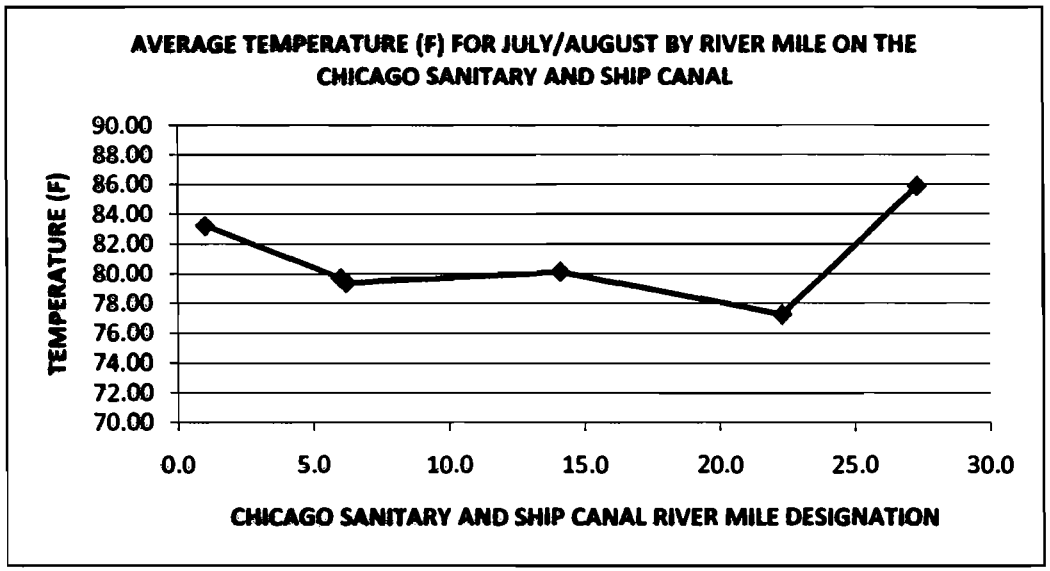
AVG. TEMP BY RIVER MILE (JULY/AUGUST)
ON THE CHICAGO SANITARY AND SHIP CANAL

	DOWNSTREAM ←				→ UPSTREAM	
	1.0	6.0	6.2	14.1	22.3	27.3
1998	83.97	80.44	79.59	80.04	69.17	86.65
1999	83.23	78.75	79.03	79.83	78.84	85.75
2000	82.90	78.49	78.44	79.41	78.31	84.61
2001	83.39	79.23	79.29	79.83	79.27	85.95
2002	82.65	81.66	80.65	82.17	80.76	86.59
2003				79.16		
2004				77.68		
2005				82.20		
2006				80.91		
2007						
	83.23	79.71	79.40	80.14	77.27	85.91

1.0	LOCKPORT LOCK & DAM
6.0	RM 6.0
6.2	ROMEOVILLE ROAD
14.1	ILLINOIS ROUTE 83
22.3	B&O C RAILROAD
27.3	CICERO AVENUE



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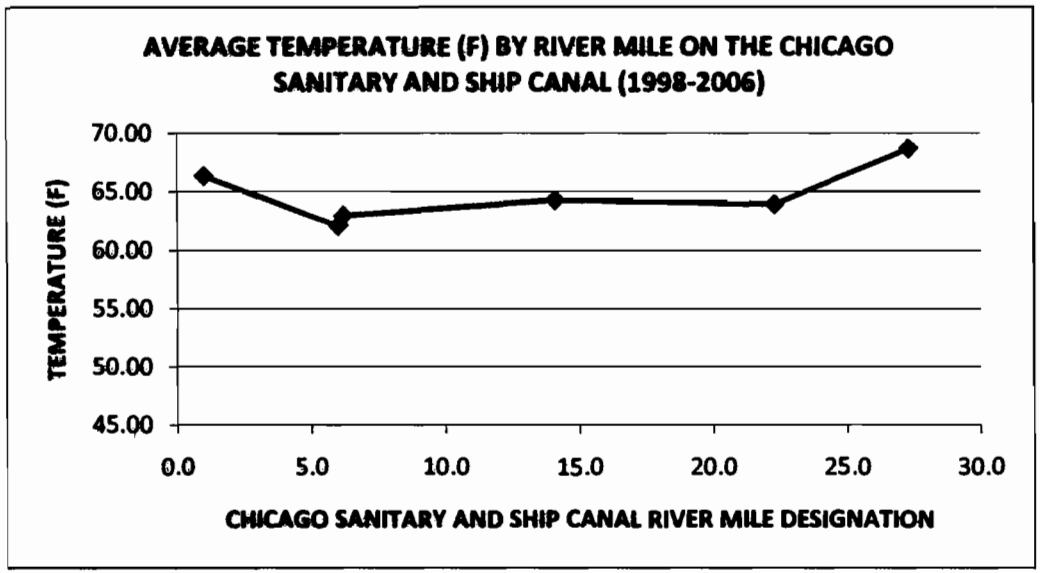
AVG. TEMP BY RIVER MILE
ON THE CHICAGO SANITARY AND SHIP CANAL

	DOWNSTREAM ←				→ UPSTREAM	
	1.0	6.0	6.2	14.1	22.3	27.3
1998	71.46	66.07	67.30	67.48		
1999	64.09	59.43	61.97	63.41	62.89	65.93
2000	66.51	62.98	61.95	64.17	64.62	71.22
2001	65.35	61.83	61.59	63.59	63.45	67.98
2002	64.22	60.21	61.97	62.56	64.69	69.58
2003				63.66		
2004				64.94		
2005				64.20		
2006				64.71		
2007						
	66.33	62.10	62.96	64.30	63.91	68.68

1.0	LOCKPORT LOCK & DAM
6.0	RM 6.0
6.2	ROMEOVILLE ROAD
14.1	ILLINOIS ROUTE 83
22.3	B&O C RAILROAD
27.3	CICERO AVENUE



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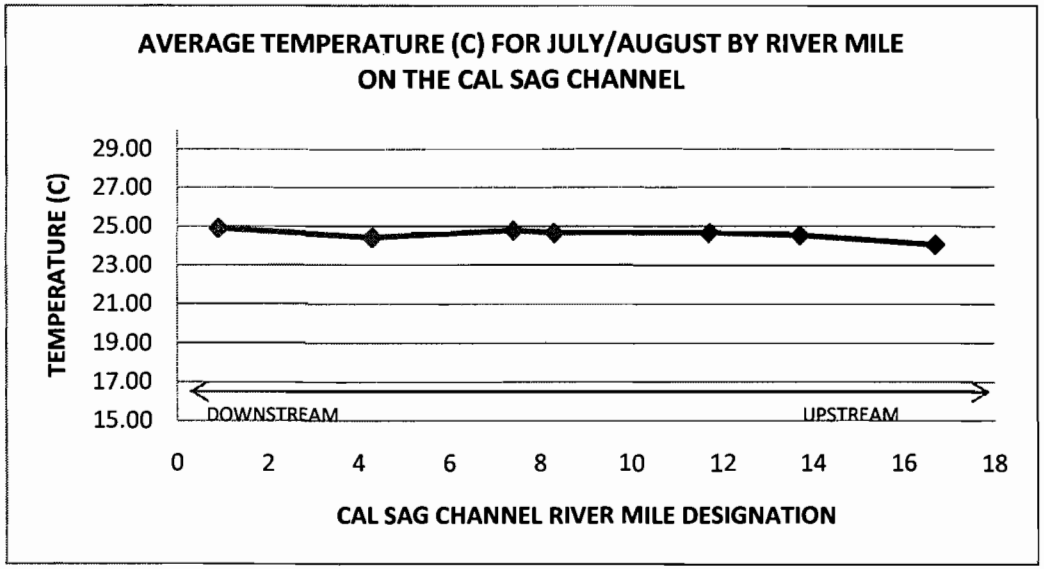
AVG. TEMP BY RIVER MILE (JULY/AUGUST) ON THE CAL SAG CHANNEL

	DOWNSTREAM ←						→ UPSTREAM
	0.9	4.3	7.4	8.3	11.7	13.7	16.7
1998	25.63				26.10		
1999	25.72				26.10		
2000	24.63				23.95		
2001	25.18		25.15	24.99	25.18	24.98	24.79
2002	25.79	24.61	25.53	25.46	25.22	25.05	24.83
2003	24.17	24.76	23.99	23.88	23.56	23.53	23.00
2004	23.34	23.87			22.98		22.80
2005	26.20	23.19			25.40		24.70
2006	24.75	25.79			24.30		24.25
2007	23.65	24.27			24.30		23.92
2008	24.78	24.53	24.51	24.30	24.18		
	24.89	24.43	24.80	24.66	24.66	24.52	24.04

0.9	ILLINOIS ROUTE 83
4.3	104TH AVENUE
7.4	SW HIGHWAY
8.3	RM 8.3 (SEPA)
11.7	CICERO
13.7	KEDZIE
16.7	HALSTED



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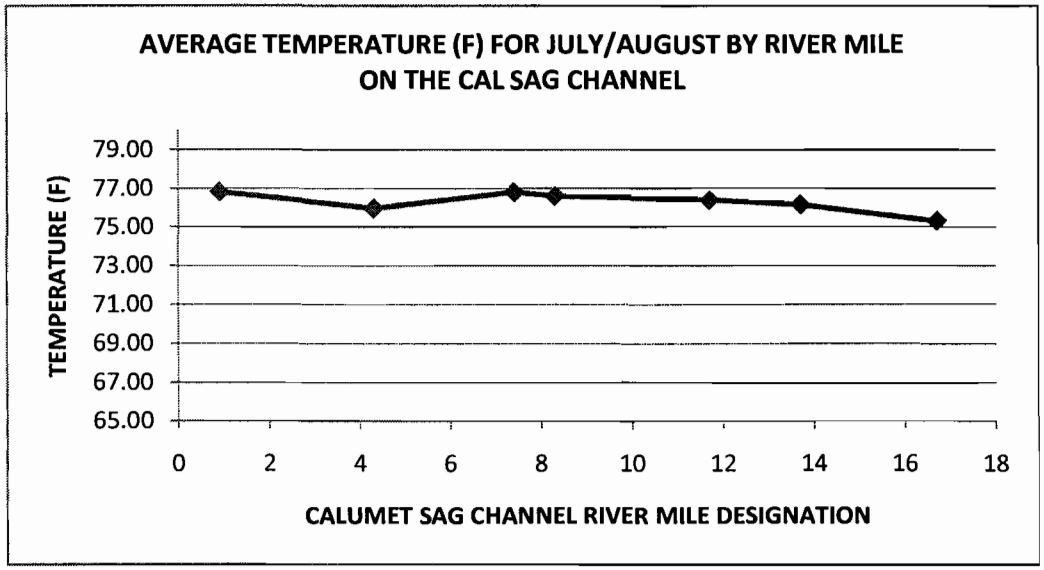
AVG. TEMP BY RIVER MILE (JULY/AUGUST) ON THE CAL SAG CHANNEL

	DOWNSTREAM ←						→ UPSTREAM
	0.9	4.3	7.4	8.3	11.7	13.7	16.7
1998	78.13				78.98		
1999	78.30				78.98		
2000	76.33				75.11		
2001	77.32		77.27	76.98	77.32	76.96	76.62
2002	78.42	76.30	77.95	77.83	77.40	77.09	76.69
2003	75.51	76.57	75.18	74.98	74.41	74.35	73.40
2004	74.01	74.97			73.36		73.04
2005	79.16	73.74			77.72		76.46
2006	76.55	78.42			75.74		75.65
2007	74.57	75.69			75.74		75.06
2008	76.60				75.52		
	76.81	75.95	76.80	76.60	76.39	76.14	75.27

0.9	ILLINOIS ROUTE 83
4.3	104TH AVENUE
7.4	SW HIGHWAY
8.3	RM 8.3 (SEPA)
11.7	CICERO
13.7	KEDZIE
16.7	HALSTED (Little Cal)



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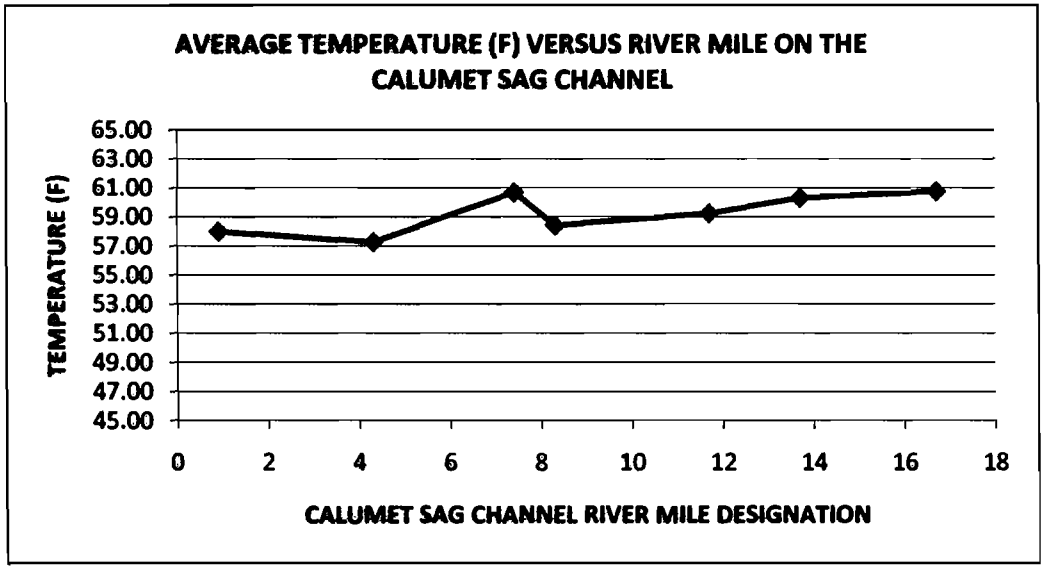
AVG. TEMP. BY RIVER MILE ON THE CAL SAG CHANNEL

	DOWNSTREAM ←						→ UPSTREAM
	0.9	4.3	7.4	8.3	11.7	13.7	16.7
1998	60.71				60.76		
1999	58.66				61.83		
2000	57.61				59.94		
2001	57.29	65.01	60.67	62.22	63.12	64.09	65.93
2002	57.51	57.47	57.25	56.71	58.55	58.48	59.00
2003	59.77	55.83	58.33	55.44	56.91	58.35	59.16
2004	57.20	57.65		51.31	58.03		59.86
2005	58.30	57.83			58.80		59.43
2006	57.47	56.44			58.53		60.01
2007	57.36	51.98			57.22		61.86
2008	56.25	56.01	66.45	66.45	58.06		
	58.01	57.28	60.68	58.43	59.25	60.31	60.75

0.9	ILLINOIS ROUTE 83
4.3	104TH AVENUE
7.4	SW HIGHWAY
8.3	RM 8.3 (SEPA)
11.7	CICERO
13.7	KEDZIE
16.7	HALSTEAD



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Metropolitan Water Reclamation District of Greater Chicago

RESEARCH AND DEVELOPMENT DEPARTMENT

REPORT NO. 98-10

A STUDY OF THE FISHERIES RESOURCES AND WATER QUALITY IN THE CHICAGO WATERWAY SYSTEM 1974 THROUGH 1996

S.G. Dennison
S.J. Sedita
P. Tata
D.R. Zenz
C. Lue-Hing

June 1998

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-17

NUMBER OF FISH COLLECTED FROM STATION 17 AT ROUTE 83 (RIVER MILE 304.2) ON THE CAL-SAG CHANNEL FROM 1975 THROUGH 1996

Fish Species or Hybrid Cross (x)	Year															Grand Total
	1975[1]	1976	1977	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
Alewife	0	0	0	0	4	0	0	0	3	0	0	0	0	0	0	7
Gizzard shad	0	0	0	1	55	7	100	9	4	66	67	31	0	4	291	635
Rainbow trout	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Central mudminnow	0	1	0	1	0	3	0	0	1	0	0	0	0	0	0	6
Goldfish	16	1	2	3	1	6	18	14	12	16	0	1	2	0	0	92
Carp	1	0	0	11	8	16	76	20	23	30	5	15	13	17	26	261
Carp x Goldfish	0	0	0	2	1	1	7	2	1	0	0	1	0	1	0	16
Golden shiner	0	0	0	0	1	0	4	0	0	0	0	1	0	0	0	6
Emerald shiner	0	0	0	0	0	1	3	1	1	2	3	0	0	1	2	14
Spottail shiner	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Bluntnose minnow	0	0	0	0	0	0	1	0	1	2	1	4	1	0	3	13
Fathead minnow	0	0	0	12	0	0	3	0	3	0	0	2	1	0	0	21
Creek chub	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Black bullhead	0	0	0	10	3	7	0	0	1	1	0	0	0	0	0	22
Yellow bullhead	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
White perch	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Yellow bass	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	3
Green sunfish	0	0	1	35	5	118	19	6	153	23	5	35	6	22	22	450
Pumpkinseed	0	0	0	0	1	0	1	1	0	6	1	0	0	0	0	10
Bluegill	0	0	1	3	2	28	4	2	46	10	7	39	7	13	8	170
Largemouth bass	0	0	0	3	1	5	5	12	10	5	4	8	2	13	9	77
Black crappie	1	0	0	0	0	2	1	0	0	0	0	0	0	0	0	4
Green x Pumpkinseed	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Yellow perch	0	0	0	1	2	6	2	0	0	0	0	0	0	0	0	11
Total Fish	18	2	4	83	84	201	244	67	260	163	93	138	33	71	363	1824
Total Species	3	2	3	11	11	12	13	8	13	11	8	10	8	6	8	22
Sample Events Per Year	1	1	2	4	4	3	4	4	4	4	2	2	2	2	2	

[1]Data for fish collection at 86th Avenue (River Mile 309.7).

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-16

NUMBER OF FISH COLLECTED FROM STATION 16 AT CICERO AVENUE (RIVER MILE 314.9) ON THE CAL-SAG CHANNEL FROM 1974 THROUGH 1996

Fish Species or Hybrid Cross	Year																	Grand Total
	1974[1]	1975[1]	1976	1977	1977[1]	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
Alewife	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Gizzard shad	0	31	0	1	0	0	1	1	107	19	45	39	53	3	13	2	47	362
Central mudminnow	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	3
Goldfish	1	0	12	2	0	0	0	0	22	18	51	64	5	5	0	3	3	186
Carp	0	0	10	1	0	0	2	4	59	41	19	49	28	22	18	35	40	328
Carp x Goldfish	0	0	0	0	0	0	0	0	3	6	5	3	1	4	0	1	0	23
Golden shiner	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
Emerald shiner	0	0	1	0	0	0	1	0	12	1	1	3	18	1	0	48	6	92
Bluntnose minnow	0	0	0	0	0	0	0	0	3	0	0	0	7	3	1	0	5	19
Fathead minnow	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	3
Creek chub	0	0	2	0	0	0	0	0	1	0	0	0	0	1	0	0	0	4
White sucker	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	3
Black bullhead	0	0	3	0	0	0	1	3	3	0	0	0	0	0	0	0	0	10
Yellow bass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Green sunfish	0	0	25	0	0	0	0	8	4	0	6	8	0	6	1	0	3	61
Pumpkinseed	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	3
Orangespotted sunfish	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Bluegill	0	0	5	0	1	0	2	10	1	2	5	12	0	6	0	1	1	46
Largemouth bass	0	0	0	0	0	0	0	0	0	2	2	1	0	3	0	6	3	17
White crappie	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Black crappie	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
Green x Pumpkinseed	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
Total Fish	1	31	60	5	1	0	7	27	218	92	135	184	113	54	33	98	111	1170
Total Species	1	1	8	4	1	0	5	6	11	9	8	10	6	9	4	7	11	20
Sample Events Per Year	1	1	1	2	2	3	3	3	4	4	4	4	2	2	2	2	2	

[1]Data for fish collection at Ashland Avenue (River Mile 319.0).

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-11

NUMBER OF FISH COLLECTED FROM STATION 11 AT 16TH STREET IN LOCKPORT (RIVER MILE 292.1) ON THE CHICAGO SANITARY AND SHIP CANAL FROM 1975 THROUGH 1996

Fish Species or Hybrid Cross (x)	Year															Grand Total
	1975	1976	1977	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
Bowfin	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Alewife	0	0	0	0	0	6	0	0	0	0	1	0	1	0	0	8
Gizzard shad	0	0	0	0	0	0	290	41	10	11	23	143	34	37	67	656
Central mudminnow	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	8
Grass pickerel	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Goldfish	0	38	1	11	14	29	9	8	8	17	2	3	23	2	1	166
Carp	0	15	20	24	30	41	19	32	41	55	14	36	19	37	60	443
Carp x Goldfish	0	6	0	4	1	2	2	5	0	2	0	2	1	0	2	27
Golden shiner	0	0	0	0	0	0	1	0	2	2	0	1	0	0	0	6
Emerald shiner	0	0	0	0	1	0	98	83	4	3	0	1	0	0	0	190
Spottail shiner	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2
Bluntnose minnow	0	0	0	2	0	1	3	0	0	0	0	1	0	1	0	8
Fathead minnow	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	2
Creek chub	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
White sucker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Black bullhead	0	4	0	5	2	1	0	0	2	0	0	0	0	0	0	14
Yellow bass	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6
Green sunfish	0	0	0	1	1	2	2	1	32	3	0	0	0	4	1	47
Pumpkinseed	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3
Orangespotted sunfish	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Bluegill	0	0	0	2	5	0	1	1	0	1	0	1	1	0	2	14
Largemouth bass	0	0	0	0	0	0	0	0	1	6	0	0	5	2	11	25
Black crappie	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	3
Yellow perch	0	0	0	2	5	6	1	11	0	0	0	0	0	0	0	25
Total Fish	0	64	21	53	67	89	430	183	101	103	41	194	84	84	144	1658
Total Species	0	4	2	9	8	8	13	8	9	9	5	8	6	7	6	23
Sample Events Per Year	1	1	2	3	4	3	4	4	4	4	2	2	2	2	2	

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-10

NUMBER OF FISH COLLECTED FROM STATION 10 AT WILLOW SPRINGS ROAD (RIVER MILE 307.9) ON THE CHICAGO SANITARY AND SHIP CANAL FROM 1974 THROUGH 1996

Fish Species or Hybrid Cross (x)	Year																Grand Total
	1974	1975	1976	1977	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
Gizzard shad	0	0	0	0	0	1	0	92	1	0	1	6	0	0	0	2	103
Rainbow smelt	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Central mudminnow	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	3
Goldfish	0	0	1	1	52	178	285	395	200	34	29	8	17	35	4	0	1239
Carp	0	0	1	2	5	16	16	24	22	65	23	15	5	29	25	40	288
Carp x Goldfish	0	0	0	0	0	0	1	0	1	0	3	1	0	0	0	0	6
Emerald shiner	0	0	0	0	0	0	0	1	0	8	0	0	0	0	1	0	10
Spottail shiner	0	0	0	0	0	1	0	0	1	1	1	0	0	1	0	0	5
Bluntnose minnow	0	0	0	0	0	0	1	13	2	28	29	76	119	132	33	2	435
Fathead minnow	0	0	0	0	0	0	0	2	0	1	0	2	4	262	4	0	275
Black bullhead	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0	4
Yellow bullhead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Mosquitofish	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Green sunfish	0	0	0	0	0	0	3	0	0	2	8	0	0	2	4	0	19
Pumpkinseed	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	3	6
Bluegill	0	0	0	0	0	1	1	0	0	1	0	1	0	0	1	1	6
Largemouth bass	0	0	0	0	0	0	0	0	1	1	2	1	1	3	5	9	23
Black crappie	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Green x Pumpkinseed	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Yellow perch	0	0	0	0	1	2	5	3	10	0	0	0	0	0	0	0	21
Total Fish	0	0	2	3	60	201	312	531	240	142	100	110	146	466	78	57	2448
Total Species	0	0	2	2	5	8	6	8	8	10	9	7	5	9	9	6	18
Sample Events Per Year	1	1	1	2	3	4	3	4	4	4	4	2	2	2	2	2	

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-9

NUMBER OF FISH COLLECTED FROM STATION 9 AT HARLEM AVENUE (RIVER MILE 314.0) ON THE CHICAGO SANITARY AND SHIP CANAL FROM 1974 THROUGH 1996

Fish Species or Hybrid Cross (x)	Year																Grand Total
	1974	1975	1977	1977[1]	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
Alewife	0	0	0	0	0	0	11	0	0	0	0	2	0	0	0	0	13
Gizzard shad	0	0	0	0	1	0	2	62	11	1	6	30	3	0	15	41	172
Brown trout	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Chinook salmon	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Rainbow smelt	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	4
Central mudminnow	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Grass pickerel	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Goldfish	0	0	0	0	238	45	166	219	169	133	62	83	1	8	19	4	1147
Carp	0	2	1	5	103	34	63	101	76	79	70	31	14	27	67	55	728
Carp x Goldfish	0	0	0	0	12	0	5	6	0	2	1	1	0	1	2	0	30
Golden shiner	0	0	0	0	0	0	1	1	0	1	14	2	0	0	0	0	19
Emerald shiner	0	0	0	0	0	0	0	6	7	0	15	1	0	1	0	0	30
Spottail shiner	0	0	0	0	3	3	0	1	2	0	0	16	2	0	0	0	27
Bluntnose minnow	0	0	0	0	1	1	12	27	68	33	122	263	264	99	0	1	891
Fathead minnow	0	0	0	0	2	0	0	3	0	0	12	9	33	14	1	0	74
Black bullhead	0	0	0	0	2	1	0	2	0	0	0	0	0	0	0	0	5
Yellow bullhead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Threespine stickleback	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5
Rock bass	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Green sunfish	0	0	0	0	3	0	3	0	0	0	1	0	0	0	0	0	7
Pumpkinseed	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4
Bluegill	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	4	7
Largemouth bass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	13	16
Yellow perch	0	0	0	0	41	2	132	3	54	0	0	0	0	0	0	0	232
Total Fish	0	2	1	5	412	86	396	433	388	249	308	439	318	150	107	124	3418
Total Species	0	1	1	1	12	6	9	12	8	5	10	10	7	5	5	8	23
Sample Events Per Year	1	1	2	2	4	4	4	4	4	4	4	2	2	2	2	2	

[1]Data for collections at the C & IW Railroad Bridge (River Mile 314.8).

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-8

NUMBER OF FISH COLLECTED FROM STATION 8 AT CICERO AVENUE (RIVER MILE 317.3) ON THE CHICAGO SANITARY AND SHIP CANAL FROM 1974 THROUGH 1996

Fish Species or Hybrid Cross (x)	Year																Grand Total
	1974	1975	1976	1977	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
Alewife	0	0	2	0	0	0	0	2	2	1	1	3	0	1	0	0	12
Gizzard shad	0	0	0	0	0	0	9	24	1	4	32	12	153	6	9	41	291
Rainbow smelt	0	0	0	0	5	1	1	2	10	1	0	0	0	0	0	0	20
Goldfish	0	0	7	0	84	81	47	704	330	382	337	41	41	36	38	19	2147
Carp	0	0	3	0	36	32	113	126	110	183	197	37	93	106	134	107	1277
Carp x Goldfish	0	0	4	0	2	8	3	16	9	5	13	3	2	6	6	6	83
Golden shiner	0	0	0	0	0	0	2	6	1	6	2	4	2	3	2	0	28
Emerald shiner	0	0	0	0	0	1	2	31	5	2	0	8	0	0	0	0	49
Spottail shiner	0	0	0	0	0	0	0	12	1	1	18	0	1	0	0	0	33
Bluntnose minnow	0	0	0	0	0	0	1	39	10	152	435	111	11	123	19	0	901
Fathead minnow	0	0	0	0	3	3	0	9	3	10	10	5	1	16	2	0	62
Creek chub	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Black bullhead	0	0	0	0	5	15	4	1	5	4	2	0	0	1	0	0	37
Yellow bullhead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Mosquitofish	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Brook stickleback	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2
Threespine stickleback	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2
Green sunfish	0	0	0	0	2	0	2	0	0	1	3	5	0	1	2	0	16
Pumpkinseed	0	0	0	0	0	0	0	0	0	1	3	2	0	0	1	0	7
Bluegill	0	0	0	0	0	0	2	1	1	0	2	0	0	0	2	0	8
Largemouth bass	0	0	0	0	0	0	0	0	0	1	9	7	0	13	33	16	79
Black crappie	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	3
Yellow perch	0	0	0	0	0	21	15	205	82	0	0	0	0	0	0	0	323
Total Fish	0	0	17	0	137	162	202	1180	571	754	1065	238	305	312	249	191	5383
Total Species	0	0	4	0	6	7	12	15	14	14	14	11	8	10	11	6	22
Sample Events Per Year	1	1	1	2	3	4	4	4	4	4	4	2	2	2	2	2	

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-7

NUMBER OF FISH COLLECTED FROM STATION 7 AT DAMEN AVENUE (RIVER MILE 321.1) ON THE CHICAGO SANITARY AND SHIP CANAL FROM 1975 THROUGH 1996

Fish Species or Hybrid Cross (x)	Year														Grand Total
	1975	1977	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
Alewife	0	0	5	1	46	2	4	0	0	7	0	0	0	0	65
Gizzard shad	0	0	1	2	6	13	7	5	16	71	19	2	20	38	200
Rainbow trout	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2
Rainbow smelt	0	0	23	2	20	0	0	0	1	0	0	0	0	0	46
Central mudminnow	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
Goldfish	0	0	58	28	39	123	81	107	203	204	44	12	20	5	924
Carp	0	0	41	49	53	57	113	166	151	84	31	86	69	41	941
Carp x Goldfish	0	0	5	2	6	5	4	3	3	1	4	2	2	0	37
Golden shiner	0	0	1	1	4	13	11	12	31	18	13	3	3	0	110
Emerald shiner	0	0	0	0	5	47	4	0	1	2	0	0	0	0	59
Spottail shiner	0	0	1	0	2	5	3	0	0	4	0	0	0	0	15
Bluntnose minnow	0	0	5	0	2	29	7	24	71	354	12	6	1	0	511
Fathead minnow	0	0	7	0	1	4	1	0	2	6	0	0	3	0	24
White sucker	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Black bullhead	0	0	24	43	46	33	27	11	0	0	2	1	1	0	188
Threespine stickleback	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2
White perch	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Green sunfish	0	0	6	3	1	0	1	3	3	2	2	1	0	1	23
Pumpkinseed	0	0	0	0	0	0	0	1	5	6	0	2	1	1	16
Orangespotted sunfish	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
Bluegill	0	0	5	2	38	8	5	8	10	5	1	0	0	4	86
Largemouth bass	0	0	0	0	5	7	10	16	37	5	9	8	36	10	143
Black crappie	0	0	0	1	2	0	0	0	0	1	0	1	0	1	6
Green x Bluegill	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Yellow perch	0	0	22	12	17	175	82	0	0	0	0	0	0	0	308
Total Fish	0	0	205	147	297	523	361	356	535	770	137	124	156	102	3713
Total Species	0	0	14	11	19	14	15	10	12	14	9	10	9	9	23
Sample Events Per Year	1	2	4	4	4	4	4	4	4	2	2	2	2	2	

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 1

FISH COLLECTED FROM THE DEEP DRAFT CANALS OF THE CHICAGO WATERWAY SYSTEM 1974 THROUGH 1996

Family and Species	North Shore Channel	North Branch Chicago River	Chicago River	Chicago Sanitary and Ship Canal	Calumet River	Little Calumet River	Cal-Sag Channel	Grand Total
Bowfins								
Bowfin	0	1	0	1	1	0	0	3
Freshwater eels								
American eel	0	0	0	0	1	0	0	1
Herrings								
Alewife	2,661	39	528	98	721	49	8	4,104
Gizzard shad	2,216	735	920	1,422	3,567	3,734	1,047	13,641
Salmon and Trouts								
Rainbow trout	16	4	10	2	3	0	1	36
Brown trout	28	0	33	1	0	0	0	62
Brook trout	2	1	1	0	0	0	0	4
Lake trout	1	0	3	0	0	0	0	4
Coho salmon	5	0	10	0	1	0	0	16
Chinook salmon	6	0	11	1	7	1	0	26
Smelts								
Rainbow smelt	2,024	2	34	71	5	1	0	2,137
Mudminnows								
Central mudminnow	5	1	0	15	0	2	9	32

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 1 (Continued)

FISH COLLECTED FROM THE DEEP DRAFT CANALS OF THE CHICAGO WATERWAY SYSTEM 1974 THROUGH 1996

Family and Species	North Shore Channel	North Branch Chicago River	Chicago River	Chicago Sanitary and Ship Canal	Calumet River	Little Calumet River	Cal-Sag Channel	Grand Total
Pikes								
Grass pickerel	2	0	0	2	2	2	0	8
Northern pike	1	0	0	0	0	0	0	1
Minnows and Carps								
Goldfish	3,289	708	402	5,623	99	1,255	290	11,666
Grass carp	0	0	1	0	1	0	0	2
Carp	854	568	1,022	3,675	900	940	667	8,626
Carp x Goldfish hybrid	596	169	116	183	32	118	39	1,253
Brassy minnow	1	0	0	0	0	0	0	1
Hornyhead chub	1	0	0	0	0	0	0	1
Golden shiner	2,494	112	63	163	83	121	9	3,045
Emerald shiner	25	20	116	346	873	1,242	241	2,863
Bigmouth shiner	1	0	0	0	0	0	0	1
Spottail shiner	1,160	34	105	82	54	34	1	1,470
Spotfin shiner	1	0	0	0	0	0	0	1
Sand shiner	3	0	1	0	5	0	0	9
Bluntnose minnow	19,270	376	1,278	2,746	6,934	520	56	31,180
Fathead minnow	9,765	49	12	437	127	47	26	10,463
Longnose dace	16	0	0	0	0	0	0	16
Creek chub	1	0	0	2	0	0	5	8
Central stoneroller	0	0	2	0	1	0	0	3

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 1 (Continued)

FISH COLLECTED FROM THE DEEP DRAFT CANALS OF THE CHICAGO WATERWAY SYSTEM 1974 THROUGH 1996

Family and Species	North Shore Channel	North Branch Chicago River	Chicago River	Chicago Sanitary and Ship Canal	Calumet River	Little Calumet River	Cal-Sag Channel	Grand Total
Suckers								
Quillback	0	0	0	0	4	0	0	4
White sucker	123	13	1	2	53	12	24	228
Black buffalo	0	0	1	0	1	0	0	2
Loaches								
Oriental weatherfish	11	1	0	0	0	0	0	12
Freshwater catfishes								
Black bullhead	380	40	39	248	5	20	34	766
Yellow bullhead	5	1	0	3	0	0	1	10
Channel catfish	0	0	0	0	7	1	15	23
Trout-perches								
Trout-perch	0	0	2	0	0	0	0	2
Livebearers								
Mosquitofish	0	0	0	2	0	4	0	6
Silversides								
Brook silverside	0	0	1	0	0	0	0	1
Sticklebacks								
Brook stickleback	1,252	29	2	2	0	0	0	1,285
Threespine stickleback	25	63	19	9	0	1	2	119
Ninespine stickleback	27	0	2	0	0	0	0	29

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 1 (Continued)

FISH COLLECTED FROM THE DEEP DRAFT CANALS OF THE CHICAGO WATERWAY SYSTEM 1974 THROUGH 1996

Family and Species	North Shore Channel	North Branch Chicago River	Chicago River	Chicago Sanitary and Ship Canal	Calumet River	Little Calumet River	Cal-Sag Channel	Grand Total
Temperate basses								
White bass	0	0	2	0	2	0	0	4
White perch	0	3	11	1	430	406	1	852
Yellow bass	0	0	0	7	0	11	15	33
White x Striped bass hybrid	0	0	0	0	1	0	0	1
Sunfishes								
Rock bass	70	1	556	1	20	0	0	648
Green sunfish	1,524	243	580	113	744	116	520	3,840
Pumpkinseed	174	15	70	36	455	272	15	1,037
Warmouth	0	0	0	0	1	0	1	2
Orangespotted sunfish	81	9	12	3	142	17	1	265
Bluegill	691	284	663	123	467	105	243	2,576
Smallmouth bass	0	0	61	1	77	0	3	142
Largemouth bass	473	198	454	293	1,108	135	190	2,851
White crappie	1	0	0	0	1	0	1	3
Black crappie	83	12	13	13	29	2	7	159
Hybrid sunfish								
Green x Orangespotted	0	1	0	0	1	0	0	2
Green x Pumpkinseed	14	5	2	1	14	3	3	42
Green x Bluegill	14	6	6	1	13	0	1	41
Pumpkinseed x Orangespotted	0	0	0	0	8	1	0	9
Pumpkinseed x Bluegill	7	2	4	0	5	0	0	18
Bluegill x Orangespotted	0	0	0	0	3	0	0	3

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 1 (Continued)

FISH COLLECTED FROM THE DEEP DRAFT CANALS OF THE CHICAGO WATERWAY SYSTEM 1974 THROUGH 1996

Family and Species	North Shore Channel	North Branch Chicago River	Chicago River	Chicago Sanitary and Ship Canal	Calumet River	Little Calumet River	Cal-Sag Channel	Grand Total
Perches								
Johnny darter	1	0	15	0	1	0	0	17
Yellow perch	3,827	300	1,387	909	1,064	118	11	7,616
Drums								
Freshwater drum	0	0	1	0	14	1	1	17
Sculpins								
Mottled sculpin	4	0	2	0	0	0	0	6
Gobies								
Round goby	0	0	0	0	22	0	0	22
Total Fish	53,231	4,045	8,574	16,638	18,109	9,291	3,488	113,376
Number of Species	44	29	41	34	40	28	30	61
Number of Hybrids	4	5	4	3	8	4	3	8

Metropolitan Water Reclamation District of Greater Chicago

RESEARCH AND DEVELOPMENT DEPARTMENT

REPORT NO. 08-2

AMBIENT WATER QUALITY MONITORING IN THE CHICAGO AREA WATERWAY SYSTEM:

A SUMMARY OF BIOLOGICAL, HABITAT, AND SEDIMENT QUALITY DATA BETWEEN 2001 AND 2004

January 2008

TABLE 5: QUALITATIVE HABITAT EVALUATION INDEX SCORES IN THE CHICAGO AREA WATERWAY SYSTEM MEASURED BETWEEN 2002 AND 2004

Station No.	Station Name	Waterway	QHEI* Score	Habitat Rating
96	Albany Avenue	North Branch Chicago River	33	Poor
36	Touhy Avenue	North Shore Channel	40	Poor
46	Grand Avenue	North Branch Chicago River	29	Very Poor
74	Lake Shore Drive	Chicago River	29	Very Poor
100	Wells Street	Chicago River	28	Very Poor
39	Madison Street	South Branch Chicago River	27	Very Poor
108	Loomis Street	South Branch Chicago River	32	Poor
99	Archer Avenue	South Fork South Branch Chicago River	42	Poor
40	Damen Avenue	Chicago Sanitary and Ship Canal	34	Poor
75	Cicero Avenue	Chicago Sanitary and Ship Canal	32	Poor
41	Harlem Avenue	Chicago Sanitary and Ship Canal	35	Poor
42	Route 83	Chicago Sanitary and Ship Canal	38	Poor
48	Stephen Street	Chicago Sanitary and Ship Canal	37	Poor
92	Lockport	Chicago Sanitary and Ship Canal	40	Poor
49	Ewing Avenue	Calumet River	32	Poor
55	130th Street	Calumet River	51	Fair
50	Burnham Avenue	Wolf Lake Drain	47	Fair
86	Burnham Avenue	Grand Calumet River	36	Poor
56	Indiana Avenue	Little Calumet River	47	Fair
76	Halsted Street	Little Calumet River	55	Fair
52	Wentworth Avenue	Little Calumet River	40	Poor
54	Joe Orr Road	Thorn Creek	55	Fair
97	170th Street	Thorn Creek	41	Poor
57	Ashland Avenue	Little Calumet River	51	Fair
58	Ashland Avenue	Calumet-Sag Channel	39	Poor
59	Cicero Avenue	Calumet-Sag Channel	37	Poor
43	Route 83	Calumet-Sag Channel	41	Poor
90	Route 19	Poplar Creek	52	Fair
110	Springinsguth Road	West Branch DuPage River	31	Poor
89	Walnut Lane	West Branch DuPage River	47	Fair
64	Lake Street	West Branch DuPage River	49	Fair
79	Higgins Road	Salt Creek	63	Good
80	Arlington Heights Rd.	Salt Creek	64	Good
18	Devon Avenue	Salt Creek	55	Fair
24	Wolf Road	Salt Creek	49	Fair
109	Brookfield Avenue	Salt Creek	47	Fair
77	Elmhurst Road	Higgins Creek	23	Very Poor

TABLE 7 (Continued): NUMBER, WEIGHT, AND NUMBER OF SPECIES FOR FISH COLLECTED IN THE CHICAGO AREA WATERWAY SYSTEM BETWEEN 2001 AND 2004

Station No.	Station Name	Year	Sample Gear[1]	Number of Fish	Weight in Grams	Number of Species Total	Number of Species Game	Most Abundant Species
				North Shore Channel (Continued)				
101	Foster Avenue	2001	EFB-L	179	45,309	15	8	Largemouth bass
				North Branch Chicago River (Deep Portion)				
37	Wilson Avenue	2001	EFB-L	75	79,777	13	6	Carp
73	Diversey Parkway	2001	EFB-L	58	23,733	7	2	Gizzard shad
46	Grand Avenue[2]	2001	EFB-L	53	43,553	9	6	Carp
	Grand Avenue[2]	2002	EFB-L	28	22,066	7	3	Carp
	Grand Avenue[2]	2003	EFB-L	67	17,359	8	4	Gizzard shad
	Grand Avenue[2]	2004	EFB-L	88	19,722	9	4	Gizzard shad
				Chicago River				
74	Outer Drive	2002	EFB-L	22	11,087	8	5	Gizzard shad & Largemouth bass
100	Wells Street	2002	EFB-L	136	104,017	11	7	Gizzard shad
				South Branch Chicago River				
39	Madison Street	2002	EFB-L	138	25,700	10	3	Emerald shiner
108	Loomis Street	2002	EFB-L	76	77,763	10	5	Carp
				Bubbly Creek (South Fork South Branch Chicago River)				
99	Archer Avenue	2002	EFB-L	21	3,812	5	2	Gizzard shad
				Chicago Sanitary and Ship Canal				
40	Damen Avenue	2002	EFB-L	148	153,355	10	4	Carp
75	Cicero Avenue[2]	2001	EFB-L	188	183,269	11	4	Carp
	Cicero Avenue[2]	2002	EFB-L	136	160,509	10	3	Carp

TABLE 7 (Continued): NUMBER, WEIGHT, AND NUMBER OF SPECIES FOR FISH COLLECTED IN THE CHICAGO AREA WATERWAY SYSTEM BETWEEN 2001 AND 2004

Station No.	Station Name	Year	Sample Gear[1]	Number of Fish	Weight in Grams	Number of Species Total	Number of Species Game	Most Abundant Species
				Chicago Sanitary and Ship Canal (Continued)				
75	Cicero Avenue[2]	2003	EFB-L	138	34,260	9	3	Gizzard shad
	Cicero Avenue[2]	2004	EFB-L	191	98,526	13	4	Carp
41	Harlem Avenue[2]	2001	EFB-L	88	51,515	9	3	Gizzard shad
	Harlem Avenue[2]	2002	EFB-L	188	114,024	11	3	Gizzard shad
	Harlem Avenue[2]	2003	EFB-L	225	47,000	9	3	Bluntnose minnow
	Harlem Avenue[2]	2004	EFB-L	193	99,601	13	3	Gizzard shad
42	Route 83	2002	EFB-L	32	1,264	5	2	Mosquitofish
48	Stephen Street	2002	EFB-L	24	1,940	4	0	Bluntnose minnow
92	Lockport[2]	2001	EFB-L	77	97,313	2	0	Gizzard shad
	Lockport[2]	2002	EFB-L	67	41,250	6	2	Gizzard shad
	Lockport[2]	2003	EFB-L	67	17,248	7	4	Carp
	Lockport[2]	2004	EFB-L	22	44,259	4	2	Carp
				Calumet River				
49	Ewing Avenue	2003	EFB-L	13	4,754	3	2	Rock bass
55	130th Street[2]	2001	EFB-L	157	62,258	13	6	Gizzard shad
	130th Street[2]	2002	EFB-L	261	54,688	12	6	Bluntnose minnow
	130th Street[2]	2003	EFB-L	182	68,404	8	3	Gizzard shad
	130th Street[2]	2004	EFB-L	360	95,951	14	6	Gizzard shad
				Wolf Lake Outlet				
50	Burnham Avenue	2003	BP/S	16	194	6	5	Longear sunfish
				Grand Calumet River				
86	Burnham Avenue	2003	BP	0	0	0	0	NA

TABLE 7 (Continued): NUMBER, WEIGHT, AND NUMBER OF SPECIES FOR FISH COLLECTED IN THE CHICAGO AREA WATERWAY SYSTEM BETWEEN 2001 AND 2004

Station No.	Station Name	Year	Sample Gear[1]	Number of Fish	Weight in Grams	Number of Species Total	Number of Species Game	Most Abundant Species
				Little Calumet River (Deep Portion)				
56	Indiana Avenue	2003	EFB-L	452	234,592	17	11	Gizzard shad
76	Halsted Street[2]	2001	EFB-L	210	128,546	16	8	Gizzard shad
	Halsted Street[2]	2002	EFB-L	163	106,079	17	7	Carp
	Halsted Street[2]	2003	EFB-L	219	47,350	13	6	Gizzard shad
	Halsted Street[2]	2004	EFB-L	207	116,705	17	9	Largemouth bass
				Thorn Creek				
54	Joe Orr Road	2003	BP	19	164	3	2	Creek chub & Green sunfish
97	170th Street	2003	EFB-S	5	1,726	4	1	White sucker
				Little Calumet River (Wadeable Portion)				
52	Wentworth Avenue	2003	BP	1	26	1	0	Carp
57	Ashland Avenue	2003	EFB-S	12	24,255	2	1	Carp
				Calumet-Sag Channel				
58	Ashland Avenue	2003	EFB-L	95	80,244	13	8	Gizzard shad
59	Cicero Avenue[2]	2001	EFB-L	127	52,583	10	4	Gizzard shad
	Cicero Avenue[2]	2002	EFB-L	174	47,808	13	6	Bluntnose minnow
	Cicero Avenue[2]	2003	EFB-L	56	27,815	12	6	Bluntnose minnow & Green sunfish
	Cicero Avenue[2]	2004	EFB-L	147	70,642	10	5	Gizzard shad
43	Route 83	2003	EFB-L	43	31,450	7	3	Carp
				Buffalo Creek				
12	Lake-Cook Road	2004	BP/S	48	890	8	6	Bluegill

TABLE 8 (Continued): INDEX OF BIOTIC INTEGRITY SCORE AND CATEGORY CALCULATED FOR THE CHICAGO AREA WATERWAY SYSTEM BETWEEN 2001 AND 2004

Station No.	Station Name	Waterway	Year	Sample Gear	IBI* Score	IBI* Category
46	Grand Avenue	North Branch Chicago River	2002	Large EF Boat	20	Poor
	Grand Avenue	North Branch Chicago River	2003	Large EF Boat	32	Fair
	Grand Avenue	North Branch Chicago River	2004	Large EF Boat	28	Fair
74	Lake Shore Drive	Chicago River	2002	Large EF Boat	30	Fair
100	Wells Street	Chicago River	2002	Large EF Boat	30	Fair
39	Madison Street	South Branch Chicago River	2002	Large EF Boat	34	Fair
108	Loomis Street	South Branch Chicago River	2002	Large EF Boat	26	Fair
99	Archer Avenue	South Fork South Branch Chicago River	2002	Large EF Boat	26	Fair
40	Damen Avenue	Chicago Sanitary and Ship Canal	2002	Large EF Boat	28	Fair
75	Cicero Avenue	Chicago Sanitary and Ship Canal	2001	Large EF Boat	20	Poor
	Cicero Avenue	Chicago Sanitary and Ship Canal	2002	Large EF Boat	22	Fair
	Cicero Avenue	Chicago Sanitary and Ship Canal	2003	Large EF Boat	22	Fair
	Cicero Avenue	Chicago Sanitary and Ship Canal	2004	Large EF Boat	22	Fair
41	Harlem Avenue	Chicago Sanitary and Ship Canal	2001	Large EF Boat	24	Fair
	Harlem Avenue	Chicago Sanitary and Ship Canal	2002	Large EF Boat	26	Fair
	Harlem Avenue	Chicago Sanitary and Ship Canal	2003	Large EF Boat	24	Fair
	Harlem Avenue	Chicago Sanitary and Ship Canal	2004	Large EF Boat	26	Fair
42	Route 83	Chicago Sanitary and Ship Canal	2002	Large EF Boat	26	Fair
48	Stephen Street	Chicago Sanitary and Ship Canal	2002	Large EF Boat	20	Poor
92	Lockport	Chicago Sanitary and Ship Canal	2001	Large EF Boat	20	Poor
	Lockport	Chicago Sanitary and Ship Canal	2002	Large EF Boat	22	Fair
	Lockport	Chicago Sanitary and Ship Canal	2003	Large EF Boat	24	Fair
	Lockport	Chicago Sanitary and Ship Canal	2004	Large EF Boat	24	Fair
52	Wentworth Avenue	Little Calumet River	2003	BP	24	Fair
54	Joe Orr Road	Thorn Creek	2003	BP	32	Fair
97	170th Street	Thorn Creek	2003	Small EF Boat	24	Fair
57	Ashland Avenue	Little Calumet River	2003	Small EF Boat	18	Poor

TABLE 8 (Continued): INDEX OF BIOTIC INTEGRITY SCORE AND CATEGORY CALCULATED FOR THE CHICAGO AREA WATERWAY SYSTEM BETWEEN 2001 AND 2004

Station No.	Station Name	Waterway	Year	Sample Gear	IBI* Score	IBI* Category
49	Ewing Avenue	Calumet River	2003	Large EF Boat	34	Fair
50	Burnham Avenue	Wolf Lake Outlet	2003	BP	32	Fair
	Burnham Avenue	Wolf Lake Outlet	2003	Seine	28	Fair
55	130th Street	Calumet River	2001	Large EF Boat	32	Fair
	130th Street	Calumet River	2002	Large EF Boat	34	Fair
	130th Street	Calumet River	2003	Large EF Boat	30	Fair
	130th Street	Calumet River	2004	Large EF Boat	36	Fair
86	Burnham Avenue	Grand Calumet River	2003	BP	NA	NA
56	Indiana Avenue	Little Calumet River	2003	Large EF Boat	34	Fair
76	Halsted Street	Little Calumet River	2001	Large EF Boat	34	Fair
	Halsted Street	Little Calumet River	2002	Large EF Boat	34	Fair
	Halsted Street	Little Calumet River	2003	Large EF Boat	36	Fair
	Halsted Street	Little Calumet River	2004	Large EF Boat	36	Fair
58	Ashland Avenue	Calumet-Sag Channel	2003	Large EF Boat	22	Fair
59	Cicero Avenue	Calumet-Sag Channel	2001	Large EF Boat	28	Fair
	Cicero Avenue	Calumet-Sag Channel	2002	Large EF Boat	28	Fair
	Cicero Avenue	Calumet-Sag Channel	2003	Large EF Boat	24	Fair
	Cicero Avenue	Calumet-Sag Channel	2004	Large EF Boat	28	Fair
43	Route 83	Calumet-Sag Channel	2003	Large EF Boat	22	Fair
12	Salt Creek	Buffalo Creek	2004	BP	22	Fair
	Salt Creek	Buffalo Creek	2004	Seine	28	Fair
13	Lake-Cook Road	Des Plaines River	2001	BP	28	Fair
	Lake-Cook Road	Des Plaines River	2001	Seine	32	Fair
	Lake-Cook Road	Des Plaines River	2002	BP	24	Fair
	Lake-Cook Road	Des Plaines River	2002	Seine	34	Fair
	Lake-Cook Road	Des Plaines River	2003	BP	32	Fair
	Lake-Cook Road	Des Plaines River	2003	Seine	32	Fair

Metropolitan Water Reclamation District of Greater Chicago

RESEARCH AND DEVELOPMENT DEPARTMENT

REPORT NO 08-33

AMBIENT WATER QUALITY MONITORING IN THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS: A SUMMARY OF BIOLOGICAL, HABITAT, AND SEDIMENT QUALITY DURING 2005

June 2008

TABLE 5: QUALITATIVE HABITAT EVALUATION INDEX SCORES IN THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS MEASURED DURING 2005

Station No.	Station Name	Waterway	QHEI[1] Score	Habitat Rating
106	Dundee Road	West Fork North Branch	46	Fair
103	Golf Road	West Fork North Branch	51	Fair
31	Lake-Cook Road	Middle Fork North Branch	32	Poor
32	Lake-Cook Road	Skokie River	62	Good
105	Frontage Road	Skokie River	36	Poor
104	Glenview Road	North Branch Chicago River	62	Good
34	Dempster Street	North Branch Chicago River	47	Fair
96	Albany Avenue*	North Branch Chicago River	33	Poor
35	Central Street	North Shore Channel	39	Poor
102	Oakton Street	North Shore Channel	39	Poor
36	Touhy Avenue*	North Shore Channel	44	Poor
101	Foster Avenue	North Shore Channel	46	Fair
37	Wilson Avenue	North Branch Chicago River	42	Poor
73	Diversey Parkway	North Branch Chicago River	30	Poor
46	Grand Avenue*	North Branch Chicago River	25	Very Poor
75	Cicero Avenue*	Chicago Sanitary & Ship Canal	32	Poor
41	Harlem Avenue*	Chicago Sanitary & Ship Canal	35	Poor
92	Lockport*	Chicago Sanitary & Ship Canal	40	Poor
55	130th Street*	Calumet River	51	Fair
76	Halsted Street*	Little Calumet River	55	Fair
59	Cicero Avenue*	Calumet-Sag Channel	37	Poor
64	Lake Street*	West Branch DuPage River	49	Fair
18	Devon Avenue*	Salt Creek	55	Fair
78	Wille Road*	Higgins Creek	27	Very Poor
13	Lake-Cook Road*	Des Plaines River	49	Fair
22	Ogden Avenue*	Des Plaines River	53	Fair
91	Material Service Rd.*	Des Plaines River	64	Good

[1]QHEI=Qualitative Habitat Evaluation Index.
*Annual sampling station.

TABLE 7: NUMBER, WEIGHT, AND NUMBER OF SPECIES FOR FISH COLLECTED IN THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS DURING 2005

Station No.	Location	Waterway	Sample Gear	Number of Fish	Weight (grams)	Number of Species		Most Abundant Species
						Total	Game	
106	Dundee Road	W Fork N Branch Chicago River[1]	BP/Seine	5	14	3	1	Carp
103	Golf Road	W Fork N Branch Chicago River[1]	BP/Seine	6	118	4	3	Green sunfish
31	Lake-Cook Road	M Fork N Branch Chicago River[2]	BP	14	260	4	2	Green sunfish
32	Lake-Cook Road	Skokie River	BP/Seine	34	5,621	4	2	Bluegill, Green sunfish
105	Frontage Road	Skokie River	BP/Seine	39	722	3	2	Green sunfish
104	Glenview Road	North Branch Chicago River	BP	10	657	3	2	Green sunfish
34	Dempster Street	North Branch Chicago River	BP/Seine	13	399	5	2	Carp
96	Albany Avenue*	North Branch Chicago River	BP	6	17	3	1	Carp
35	Central Street	North Shore Channel	Large EF Boat	139	159,512	10	5	Carp
102	Oakton Street	North Shore Channel	Large EF Boat	151	21,056	17	9	Golden shiner
36	Touhy Avenue*	North Shore Channel	Large EF Boat	276	102,744	9	4	Gizzard shad
101	Foster Avenue	North Shore Channel	Large EF Boat	273	48,926	16	7	Gizzard shad
37	Wilson Avenue	North Branch Chicago River	Large EF Boat	122	169,620	11	5	Carp
73	Diversey Parkway	North Branch Chicago River	Large EF Boat	164	70,776	12	6	Golden shiner
46	Grand Avenue*	North Branch Chicago River	Large EF Boat	77	14,020	5	3	Gizzard shad
75	Cicero Avenue*	Chicago Sanitary & Ship Canal	Large EF Boat	184	59,470	7	3	Gizzard shad
41	Harlem Avenue*	Chicago Sanitary & Ship Canal	Large EF Boat	758	96,426	13	4	Gizzard shad
92	Lockport*	Chicago Sanitary & Ship Canal	Large EF Boat	179	20,337	9	3	Gizzard shad
55	130th Street*	Calumet River	Large EF Boat	380	102,346	16	7	Largemouth bass
76	Halsted Street*	Little Calumet River	Large EF Boat	913	125,321	18	9	Gizzard shad

TABLE 7 (Continued): NUMBER, WEIGHT, AND NUMBER OF SPECIES FOR FISH COLLECTED IN THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS DURING 2005

Station No.	Location	Waterway	Sample Gear	Number of Fish	Weight (grams)	Number of Species		Most Abundant Species
						Total	Game	
59	Cicero Avenue*	Calumet-Sag Channel	Large EF Boat	453	85,424	10	5	Emerald shiner
64	Lake Street*	West Branch DuPage River	BP/Seine	64	1,633	7	3	Green sunfish
18	Devon Avenue*	Salt Creek	BP/Seine	49	2,985	8	4	Green sunfish
78	Wille Road*	Higgins Creek	BP	30	214	6	1	White sucker
13	Lake-Cook Road*	Des Plaines River	BP/Seine	125	2,284	10	5	Green sunfish
22	Ogden Avenue*	Des Plaines River	BP	39	1,522	10	3	White sucker
91	Material Service Road*	Des Plaines River	BP/Seine	129	454	12	3	Bluntnose minnow
TOTAL				4,632	1,093 kg.	36	14	

[1]West Fork North Branch Chicago River.
[2]Middle Fork North Branch Chicago River.
*Annual sampling station.

TABLE 8: INDEX OF BIOTIC INTEGRITY SCORE AND CATEGORY BY STATION DURING 2005

Station No.	Location	Waterway	Sample Gear	IBI* Score	IBI* Category
106	Dundee Road	West Fork North Branch Chicago River	BP	26	Fair
106	Dundee Road	West Fork North Branch Chicago River	Seine	24	Fair
103	Golf Road	West Fork North Branch Chicago River	BP	28	Fair
103	Golf Road	West Fork North Branch Chicago River	Seine	28	Fair
31	Lake-Cook Road	Middle Fork North Branch Chicago River	BP	22	Fair
31	Lake-Cook Road	Middle Fork North Branch Chicago River	Seine	ND	ND
32	Lake-Cook Road	Skokie River	BP	26	Fair
32	Lake-Cook Road	Skokie River	Seine	30	Fair
105	Frontage Road	Skokie River	BP	22	Fair
105	Frontage Road	Skokie River	Seine	ND	ND
104	Glenview Road	North Branch Chicago River	BP	22	Fair
104	Glenview Road	North Branch Chicago River	Seine	ND	ND
34	Dempster Street	North Branch Chicago River	BP	24	Fair
34	Dempster Street	North Branch Chicago River	Seine	24	Fair
96	Albany Avenue	North Branch Chicago River	BP	22	Fair
96	Albany Avenue	North Branch Chicago River	Seine	ND	ND
35	Central Street	North Shore Channel	Large EF Boat	28	Fair
102	Oakton Street	North Shore Channel	Large EF Boat	36	Fair
36	Touhy Avenue	North Shore Channel	Large EF Boat	32	Fair
101	Foster Avenue	North Shore Channel	Large EF Boat	32	Fair
37	Wilson Avenue	North Branch Chicago River	Large EF Boat	30	Fair
73	Diversey Parkway	North Branch Chicago River	Large EF Boat	30	Fair
46	Grand Avenue	North Branch Chicago River	Large EF Boat	28	Fair
75	Cicero Avenue	Chicago Sanitary and Ship Canal	Large EF Boat	28	Fair
41	Harlem Avenue	Chicago Sanitary and Ship Canal	Large EF Boat	30	Fair
92	Lockport	Chicago Sanitary and Ship Canal	Large EF Boat	30	Fair

TABLE 8 (Continued): INDEX OF BIOTIC INTEGRITY SCORE AND CATEGORY BY STATION DURING 2005

Station No.	Location	Waterway	Sample Gear	IBI* Score	IBI* Category
55	130th Street	Calumet River	Large EF Boat	42	Good
76	Halsted Street	Little Calumet River	Large EF Boat	36	Fair
59	Cicero Avenue	Calumet-Sag Channel	Large EF Boat	36	Fair
13	Lake-Cook Road	Des Plaines River	BP	28	Fair
13	Lake-Cook Road	Des Plaines River	Seine	34	Fair
78	Wille Road	Higgins Creek	BP	28	Fair
78	Wille Road	Higgins Creek	Seine	ND	ND
18	Devon Avenue	Salt Creek	BP	24	Fair
18	Devon Avenue	Salt Creek	Seine	34	Fair
22	Ogden Avenue	Des Plaines River	BP	26	Fair
22	Ogden Avenue	Des Plaines River	Seine	ND	ND
91	Material Services Road	Des Plaines River	BP	28	Fair
91	Material Services Road	Des Plaines River	Seine	26	Fair
64	Lake Street	West Branch DuPage River	BP	28	Fair
64	Lake Street	West Branch DuPage River	Seine	32	Fair

*IBI = Index of Biotic Integrity.
ND = No fish were caught in the seine or conditions were unfavorable for seining.

2006 UPPER ILLINOIS WATERWAY FISHERIES INVESTIGATION RM 274.4-296.0

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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.

INHS Fish Collection Database Search Results

For additional information, please contact the collection manager, Mike Retzer

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Catalogue #	Genus species	Stream	Drainage	County	State	Country	Year
INHS 32233	Morone mississippiensis	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Will	Illinois	USA	1993
INHS 38945	Ameiurus melas	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1993
INHS 38946	Pimephales promelas	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1993
INHS 38947	Ambloplites rupestris	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1993
INHS 38955	Gasterosteus aculeatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Will	Illinois	USA	1994
INHS 38960	Dorosoma cepedianum	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Will	Illinois	USA	1993
INHS 38963	Esox americanus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Will	Illinois	USA	1993
INHS 38965	Umbra limi	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1994
INHS 38966	Lepomis gibbosus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1995
INHS 53900	Cyprinus carpio	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 53901	Ameiurus natalis	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 53902	Ictalurus punctatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 53903	Noturus gyrinus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 53904	Morone mississippiensis	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 53905	Morone americana	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 59327	Carassius auratus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1988
INHS 59340	Lepomis cyanellus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1989
INHS 59343	Notropis atherinoides	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Will	Illinois	USA	1988
INHS 61132	Gasterosteus aculeatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1991
INHS 90512	Umbra limi	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2001
INHS 90513	Carassius auratus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2001
INHS 90514	Ameiurus natalis	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2001
INHS 90515	Lepomis gibbosus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2001
INHS 90516	Pomoxis nigromaculatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2001
INHS 96715	Cyprinus carpio	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1991
INHS 96716	Cyprinella spiloptera	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 96717	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 96752	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Will	Illinois	USA	1999
INHS 96753	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Will	Illinois	USA	1988
INHS 96754	Lepomis humilis x L. macrochirus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Will	Illinois	USA	1991
INHS 96759	Dorosoma cepedianum	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 96760	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 96761	Lepomis hybrid	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 96907	Cyprinus carpio	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998

INHS 96909	Notropis atherinoides	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 96910	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 96911	Morone mississippiensis	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 96912	Dorosoma cepedianum	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96913	Lepomis gibbosus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96914	Micropterus salmoides	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96915	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 96916	Pimephales promelas	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 96917	Lepomis gibbosus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 96934	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 96937	Cyprinella spiloptera	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 96938	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 96939	Pimephales promelas	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 96940	Dorosoma cepedianum	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96941	Ameiurus melas	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96942	Ameiurus natalis	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96943	Micropterus salmoides	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96977	Notemigonus crysoleucas	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 96978	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 96979	Notemigonus crysoleucas	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 96980	Lepomis macrochirus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 96981	Dorosoma cepedianum	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96982	Carassius auratus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96983	Cyprinus carpio	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96984	Morone americana	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96985	Morone mississippiensis	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96986	Lepomis cyanellus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96987	Micropterus salmoides	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96988	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 96991	Cyprinella spiloptera	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 96992	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 97042	Dorosoma cepedianum	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97043	Ameiurus natalis	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97044	Lepomis gibbosus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97045	Micropterus salmoides	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97109	Dorosoma cepedianum	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97110	Notropis atherinoides	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97111	Morone americana	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
		Chicago Sanitary & Ship					

INHS 97112	Lepomis cyanellus	Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97113	Lepomis gibbosus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97114	Lepomis macrochirus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97115	Micropterus salmoides	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97116	Notropis atherinoides	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 97117	Notropis hudsonius	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 97118	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 97119	Morone americana	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 97120	Morone mississippiensis	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 97121	Lepomis cyanellus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 97122	Lepomis macrochirus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 97128	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 97129	Lepomis cyanellus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 97130	Lepomis macrochirus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 97131	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 97136	Gambusia affinis	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1992
INHS 97221	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 97224	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 97302	Dorosoma cepedianum	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97303	Notemigonus crysoleucas	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97304	Lepomis gibbosus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97305	Lepomis macrochirus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97306	Micropterus salmoides	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97319	Pimephales notatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 97339	Morone chrysops	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 97340	Micropterus salmoides	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 97688	Cyprinus carpio	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97689	Ictalurus punctatus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97690	Cyprinus carpio	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97696	Carassius auratus	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97697	Cyprinus carpio	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97698	Carassius auratus x Cyprinus carpio	Chicago Sanitary & Ship Canal	(Des Plaines River Dr.)	Cook	Illinois	USA	2000

INHS Fish Collection Database Search Results

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Catalogue #	Genus species	Stream	Drainage	County	State	Country	Year
INHS 749	Catostomus commersoni	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1967
INHS 750	Carassius auratus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1967
INHS 751	Cyprinus carpio	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1967
INHS 752	Semotilus atromaculatus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1967
INHS 753	Ameiurus melas	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1967
INHS 754	Lepomis cyanellus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1967
INHS 755	Lepomis macrochirus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1967
INHS 32232	Morone mississippiensis	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1993
INHS 53880	Notropis hudsonius	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 53881	Morone mississippiensis	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 53882	Morone americana	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 54308	Cyprinus carpio	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 54309	Notropis atherinoides	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 54310	Ictalurus punctatus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 54311	Aplodinotus grunniens	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 54312	Morone americana	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 54313	Cyprinus carpio	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 54314	Notropis atherinoides	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 54315	Notropis buchanani	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 54316	Morone americana	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 54481	Pimephales notatus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 54482	Pimephales promelas	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 57051	Carassius auratus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1976
INHS 57052	Morone mississippiensis	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1996
INHS 57053	Lepomis gulosus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1996
INHS 57066	Morone mississippiensis	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1997
INHS 57067	Pimephales promelas	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1997
INHS 57250	Morone mississippiensis	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1996
INHS 96704	Dorosoma cepedianum	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96705	Carassius auratus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96706	Cyprinus carpio	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96707	Morone mississippiensis	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96708	Lepomis cyanellus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96709	Micropterus salmoides	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96710	Morone americana	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 96711	Notropis atherinoides	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 96712	Notropis atherinoides	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 96713	Pimephales notatus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 96714	Micropterus salmoides	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 97053	Dorosoma cepedianum	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97054	Cyprinus carpio	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97055	Lepomis gibbosus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97056	Lepomis macrochirus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97057	Micropterus salmoides	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97071	Notropis atherinoides	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 97072	Notropis atherinoides	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 97073	Morone mississippiensis	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97074	Lepomis cyanellus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97075	Micropterus salmoides	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97076	Carassius auratus x Cyprinus carpio	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97213	Pimephales notatus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 97215	Pimephales notatus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1998
INHS 97216	Pimephales notatus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	1999
INHS 97680	Aplodinotus grunniens	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000

INHS 97681	Carassius auratus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97682	Cyprinus carpio	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97683	Catostomus commersoni	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97684	Ameiurus natalis	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97685	Ictalurus punctatus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97686	Lepomis macrochirus	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000
INHS 97687	Micropterus dolomieu	Calumet Sag Channel	(Des Plaines River Dr.)	Cook	Illinois	USA	2000

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TOTAL NUMBER OF FISH COLLECTED FROM EACH SAMPLING STATION IN THE CHICAGO AREA WATERWAY SYSTEM
FROM 2001 THROUGH 2005 AS PART OF THE AMBIENT WATER QUALITY MONITORING PROGRAM

Waterway	USGS River Mile	Station Number	Station Name	Species Code	Fish Species or Hybrid (x)	NUMBER OF FISH COLLECTED Year 2001	2002	2003	2004	2005	Grand Total
Bubbly Creek	323	99.3	RAPS	19	Gizzard shad			97	42	498	637
				31	Coho salmon			1			1
				44	Carp			28	8	6	42
				44.5	Carp x Goldfish			10	3	9	22
				60	Golden shiner				8		8
				88	Bluntnose minnow				1		1
				128	Channel catfish				1	1	2
				163	Pumpkinseed			9	20	3	32
				166	Bluegill			5	10		15
				174	Largemouth bass			1	3		4
				223	Nile tilapia				1		1
			RAPS Count					151	97	517	765
Bubbly Creek	322.5	99.2	35th Street	19	Gizzard shad			15	9	103	127
				41	Goldfish				1		1
				44	Carp			9	6	4	19
				44.5	Carp x Goldfish					4	4
				60	Golden shiner				2	1	3
				88	Bluntnose minnow				1		1
				163	Pumpkinseed			11	3		14
				166	Bluegill			3	4		7
				174	Largemouth bass			1	1	2	4
			35th Street Count					39	27	114	180
Bubbly Creek	322.1	99	Archer Avenue	19	Gizzard shad		9				9
				44	Carp		4				4
				63	Emerald shiner		2				2
				163	Pumpkinseed		3				3
				174	Largemouth bass		3				3
			Archer Avenue Count				21				21
Bubbly Creek	321.9	99.1	I-55	19	Gizzard shad			6	19	125	150
				41	Goldfish					1	1
				44	Carp			1	8	3	12
				60	Golden shiner				2		2
				79	Spotfin shiner				7		7
				128	Channel catfish				1		1
				162	Green sunfish			4	1		5
				163	Pumpkinseed			11	7		18
				166	Bluegill			7	4		11
				174	Largemouth bass			2	10	9	21
				175	White crappie				1		1
				176	Black crappie					1	1
			I-55 Count					31	60	139	230
Chicago Sanitary and Ship Canal	321.1	40	Damen Avenue	19	Gizzard shad		10				10
				41	Goldfish		1				1
				44	Carp		58				58
				60	Golden shiner		18				18
				63	Emerald shiner		5				5
				88	Bluntnose minnow		13				13
				128	Channel catfish		2				2
				163	Pumpkinseed		28				28
				166	Bluegill		7				7
				174	Largemouth bass		6				6
			Damen Avenue Count				148				148
Chicago Sanitary and Ship Canal	317.3	75	Cicero Avenue	19	Gizzard shad	47	37	88	48	106	326
				41	Goldfish	1	1	4	1		7
				44	Carp	93	82	15	53	46	289
				44.5	Carp x Goldfish	3	1	1	2		7
				60	Golden shiner				12		12
				63	Emerald shiner	1	1		1		3
				79	Spotfin shiner		2	2	1	2	7
				88	Bluntnose minnow	10	3	2	33	16	64
				126	Yellow bullhead		2	4	2	4	12
				128	Channel catfish	1			2		3
				152	Mosquitofish	2			1		3
				162	Green sunfish	5	1	6	7	2	21
				163	Pumpkinseed	21	6	16	28	8	79
				166	Bluegill	4					4
			Cicero Avenue Count			188	136	138	191	184	837

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TOTAL NUMBER OF FISH COLLECTED FROM EACH SAMPLING STATION IN THE CHICAGO AREA WATERWAY SYSTEM FROM 2001 THROUGH 2005 AS PART OF THE AMBIENT WATER QUALITY MONITORING PROGRAM

Waterway	USGS River Mile	Station Number	Station Name	Species Code	Fish Species or Hybrid (x)	NUMBER OF FISH COLLECTED Year 2001	2002	2003	2004	2005	Grand Total
Chicago Sanitary and Ship Canal	314	41	Harlem Avenue	19	Gizzard shad	59	83	54	102	603	901
				41	Goldfish	1	3		1	6	11
				44	Carp	16	35	15	29	36	131
				44.5	Carp x Goldfish			1			1
				60	Golden shiner		4	2	1	14	21
				63	Emerald shiner	2	4		1	33	40
				79	Spotfin shiner	1	4	2	4	2	13
				88	Bluntnose minnow	4	12	112	29	14	171
				89	Fathead minnow				1	1	2
				126	Yellow bullhead	1	3	4	2	4	14
				152	Mosquitofish		27	1	1	2	31
				157	Yellow bass					1	1
				162	Green sunfish		1	3			4
				163	Pumpkinseed	2	12	31	20	40	105
				166	Bluegill					1	1
				174	Largemouth bass	2			1		3
				186	Pumpkinseed x bluegill					1	1
				231	Round goby				1		1
			Harlem Avenue Count			88	188	225	193	758	1,452
Chicago Sanitary and Ship Canal	304.1	42	Route 83	19	Gizzard shad		1				1
				44	Carp		3				3
				126	Yellow bullhead		1				1
				152	Mosquitofish		25				25
				162	Green sunfish		2				2
			Route 83 Count				32				32
Chicago Sanitary and Ship Canal (also see SEPA 5 Calumet-Sag Channel)	303.4	905.1	SEPA 5 (Chicago Sanitary and Ship Canal Waterfall)	19	Gizzard shad			91	27	180	298
				32	Chinook salmon					1	1
				44	Carp			2	7	4	13
				63	Emerald shiner			4	6	120	130
				79	Spotfin shiner			1	2	1	4
				88	Bluntnose minnow				6	3	9
				126	Yellow bullhead			2	1		3
				128	Channel catfish			2		3	5
				156	White bass				1		1
				156.5	White perch					2	2
				157	Yellow bass					3	3
				162	Green sunfish				1	1	2
				163	Pumpkinseed					2	2
				166	Bluegill				5		5
				174	Largemouth bass			4	8	13	25
				231	Round goby			1		1	2
			SEPA 5 Count					107	64	334	505
Chicago Sanitary and Ship Canal	300.5	48	Stephen Street	19	Gizzard shad		7				7
				44	Carp		2				2
				63	Emerald shiner		3				3
				88	Bluntnose minnow		12				12
			Stephen Street Count				24				24
Chicago Sanitary and Ship Canal	292.1	92	Lockport	17	Skipjack herring					3	3
				19	Gizzard shad	51	50	19	3	159	282
				44	Carp	26	11	43	12	3	95
				60	Golden shiner					1	1
				63	Emerald shiner		2	1		8	11
				126	Yellow bullhead					1	1
				128	Channel catfish		2	1	2	2	7
				162	Green sunfish		1	1			2
				163	Pumpkinseed			1		1	2
				166	Bluegill			1			1
				174	Largemouth bass				5		5
				221	Freshwater drum		1			1	2
			Lockport Count			77	67	67	22	179	412

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

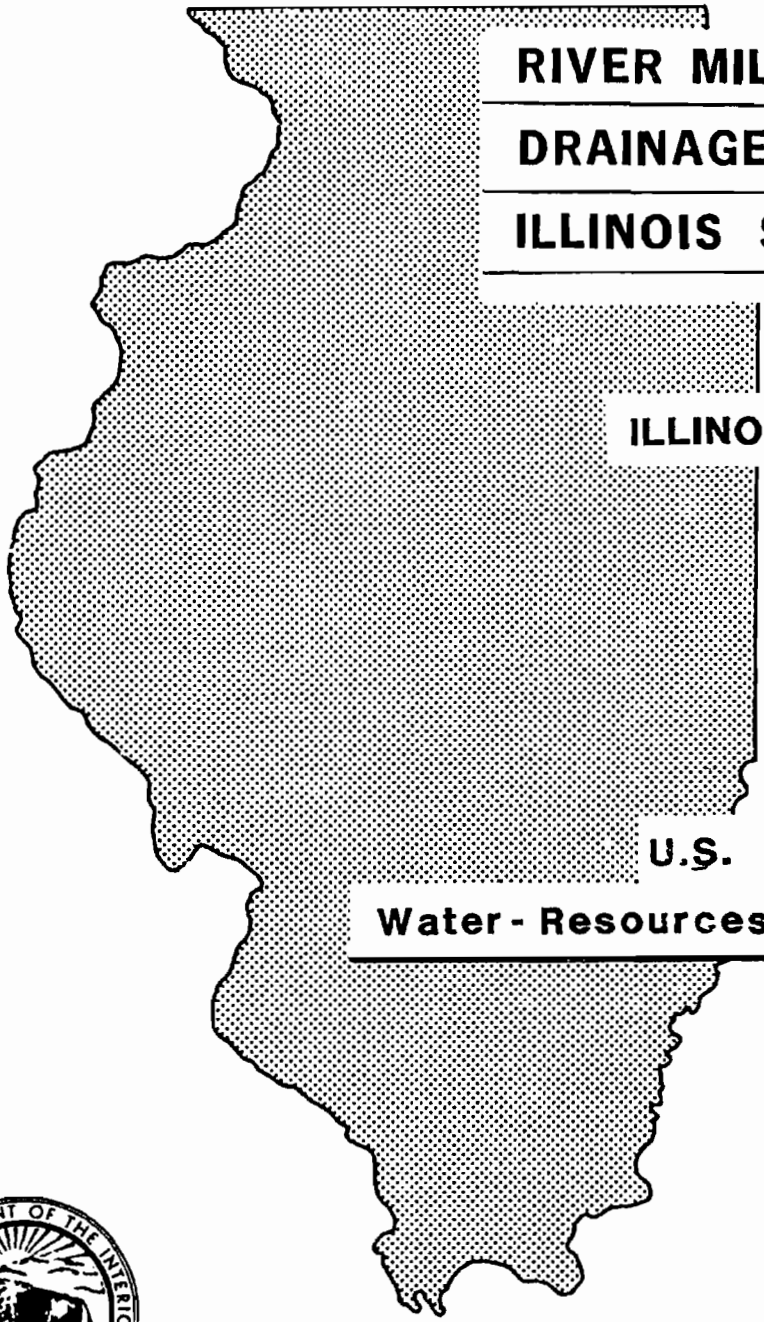
TOTAL NUMBER OF FISH COLLECTED FROM EACH SAMPLING STATION IN THE CHICAGO AREA WATERWAY SYSTEM
FROM 2001 THROUGH 2005 AS PART OF THE AMBIENT WATER QUALITY MONITORING PROGRAM

Waterway	USGS River Mile	Station Number	Station Name	Species Code	Fish Species or Hybrid (x)	NUMBER OF FISH COLLECTED Year 2001	2002	2003	2004	2005	Grand Total
Little Calumet River (Wadeable)		52	Wentworth Avenue	44	Carp			1			1
			Wentworth Avenue Count					1			1
Little Calumet River (Wadeable)		57	Ashland Avenue	44	Carp			11			11
				162	Green sunfish			1			1
			Ashland Avenue Count					12			12
Thorn Creek		97	170th Street	19	Gizzard shad			1			1
				44	Carp			1			1
				104	White sucker			2			2
				162	Green sunfish			1			1
			170th Street Count					5			5
Thorn Creek		54	Joe Orr Road	93	Creek chub			9			9
				162	Green sunfish			9			9
				166	Bluegill			1			1
			Joe Orr Road Count					19			19
Calumet-Sag Channel	319.1	58	Ashland Avenue	19	Gizzard shad			30			30
				41	Goldfish			1			1
				44	Carp			26			26
				88	Bluntnose minnow			5			5
				126	Yellow bullhead			2			2
				156.5	White perch			3			3
				157	Yellow bass			2			2
				162	Green sunfish			9			9
				163	Pumpkinseed			1			1
				166	Bluegill			5			5
				174	Largemouth bass			8			8
				180	Green sunfish x Bluegill			1			1
				221	Freshwater drum			2			2
			Ashland Avenue Count					95			95
Calumet-Sag Channel	318	903	SEPA 3	19	Gizzard shad			88		70	158
				27	Rainbow trout			1			1
				32	Chinook salmon					1	1
				41	Goldfish					4	4
				44	Carp			20		16	36
				60	Golden shiner					2	2
				63	Emerald shiner			3		102	105
				88	Bluntnose minnow			1		9	10
				93	Creek chub					1	1
				104	White sucker			3		1	4
				128	Channel catfish					4	4
				156.5	White perch			3		11	14
				157	Yellow bass			1		9	10
				157.5	Striped bass			1			1
				163	Pumpkinseed			2			2
				166	Bluegill			6			6
				172	Smallmouth bass					2	2
				174	Largemouth bass			18		13	31
				221	Freshwater drum					3	3
				231	Round goby			1		5	6
			SEPA 3 Count					148		253	401

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TOTAL NUMBER OF FISH COLLECTED FROM EACH SAMPLING STATION IN THE CHICAGO AREA WATERWAY SYSTEM FROM 2001 THROUGH 2005 AS PART OF THE AMBIENT WATER QUALITY MONITORING PROGRAM

Waterway	USGS River Mile	Station Number	Station Name	Species Code	Fish Species or Hybrid (x)	NUMBER OF FISH COLLECTED Year 2001	2002	2003	2004	2005	Grand Total
Calumet-Sag Channel	315	59	Cicero Avenue	19	Gizzard shad	61	33	3	102	145	344
				41	Goldfish	1	2				3
				44	Carp	23	15	11	25	21	95
				60	Golden shiner					7	7
				63	Emerald shiner	6	29			234	269
				88	Bluntnose minnow	7	41	12	1	27	88
				89	Fathead minnow		5	2			7
				93	Creek chub	1		1			2
				125	Black bullhead			1		1	2
				126	Yellow bullhead	1	1	1	1		4
				156.5	White perch		2	2		6	10
				157	Yellow bass				2	4	6
				162	Green sunfish	5	9	12	3		29
				163	Pumpkinseed		2			1	3
				166	Bluegill	1	1	1			3
				174	Largemouth bass	21	31	9	9	7	77
				176	Black crappie				1		1
				221	Freshwater drum		3	1	1		5
				231	Round goby				2		2
			Cicero Avenue Count			127	174	56	147	453	957
Calumet-Sag Channel	311.7	904	SEPA 4	19	Gizzard shad			49	27	251	327
				41	Goldfish					9	9
				44	Carp			13	35	5	53
				60	Golden shiner					1	1
				63	Emerald shiner			11	1	345	357
				75	Spottail shiner			1	1	1	3
				80	Sand shiner					1	1
				88	Bluntnose minnow			4	7	29	40
				89	Fathead minnow					2	2
				104	White sucker			1			1
				156.5	White perch			6	1	6	13
				157	Yellow bass				1	4	5
				162	Green sunfish			1	1	1	3
				166	Bluegill			1	2		3
				172	Smallmouth bass			2	2		4
				174	Largemouth bass			4	4	5	13
				221	Freshwater drum					3	3
			SEPA 4 Count					93	82	663	838
Calumet-Sag Channel	304.3	43	Route 83	19	Gizzard shad			11			11
				41	Goldfish			1			1
				44	Carp			12			12
				88	Bluntnose minnow			11			11
				126	Yellow bullhead			2			2
				162	Green sunfish			3			3
				174	Largemouth bass			3			3
			Route 83 Count					43			43
Calumet-Sag Channel (also see SEPA 5 Chicago Sanitary and Ship Canal)	303.4	905	SEPA 5 (Calumet-Sag Channel Waterfall)	19	Gizzard shad			107	19	167	293
				44	Carp			1	2	3	6
				60	Golden shiner			1		7	8
				63	Emerald shiner			4		200	204
				79	Spotfin shiner			1			1
				88	Bluntnose minnow			3		5	8
				126	Yellow bullhead					2	2
				128	Channel catfish			9		6	15
				132	Tadpole madtom					1	1
				156.5	White perch					1	1
				157	Yellow bass					3	3
				162	Green sunfish			1	8	4	13
				163	Pumpkinseed			1		6	7
				166	Bluegill			4		1	5
				174	Largemouth bass			11	1	8	20
				231	Round goby					1	1
			SEPA 5 Count					143	30	415	588



RIVER MILEAGES AND DRAINAGE AREAS FOR ILLINOIS STREAMS —

VOLUME 2, ILLINOIS RIVER BASIN

U.S. GEOLOGICAL SURVEY
Water-Resources Investigations 79-111

Prepared in cooperation with
U.S. ARMY CORPS OF ENGINEERS

MILES ABOVE MOUTH	POINT OF INTEREST	DRAINAGE AREA SQ MI	LATITUDE D M S	LONGITUDE D M S	TOPOGRAPHIC QUAD
	CHICAGO SANITARY & SHIP CANAL (MOUTH @ DES PLAINES R MILE 16.9)WILL COUNTY				
0.8	DEEP RUN L				JOLIET
1.0	LOCKPORT LOCK AND DAM				JOLIET
1.1	USGS GAGE 05537000 AT LOCKPORT	740	413411	0880442	JOLIET
2.2	16TH STREET				JOLIET
2.7	IL RT 7				JOLIET
3.2	SLUICE TO DES PLAINES R				JOLIET
6.2	ROMEOVILLE ROAD				ROMEOVILLE
6.2	USGS GAGE 05536995 AT ROMEO	739	413826	0880338	ROMEOVILLE
9.0	WILL COOK CO LINE				ROMEOVILLE
10.5	STEPHEN STREET				ROMEOVILLE
10.5	USGS GAGE 05536900 AT LEMONT	738	414044	0880003	ROMEOVILLE
10.6	IL CENTRAL GOLF RR				SAG BRIDGE
11.9	COOK-DU PAGE CO LINE				SAG BRIDGE
13.4	CALUMET SAG CHANNEL L				SAG BRIDGE
13.4	AREA ABOVE CALUMET SAG CHANNEL	346	414151	0875654	SAG BRIDGE
13.4	DU PAGE COOK CO LINE				SAG BRIDGE
14.1	IL RT 83				SAG BRIDGE
14.1	USGS GAGE 05536152 NR SAG BRIDGE				SAG BRIDGE
17.8	WILLOW SPRINGS ROAD				SAG BRIDGE
17.8	USGS GAGE 05536150 @ WILLOW SPRINGS	341	414403	0875248	SAG BRIDGE
19.3	INTERSTATE 294				PALOS PARK
19.4	US HWY 45				PALOS PARK
22.3	B & O C RR				BERWYN
23.0	LAWNDALE AVENUE BRIDGE				BERWYN
23.4	STEVENSON EXPRESSWAY				BERWYN
24.0	HARLEM AVENUE				BERWYN
24.0	USGS GAGE 05536142 AT HARLEM AVE				BERWYN
24.8	A T & SF RR				BERWYN
26.3	CENTRAL AVENUE				ENGLEWOOD
27.3	CICERO AVENUE				BERWYN
27.3	USGS GAGE 05536140 AT CICERO AV				ENGLEWOOD
27.6	BELT RAILWAY				ENGLEWOOD
27.8	HYDROLOGIC UNIT 07120003				ENGLEWOOD
28.4	PULASKI ROAD				ENGLEWOOD
28.9	IL NORTHERN RR				ENGLEWOOD
29.5	KEDZIE AVE				ENGLEWOOD
29.6	IL CENTRAL RR				ENGLEWOOD
30.0	CALIFORNIA AVENUE				ENGLEWOOD
30.5	B & O C RR				ENGLEWOOD
30.6	WESTERN AVENUE				ENGLEWOOD
31.1	DAMEN AVENUE				ENGLEWOOD
31.6	USGS GAGE 05536135 AT ASHLAND AVE				ENGLEWOOD
31.6	ASHLAND AVENUE				ENGLEWOOD
	S BR CHICAGO RIVER (HEAD OF CHICAGO SANITARY & SHIP CANAL)				
31.9	LOOMIS STREET				ENGLEWOOD
32.2	THROOP STREET				ENGLEWOOD
32.7	HALSTED STREET				ENGLEWOOD
32.8	DAN RYAN EXPRESSWAY				ENGLEWOOD
33.2	CERMAK ROAD				ENGLEWOOD
33.4	CANAL STREET				ENGLEWOOD
33.5	PENN CENTRAL RR				ENGLEWOOD
33.7	18TH STREET				ENGLEWOOD
33.8	C RI & P RR				ENGLEWOOD
34.3	ROOSEVELT ROAD				ENGLEWOOD
34.7	HARRISON STREET				ENGLEWOOD
34.8	EISENHOWER EXPRESSWAY				CHICAGO LOOP
34.9	VAN BUREN STREET				CHICAGO LOOP

MILES ABOVE MOUTH	POINT OF INTEREST	DRAINAGE AREA SQ MI	LATITUDE D M S	LONGITUDE D M S	TOPOGRAPHIC QUAD
	DEEP RUN(MOUTH AT CHICAGO SAN & SHIP CANAL MILE 0.8) WILL COUNTY				
	AT MOUTH NEAR LOCKPORT	0.75	413356	0880409	JOLIET
	CALUMET SAG CHANNEL(MOUTH @ CHICAGO SAN & SHIP CAN MILE 13.4)DU PAGE COUNTY				
0.0	AT MOUTH NR SAG BRIDGE	391	414144	0875702	SAG BRIDGE
0.2	DU PAGE-COOK CO LINE				SAG BRIDGE
0.6	I C G RR				SAG BRIDGE
0.9	IL RT 83				SAG BRIDGE
0.9	USGS GAGE 05536700 @ SAG BRIDGE	389.	414145	0873611	SAG BRIDGE
4.7	CROOKED CREEK R				SAG BRIDGE
5.3	US HWY 45				PALOS PARK
5.6	MILL CREEK L				PALOS PARK
5.6	HYDROLOGIC UNIT 07120003				PALOS PARK
7.4	IL RT 7				PALOS PARK
7.5	WABASH RR				PALOS PARK
8.2	IL RT 43				PALOS PARK
8.2	USGS GAGE 05536520 NR PALOS HGHTS	335	414041	0874749	PALOS PARK
9.2	NAVAJO CREEK L				PALOS PARK
9.2	RIDGELAND AVENUE				PALOS PARK
10.7	TINLEY CREEK L				PALOS PARK
10.9	127TH STREET				BLUE ISLAND
11.6	IL RT 50				BLUE ISLAND
11.6	USGS GAGE 05536420 NR ALSIP	310.	413923	0874418	BLUE ISLAND
12.4	INTERSTATE 294				BLUE ISLAND
12.7	CRAWFORD AVENUE				BLUE ISLAND
13.7	KEDZIE AVENUE				BLUE ISLAND
14.1	FRANCISCO AVENUE				BLUE ISLAND
14.2	B & O C T RR				BLUE ISLAND
14.3	GRAND TRUNK RR				BLUE ISLAND
14.5	STONY CREEK (EAST) R				BLUE ISLAND
14.6	ROAD S36,T37N,R13E				BLUE ISLAND
14.6	C RI & P RR				BLUE ISLAND
14.7	WESTERN AVENUE				BLUE ISLAND
14.9	CHATHAM STREET				BLUE ISLAND
15.2	DIVISION STREET				BLUE ISLAND
15.2	USGS GAGE 05536368 @ BLUE ISLAND	292	413911	0874013	BLUE ISLAND
15.6	INTERSTATE 57				BLUE ISLAND
15.7	ASHLAND AVENUE				BLUE ISLAND
15.7	USGS GAGE 05536367 @ S ASHLAND AV				BLUE ISLAND
16.1	ROAD S32,T37N,R14E				BLUE ISLAND
	LITTLE CALUMET RIVER (HEAD OF CALUMET SAG CHANNE)				
16.2	ABOVE CALUMET SAG CHAN	291	413924	0873910	BLUE ISLAND
16.3	LITTLE CALUMET R(LOWER) R				BLUE ISLAND
16.3	NEAR CALUMET PARK	265	413921	0873903	BLUE ISLAND
16.9	ASHLAND AVENUE				BLUE ISLAND
16.9	USGS GAGE 05536356 @ ASHLAND AV				BLUE ISLAND
17.0	INTERSTATE 57				BLUE ISLAND
17.3	ROAD S31,T37N,R14E				BLUE ISLAND
17.5	INDIANA HARBOR BELT RR				BLUE ISLAND
17.6	MIDLOTHIAN CR L				BLUE ISLAND
18.2	INDIANA HARBOR BELT RR				BLUE ISLAND
18.2	INTERSTATE 57				BLUE ISLAND
18.3	S ASHLAND AVENUE				BLUE ISLAND
18.3	USGS GAGE 05536326 AT DIXMOOR	257	413821	0873936	BLUE ISLAND

ATTACHMENT 7

FISH DATA ON THE UPPER ILLINOIS WATERWAY

2006 UPPER ILLINOIS WATERWAY FISHERIES INVESTIGATION RM 274.4-296.0

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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.)

BRANDON POOL

SPECIES	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.)

DOWNSTREAM I-55

SPECIES	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.

TABLE 14 (cont.)

UPSTREAM I-55

SPECIES	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	

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								2005							
	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	--	--	--	--	0.3	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.)

2006

SPECIES	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	21.3	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.

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

Temperature Criteria Options for the Lower Des Plaines River

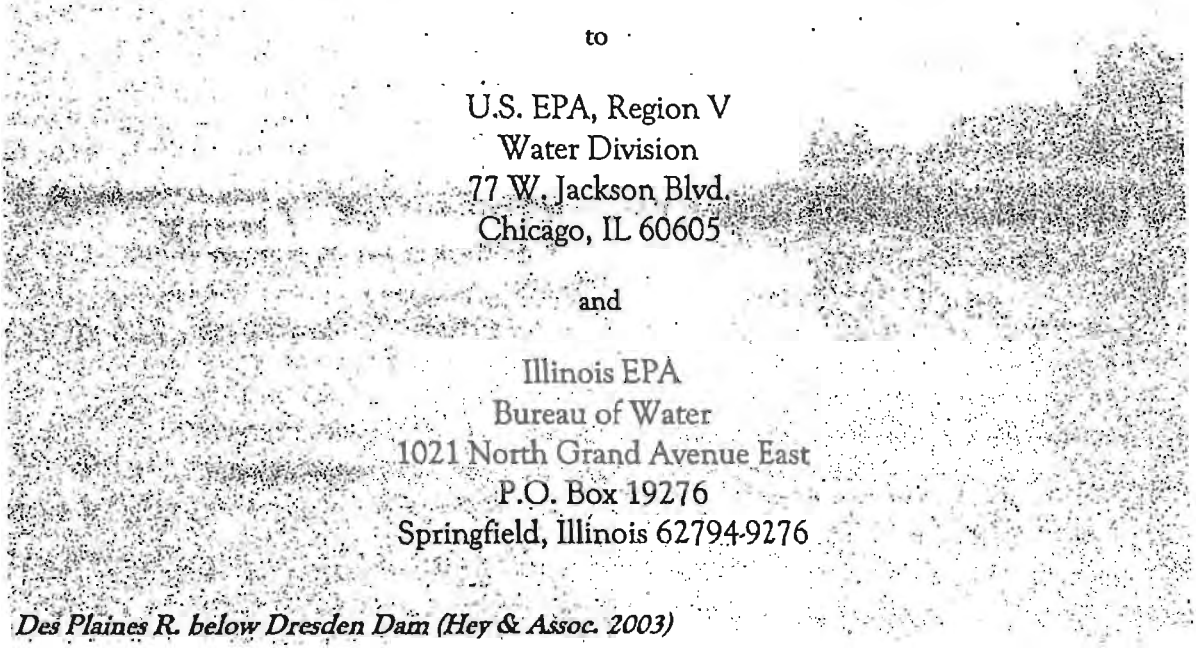
Final Report

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
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and

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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.

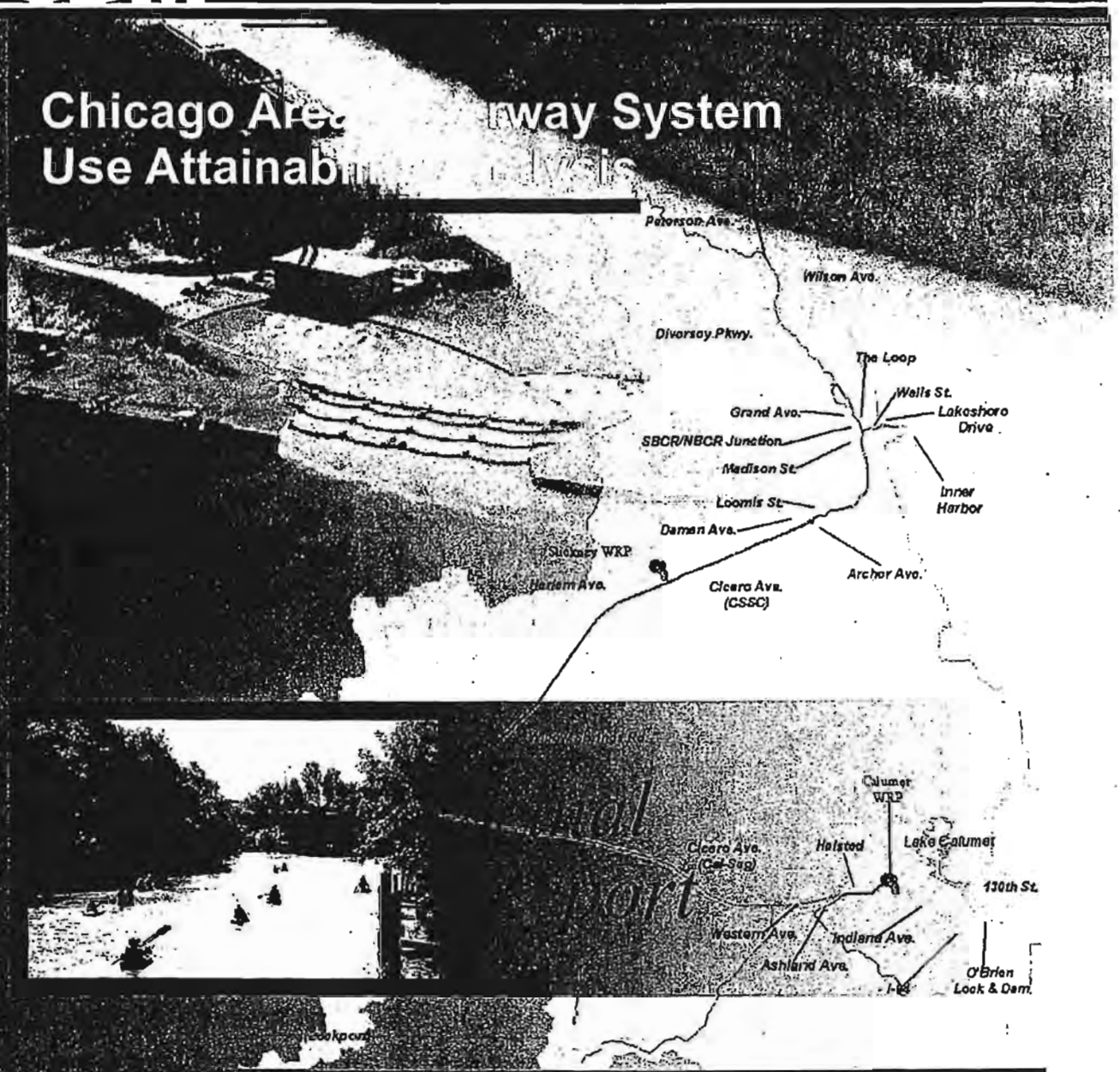
Thermal Category	Proportion of Representative Fish Species 100%	90%	75%	50%
Modified Use RAS 1 *(includes golden redhorse)*				
Optimum	71.2 (21.8)	75.4 (24.1)	81.3 (27.4)	82.6 (28.1)
Growth (MWAT)	77.5 (25.3)	81.0 (27.2)	85.8 (29.9)	86.7 (30.4)
Avoidance (UAT)	83.7 (28.7)	84.9 (29.4)	87.1 (30.6)	88.9 (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



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: Croakers 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

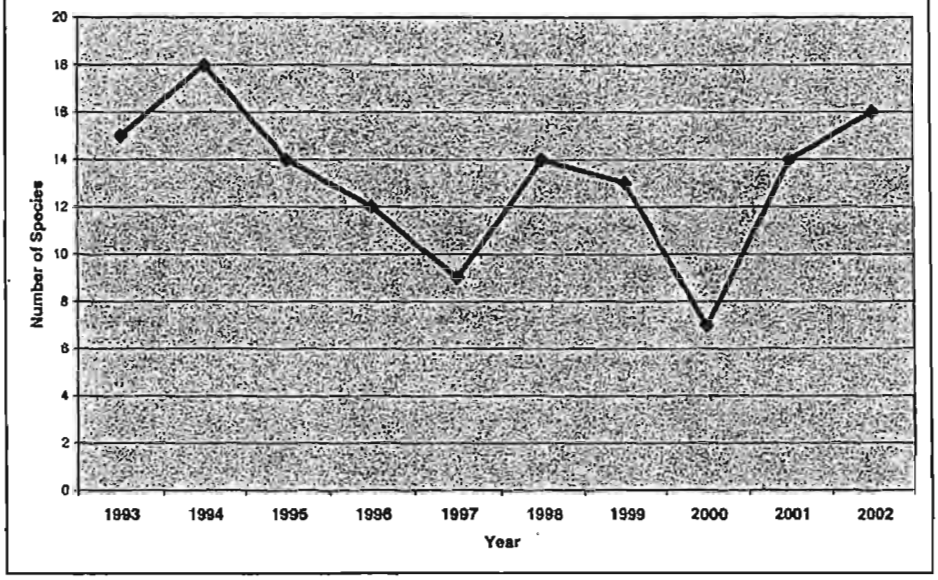
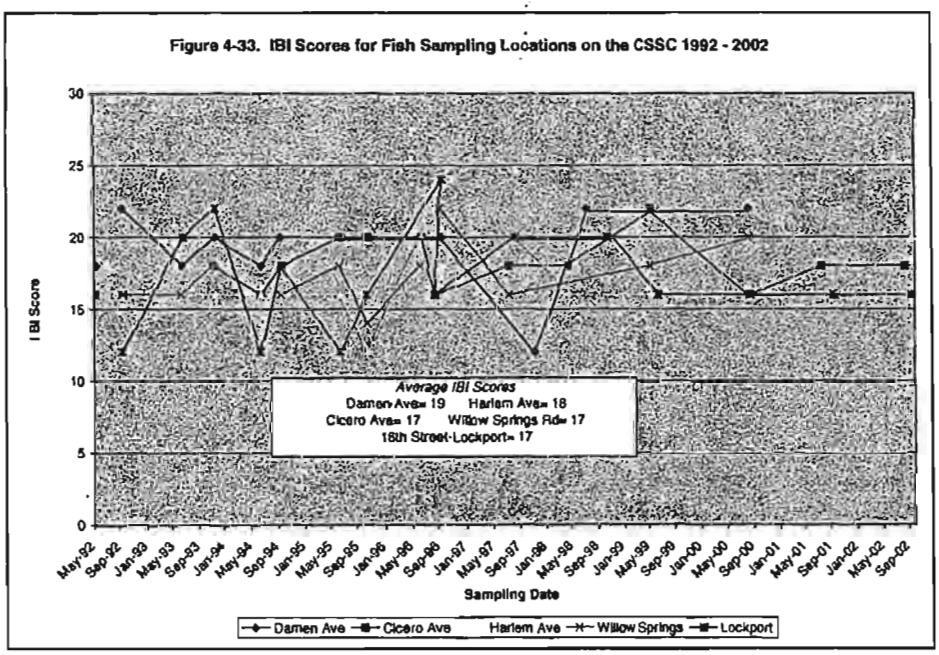


Figure 4-33. IBI Scores for Fish Sampling Locations on the CSSC 1992 - 2002



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 8

RESUME OF NICK OWENS

NICK OWENS
Ecologist

Expertise: Ecological Issues, Freshwater Mussels, Fish, Botanical Surveys, Threatened and Endangered Species

Plant Management & Herbiciding

Mr. Owens has an extensive background in managing plant communities in wetlands, grasslands and forests. His extensive knowledge of community dynamics and landscape ecology and experience with herbicide applications have helped in the following recent projects:

- Conducted selective herbicide treatments on exotic species at a dolomite prairie in the Midewin National Tallgrass Prairie complex (2007).
- Managed five wetlands within a utility right of way conducting routine site visits to manage exotic species including coordinating and overseeing a crew of three people (2007).
- Conducted selective herbicide treatments on a wetland within DuPage County, and additionally drafted a planting plan and conducted plantings to meet DuPage County wetland standards (2007).
- Coordinated and supervised herbicide applications for various exotic species at Keepataw Forest Preserve, Will County (2007) on approximately ten acres of upland and wetland areas.

T&E Species Surveys

Mr. Owens has surveyed both invertebrate and vertebrate populations of state listed species throughout Illinois. Recent projects include:

- Conducted a visual survey for the State-Endangered Eastern Massasauga (*Sistrurus catenatus*) and a cover board survey for the State-Threatened Kirtland's snake (*Clonophis kirtlandii*) along a 100+ acre corridor of the Plum Creek Tributary in Crete, Will County (2007)
- Transplanted the Illinois State-Threatened species bog arrow grass (*Triglochlin palustris*) along I-294 to suitable protected habitat for the Illinois Tollway and monitored success of translocation efforts (2007).
- Conducted field investigations for the Illinois State-Threatened Spike Mussel (*Elliptio dilatata*), Black Sandshell (*Ligumia recta*), and Slippershell Mussel (*Alasmidonta viridis*) in addition to the Illinois State-Endangered Butterfly Mussel (*Ellipsaria lineolata*) and Spectaclecase Mussel (*Cumberlandia monodonta*).
- Conducted field investigations for the Illinois State-Endangered barn owl (*Tyto alba*) near Goodenow, Illinois (2007)
- Conducted a live trap survey for the Illinois State-Threatened Franklin's ground squirrel (*Spermophilus franklinii*) along 7+ miles of railroad right-of-way in Will and Grundy Counties (2007)
- Conducted field investigations for the Illinois State-Threatened white ladies slipper (*Cypripedium candidum*) along 2 miles of railroad right-of-way in Lake County, Illinois (2008).

Tree Surveys

Mr. Owens has conducted tree surveys across the state of Illinois since the summer of 2004. Recent tree surveys include:

- Identified 50+ trees for the Illinois Tollway along I-94 (2007).
- Identified 2,000+ trees for roadway and railway projects in Will and Kane Counties (2008).
- Identified 300+ trees for Graef Engineering along Interstate 90 (2009).
- Identified 500+ trees for CDI for an 8 mile sewer line project in Indianapolis, IN (2009).

Stream Surveys

Mr. Owens has managed multiple biological stream surveys. These projects typically include identification of aquatic biota and qualitative assessment of biotic communities and stream habitat. Techniques used during stream surveys include electrofishing via backpack electrofisher or an electric seine, kick-sort invertebrate sampling, Hester-Dendy artificial substrate deployment, and hand and visual mussel searching. Additionally, Mr. Owens put together survey reports, including background historical research, historical collection searches, and FOIA requests. Recent projects include:

- Fish community characterization, macroinvertebrate, mussel, SOD, sediment, and habitat study along a 6.5 mile stretch of Cedar Creek, Knox County, Illinois for the Galesburg Sanitary District (2007).
- Stream surveys on a 2.5 mile stretch of Hickory Creek, including fish community characterization, mussels, and macroinvertebrate collections as well as water quality analysis (2007).
- Stream surveys on a 3.2 mile stretch of the Jackson Branch of Jackson Creek, and Spring Creek, including fish community characterization, mussels, and macroinvertebrate collections as well as water quality analysis (2007)
- Stream surveys on a 1.5 mile stretch of Spring Creek, including fish community characterization, mussels, and macroinvertebrate collections as well as water quality analysis (2007)
- Mussel survey and mussel relocation at Brewster Creek in conjunction with Stearns Road Bridge project (2007).
- Mussel survey of Big Rock Creek at Jericho Road for the state threatened Spike Mussel (2007).
- Mussel survey of a one mile stretch of Beaver Creek for the state threatened Spike Mussel (2007).
- Sampled sediment at various locations on the East Branch of the DuPage River in DuPage County (Conservation Foundation, 2007)
- Fish community characterization, macroinvertebrate, mussel, and habitat study in the West Branch of the DuPage River, in association with the McDowell Grove Dam Removal, DuPage County, Illinois for the DuPage County Forest Preserve District (2008).
- Mussel survey of Tyler Creek at Damisch Road for the state threatened Slippershell Mussel (2008).
- Mussel survey of Big Rock Creek at Jericho Road for the state threatened Slippershell Mussel (2008).
- Mussel survey and relocation on the Mississippi River near Wood River, Illinois (2008) of nearly 1,500 mussels including the Illinois state-endangered Spectaclecase Mussel and the Illinois state-threatened Butterfly Mussel and Black Sandshell Mussel.

Water Quality Assessments

Mr. Owens has conducted pollutant loading analysis for roadway projects as it pertains to stream water quality impacts. Common techniques employed during pollutant loading analysis include the Driscoll and the Driver methods. Additionally, Mr. Owens has prepared antidegradation analysis reports for several municipal waste water treatment plant projects.

- Assessment of pollution impacts associated with Interstate Route 88 improvements in the Fox River watershed in Kane County for Teng Engineering (2007).
- Antidegradation analysis associated with the City of McHenry WWTP expansion on the Fox River in McHenry County for Donohue & Associates (2007)
- Regularly conducted water quality inspections for a construction site in Antioch, IL (2007).
- Antidegradation analysis associated with the Village of New Lenox Central WWTP on Hickory Creek in Will County (2009).

Wetlands and Permitting

Mr. Owens has completed over 200 wetland screenings totaling more than 30 miles of linear projects in Carroll, Cook, DuPage, Ford, Grundy, Kane, Kankakee, Kendall, Lee, Lake, LaSalle, Livingston, McLean, McHenry, Ogle, Pike, Stephenson, Will, Winnebago, and Woodford Counties, Illinois.

Mr. Owens has delineated wetland projects in Cook, DuPage, Kane, Lake, Livingston, McLean and Will Counties, Illinois. Recent projects include:

- Over 2 miles of right-of-way along Interstate 294 for the Illinois Department of Transportation, including right-of-way areas within the Gensburg-Markham Prairie Nature Preserve.
- Over 40 acres of newly acquired right-of-way along Interstate 55 for the Illinois Department of Transportation in the vicinity of Midewin National Tallgrass Prairie.
- Over 2 miles of right-of-way along Interstate 90 for the Illinois Department of Transportation at Illinois Route 47.

- Over 30 acres of new right-of-way for the Kane County Department of Transportation, in association with the proposed Anderson Road extension project, vcty. Elburn, Illinois.
- Over 20 acres of proposed easement for a natural gas pipeline installation in Livingston and McLean Counties for Nicor Gas.

Mr. Owens has delineated a wetland project in Marion County Indiana for a new sewer line totaling 8 miles in length (Clark Dietz, Inc. 2008).

Mr. Owens has also delineated a wetland project in Lake County Indiana for the Indiana Toll Road totaling five acres.

Mr. Owens also has experience preparing County permits for Kane, DuPage, Lake, McHenry, McLean and Will Counties as well as NPDES permits and IHPA, USFWS, and IDNR clearances. Additionally Mr. Owens has experience preparing USACOE Joint Application permit submittals.

Environmental Site Inspection/Soil and Erosion Control Inspection
Mr. Owens has provided environmental site inspection for underground utility boring projects, offering environmental overview and compliance services.

Past Experience

- Prior to his work at Huff & Huff, Mr. Owens was employed by Shirley Heinze Land Trust as a Restoration Program Assistant. He was part of a team of Restoration Ecologists who worked to restore wetlands, prairies, savannahs, and forests with particular focus on globally rare dune and swale habitat. It was necessary to learn to identify many trees and prairie plants quickly and to understand the various theories of restoration. The methods included herbiciding, brush cutting, chain sawing, prescribed burns, and seed collecting. (2006-2007)
- Prior to his work for the Shirley Heinze Land Trust Mr. Owens worked as a Botanical Assistant for the Illinois Natural History Survey Critical Trends Assessment Program doing botanical surveys of randomly selected woodlands, wetlands and grasslands across the state of Illinois (summer 2004, 2005, 2006, 2007).
- Mr. Owens also worked as an Independent Contractor for the Illinois Department of Natural Resources chemically treating exotic species at various Illinois State Nature Preserves and Illinois State Land and Water Reserves throughout east central Illinois (2001-2006).
- Mr. Owens has also worked with the Illinois Department of Natural Resources as an Assistant Streams Biologist where he identified benthic macro-invertebrates from streams across Illinois using Illinois Environmental Protection Agency protocols, conducted fish sampling via an electric seine and boat sampling techniques in association with the Kaskaskia River Intensive Basin Surveys which included mainstem and tributary sampling efforts, fish identification, surveying freshwater mussel fauna, and identification of freshwater mussel species. Mr. Owens has also been intricately involved with mussel sampling efforts for the Illinois Department of Natural Resources Intensive Basin Survey in relation to the Embarras and Sangamon River basins.

Educational Experience
B.A. in Biology Eastern Illinois University - Charleston, Illinois (1999-2003)

Professional Affiliations
American Malacological Society, Inc.
Freshwater Mollusk Conservation Society
Illinois State Academy of Sciences
Illinois Native Plant Society
Natural Areas Association
American Fisheries Society - Illinois Chapter
Illinois Prescribed Fire Council

Certifications

- Illinois Pesticide Public Applicator License (2002-2006)
- Illinois Pesticide Commercial Operator License (2007-present)
- Indiana Pesticide Applicator License (2007-present)
- Soil Erosion Control – Joliet Junior College March 21, 2007 (Stormwater Management)
- Wetland Delineation Training, Institute for Wetland & Environmental Education and Research, 2007
- Contractor Orientation Course BNSF, UPRR, Metra Railroads (2007 to present)
- Wetland Plants course, DuPage County, 2007
- Wetland Plants course, DuPage County, 2008
- Illinois Department of Natural Resources Scientific Permit – all aquatics (fish, mussels, macroinvertebrates, etc.) (2006-present)
- Indiana Department of Natural Resources Scientific Purposes License – fish, mussels (2008-present)
- United States Fish and Wildlife Service Scientific Purposes Permit – mussels (Illinois and Indiana) – 2008 to present
- McHenry County Certified Wetland Specialist (2008-present)
- Emergency Management Institute IS-00100.a and IS-00700.a Coursework
- National Wildfire Coordinating Group L-180, S-130, and S-190 40 hour Red Card certification Coursework (2009)

Presentations

SERVING NUMEROUS WIDELY SCATTERED SITES WITH A SMALL NUMBER OF VOLUNTEERS. 12th Annual Northern Illinois Prairie Workshop. College of Dupage, Glen Ellyn, IL. (2001).

SURVEY OF THE FRESHWATER MUSSELS (MOLLUSCA: BIVALVIA: UNIONIDEA) OF THE EMBARRAS RIVER BASIN, ILLINOIS. Illinois State Academy of Science Meetings. Southern Illinois University, Edwardsville, IL. (2002).

SURVEY OF THE FRESHWATER MUSSELS (MOLLUSCA: BIVALVIA: UNIONIDEA) OF THE EMBARRAS RIVER BASIN, ILLINOIS. Midwest Fisheries Conference, Bettendorf, IA (2002).

SURVEY OF THE FRESHWATER MUSSELS (MOLLUSCA: BIVALVIA: UNIONIDEA) OF THE EMBARRAS RIVER BASIN, ILLINOIS. Illinois Chapter of the American Fisheries Society meetings. Rend Lake Conference Center, IL (2003).

VEGETATION OF CONEFLOWER GLACIAL DRIFT HILL PRAIRIE NATURAL AREA, MOULTRIE COUNTY, ILLINOIS. Illinois State Academy of Science Meetings. Eastern Illinois University, Charleston, IL (2004).

DAMN THOSE DAMS - THEIR EFFECT ON FRESHWATER MUSSELS. Jeremy Tiemann, Hope Dodd, Nick Owens, David Wahl. Joint Meetings of the Illinois Chapter of the American Fisheries Society and The Wildlife Society. Rend Lake Conference Center, IL (2006).

Posters

25 Years of Vegetational Changes in a Glacial Drift Hill Prairie Community in East Central Illinois. Illinois State University, Normal, IL (2003).

Assessment and Relocation of a Mussel Bed, Mississippi River, Greater St. Louis Metropolitan Area. Illinois Chapter of the American Fisheries Society. Fifth Season Hotel, Moline, IL (2009).

Publications

Owens, N.L., Cole, G.N. 25 Years of Vegetational Changes in a Glacial Drift Hill Prairie Community in East Central Illinois. 2003. Transactions of the Illinois State Academy of Science 96: 265-269.

Owens, N.L., Ebinger, J.E. 2006. Flora and Vegetation of Coneflower Glacial Drift Hill Prairie Natural Area,

Tiemann, J.S., H.R. Dodd, N. Owens, and D.H. Wahl. 2007 Effects of multiple low head dams on freshwater mussels in the Fox River, Illinois. Northeastern Naturalist. 14(1): 125-138.

Owens, N.L., Ebinger, J.E. 2008. Windfall Glacial Drift Hill Prairie, Vermillion County, Illinois: Present Vegetation and Changes Since 1977. Transactions of the Illinois State Academy of Science 101: 157-165.

Tucker, T.C, B. Edgin, N.L. Owens, J.E. Ebinger. 2008. Botanical Survey of Wildcat Hollow State Forest, Effingham County, Illinois. Transactions of the Illinois State Academy of Science (***In Press***).