

**BEFORE THE ILLINOIS POLLUTION CONTROL BOARD**

IN THE MATTER OF: )  
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)  
WATER QUALITY STANDARDS AND )  
EFFLUENT LIMITATIONS FOR THE ) R08-09 Subdocket C  
CHICAGO AREA WATERWAYS SYSTEM ) (Rulemaking- Water)  
(CAWS) AND THE LOWER DES PLAINES )  
RIVER: PROPOSED AMENDMENTS TO )  
35 Ill. Adm. Code Parts 301, 302, 303 and 304 )  
(Recreational Use Designations) )

**NOTICE OF FILING**

To:

John Therriault, Clerk  
Illinois Pollution Control Board  
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100 West Randolph St., Suite 11-500  
Chicago, IL 60601

Marie Tipsord, Hearing Officer  
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Chicago, IL 60601

Persons included on the attached  
SERVICE LIST

Please take notice that on the 1<sup>st</sup> Day of February, 2011, I filed with the Office of the Clerk of the Illinois Pollution Control Board the attached **Testimony of Dr. David L. Thomas**, a copy of which is hereby served upon you.

Respectfully Submitted,



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DATED: February 1, 2011

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**TESTIMONY OF DR. DAVID THOMAS ON THE LIMNOTECH REPORTS ON  
“CHICAGO AREA WATERWAY SYSTEM HABITAT EVALUATION AND  
IMPROVEMENT STUDY” INCLUDING “ANALYSIS OF THE RELATIONSHIP  
BETWEEN FISH AND WATER QUALITY” AND “REVIEW AND SELECTION  
OF FISH METRICS”**

My name is Dr. David L. Thomas, and I am a retired fisheries scientist and ecologist, formerly Chief of the Illinois Natural History Survey. I previously testified on fish and water quality issues in these proceedings and additional information about my background was presented at that time. I have been on the Chicago Area Waterways twice, in the early 1990s with personnel from the District and in July 2009 when I toured by boat the Chicago River, Chicago Sanitary and Ship Canal (CSSC) and the Cal Sag channel.

I have reviewed the reports by LimnoTech which have been submitted to the Board by the Metropolitan Water Reclamation District of Greater Chicago (District) as Public Comment # 284. The focus of my testimony is on the relationship between fish and water quality but I do have a few comments on some of the conclusions in the habitat evaluation and improvements reports. I found the study a very extensive examination of the habitat provided in the Chicago Area Waterway System (CAWS) and agree that their habitat metrics are probably superior for the CAWS to others that have been developed for river systems including the QHEI (Quality Habitat Evaluation Index). I agree with the authors of these reports that this is not a typical river system and may represent an area somewhat between a river and a reservoir. Of course as these authors state, anthropogenic alterations are imposed on most of our large rivers, and many are dammed, providing large stretches of water with a reservoir-like habitat for aquatic organisms.

On page 115 of the Habitat Evaluation Report the authors list six habitat variables as having the greatest influence on fish metrics: maximum depth of channel, off-channel bays, percent of vertical wall banks in reach, percent of riprap banks in reach, manmade structures in reach, and percent macrophyte cover in reach. I would have thought that they would have looked at the percent of the cross sectional area of the reach that was under 4 feet in depth. The reason that

this could be important is that the boat electrofishing gear that was used to sample fish is only effective to about a depth of 4 feet. Thus all other variables equal, I would expect that reaches that had a larger percentage of area under 4 feet in depth might have yielded a larger fish catch. Those fish species restricted to deeper waters of the channel would have been under sampled or possibly missed entirely. IDNR in their October 22, 2010 submittal to the Board discussed the limitations of electrofishing in large, deep draft channels, and especially areas with steep, artificial banks.

The Habitat Evaluation Report (page 124-25) stated that the two most important physical habitat variables in the CAWS that are positively correlated with fish are macrophyte cover and the quantity of areas that act as off-channel bays to provide refuge from the main channel. They stated on page 66 that submerged aquatic macrophyte cover was non-existent at 19 of 28 stations in 2008 and they had no stations with macrophytes in the Cal-Sag channel. On the boat tour that I took on July 31, 2009 I saw both floating aquatic vegetation in the Cal-Sag channel as well as some emergent vegetation growing in the water near the shoreline. There were no barges at the time we went through the channel and thus the aquatic vegetation may have been more noticeable. I also observed some logs and tree branches hanging in the water, a potential macroinvertebrate and fish habitat that was essentially absent from the waterway according to the LimnoTech report.

The report discussed the “bank pocket areas” where erosion had crumbled a portion of the limestone walls creating some small “coves” of rubble that provide habitat for both invertebrates and fish. In my boat tour referenced above, I observed some groups of mallard ducks using some of these areas for feeding. The authors state on page 65 “where large substrate (gravel, cobble, boulders) are present in the CAWS they appear to be important to fish.” They also stated (page 84) that “small areas of refuge in the banks were measured in this study and are prevalent...” The fact is that erosion and slumping of some rock walls is creating additional habitat for aquatic organisms and this process will continue to provide additional fish habitat.

While the focus in these reports is on habitat and fish, there is some discussion of macroinvertebrates. Ephemeroptera (mayflies), Plecoptera (stoneflies) and Tricoptera (Caddisflies) are collectively known as EPT taxa, and are indicators of good water quality. On page 101 of the Habitat Evaluation Report, the authors state that “the presence of intolerant benthic EPT taxa in Hester –Dendy samples and the absence of EPT taxa in Ponar samples suggests sediment toxicity to mayfly, stonefly, and caddisfly larvae.”

Hester-Dendy samplers are a hard substrate that is put into the water for a limited period of time (sometimes one or two months). These substrates provide a surface where algae and macroinvertebrates can colonize and grow. These samplers replicate in a way the hard substrates provided by rocks, rubble, logs, and other submerged objects (including pilings), but do not collect the full range of macroinvertebrates that may be in the water body because they are only in the water for a few months, while rocks, rubble, submerged objects, et cetera are, of course, in the system throughout the year.

In large rivers, it is these hard substrates that often are the major habitats for many of our invertebrate species. My experience on the Kaskaskia River with Ponar samples was that there

were relatively few macroinvertebrates in the soft substrates in the river, which is the type of area studied here. In the Kaskaskia River, logs, rocks and other hard substrates provided the substrate necessary for many of the macroinvertebrates in the river, particularly the EPT taxa. While toxic sediments may have played a role in the low abundance of macroinvertebrates in the soft sediments of the CAWS, another explanation is that this is an unstable substrate in large river systems that generally has few invertebrates (other than oligochaetes and midges).

An accurate analysis of the relationship between fish and water quality depends on an adequate and representative sampling of the fish population in each of the reaches. As shown in the IDNR comment filed October 2010 (PC #505), rotenone collections taken in the CSSC and Little Calumet River reveal that many species in these systems were under-sampled or not sampled at all by electrofishing. As they reported, 12 of the native species found in December 2009 sampling in the CSSC were not reported in the "Use Attainability Analyses" for this area (CDM 2007). For the Little Calumet River, 10 species were found in the rotenone sampling operation that were not recorded in the Use Attainability report (CDM 2007). Channel catfish, which were rarely reported in the standard electrofishing studies conducted in the CAWS, were abundant in rotenone collections in the CCSC and Little Calumet River taken in December 2009 and May 2010, respectively. A number of the "new" species collected would be considered moderately intolerant. One species reported in the LimnoTech report (PC# 284, page 98), steelcolor shiner, is considered by the state (Bertrand, Hite and Day 1996) to be intolerant of degraded water quality. A more representative collection of the fish in each reach could have significantly affected the results of habitat and fish metrics evaluations.

The authors of the Habitat Evaluation Report spent a lot of time looking at the variables that could best explain the fish data collected from 2001 to 2007. They reported (PC#284, page 120) that "the regression analyses shows that physical habitat can explain 48% of the fish data collected from 2001 to 2007." They also stated (page 124) that "including dissolved oxygen (DO) with the habitat variables improved the amount of fish data variability by the regression by about 4% over physical habitat alone." They did report that "fish metrics are positively correlated to dissolved oxygen, but that dissolved oxygen is a poor predictor of fish metrics." Part of the reason for this may be that fish move about significantly and they may move into and out of low DO waters to feed and in movements between areas. Still, this study did find (page 57) that "fish metrics from observations where standards were being attained were generally better than fish metrics where standards were not in attainment..." Increased DO at SEPA stations does seem to have attracted a number of species including some moderately intolerant species. In the MWRD Study of Fisheries Resources in the CAWS (Ex. 179, Attachment M3), page 18, there is mention that Smallmouth bass, Largemouth bass, and Channel catfish were attracted to higher DO waters at the SEPA stations (Dennison et al. 1998). Thus improving water quality, particularly dissolved oxygen levels, might be particularly beneficial to moderately intolerant species

On page 94 of the Habitat Evaluation Report (PC # 284), the authors discussed that the CAWS was constructed for the conveyance of treated wastewater and urban drainage away from Lake Michigan and also to support commercial navigation. The authors conclude that "these conditions impose a significant limitation on the potential of the CAWS to support fish communities different than what presently exists there." However, the District report on

fisheries resources and water quality in the CAWS from 1974 through 1996 (Dennison et al. 1998: Ex. 179 Attachment M3) documented that the “abundance and species richness of the fish populations have increased in every one of the seven waterway segments of the Chicago Waterway system” in conjunction with improvements made to water quality. They also documented that a number of game fish species had increased in the waterways, and that harvestable sized game fish included northern pike, white bass, white perch, rock bass, green sunfish, pumpkinseed sunfish, bluegill, smallmouth bass, largemouth bass, white crappie, black crappie, and yellow perch. IDNR in their October 2010 submittal to the Board listed significant numbers of the following game fish for the CSSC: Channel catfish, white perch, largemouth bass, bluegill, freshwater drum and pumpkinseed sunfish. In the Little Calumet River near T.J. O’Brien Lock and Dam they reported significant numbers of the above sport fish as well as black crappie, smallmouth bass, white bass, white crappie, and yellow perch.

IDNR in their October submittal (PC #505) concluded that “the CSSC is capable of supporting a diverse, healthy, and reproducing population of fish comprised of a high percentage of moderately tolerant species in adult and early life stages.” They also found the Little Calumet River supported “a diverse assemblage of species including the intolerant smallmouth bass (N=45)”. I agree with IDNR’s conclusion that aquatic life use categories for these waters could be raised as has been proposed by IEPA in these proceedings.

One last observation I would like to make addresses some of the conclusions reached in LimnoTech’s Habitat Improvement Report (PC#284). On page 63 of this report they state some of their conclusions. They discuss that the habitat improvements they identified would probably cost in excess of \$460 million dollars system-wide, and even with these improvements they would not “significantly alter the relative habitat index scoring of the CAWS reaches.” The implication of these conclusions is that even with a large infusion of money habitat in the CAWS would not significantly improve fish populations.

The fact is fish in large river and reservoir systems often move long distances to find suitable habitats for spawning and other aspects of their life history. As I discussed above, natural processes (i.e., erosion of banks) are already creating additional habitats which are used by fish and macroinvertebrates. I am convinced that selective habitat improvements could significantly help at least some of the fish species in the CAWS, and that these improvements could be made at a much reduced cost over what has been proposed in these reports. Some of these improvements could include creating sand and gravel beds in select sections of the CAWS for spawning areas, creating protected areas along the shoreline (through the use of rip-rap or behind sheet pilings) where fish could seek shelter for feeding and spawning, or by creating floating beds of vegetation such as has been done to a limited degree in the Chicago River. My conclusion is that selective improvements in habitat along with continued improvements in water quality will continue to enhance the fish community in the CAWS.

/s/ David L. Thomas

Dr. David L. Thomas

Chief Emeritus, Illinois Natural History Survey

References:

Bertrand, W.A., R.L. Hite, and D.M. Day. 1996. Biological Stream Characterization (BSC): Biological Assessment of Illinois Stream Quality through 1993. IEPA/BOW/96-058. 40p.

CDM. 2007. Chicago Area Waterway System Use Attainability Analysis Final Report. Prepared for IEPA, Camp, Dresser and McKee. IPCB case No. R2008-09, document number 59252 (Attachment B to IEPA Statement of Reasons).

Dennison, S.G., S.J. Sedita, P. Tata, D.R. Zenz, and C. Lue-Hing. 1998. A Study of the Fisheries Resources and Water Quality in the Chicago Waterway System 1974 through 1996. Report No. 98-10, Metropolitan Water Reclamation District of Greater Chicago, Research and Development Department (Exhibit 179, Attachment M3).

**CERTIFICATE OF SERVICE**

I, Albert Ettinger, hereby certify that I have served the attached **Testimony of Dr. David L. Thomas** upon:

Mr. John T. Therriault  
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via electronic filing on February 1, 2011; and upon the attached service list by depositing said document in the United States Mail, postage prepaid, in Chicago, Illinois on February 1, 2011.

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